GOVERNMENT OF SINDH

Project Management & Implementation Unit
Education & Literacy Department, Karachi

September 2016

ESTABLISHMENT OF COMPREHENSIVE HIGH SCHOOLS

IN SINDH (25 Nos.)

TENDER DOCUMENTS
ON EPC BASIS

PACKAGE - D
Shaheed Benazirabad, Sanghar, Khairpur, Shadadkot, Dadu & Ghotki

VOLUME- I: Condition of Contract
VOLUME- II: Technical Specifications
VOLUME- III: Bill of Quantities

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VOLUME -I

CONDITION OF CONTRACT

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INVITATION
FOR BIDS

INVITATION FOR BIDS

Date: _____

1. **The Project Director PMIU, Education and Literacy Department, Government of Sindh** (the "Employer") invites to submit sealed financial Bids along with post qualification requirements from bidders licensed by Pakistan Engineering Council (PEC) in C-1 and above category for the work of their project **"Design, Supply and Installation of Comprehensive Schools with Cold Formed Steel Structure (Inclusive of Complete Civil, Electrical, Plumbing & external development works)** of Comprehensive Schools in Sindh for following Packages**.**

   Package-D (Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki)

2. A foreign Bidder is entitled to bid only in a joint venture with a Pakistani constructor in accordance with the provisions of PEC bye-laws.
3. Bidders may obtain further information from, inspect at and acquire the Bidding Documents from the Office of the ***Project Director, Project management and implementation unit Education & Literacy Department Government of Sindh D-62/3 opposite Bacon house K-2 school near Kauser Medicos Block-9, Clifton, Karachi.***

4. A complete set of Bidding Documents may be procured by interested Bidders on submission of a written application to the above office and upon payment of a non-refundable fee of Rs. 5,000/-(Rupees Five thousand) in the form of a Pay Order in favor of ***Project Director, Project management and implementation unit Education & Literacy Department Government of Sindh.***

5. All bids must be accompanied by a Bid Security of an amount of 2% of bid price in a freely convertible currency in the form of bank guarantee issue by a schedule Bank duly accredited by State Bank of Pakistan on prescribed form or in the form of Pay order / Bank draft or from a foreign bank duly counter guaranteed by a schedule bank of Pakistan in favor of Employer, and must be delivered to Project Director, PMIU, Education & Literacy Department Government of Sindh D-61/1 Near Kausar Medicos Block-9 Clifton, Karachi at or before 1500 hours, on 10th October, 2016. Bids will be opened at 1530 hours on the same day, in the presence of Bidders' representatives who choose to attend at the same address (***Project Director, PMIU Education & Literacy Department Government of Sindh D-61/1 Near Kauser Medicos Block-9, Clifton, Karachi.***

7. Offers must be valid for 120 days from the date of opening of bid.
6. The Employer reserves the right to reject any or all bids without assigning any reason(s) thereof.

Project Director,
Project Management & Implementation Unit Education & Literacy Department,
Government of Sindh, D-61/1, Near Kausar Medicos Block-9 Clifton, Karachi.
Tel: 0300-8370734

INSTRUCTIONS
TO
BIDDERS& APPENDICES

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INSTRUCTIONS TO BIDDERS AND APPRNDICES

(A) GENERAL

IB.1 Scope of Bid and Source of Funds

1.1 Scope of Bid

2 The Project Director PMIU, Education and Literacy Department, Sindh (hereinafter called the "Employer") wishes to receive Bids on EPC/Turnkey basis for the scope of work which includes, but shall not be limited to:

3 Design, Supply and Installation (Inclusive of Complete Civil, Electrical, Plumbing & external development works) of Comprehensive Schools in Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki District of Sindh with Cold Formed Steel Structure on EPC/Turnkey basis.

The Works to be executed under this Contract comprise Design, Construct, Manufacture, Supply and Install on EPC/Turnkey basis.

A detailed scope of work has been described elsewhere in these documents. The successful Bidder will be expected to complete the Works within the stipulated period of ***550 days*** including gazette holidays as specified in these Bidding Documents.

Bidders must quote prices for the complete scope of work. Any bid covering partial scope of work will be non-responsive, pursuant to Clause IB.24.

1.2 Source of Funds

The Employer has received funds from the Govt. of Sindh (GOS), Pakistan and it is intended that part of the proceeds of the funds will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.2 Eligible Bidders

2.1 Bidding is open to all firms meeting the following requirements:

a) Duly licensed by the Pakistan Engineering Council (PEC) in Category C-1 and above.

b) Foreign Bidders from eligible countries as per Appendix `A' to Instructions to Bidders.

c) Valid NTN Certificate from Income Tax Authorities in Pakistan.

d) Should be in construction business for last 15 years or more.

e) Not blacklisted or engaged in any Litigation on any project.

f) Should have completed two contracts of similar nature in last 10 years.

g) Prequalified, if such prequalification exercise has been conducted.

h) Valid Professional Tax Certificate.

i) Registration with S.R.B.

IB.3 Eligible Goods and Services

3.1 All Goods & ancillary Services to be supplied under this Contract shall have their origin in

eligible countries as per Appendix 'A' to Instructions to Bidders and all expenditures made under the Contract will be limited to such Goods and Services.

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

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

IB.4 Cost of Bidding

4.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.

(B) BIDDING DOCUMENTS

IB.5 Contents of Bidding Documents

5.1 In addition to Invitation for Bids, the Bidding Documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause IB.7.

1. Instructions to Bidders (ITB) with Appendices to ITB
2. Letter of Bid & Schedules to Bid
   Schedules to Bid are the following:
   - (i) Schedule A: Specific Works data
   - (ii) Schedule B: Proposed Organization for the Project
   - (iii) Schedule C: Method of Performing Works
   - (iv) Schedule D: Proposed Programme of Works
   - (v) Schedule E: Work to be Performed by Subcontractors
   - (vi) Schedule F: Deviations from Technical& Contractual Provisions
   - (vii) Schedule G:Specific Operation/Plant and Equipment Details
   - (viii) Schedule H: Specimen JV Agreement
   - (ix) Schedule I: Past Performance and Present Commitments
3. Letter of Price Bid & Schedules to Bid
   Schedules to Bid are the following:
   - (i) Schedule J: Integrity Pact
   - (ii) Schedule K: Estimated Progress Payments
   - (iii) Schedule L: Lump Sum Cost Breakup for Major Cost Items
4. Schedule of Prices
5. Preamble to Conditions of Contract
6. General Conditions of Contract (GCC)

7. Particular Conditions of Contract (PCC)

8. Standard Forms

Forms include the following:

(i) Form of Bid Security

(ii) Form of Contract Agreement

(iii) Form of Performance Security

(iv) Form of Bank Guarantee for Advance Payment (N/A)

(v) Indemnity Bond for Secured Advance (N/A)

9. Specifications - Special & Technical Provisions

10. Drawings

5.2 The Bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of Bid submission will be at the Bidders own risk. Pursuant to Clause IB.24, Bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.6 Clarification of Bidding Documents

6.1 A prospective Bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer with a copy to the Project Manager/Engineer in writing or by fax at the address as provided under Sub-Clause 49.2 of GCC. Employer will examine the request for clarification of the Bidding Documents which it receives not later than twenty eight (28) days prior to the deadline for the submission of bids and if needed will issue the clarification/amendment of the Bidding Documents at least fourteen (14) days before the date of submission of Bids (without identifying the source of enquiry) to all prospective Bidders who have purchased the Bidding Documents.

IB.7 Amendment of Bidding Documents

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

7.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof, and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective Bidders shall acknowledge receipt of each addendum in writing to the Employer. The Bidder shall also confirm in the Form of Bid that the information contained in such addenda have been considered in preparing his Bid.

7.3 To afford prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may at its discretion extend the deadline for submission of Bids in accordance with Clause IB.19.

(C) PREPARATION OF BIDS

IB.8 Language of Bid

8.1 The Bid prepared by the Bidder and all correspondence and documents relating to the Bid, exchanged by the Bidder and the Project Manager/Engineer shall be written in the English

language, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by an English translation of its pertinent passages in which case, for purposes of interpretation of the Bid, the English translation shall govern.

IB.9 Documents Comprising the Bid

9.1 The Bid prepared by the Bidder shall comprise the following components:

(a) Covering Letter

(b) Letters of Bids duly filled, signed and sealed, in accordance with Clause IB.17.

(c) Schedules (A to L) to Bid duly filled and signed, in accordance with the instructions contained therein.

(d) Schedule of Prices completed in accordance with Clauses IB.11 and IB.12 in separate sealed envelope.

(e) Bid Security furnished in accordance with Clause IB.15.

(f) Power of Attorney in accordance with Clause IB 17.5.

(g) Joint Venture Agreement (if applicable). A foreign Bidder is entitled to bid only in a joint venture with a Pakistani constructor in accordance with the provisions of relevant PEC bye-laws.

(h) Documentary evidence established in accordance with Clause IB.13 that the Bidder is eligible to Bid and is qualified to perform the Contract if its Bid is accepted (past performance and present commitments to be filled in as per schedule I to Bid).

(i) Documentary evidence established in accordance with Clause IB.14 that the Plant and ancillary Services to be supplied by the Bidder are eligible Plant and Services and conform to the Bidding Documents.

(j) Bidders applying for eligibility for domestic preference in bid evaluation shall supply all information & evidence to establish the claim for domestic preference required to satisfy the criteria for eligibility as described in Clause IB.27. The particulars for domestic Goods prescribed in Appendix C to these Instructions shall also be filled in to substantiate claim for domestic preference.

(k) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the Bid.

IB.10 Letters of Bids and Schedules

10.1 The Bidder shall complete, sign and seal the Letters of Bids, Schedules (A to L, or as modified) to Bid and Schedule of Prices furnished in the Bidding Documents and shall also enclose other information as detailed in Clause IB.9.

10.2 For the purpose of granting a margin of domestic preference pursuant to Clause IB.27, the Employer will classify the Bids, when submitted in one of three groups as follows subject to change, if any, as per policy of the Federal Government as applicable on the date of bid opening:

(a) **Group 'A' Bid.** (i) For Goods for which labour, raw materials and components from within Pakistan account for at least 20% of the ex-factory bid price of the products offered (ii) For Goods for which labour, raw materials and components

from within Pakistan account for over 20% and up to 30% of the ex-factory bid price of the products offered (iii) For Goods for which labour, raw materials and components from within Pakistan account for over 30% of the ex-factory bid price of the products offered;

(b) **Group 'B' Bid.** For Goods manufactured in Pakistan for which the domestic value added in the manufacturing cost is less than 20% of the ex-factory bid price; and

(c) **Group 'C' Bid.** For Goods of foreign origin.
In preparing their bids, the Bidders, whether local or foreign, shall enter in the Schedule of Prices, ex-factory price for indigenously manufactured products and CIF price as well as customs duty and sales tax and other import charges for products to be imported from outside Pakistan.

IB.11 Bid Prices

11.1 The Bidder shall fill up the Schedule of Prices attached to these documents indicating the unit rates and prices of the Works to be performed under the Contract. Prices on the Schedule of Prices shall be entered keeping in view the instructions contained in the Preamble to the Schedule of Prices.

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

11.3 The Bidder's breakup of price components in accordance with Sub-Clause 11.1 above will be solely for the purpose of facilitating the comparison of Bids by the Employer and will not in any way limit its right to contract on any of the terms offered.

11.4 Unless otherwise stipulated in the Conditions of Contract, prices quoted by the Bidder shall remain fixed during the Bidder's performance of the Contract and not subject to variation on any account. When the Bidders are required to quote only fixed price(s), a Bid submitted with an adjustable price quotation will be treated as non-responsive, pursuant to Clause IB.24.

11.5 Any discount offered shall be valid throughout the project duration. A discount valid for lesser period shall be considered null and void.

IB.12 Currencies of Bid

12.1 Prices shall be quoted in the following currencies:

(a) For Plant/Goods and Services which the Bidder will supply from within Pakistan, the prices shall be quoted in the Pak. Rupees.

(b) For Plant/Goods and Services which the Bidder will supply from outside Pakistan, the prices shall also be quoted in Pak. Rupees and its equitable dollar price/rate on the date of first issuance of this add shall also be mentioned.

12.2 Further, a Bidder expecting to incur a portion of its expenditure in the performance of the Contract in more than one currency (but use no more than 3 foreign currencies), and wishing to be paid accordingly, shall so indicate in its bid.(N/A)

12.3 The currencies of payment shall be as stated in Particular Conditions of Contract.

IB.13 Documents Establishing Bidder's Eligibility and Qualifications

13.1 Pursuant to Clause IB.9, the Bidder shall furnish, as part of its Bid, documents establishing the Bidder's eligibility to Bid and its qualifications to perform the Contract if its Bid is accepted.

13.2 The documentary evidence of the Bidder's eligibility to Bid shall establish to the Employer's satisfaction that the Bidder, at the time of submission of its Bid is from an eligible source country as defined under Clause IB.2.

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

(a) that, the Bidder must have its own/arranged CNC manufacturing facility of international brand in Pakistan for the manufacturing of Light Gauge Steel Frame;

(b) that the Bidder/Manufacturer has the financial, technical and production capability necessary to perform the Contract; and

(c) that, in the case of a Bidder not doing business within Pakistan the Bidder is or will be (if successful) represented by an agent in Pakistan equipped and able to carry out the Supplier's maintenance, repair and spare parts stocking obligations prescribed by the Conditions of Contract and/or Technical Provisions.

13.4 (a) Bidder/Manufacturer must possess and provide evidence of the following experience:

i. has completed at least one (1) turnkey Contract with a minimum value of Rs. 400 Million during the last ten years.

ii. has designed, constructed, supplied and installed at least one similar nature technology during the last ten years of Rs. 400 Million.

iii. Only those Bidder/Manufacturer are expected to participate who can manage specific equipment/tools/machines specified in the Bidding Documents/NIT for satisfactory performance of any specialized job as required under the Contract.

Documentation regarding the Bidder's experience on previous similar contracts must accompany with each Bid.

Bidder shall also submit proof of their financial capability to undertake the Contract.

In the event that the successful Bidder is a joint venture formed of two or more companies, the Employer requires that the parties to the joint venture accept joint and several liabilities for all obligations under the Contract.

Bidders shall furnish documentary evidence of qualification on the Form "Evidence of Bidder's Capability" (Appendix B to these Instructions).

(b) The Bidder should have an average annual turnover in the last five years equal to or more than Rs. 400 Million. Alternately, the Bidder should have successfully completed in the last ten (10) years any specific project having value equal to or higher than Rs.400 Million.

13.5 Joint Venture

In order for a Joint Venture to qualify:

(a) At least one of the partners of joint venture shall satisfy the relevant experience criteria specified in Sub-Clause 13.4(a) hereinabove.

(b) All firms comprising the joint venture shall be legally constituted and shall meet the eligibility requirement of Sub-Clause 2.1 hereof.

(c) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally to Employer for the execution of the entire Contract in accordance with the Contract terms and conditions and a statement to this effect shall be included in the authorization mentioned under para (f) below as well as in the Form of Bid and Form of Contract Agreement (in case of a successful Bidder).

(d) The Form of Bid, and in the case of successful Bidder, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners.

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

(f) The partner-in-charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture.

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

13.6 The Bidder shall propose, in order of his priority; plant, equipment or goods of not more than three (3) Manufacturers. Employer at his own jurisdiction will evaluate the plant, equipment or goods of only one of such Manufacturers.

IB.14 Documents Establishing Plant's Eligibility and Conformity to Bidding Documents

14.1 Pursuant to Clause IB.9, the Bidder shall furnish, as part of its Bid, documents establishing the eligibility and conformity to the Bidding Documents of all Plant and Services which Bidder proposes to perform under the Contract.

14.2 The documentary evidence of the Plant and Services eligibility shall establish to the Employer's satisfaction that they will have their origin in an eligible source country as defined under Clause IB.3. A certificate of origin issued at the time of shipment will satisfy the requirements of the said Clause.

14.3 The documentary evidence of the Plant and Services' conformity to the Bidding Documents may be in the form of literature, drawings and data and shall furnish:

(a) A detailed description of the Plant, essential technical and performance characteristics.

(b) Complete set of technical information, description data, literature and drawings as

required in accordance with Schedule A to Bid, Specific Works Data. Drawings and data submitted must be in sufficient detail and clarity to permit the Employer to verify compliance with the provisions of the Bidding Documents. This will include but not be limited to the following:

(i) A sufficient number of drawings, diagrams, photographs, catalogues, illustrations and such other information as are necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the Plant to be furnished.

(ii) The approximate weight and dimension of the main components, a brief description of the principal materials and fabrication processes to be used and recommended methods of assembly.

(iii) Any other information which is required for evaluation purposes.

(c) A clause-by-clause commentary on Technical Provisions, provided with the Bidding Documents, demonstrating the Plant's and Service's substantial responsiveness to those Specifications or a statement of deviations and exceptions to the provisions of the Technical Provisions as required in Schedule F to Bid.

14.4 For purpose of the commentary to be furnished pursuant to Sub-Clause 14.3(c) above, the Bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, designated by the Project Manager/Engineer in the Technical Provisions are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalogue numbers in its Bid, provided that it demonstrates to the Project Manager/Engineer's satisfaction that the substitutions are substantially equivalent or superior to those designated in the Technical Provisions. Copies of the standards proposed by the Bidder other than those specified in the Bidding Documents shall be furnished.

IB.15 Bid Security

15.1 Each Bidder shall furnish, as part of his Bid, Bid Security of an amount of 2% of bid price in Pak Rupees or an equivalent amount in any freely convertible currency.

15.2 The Bid Security shall be, at the option of the Bidder, in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan.

15.3 The Bid Security is required to protect the Employer against the risk of Bidder's conduct which would warrant the security's forfeiture, pursuant to Sub-Clause 15.7 hereof.

15.4 Any Bid not accompanied by an acceptable Bid Security shall be considered by the Employer as non-responsive, pursuant to Clause IB.24.

15.5 The Bid securities of unsuccessful Bidders will be returned upon award of contract to the successful Bidder or on the expiry of validity of Bid Security whichever is earlier.

15.6 The Bid Security of the successful Bidder will be returned when the Bidder has furnished the required Performance Security, pursuant to Clause IB.34 and signed the Contract Agreement, pursuant to Clause IB.35.

15.7 The Bid Security may be forfeited:

(a) if a Bidder withdraws his Bid during the period of Bid validity;

(b) if a Bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause

24.2 hereof; or

(c) in the case of a successful Bidder, if he fails to:

(i) furnish the required Performance Security in accordance with Clause IB.34, or

(ii) sign the Contract Agreement, in accordance with Clause IB.35.

IB.16 Validity of Bids

16.1 Bids shall remain valid for 120 days after the date of Bid opening as prescribed in Clause IB.19.

16.2 In exceptional circumstances prior to expiry of original Bid validity period, the Employer may request the Bidders to extend the period of validity for a specified additional period which shall in no case be more than the original Bid validity period. The request and the responses thereto shall be made in writing. A Bidder may refuse the request without forfeiture of his Bid Security. A Bidder agreeing to the request will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects in which case, the Employer will be obligated to compensate the Bidders, upon substantiation for their increase in costs (if it is a fixed price bid).

IB.17 Format and Signing of Bid

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

17.2 All Schedules to Bid (A to L) are to be properly completed and signed.

17.3 No alteration is to be made in the Form of Bid nor in the Schedules thereto except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the Bid may be rejected.

17.4 Each Bidder shall prepare one (1) Original and Two copies, of

the documents comprising the bid as described in Clause IB.9 and clearly mark them "ORIGINAL" and 'COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

17.5 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign (in the case of copies, Photostats are also acceptable). This shall be indicated by submitting a written Power of Attorney authorizing the signatory of the Bidder to act for and on behalf of the Bidder. All pages of the Bid and Schedules to Bid shall be initialed and stamped by the person or persons signing the Bid.

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

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

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

(D) SUBMISSION OF BIDS

IB.18 Sealing and Marking of Bids

18.1 Each Bidder shall submit his Bid as under:

(a) ORIGINAL and Two Copies of the original Technical Bid and Price Bid shall be separately sealed and put in separate envelopes and marked as such.

(b) The envelopes containing the ORIGINAL and COPIES of both Technical Bids and Price Bids will be put in one sealed envelope and addressed/identified as given in Sub-Clause 18.2 hereof.

18.2 The inner and outer envelopes shall;

(a) be addressed to the Employer at the address given in Sub-Clause 6.1 heretofore.

(b) bear the Project name, Contract No. and Date of opening of Bid.

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

18.3 The Bid shall be delivered in person or sent by registered mail at the address to Employer as mentioned in the Invitation to Bids.

18.4 In addition to the identification required in Sub-Clause 18.2 hereof, the inner envelope shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared "late" pursuant to Clause IB.20.

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

IB.19 Deadline for Submission of Bids

19.1 (a) Bids must be received by the Employer at the address specified in Invitation for Bids not later than the time and date stipulated in the Invitation for Bids.

(b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the Bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of Bids.

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

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

19.2 Bids submitted through telegraph, telex, fax or e-mail shall not be considered.

19.3 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an addendum in accordance with Clause IB.7, in which case all rights and obligations of the Employer and the Bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.20 Late Bids

20.1 (a) Any Bid received by the Employer after the dead line for submission of Bids prescribed in Clause IB.19 will be returned unopened to such Bidder.

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

IB.21 Modification, Substitution and Withdrawal of Bids

21.1 Any Bidder may modify, substitute or withdraw his Bid after Bid submission provided that modification, substitution or written notice of the withdrawal is received by the Employer prior to the deadline for submission of Bids.

21.2 The modification, substitution or withdrawal of any Bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.18 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL", as appropriate.

21.3 Withdrawal of a Bid during the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified in the Form of Bid may result in forfeiture of the Bid Security pursuant to Clause IB.15.

(E) BID OPENING AND EVALUATION

IB.22 Bid Opening

22.1 A committee consisting of nominated members by the Employer and by the Project Manager/Engineer will open the Bids, including withdrawals, substitution and modifications made pursuant to Clause IB.21, in the presence of Bidders' representatives who choose to attend, at the time, date and location stipulated in the Invitation for Bids. Technical Bids will be opened first. At the end of the evaluation of the Technical Bids, the Employer will invite Bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend opening of the Price Bids.

The Bidders' representatives who are present shall sign in a register evidencing their attendance.

22.2 Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first and the name of the Bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.21 shall not be opened.

22.3 The Bidder's name, Bid Prices, unit rates, any discount offered, Bid modifications, substitutions and withdrawals, the presence or absence of Bid Security, and such other details as the Employer at its discretion may consider appropriate, will be announced by the Employer at the Bid opening. The Employer will record minutes of Bid opening.

Any Bid Price or discount which is not read out and recorded at Bid opening will not be taken into account in the evaluation of Bid.Any discount offered by the Bidder on its quoted prices, shall only be considered if such discount is either shown on the duly filled-

in, signed and stamped Form of Bid/Letter of price bid or on the Summary Page of the quoted amount for Lump sum contract/bill of quantities as applicable. In case of any discrepancy or difference in the rate or amount of discount mentioned in the Form of Bid/Letter of price bid (as duly filled-in and signed), and on the Summary Page of the Priced BOQ, the discount shown on the Priced BOQ shall prevail. Discount, if offered, through a separate letter of discount submitted with the Bid, will not be entertained and shall be considered null & void."

22.4 Discounts offered for lesser period than the Bid validity shall not be considered in evaluation.

IB.23 Clarification of Bids

23.1 To assist in the examination, evaluation and comparison of Bids, the Project Manager/Engineer may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted.

IB.24 Preliminary Examination & Determination of Responsiveness of Bids

24.1 Prior to detailed evaluation pursuant to Clause IB.26, the Project Manager/Engineer will determine the responsiveness of the Bids as follows:

(a) the Project Manager/Engineer will examine the Bids to determine whether;

(i) the Bid is complete and does not deviate from the scope,

(ii) any computational errors have been made,

(iii) required sureties have been furnished,

(iv) the documents have been properly signed,

(v) the Bid is valid till required period,

(vi) the Bid prices are firm during currency of contract if it is a fixed price bid,

(vii) completion period offered is within specified limits,

(viii) the Bidder/Manufacturer is eligible to Bid and possesses the requisite experience,

(ix) the Bid does not deviate from basic technical requirements; and

(x) the Bids are generally in order.

(b) A bid is likely not to be considered, if;

(i) it is unsigned,

(ii) its validity is less than specified,

(iii) it is submitted for incomplete scope of work,

(iv) it indicates completion period later than specified,

(v) it indicates that Works and materials to be supplied do not meet eligibility requirements,

(vi) it indicates that Bid prices do not include the amount of income tax, and

(vii) Alteration in Form of Bid as per IB.17.3.

(c) A bid will not be considered, if;

(i) it is not accompanied with bid security,

(ii) it is submitted by a Bidder who has participated in more than one Bid,

(iii) it is received after the deadline for submission of Bids,

(iv) it is submitted through fax, telex, telegram or email,

(v) it indicates that prices quoted are not firm during currency of the contract whereas the Bidders are required to quote fixed price(s),

(vi) the Bidder refuses to accept arithmetic correction,

(vii) it is materially and substantially different from the Conditions/ Specifications of the Bidding Documents.

It is after review and determination of the responsiveness as per above that further action on technical evaluation will be taken.

24.2 Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between the words and figures the amount in words shall prevail. If there is a discrepancy between the total Bid price entered in Form of Price Bid and the total shown in Schedule of Prices Summary, the amount stated in the Form of Price Bid will be corrected by the Employer/Project Manager/Engineer in accordance with the Corrected Schedule of Prices.

If the Bidder does not accept the corrected amount of Bid, his Bid will be rejected and his Bid Security forfeited.

24.3 Prior to the detailed evaluation, pursuant to Clause IB.26 the Employer/Project Manager/Engineer will determine the substantial responsiveness of each Bid to the Bidding Documents. For purpose of these Clauses, a substantially responsive Bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations.

A material deviation or reservation is one:

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

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

(iii) whose rectification/adoption would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

The Employer's/Project Manager/Engineer's determination of a Bid responsiveness will be based on the contents of the Bid itself without recourse to irrelevant evidence.

24.4 A Bid determined as substantially non-responsive will be rejected and will not subsequently be made responsive by the Bidder by correction of the non-conformity.

24.5 Any minor informality or non-conformity or irregularity in a Bid which does not constitute a material deviation may be waived by Employer, as long as the waiver does not prejudice or affect the relative ranking of any Bidder.

IB.25 Conversion to Single Currency

25.1 To facilitate evaluation and comparison, the Project Manager/Engineer will convert all Bid Prices, expressed in the amounts in various currencies in which bid Price is quoted, to Pak Rupees at the telegraphic Transfer and Over Draft (TT&OD) composite selling exchange rate published/authorized by the State Bank of Pakistan and applicable to similar transaction, on the date of bid opening.

IB.26 Detailed Evaluation of Bids

26.1 Only the Bids previously determined to be substantially responsive pursuant to Clause IB.24 will be evaluated and compared in detail by the Employer/Project Manager/Engineer as per the requirements given hereunder:

26.2 Evaluation and Comparison of Bids

(a) Bids will be evaluated for each item and/or complete scope of work.

(b) Basis of Price Comparison

The prices will be compared on the basis of the Evaluated Bid Price pursuant to Para (e) herein below.

(c) Technical Evaluation

(i) It will be examined in detail whether the Plant/facility offered by the Bidder comply with the Technical Provisions of the Bidding Documents. For this purpose, design offered by the Bidder will be reviewed for which the Bidder's data submitted with the Bid under Schedule A to Bid (Specific Works Data) will be compared with the technical features/criteria of the Plant/facility detailed and prescribed by the Employer in these documents. Other technical information submitted with the Bid regarding the Scope of Work will also be reviewed including importations, if any, required. (d) Commercial Evaluation

It will be examined in detail whether the Bids comply with the commercial/contractual conditions of the Bidding Documents. It is expected that no major deviation/stipulation shall be taken by the Bidders.

(e) Evaluated Bid Price

In evaluating the Bids, the Employer will determine for each Bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Bid Price:

(i) making any correction for errors pursuant to Sub-Clause 24.2 hereof.

(ii) excluding Provisional Sums, if any, but including priced Day work.

(iii) making an appropriate adjustment for any other acceptable variation or deviation.

26.3 Evaluation Methods

Pursuant to Sub-Clause 26.2, Para (e)(iii) following evaluation methods for price adjustments will be followed in the financial evaluation:

(a) Price Adjustment for Completeness in Scope of Work

(b) Price Adjustment for Technical Compliance

(c) Price Adjustment for Commercial Compliance

(d) Price Adjustment for Deviations in Terms of Payment

(e) Price Adjustment for Completion Schedule

(i) Price Adjustment for Completeness in Scope of Work

In case of omission in the scope of work of a quoted item, no price adjustment for the omitted item(s) shall be applied provided that the Bidder has mentioned in his Bid that the same is covered in any other item.

The price adjustment shall not justify any additional payment by the Employer. The price(s) of omitted item(s) shall be deemed covered by other prices of the Schedule of Prices.

(ii) Price Adjustment for Technical Compliance

The cost of making good any deficiency resulting from technical noncompliance will be added to the Corrected Total Bid Price for comparison purposes only. The adjustments will be applied taking the average price quoted by other Bidders being evaluated in detail in their original Bids for corresponding item. In case of non-availability of price from other Bidders, the price will be estimated by the Project Manager/Engineer.

(iii) Price Adjustment for Commercial Compliance

The cost of making good any deficiency resulting from any quantifiable acceptable variations and deviations from the Bid Schedules and Conditions of Contract, as determined by the Project Manager/Engineer will be added to the Corrected Total Bid Price for comparison purpose only. Adjustment for commercial compliance will be based on Corrected Total Bid Prices.

(iv) Price Adjustment for Deviation in Terms of Payment

If a Bid deviates from the terms of payment/payment conditions as specified in the Conditions of Contract and if such deviation is considered acceptable to the Employer, mark-up earned for any earlier payments involved in the terms outlined in the Bid as compared to those stipulated in the Conditions of Contract shall be calculated at the mark-up rate of 10% per annum and shall be added to the Corrected Total Bid Price for comparison purposes only.

(v) Price Adjustment for Completion Schedule

Bids indicating completion in advance of the dates stated in Preamble to Conditions of Contract, no credit will be given in this evaluation.

Bids indicating completion period later than the period set out in Preamble to Conditions of Contract shall be adjusted in the evaluation by adding a factor of 0.05% of the Corrected Total Bid Price for each calendar day of completion later than specified period of the completion.

Bids indicating completion beyond 50 days later than the dates set out in Preamble to Conditions of Contract shall not be considered and rejected as non- responsive.

26.4 If the Bid of the successful Bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Schedule of Prices

to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.34 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

IB.27. Domestic Preference (NA)

27.1 In the comparison of evaluated Bids, the Goods manufactured in Pakistan, will be granted a margin of preference in accordance with the following procedures, provided the Bidder shall have established to the satisfaction of Employer that the manufacturing cost of such Goods includes a domestic value addition equal to at least 20% of the ex-factory Bid price of such Goods. Bidders applying for domestic preference shall fill in Appendix C to these Instructions to substantiate their claim.

27.2 The Employer/Project Manager/Engineer will first review the Bids to determine, the Bid group classification in accordance with Sub-Clause 10.2 hereof.

27.3 The comparison shall be ex-factory price of the Goods to be offered from within Pakistan (such prices to include all costs as well as custom duties and taxes paid or payable on raw materials and components incorporated or to be incorporated in the Goods) and the DDP (CIF + Customs duty, sales tax and other import charges) Pakistan seaport price of the Goods to be offered from outside Pakistan.

27.4 The lowest evaluated Bid of each Group shall first be determined by comparing all evaluated Bids in each Group among themselves taking into account:

(a) In the case of Goods manufactured in Pakistan, sales tax, local body charges and other similar taxes which will be payable on the furnished Goods in Pakistan.

(b) In the case of Goods of foreign origin offered from abroad, customs duties, sales tax and other import charges which will be payable on furnished Goods in Pakistan.

(c) In the case of Goods of foreign origin already located in Pakistan, customs duty, sales tax and import charges on CIF price as applicable for Sub-Clause 27.4(b) here above.

27.5 The price preference to Group A bids will be:

(i) 15% of the ex-factory bid price, if the value addition through indigenous manufacturing is at least 20%;

(ii) 20% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 20% and up to 30%; and

(iii) 25% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 30%.

27.6 The applicable price preference i.e., as per Sub-Clause 27.5 here above will be applied to Group A Bid by reducing the ex-factory bid price.

27.7 The computation for the purpose of domestic preference under Sub-Clause IB 10.2 and Clause IB 27 and award of contract shall subject to change, if any, as per policy of the Federal Government as applicable on the date of bid opening.

IB.28 Process to be Confidential

28. 1 Subject to Clause 23 heretofore, no Bidder shall contact Employer and/or Project

Manager/Engineer on any matter relating to its Bid from the time of the Bid opening to the time the Bid evaluation result is announced by the Employer. The evaluation result shall be announced at least ten (10) days prior to award of Contract. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the Bids evaluated.

28.2 Any effort by a Bidder to influence Employer and/or Project Manager/Engineer in the Bid evaluation, Bid comparison or Contract Award decisions may result in the rejection of his Bid. Whereas any Bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the Bid evaluation result; however, mere fact of lodging a complaint shall not warrant suspension of the procurement process.

(F) AWARD OF CONTRACT

IB.29. Post-Qualification

29.1 The Employer, at any stage of the bid evaluation, having credible reasons for or *prima facie* evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

29.2 The determination will take into account the Bidder's financial, technical and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualification submitted under Appendix B to Instructions to Bidders "Evidence of Bidder's Capability" by the Bidder pursuant to Clause IB.13, as well as such other information as required under the Bidding Documents.

29.3 An affirmative determination will be a pre-requisite for award of the Contract to the lowest evaluated Bidder. A negative determination will result in rejection of that Bidder's Bid in which event, Employer will proceed to undertake a similar determination of the next lowest evaluated Bidder's capabilities to perform the Contract satisfactorily.

IB.30 Award Criteria

30.1 Subject to Clause IB.32, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such Bidder has been determined to be qualified to satisfactorily perform the Contract in accordance with the provisions of Clause IB.29.

IB.31 Employer's Right to Vary Quantities

31.1 Employer reserves the right at the time of award of Contract to increase or decrease by up to 25% the quantity of Plant and Services contained in the Schedule of Prices without any change in the unit price or other terms and conditions.

IB.32 Employer's Right to Accept any Bid and to Reject any or all Bids

32.1 Notwithstanding Clause IB.30, the Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids, at any time prior to award of Contract,

without thereby incurring any liability to the affected Bidders or any obligation to inform the affected Bidders of the grounds for the Employer's action except that the grounds for its rejection shall upon request be communicated, to any Bidder who submitted a Bid, without justification of grounds. Rejection of all Bids shall be notified to all Bidders promptly.

32.2 No negotiation with the Bidder having been evaluated as lowest responsive or any other Bidder shall be permitted. However, the Employer may have clarification meeting(s) to get clarified any item(s) in the Bid evaluation report.

IB.33 Notification of Award

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

33.2 The Letter of Acceptance and its acceptance by the Bidder will constitute the formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.

33.3 Upon furnishing by the successful Bidder of a Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful and return their Bid securities.

IB.34 Performance Security

34.1 The successful Bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period twenty eight (28) days after the receipt of Letter of Acceptance.

34.2 Failure of the successful Bidder to comply with the requirements of Sub-ClausesIB.34.1, IB.35 or Clause IB.44 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.35 Signing of Contract Agreement

35.1 Within fourteen (14) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send to the successful Bidder the Form of Contract Agreement provided in the Bidding Documents, duly filled in and incorporating all agreements between the parties for signing and return it to the Employer.

35.2 The formal Agreement between the Employer and the successful Bidder shall be executed within fourteen (14) days of the receipt of such Form of Contract Agreement by the successful Bidder from the Employer.

(G) ADDITIONAL INSTRUCTIONS

IB.36 Instructions not Part of Contract

36.1 Bids shall be prepared and submitted in accordance with the above Instructions to Bidders including Additional Instructions which are provided to assist Bidders in preparing their Bids, and do not constitute part of the Bid or the Contract Documents.

IB.37 Contract Documents

37.1 The Documents which will be included in the Contract are listed in the Form of Contract Agreement set out in these Bidding Documents.

IB.38 Sufficiency of Bid

38.1 Each Bidder shall satisfy himself before bidding as to the correctness and sufficiency of his Bid and of the rates and prices entered in the Schedule of Prices. Except insofar as it is otherwise expressly provided in the Contract, the rates and prices entered in the Schedule of Price shall cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works/facility.

IB.39 One Bid per Bidder

39.1 Each Bidder shall submit only one Bid either by himself, or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid will be disqualified and Bids submitted by him shall not be considered for evaluation and award.

IB.40 Bidder to inform himself

40.1 The Bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the Bid and entering into a Contract for execution of the Works/facility. This shall include but not be limited to the following:

(a) inquiries on Pakistani Income Tax to the Commissioner of the Income Tax and Sales Tax.

(b) inquiries on customs duties and other import taxes, to the concerned authorities of Customs and Excise Department.

(c) information regarding port clearance facilities, loading and unloading facilities, storage facilities, transportation facilities and congestion at Pakistan seaports.

(d) investigations regarding transport conditions and the probable conditions which will exist at the time the Plant will be actually transported.

IB.41 Alternate Proposals by Bidder

41.1 Should any Bidder consider that he can offer any advantage to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his Bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details / conditions, provided always that the total sum entered on the Form of Bid shall be that which represents complete compliance with the Bidding Documents.

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

IB.42 Site Visit and Local Conditions

42.1 Bidder must verify and supplement by his own investigations the information about site and local conditions. However, Employer will assist the Bidder wherever practicable and possible.

42.2 All Bidders are required to visit the site at their own expense to review the areas allocated for the Plant and the interfacing facilities, if any. Bidders may also wish to study local conditions, available facilities, communications, craft wages, roads and other transport facilities. Bidders shall also acquaint themselves with the relevant laws, rules, and regulations of Pakistan.

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

IB.43 Pre-Bid Meeting

43.1 The Employer may, at his own or at the request of any prospective Bidder(s), hold a Pre-Bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of Pre-Bid meeting, if convened, shall be intimated through letter for invitation.

All prospective Bidders or their authorized representatives shall be invited to attend such a Pre-Bid meeting.

IB.44 Integrity Pact

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

IB.45 General Performance of the Bidders

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

(H) APPENDICES

The Appendices to ITB are as given below:

- Appendix-A: Name of Eligible Countries
- Appendix-B: Evidence of Bidder's Capabilities
- Appendix-C: Domestic Goods (value added in Pakistan)

Appendices are given here below:

Appendix A to
Instructions to Bidders

NAME OF ELIGIBLE COUNTRIES

All countries of the World with whom Islamic Republic of Pakistan has commercial relations.

EVIDENCE OF BIDDER'S CAPABILITY

Note: Bidders to provide the following information with the Bid separately and indicate herein its references where this information is available.

Sr.No.		Information to be Supplied	Bid References
1.		Name of Bidder, business address and country of incorporation.	
2.		Type of firm whether individually owned, partnership, corporation or joint venture and the names of its owners or partners.	
3.	(a)	The annual reports giving general description of the firm, sort of business carried out, balance sheets, profit and loss statements, turn over and business done by the firm, duly authenticated, for the last three (3) years. Audited Balance Sheets for the preceding three (3) years and projected assets and liabilities for the next two (2) years shall be provided. i. Total value of works in hand on bid opening/preparation date. ii. Total value of works completed in last five years.	
4.	(a)	Has completed at least one (1) EPC/Turnkey Contract with a min. value of Rs.400 Million during the last three (3) years.(Schedule-I to bid)	
	(b)	Has designed, supplied and installed at least two similar facility during the last three (3) years of Rs.400 million. (Schedule-I to bid)	
5.		Location and address of manufacturing facilities as applicable.	
6.		Details of the facilities where the offered equipment is proposed to be manufactured. This description should include the facilities and capacities of the particular factories	

Sr.No.		Information to be Supplied	Bid References
		including testing facilities and the processes used in manufacturing and testing. Where parts or components are purchased from outside, the details of equipment purchased and the names and experience record of the suppliers.	
7.		Detailed description of the quality control testing and research facilities. If the equipment is manufactured under license, the name of the licensee and details of the licensing arrangements, such as the duration of the license, the facilities provided to the Bidder by the licensee and whether future improvements are available or not etc. A copy of the license agreement may be attached. Quality Control/ Quality assurance plan must also be submitted.	
8.	(a)	Names, qualifications and experience of the key technical personnel along with Resumes.	
	(b)	(i) Nos. of total permanent Staff on roll of the company.	
		(ii) Nos. of total qualified engineers on roll of the company.	
9.		The time since the manufacturer has been in this business and the time since he has been doing work of similar nature.	
10.		The time since the particular equipment offered has been manufactured and the time for which it has been in service. The manufacturer shall have the experience stated in Sub-Clause IB 13.4(a).	
11.		Reference lists of similar works done by the Bidder in its country and abroad indicating the name of customer, description and quantity of product, year of supply and the approximate value. This is an important consideration and should be filled in with full details (attach separate sheet if needed)	

Sr.No.	Information to be Supplied	Bid References
12.	Details of projects under execution and future contractual commitments (for each partner, in case of a joint venture).	
13.	(a) Banking reference, names of banks and addresses may be given to whom reference regarding financial capability of the Bidder may be made, with authority to make inquiries from the Bidder's bankers and clients regarding any financial and technical aspects (for each partner, in case of a joint venture). (b) Detail of credit facilities available to the firm by the bank for the business including amount and its validity period.	
15.	Health, Safety and emergency plan as well as Risk Management plan for the project.	
16.	Detailed/ Integrated work plan along with methodology to complete the assignment.	
17.	Training and Employment plan of local work force of contractor for which contractor is to at least have a budget of Rs 0.5 million ***for each contract Package*** for incurring expenditures on arranging such trainings for Consultant/Employer staff who are to maintain and operate the facility after construction. This is not reimbursable and contractor has to consider this amount included in his overheads.	
18.	Information on any litigation or arbitration resulting from contracts completed or under execution by the Bidder over the last ten (10) years. The information shall indicate the parties concerned, the matter of dispute, the disputed amounts and the result thereof (for each partner, in case of a joint venture).	

Not Applicable

Domestic Goods (Value added in Pakistan)

[Bidders claiming eligibility for domestic preference should fill in for supply items only, all columns hereunder and provide necessary documentation to substantiate their claim].

Sr. No.	Description of Indigenous Goods	Unit	Qty	Total Price of Goods Ex-Factory (Pak Rs.)	Domestic value added in the manufacturing cost as percentage of Ex-Factory Price	Amount of value addition (Pak Rs.)
1	2	3	4	5	6	7
Total in columns 5 & 7						

Computations:

A. Total amount of Value Addition (from Col.7) Rs_____

B. Total Ex-Factory Price of Indigenous Goods (from Col.5) Rs_____

C. Total DDP Price of imported supply items Eqv.Rs_____

D. Total Price of supply items [B+C] Eqv.Rs_____

E. % of value addition = [(A/D)x100] _____%

F. Domestic Preference =(15,20 or 25)% of B Rs_____

LETTER OF TECHNICAL BID
AND
SCHEDULES TO BID

LETTER OF TECHNICAL BID
AND
SCHEDULES TO BID

Letter of Technical Bid

Schedules to Bid

–	Schedule A to Bid:	Specific Works Data
–	Schedule B to Bid:	Proposed Organization for the Project
–	Schedule C to Bid:	Method of Performing Works
–	Schedule D to Bid:	Proposed Programme of Works
–	Schedule E to Bid:	Works to be Performed by Subcontractors
–	Schedule F-1 to Bid:	Deviations from Technical Provisions
–	Schedule F-2 to Bid:	Deviations from Contractual Conditions
–	Schedule G to Bid:	Specific Operation/Plant and Equipment Detail
–	Schedule H To Bid:	Specimen JV Agreement
–	Schedule I To Bid:	Past Performance and Present Commitments

LETTER OF TECHNICAL BID

Bid Reference No.: …….
Package No.: …….

"Design, Supply and Installation of Comprehensive Schools with Cold Formed Steel Structure (Inclusive of Complete Civil, Electrical, Plumbing & external development works)"

To:

……
……
……

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, Schedules to Bid, Schedule of Prices and Addenda Nos. …….. for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address ……. …… ……. and being duly incorporated under the laws of …… hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said documents including Addenda thereto.

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

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of …… drawn in the favor of, or made payable to the Employer, …… and valid for a period …..days beyond the period of validity of Bid.

4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.

5. We agree to abide by this Bid for the period of ……. days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

7. We undertake, if our Bid is accepted to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.

8. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.

9. We do hereby declare that our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries

10. We, including any subcontractors or suppliers for any part of the Contract, do not have any conflict of interest.

11. We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process.
12. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).

Dated this …… day of ……. 2016

Signature ……... in the capacity of ……. duly authorized to sign the Bid for and on behalf of …….
(Name of Bidder in Block Capitals)
(Seal of Bidder)

Bidder's Address
……
……
……..……

Witness:

Signature: …….
Name: ……

Address:
……
……
……..……

Occupation …….

SPECIFIC WORKS DATA

The main technical data is prescribed in the relevant sections of the Technical Provisions. However, the Bidder may supplement the main technical data by providing hereunder other salient parameters including main plant make, capacity and suitability for the works under consideration to enable the Employer/Project Manager/Engineer to assess technical conformance of the proposed process and the means available with the contractor to do it.

Initials of Signatory to Bid:……

SCHEDULE – B TO BID

PROPOSED ORGANIZATION FOR THE PROJECT

The Bidder shall provide in this Schedule Organization chart indicating the key personnel he will employ for Head office and for Site office involved in management, supervision and Project Manager/Engineering of the Works to be done under the Contract to direct and execute the Works, together with their names, qualifications, experience, positions held and their nationalities.

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

- Head Office:

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

Initials of Signatory to Bid:……

METHOD OF PERFORMING THE WORKS

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

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.

- A list of all major items of constructional and erection plant, tools and vehicles proposed to be used in carrying out the Works at Site, including number of each kind, make, type, capacity of all equipment, working condition, which shall be deployed by him for Civil Work and Erection, Testing and Commissioning of the Works, in sufficient detail to demonstrate fully that the equipment will meet all the requirements of the Specifications.

- The procedure for installation/erection of equipment and transportation of equipment and materials to the site.

- Details regarding mobilization in Pakistan, the type of facilities including personnel accommodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.

- The Contractor shall provide description of his construction camp's facilities and staff housing requirements.

- The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp and staff housing facilities. The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

    1. Site Preparation (clearing, land preparation, etc.).
    2. Provision of Services.
        a) Power (expected power load, etc.).
        b) Water (required amount and system proposed).
        c) Sanitation (sewage disposal system, etc.).

3. Construction of Facilities

   a) Contractor/ Project Manager/ Project Engineer/ Consultant's Office, Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).

   b) Warehouses and Storage Areas (area required, type of construction and layout).

   c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.)

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

5. Other Items Proposed (Security services, etc.).

Initials of Signatory to Bid:……

PROPOSED PROGRAMME OF WORKS

Bidder shall provide a programme in a bar-chart/CPM/PERT form showing the sequence of work items by which he proposes to complete the Work of the entire Contract. The programme should indicate the sequences of work items and the period of time during which he proposes to complete the Works including the activities like designing, schedule of submittal of drawings, ordering/procurement of materials, manufacturing, delivering, design & construction of associated civil works, installation/erection, testing and commissioning of Works to be executed under the Contract.

Initials of Signatory to Bid:……

SCHEDULE – E TO BID

WORK TO BE PERFORMED BY SUBCONTRACTORS

The Bidder will do the work with his own forces except the part (s) of the Works listed below which he intends to sub-contract.

Items of Works to be Sub-Contracted	Name and address of Sub-Contractor	Statement of similar works previously Executed (attach evidence)

Note:

1. No change of Sub-Contractor shall be made by the Bidder without prior approval of the Employer.
2. The truthfulness and accuracy of the statement as to the experience of Subcontractors is guaranteed by the Bidder. The Employer's judgment shall be final as to the evaluation of the experience of Subcontractors submitted by the Bidder.
3. Statement of similar works shall include description, location & value of work, year completed and name & address of the clients.
4. This may include manufacturer(s) who are proposed here and their relevant details to be provided accordingly including make, capacity and salient features to make it particularly suitable for the works. The technology used should also be detailed adequately.

Initials of Signatory to Bid:……

SCHEDULE – F-1 TO BID

DEVIATIONS
FROM TECHNICAL PROVISIONS

It is presumed that the Bidder shall not take any deviation. However, if he intends to take deviations to the specified technical provisions, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications

Note: Attach additional sheets, if necessary

Initials of Signatory to Bid:……

SCHEDULE – F-2 TO BID

DEVIATIONS
FROM CONTRACTUAL CONDITIONS

It is presumed that the Bidder shall not take any deviation. However, if he intends to take deviations to the specified Contractual/Commercial Conditions, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications

Note: Attach additional sheets, if necessary

Initials of Signatory to Bid:……

SPECIFIC OPERATION/PLANT AND EQUIPMENT DETAIL

Note: Attach additional sheets, if necessary

Initials of Signatory to Bid:……

JV AGREEMENT

[Employer to provide the standard form of Joint Venture Agreement]

(In the event that the successful Bidder is a joint venture formed of two or more companies, the Employer requires that the parties to the joint venture accept joint and several liabilities for all obligations under the Contract.)

SCHEDULE –I TO BID

PAST PERFORMANCE AND PRESENT COMMITMENTS

Past Performance

Sr. No.	Name of project(s)	Name of employer	completed cost	Start date	Planned completion date	Actual completion date	Satisfactory performance certificate from employer / Remarks regarding delays if applicable
1.							
2.							
3.							
4.							
5.							
6.							
7.							

Present Commitments

Sr. No.	Name of ongoing project(s)	Name of employer	Total cost	Start date	Planned completion date	%age of works completed	Award letter / Remarks regarding delays if applicable
1.							
2.							
3.							
4.							
5.							
6.							
7.							

Any Bidder showing projects outside Pakistan, the information provided on the project needs to be substantiated by certification of concerned country's embassy in Pakistan.

LETTER OF PRICE BID
AND
SCHEDULES TO BID

LETTER OF PRICE BID
AND
SCHEDULES TO BID

Letter of Price Bid

Schedules to Bid

- Schedule J to Bid: Integrity Pact
- Schedule K to Bid: Estimated Progress Payments
- Schedule L to Bid: Lump Sum Cost Breakdown for Major Cost Items

SCHEDULE OF PRICES

- Preamble to Schedule of Prices
- Schedule of Prices
- Summary of Bid Prices

LETTER OF PRICE BID

Bid Reference No.: …….
Package No.: …….

"Design, Supply and Installation of Comprehensive Schools with Cold Formed Steel Structure (Inclusive of Complete Civil, Electrical, Plumbing & external development works)"

To:
……
……
……

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, Schedules to Bid, Schedule of Prices and Addenda Nos. ……. for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address …… ……. and being duly incorporated under the laws of …….. hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price comprising of Local Currency Component of Pak Rupees …….….. (Rs. …….) or such other sum as may be ascertained in accordance with the said Documents.

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

4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.

5. We agree to abide by this Bid for the period of ……. days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

7. We undertake, if our Bid is accepted to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.

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

9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.

10. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid

from a single firm).

Dated this ……. day of …….. 2016

Signature …….. in the capacity of ……duly authorized to sign the Bid for and on behalf of ……
(Name of Bidder in Block Capitals)

(Seal of Bidder)

Bidder's Address
……
……

Witness:

Signature: …….
Name: ……
Address:
……
……
Occupation ……

SCHEDULE – J TO BID

Integrity Pact

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

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

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

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

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

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

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

Name of Buyer: ……	Name of Seller/Supplier: ……
Signature: ……	Signature: ……
[Seal]	[Seal]

ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of Works and the Rates in the Schedule of Prices, expressed in foreign and local currency of payments:

Period	**Amounts**	
	LCC (Rs.)	**FCC**
Ist Quarter (Ist 3 Month)		
2nd Quarter		
3rd Quarter		
4th Quarter		
5th Quarter		
6th Quarter		
Total Bid Price		

Initials of Signatory to Bid: ……

LUMPSUM COST BREAKUP FOR MAJOR COST ITEMS

The Bidder is to provide a detailed breakup of his Lump sum costs in a manner that the overall picture for the quoted price can be understood. It should include major heading wise cost breakup including rate analyses for at least 6 major cost items as required to analyze it.

SCHEDULE OF PRICES

SCHEDULE OF PRICES

Description

1. Preamble to Schedule of Prices

Summary of Bid Prices

Schedule No.1	-	External Works (BOQ measurement basis)
Schedule No.2	-	Foundation Works (BOQ measurement basis)
Schedule No. 3	-	Supply of Plant (Pre Engineered Structures) including Fixtures and other materials & goods and spare parts (if any) (Schedule of Price basis)
Schedule No. 4	-	Installation and other Services (Schedule of Price basis)
Schedule No. 5	-	Design Services (Schedule of Price basis)

1. PREAMBLE TO SCHEDULE OF PRICES

1. General

1.1 The Schedule of Prices shall be read in conjunction with the Conditions of Contract together with the Specifications and Bid Drawings.

1.2 The Bidder shall quote for all items of the Works executed on EPC/Turnkey basis and the prices shall be quoted for the complete scope of Work as described or implied from these Bidding Documents in schedule-L to bid.

2. Description & Quantities

2.1 Price given in the Schedule of Prices against each item shall be for the scope covered by that item as detailed in the Specifications, Bid Drawings or elsewhere in the Bidding Documents. The general directions and descriptions of work and materials are not necessarily repeated nor summarized in the Schedule of Prices and do not generally give a full description of the Plant and equipment to be supplied and the services to be performed under each item. References to the relevant sections of the Bidding Documents shall be made to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices against each item in Schedule of Prices.

The Schedule of Prices only identifies major components of the structure and it does not restrict the responsibility of the Contractor to furnish all equipments, materials and services as deemed necessary by the Employer/Project Manager/Engineer for making the structure operationally complete and satisfactory as specified and/or implied in the Bidding Documents and subsequent revisions thereto.

2.2 The quantities as shown in the Schedule of Prices are estimated quantities (only for schedule #1 & #2) and provisional only being given as an indication of the Scope of Work to enable the Bidder to bid for different items of the Works in accordance with his estimate of costs. The estimated quantities shall be used for comparing the Bids. It is, however, be noted that the basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Project Manager/Engineer. The schedule #3, #4, #5 & #6 are treated as EPC contract and will not be measured separately for the payment and also Contractor shall be responsible to carry out all the item of works which deemed to be essential for carry out the completion of the project.

2.3 The sizes & dimensions mentioned and/or specified in the various technical descriptions and specifications including Bid Drawings are tentative and not final as the responsibility for detailed design rests with the Contractor under the Contract. If, in the opinion of the Project Manager/Engineer, at the time of review of Contractor's drawings/designs for approval, certain sizes & dimensions of some items have to be increased for proper completion and/or operation of the Works, then revised sizes & dimensions shall be supplied by the Contractor at no extra cost to the Employer.

3. Units & Abbreviations

3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply both with FPS & MKS System.

The following abbreviations shall be used in the Schedule of Prices:

	Abbreviation
Local Currency Component	LCC
Pakistani Rupees	PKR/Pak Rs.
Ex Works	EXW
Quantity	Qty
Square Feet	Sft.
Running Feet	Rft.

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the unit rates and lump sum amounts entered in the Schedule of Prices will be the rates at which the Contractor will be paid, and shall be deemed to include for the full scope and all costs incurred by the Contractor in the performance of the Works, the provision of services including his overheads, income tax, super tax, other indirect costs, customs & other duties, profits and costs of accepting the general risks, liabilities and obligations set forth or implied in the Contract, except for such costs which are specified as reimbursable under the Contract.

The unit rates shall be extended to show the total amount for each item. The total of the Schedule of Prices is the Total Bid Price and shall be entered in Paragraph 1 of the Form of Price Bid. Where a discrepancy exists between the unit rate and the extended total amount, the unit rate shall be taken as correct and the total amount adjusted accordingly.

4.2 Unless otherwise stipulated in the Conditions of Contract, the rates and prices entered by the Bidder shall be fixed and firm and shall not be subject to adjustment during the performance of the Contract.

4.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date twenty eight (28) days prior to the deadline for submission of Bids shall be included in the rates and prices and the total Bid Price submitted by a Bidder.

Additional/reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed/deducted as per provisions of the Conditions of Contract.

4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Schedule of Prices, and where no items are provided in the Schedule of Prices for any work required to be executed by the Contractor on EPC/Turnkey basis under single responsibility for the completion of the Works and to make the structure operationally complete, the cost of such item(s) shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made by the Employer for those items executed by the Contractor.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Where a Bidder fails to quote a price of any item of the Schedule of Prices, the Employer will consider that the price of that item is included among other items and the Contractor will be obligated to furnish that item at no extra cost to the Employer, if awarded the Contract.

4.5 The Bidder shall be deemed to have obtained all information as to port clearance facilities and charges, loading and unloading facilities and charges, storage facilities and charges, transportation facilities and charges, congestion and/or other conditions to be expected at Karachi Port and or any other seaport of Pakistan and all requirements related thereto.

The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site. The Bidder shall be deemed to have included all clearing, forwarding and other incidental costs in this regard in his Bid. The Contractor will have the option to use either Karachi Port or any other seaport of Pakistan.

4.6 The Contractor shall provide all parts of the Works to be completed in every respect for commercial operation. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Plant, are not specifically mentioned in the Schedule of Prices, Specifications including Bid Drawings, such details shall be considered as included in the Contract Price. All charges for the supply of goods, materials, accessories or work not specifically mentioned herein but necessary for the completion and operation of the Works shall be deemed to have been included in the quoted prices.

4.7 All costs in connection with inspection and witnessing of Factory Acceptance Tests within and outside Pakistan as per provisions of Sub-Clause 20.6 of Particular Conditions of Contract shall be borne by the Contractor and shall be deemed to have been included in the quoted prices.

All costs in connection with the holding of meetings shall be borne by the Contractor.

The rates in the Schedule of Prices shall also include Contractor's cost for providing Performance Security and other Bank Guarantees required for performance of the Contract.

5. Bid Prices

5.1 Break-up of Bid Prices

The various elements of Bid Prices shall be quoted as detailed below:

a) Shipping & Insurance

i) Shipping

The Bidder shall quote prices for shipping from port of shipment to the port of entry in Pakistan (Pakistan seaport) for the sub-totals of the Plant, Erection Equipment, Spare Parts, Workshop Equipment and other materials to be imported in Pakistan for the Contract. Such prices shall include all marine transportation costs including ocean freight, heavy lift charges, fees and other charges, etc.

The prices for shipping/marine transportation shall be quoted for shipment through any reputed shipping lines acceptable to the Employer including Pakistan National Shipping Corporation (PNSC).

Cost of shipment(s) affected by the Contractor at his option by aircraft shall be deemed to be included in the Total Bid Price.

ii) Insurance

The Bidder shall quote prices for insurance cover from ex-factory/ex-works to the

Not Applicable

Site (warehouse to warehouse) for the sub-totals of the Plant, Erection Equipment, Spare Parts, Workshop Equipment and other materials to be imported in Pakistan for the Contract. Such prices shall include all insurance costs covering the responsibility for all loss or damages while loading, unloading, storing and trimming on board the vessel at the port of shipment or on inland carrier and transportation to Site.

The prices for transportation/marine insurance cover shall be quoted on the basis of insurance through insurers from any country(ies) of the world acceptable to the Employer.

b) Unit Price for Supply of Goods

The Bidder shall quote prices for Local Goods, materials (other than materials required for civil works such as concrete and reinforcement etc. cost of which will be included in the price of civil works) and equipment in the relevant column of Ex-Factory of "Schedule of Prices". Such prices shall include:

i) Design documentation, drawings, drafting, planning services, manufacturing, testing and packing of finished goods ready for delivery to Site including loading, unloading, transportation, storing and insurance costs,

ii) All custom duties, sales tax and other taxes already paid or payable on the components and raw materials used in the manufacture or assembly of Local Goods, materials and equipments.

c) Local Transport

Inland transportation for the Plant, Erection Equipment, Spare Parts and Workshop Equipment shall be the Contractor's responsibility in respect of:

i) the Plant, Erection Equipment, Spare Parts, Workshop Equipment and other materials offered from outside Pakistan; from the port of entry in Pakistan to the storage area at the Site, and

ii) indigenous Plant, Erection Equipment, Spare Parts, Workshop Equipment and other materials if any, offered from within Pakistan; from the factory in Pakistan to the storage area at the Site. The cost shall also include all insurance costs of Local Goods and other materials from factory to Site covering the responsibility of all losses or damages, while loading, unloading, storing, trimming on the carrier and transporting to Site. The cost of insurance of Local Goods shall be quoted on the basis of insurance through any insurance company listed in Clause 5.1 a) ii) here above, acceptable to the Employer.

All charges occurring there from including octroi, zila tax, fees etc. and charges for loading, forwarding and unloading expenses shall be borne by the Contractor. Unloading at the Site, handling of the Plant, Erection Equipment, Spare Parts, Workshop Equipment and other materials to the designated point of Site storage, checking and verifying all shipments received against shipping documents, issue of all receiving reports and issues of damage reports (when applicable) shall be the Contractor's responsibility.

The Bidder shall recognize such elements of the costs which he expects to incur in the performance of the Works and shall include all such costs in the rates and amounts entered in the Schedule of Prices.

d) Erection & Other Work

The Bidder shall quote prices for Erection & Other Work for the sub-totals of the Plant at the Site. Such prices shall include the costs of handling of the Plant and other materials from Site storage to point of final installation, erection, installation, testing, commissioning including all inspection, performance tests, reliability tests and responsibility for operation & maintenance of the Plant until issuance of the Taking-Over Certificate, the cost of foreign and local erection staff and labour, tools and equipment etc. It shall also cover the services of qualified representative(s) of the supplier(s) of Plant or adviser(s) to assure proper erection and commissioning of the Plant.

The price shall also include cost of arranging insurances in respect of Contractor's operations in Pakistan which insurances shall be effected by the Contractor with any insurance company listed in Clause 5.1 a) ii) here above, acceptable to the Employer.

e) Civil Works

The Bidder shall quote prices for Civil Works separately. Such prices shall include all costs of materials used for civil building and other construction works, construction for civil works, supervision including all costs of construction staff and labour, Contractor's Equipment, tools and equipment, etc.

f) Other Services

In the Schedule of Prices, under the relevant items, the Bidders shall quote prices for all costs to be incurred in connection with inspections and witnessing of tests at manufacturers' works within or outside Pakistan by the Employer/Project Manager/Engineer's staff.

5.2 Total Bid Price

The total of Bid prices in the Schedule of Prices shall be entered in the Summary of Bid Prices.

6. Erection & Testing Equipment and Maintenance Tools

6.1 The Bidder shall be responsible to provide all Erection and Testing Equipment & Maintenance Tools at the Site, at his own expenses.

7. Provisional Sums

7.1 Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Employer/Project Manager/Engineer. The Contractor will only receive payment in respect of Provisional Sums if he has been instructed by the Employer/Project Manager/Engineer to utilize such sums.

Provisional Sums shall be expended for reimbursement of Contractor's invoices for any additional site protection works, relocation of services or any other work / payments as instructed by the Employer/Project Manager/Engineer through Variation Order.

DAYWORK SCHEDULE

(As per requirement of job)

PREAMBLE TO CONDITIONS OF CONTRACT

PREAMBLE TO CONDITIONS OF CONTRACT

Commencement Date	Sub-Clause 1.1.1.(i) The date for commencement of the Works is the date of issuance of the Project Manager/Engineer's Written Order to Commence which shall be issued within 14 days of signing of Contract Agreement and also site possession has been delivered.
Defect Liability Period	Sub-Clause 1.1.11 The Defect Liability Period is 365 days after the date certified in the Taking-Over Certificate but subject to extension as provided under Sub-Clause 30.4. The defects at site considering structural stability, physical appearance and precautionary measures shall be identified by the Employer's Representative.
The Employer	Sub-Clause 1.1.12. The Employer is Project Director PMIU, Education and Literacy Department, Sindh
The Project Manager/Engineer	Sub-Clause 1.1.15. The Project Manager is EA Consulting (Pvt) ltd, Architect, Engineers & Project Management and the Engineer is AL-9, 15th Lane, Phase vii DHA, Karachi insert or any competent person/firm/authority appointed by the Employer, and notified to the Contractor.
Time for Completion	Sub-Clause 1.1.35. The Time for Completion for whole of the Works is 550 days reckoned from the Commencement Date for the project. Separate date if different part/section of the projects are desired to be completed at different periods.
Warranty Period	Sub-Clause 1.1.40. The Warranty Period is 1years for (goods/equipment)
Project Manager/Engineer 's Duties & Authorities	Sub-Clause 2.1 The duties & authorities of the Project Manager/Engineer are specified in Particular Conditions of Contract.
Confirmation in Writing	Sub-Clause 2.6 (i) The Contractor shall notify to the Project Manager/Engineer within ten (10) days, if he requires any confirmation. (ii) Project Manager/Engineer shall confirm the decision/instruction within ten (15) days of the requirement.
Ruling Language	Sub-Clause 5.1. The version in English language (ruling language) shall prevail.
Day to Day Communications	Sub-Clause 5.2. The language for day to day communication is English.
As Built-Drawings	Sub-Clause 6.10

As-Built drawings shall be provided to the Project Manager/Engineer within thirty (30) days from the date of issue of Taking-Over Certificate.

Programme to be Furnished

Sub-Clause 12.1.
The Programme must be submitted in the form of Bar-Chart with critical path/activities for individual activities and overall Project.

Employer's Equipment

Sub-Clause 14.4.
There will be no Employer's Equipment available for use by the Contractor.

Working Hours

Sub-Clause 18.3.
The normal working hours on the Site are to conform to the applicable labour laws and the existing customs of Pakistan.

Time for Completion

Sub-Clause 25.1
Period of Completion is as stated under Sub-Clause 1.1.35 hereof.

Earlier Completion

Sub-Clause 26.3
(i) Amount of Bonus per day 0.01% for each day
(ii) Max. Amount of Bonus 5% of contract value

Delay in Completion

Sub-Clause 27.1.
Failure of the Contractor to meet the Time for Completion entitles the Employer to deduct from the Contract Price, the liquidated damages @ 0.10 % percent of the Contract Price as stated in Letter of Acceptance, excluding Provisional Sums for each and every day, including holidays, of delay or part thereof; but to a maximum limit of 10 % of the Contract Price as stated in Letter of Acceptance, excluding Provisional Sums.

Prolonged Delay

Sub-Clause 27.2.
Maximum amount recoverable from the Contractor by the Employer shall be 10% of Contract Price as stated in the Letter of Acceptance, excluding Provisional Sum.

Terms of Payment

Sub-Clause 33.1.
In addition to the provisions under Clause 33, the terms of payment shall be as stated in Sub-Clause 33.1 of Particular Conditions of Contract.

Payment in Foreign Currencies

Sub-Clause 35.1.
Payment will only be made in local currency*[Employer may change it]*.

Insurance of Works

Sub-Clause 43.1.
The amount of insurance shall be for full replacement value of the Works. For the deductibles, if any, the Contractor shall submit an undertaking that he shall indemnify and keep indemnified the Employer for the amount of deductibles provided in the insurance policy.

Sub-Clause 43.1.(a)

The additional risks to be insured are as stated in Sub-Clause 43.1(a) of the Particular Conditions of Contract.

Third Party Liability

Sub-Clause 43.3.
The amount of insurance against third party liability taken out by the Contractor shall not be less than Pak Rs 0.50 million per occurrence with number of occurrences unlimited for each package / contract.

Payment on Termination for Employer's Default

Sub-Clause 46.3.
The additional amount payable by the Employer on termination shall not exceed the actual cost of work executed.

Labour, Materials and Transport

Sub-Clause 47.1.
The Contract shall be subject to price adjustment. The method of calculating adjustments for rise in costs shall be: *[The user may extract the formula:*

i. fromSub-Clause 14.11 of PCC of PEC Civil Works Bidding Documents
ii. with reference to PEC Documents "Standard Guidelines and Formula for Price Adjustment".
iii. *fromSub-Clause 15.2 of GCC of PEC Bidding Documents for Supply of Goods.]*

Not Applicable

Notices to Project Manager/Engineer

Sub-Clause 49.2.
The address of the Employer for notices is the same as given in Sub-Clause 1.1.12 here above.

The address of the Project Manager/Engineer for notices is the same as given in Sub-Clause 1.1.15 here above.

Applicable Law

Sub-Clause 51.1.
The Contract in all respects be read and construed and shall operate as a Pakistani Contract in conformity with the Laws of Islamic Republic of Pakistan.

Procedural Law for Arbitration

Sub-Clause 51.2.
The procedural law for arbitration shall be the Rules of Pakistan Arbitration Act 1940 as amended.

Language and Place of Arbitration

Sub-Clause 51.3.
The language of arbitration is English.
The place of arbitration is Karachi, Islamic Republic of Pakistan.

GENERAL CONDITIONS OF CONTRACT

[Notes on the Conditions of Contract]

The Conditions of Contract comprise two parts:

(a) General Conditions of Contract
(b) Particular Conditions of Contract

Over the years, a number of "model" General Conditions of Contract have evolved. The one used in these Standard Bidding Documents was prepared by the International Federation of Consulting Engineers (Federation Internationale des Ingenieurs-Conseils, or FIDIC), and is commonly known as the FIDIC Conditions of Contract. (The used version is the 1987 edition, reprinted in 1988 with editorial amendments.)

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

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

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

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

* Add the following text if the bidding documents, as issued, do not include a copy:

"Copies of the FIDIC Conditions of Contract can be obtained from:
FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland
fidic.pub@fidic.org – FIDIC.org/bookshop]

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PART-I: GENERAL CONDITIONS OF CONTRACT

Definitions and Interpretations

1.1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them:

1.1.1 "Commencement Date" means whichever the latest is of:

i) the date specified in the Preamble as the date for commencement of the Works or the date when the Contractor receives,

ii) such payment in advance of the commencement of the Works as may be specified in the terms of payment, or

iii) notice of the issue of any import license necessary for commencing performance of the Contract, or

iv) notice that any legal requirements necessary for the Contract to enter into force have been fulfilled, or

v) notice that any necessary financial or administrative requirements specified in Part II as conditions precedent to commencement have been fulfilled.

1.1.2 "Conditions" means the Preamble to and these Conditions of Contract, Parts I and II.

1.1.3 "Contract" means the agreement between the Employer and the Contractor for the execution of the Works incorporating the Conditions, Specification, Employer's Drawings and Contractor's Drawings, priced and completed Schedules, Tender, Letter of Acceptance and such further documents as may be expressly incorporated by the Letter of Acceptance.

1.1.4 "Contract Agreement" means the documents recording the terms of the Contract between the Employer and the Contractor.

1.1.5 "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution of the Works.

1.1.6 "Contractor" means the person whose tender has been accepted by the Employer and the legal successors in title to the Contractor but not (except with the consent of the Employer) any assignee of the Contractor.

1.1.7 "Contractor's Drawings" means all drawings, samples, patterns, models and operation and maintenance manuals to be submitted by the Contractor in accordance with Clause 6.

1.1.8 "Contractor's Equipment" means all appliances or things of whatsoever nature required for the purposes of the Works but does not include Plant.

1.1.9 "Contractor's Risks" means the risks defined in Sub-Clause 37.3.

1.1.10 "Defects Liability Certificate" means the certificate to be issued by the Engineer to the Contractor in accordance with Sub-Clause 30.11.

1.1.11 "Defects Liability Period" means one year or the period stated in Part II following taking over, during which the Contractor is responsible for making good defects and damage in accordance with Clause 30.

1.1.12 “Employer" means the person named as such in the Preamble and the legal successors in title to the Employer but not (except with the consent of the Contractor) any assignee of the Employer.

1.1.13 "Employer's Drawings" means all the drawings and information provided by the Employer or the Engineer to the Contractor under the Contract.

1.1.14 "Employer's Risks” means those risks defined in Sub-Clause 37.2.

1.1.15 "Engineer” means the person appointed by the Employer to act as Engineer for the purposes of the Contract and designated as such in the Preamble.

1.1.16 "Engineer's Representative" means any representative of the Engineer appointed from time to time by the Engineer under Sub-Clause 2.2.

1.1.17 "Final Certificate of Payment", means the certificate to be issued by the Engineer to the Employer in accordance with Sub-Clause 33.10.

1.1.18 "Force Majeure" has the meaning assigned to it under Sub-Clause 44.1.

1.1.19 "Foreign Currency" means a currency of a country other than that in which Plant is to be installed.

1.1.20 "Gross Misconduct" means any act or omission of the Contractor in violation of the most elementary rules of diligence which a conscientious contractor in the same position and under the same circumstances would have followed.

1.1.21 "Letter of Acceptance" means the formal acceptance by the Employer of the Tender incorporating any adjustments or variations to the Tender agreed between the Employer and the Contractor.

1.1.22 "Performance Security" means the security to be provided by the Contractor in accordance with Sub-clause 10.1. for the due performance of the Contract.

1.1.23 "Plant” means machinery, apparatus, materials and all things to be provided under the Contract for incorporation in the Works.

1.1.24 "Programme" means the Programme to be submitted by the Contractor in accordance with Sub-Clause 12.1 and any approved revision thereto.

1.1.25 "Provisional Sum" means a sum, described as such for the execution of work or for the supply of goods or services, to be used in accordance with Sub-Clause 36.1.

1.1.26 "Risks Transfer Date" means the date when the risk of loss of or damage to the Works passes from the Contractor to the Employer in accordance with Sub-Clause 39.1.

1.1.27 "Schedule of Prices" means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Tender and forming a part of the Contract documents.

1.1.28 "Section" means a part of the Works specifically identified as such as in the Contract.

1.1.29 "Site" means the place or places, provided or made available by the Employer where work is to be done by the Contractor or to which Plant is to be delivered, together with so much of the area surrounding the same as the Contractor shall with the consent of the Employer use in connection with the Works otherwise than merely for the purposes of access.

1.1.30 "Specification" means the specification of the Works included in the Contract and any modification thereof made in accordance with Clause 31.

1.1.31 "Subcontractor" means any person (other than the Contractor) named in the Contract for any part of the Works, or any person to whom any part of the Contract has been subcontracted with the consent of the Engineer, and the Subcontractor's legal successors in title but not any assignee of the Subcontractor.

1.1.32 "Taking-Over Certificate" means the certificate to be given by the Engineer to the Contractor in accordance with Clause 29.

1.1.33 "Tender" means the Contractor's priced offer to the Employer for the Execution of the Works.

1.1.34 "Tests on Completion" means the tests specified in the Contract or otherwise agreed by the Engineer and the Contractor to be performed before the Works are taken over by the Employer.

1.1.35 "Time for Completion" means the time stated in the Preamble for completing the Works or any Section thereof and passing the Tests on Completion calculated from the Commencement Date unless extended in accordance with Clause 26.

1.1.36 "Variation Order" means any written order, identified as such, issued to the Contractor by the Engineer under Sub-Clause 31.1.

1.1.37 "Works" means all Plant to be provided and work to be done by the Contractor under the Contract.

1.2 Headings and Titles

The headings and titles in these Conditions shall not be deemed part thereof or be taken into consideration in the interpretation or construction of the Contract.

1.3 Interpretation

Words importing persons or parties shall include firms and corporations and any organization having legal capacity.

Words importing the singular only also include the plural and vice versa where the context requires.

1.4 Written Communications

Wherever in the contract provision is made for a communication to be "written" or "in writing" this means any hand-written, type-written or printed communication, including telex, cable and facsimile transmission.

1.5 Notices, Consents and Approvals

Wherever in the Contract provision is made for the giving of notice, consent or approval by any person, such consent or approval shall not be unreasonably withheld. Unless otherwise specified, such notice, consent or approval shall be in writing and the word "notify" shall be construed accordingly.

1.6 Costs, Overhead Charges and Profit

Whenever by these Conditions the Contractor is entitled to be paid cost, such cost shall be properly incurred and shall include any overhead charges properly allocable thereto but not profit unless so stated. Any profit entitlement shall be added to cost at the percentage stated in the Preamble.

1.7 Periods

In these Conditions "days" means calendar day and "year" means 365 days.

Engineer and Engineer's Representative

2.1 Engineer's Duties

The Engineer shall carry out the duties specified in the Contract.

If the Engineer is required, under the terms of his appointment by the Employer, to obtain the specific approval of the Employer before carrying out any of these duties, full particulars of such requirements shall be set out in Part II.

Except as expressly stated in the Contract the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

2.2 Engineer's Representative

The Engineer's Representative shall be appointed by and be responsible to the Engineer and shall only carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3.

2.3 Engineer's Power to Delegate

The Engineer may from time to time delegate to the Engineer's Representative any of the duties vested in the Engineer and may at any time revoke such delegation.

Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Contractor and the Employer.

Any decision, instruction or approval given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. However:

(a) any failure of the Engineer's Representative to disapprove any Plant or workmanship shall not prejudice the right of the Engineer to disapprove such Plant or workmanship and to give instructions for the rectification thereof.

(b) if the Contractor questions any decision or instruction of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary such decision or instruction.

2.4 Engineer to Act Impartially

Wherever under the Contract the Engineer is required to exercise his discretion by:

(a) giving his decision, opinion or consent, or

(b) expressing his satisfaction or approval, or

(c) determining value, or

(d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor,

he shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances.

2.5 Engineer's Decisions and Instructions

The Contractor shall proceed with the decisions and instructions given by the Engineer in accordance with these Conditions.

2.6 Confirmation in Writing

The Contractor may require the Engineer to confirm in writing any decision or instruction of the Engineer which is not in writing. The Contractor shall notify the Engineer of such requirement without undue delay. Such a decision or instruction shall not be effective until written confirmation thereof has been received by the Contractor.

2.7 Disputing Engineer's Decisions and Instructions

If the Contractor disputes or questions any decision or instruction under Sub-Clause 2.5 or a written confirmation under Sub-Clause 2.6, he shall give notice to the Engineer within twenty eight (28) days after receipt thereof, giving his reasons.

The Engineer shall within a further period of twenty eight (28) days by notice to the Contractor and the Employer with reasons, confirm, reverse or vary such decision or instruction.

If either party disagrees with the action taken by the Engineer, or if the Engineer fails to reply to the Contractor's notice within the stipulated twenty eight (28) days, and the matter cannot be settled amicably that party shall be at liberty, subject to Sub-Clause

50.1, to refer the matter to arbitration in accordance with the Contract.

2.8 Replacement of Engineer

The Employer shall not appoint any person to act in replacement of the Engineer without the consent of the Contractor.

Assignment and Subcontracting

3.1 Assignment

The Contractor shall not assign the Contract or any part of his obligations under the Contract. A charge in favor of the Contractor's bankers of any monies due under the Contract shall not be considered an assignment.

4.1 Subcontracting

The Contractor shall not subcontract the whole of the Works.

Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer.

The Contractor shall however, not require such consent for purchases of materials or to place contracts for minor details or for any part of the Works of which the manufacturer or supplier is named in the Contract.

The Contractor shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents or employees as fully as if they were the acts, defaults or neglects of the Contractor, his agents or employees.

Contract Documents

5.1 Ruling Language

Where versions of the Contract are prepared in different languages, the version which is to prevail shall be specified in the Preamble. The language of such version is referred to as the ruling language.

5.2 Day to Day Communications

The language for day to day communications is stated in the Preamble.

5.3 Priority of Contract Documents

Unless otherwise provided in the Contract, the priority of the Contract documents shall be as follows:

1. The Letter of Acceptance
2. The Preamble
3. The Conditions of Contract, Part II

4. The Conditions of Contract, Part I

5. Any other documents forming part of the Contract.

5.4 Documents Mutually Explanatory

Subject to Sub-Clause 5.3.the Contract documents shall be taken as mutually explanatory. Any ambiguities or discrepancies shall be resolved by the Engineer, who shall then instruct the Contractor thereon.

If the Contractor considers that compliance with such instructions will result in any cost which the Contractor could not reasonably have anticipated, he shall forthwith inform the Engineer with full supporting details. The Engineer shall then, if he approves, certify such costs as may be reasonable, together with profit where appropriate, which shall be added to the Contract Price.

If on the other hand compliance with such instructions results in lower costs for the Contractor then he had reason to anticipate, the Engineer shall certify a deduction from the Contract Price allowing for profit where appropriate.

6.1 Contractor's Drawings

The Contractor shall submit to the Engineer for approval:

(a) within the time given in the Contract or in the Programme such drawings, samples, models or information as may be called for therein, and in the numbers therein required, and

(b) during the progress of the Works, such drawings of the general arrangement and details of the Works as specified in the Contract or as the Engineer may require.

The Engineer shall signify his approval or disapproval thereof. If he fails to do so within the time given in the Contract or the Programme or if no time limit is specified, within twenty eight (28) days of receipt, they shall be deemed to be approved.

Approved drawings, samples and models shall be signed or otherwise identified by the Engineer.

The Contractor shall supply additional copies of approved drawings in the form and numbers stated in the Contract.

6.2 Consequences of Disapproval of Contractor's Drawings

Any Contractor's Drawings which the Engineer disapprove shall be forthwith modified to meet the requirements of the Engineer and shall be re-submitted.

6.3 Approved Contractor's Drawings

Approved Contractor's Drawings shall not be departed from except as provided in Clause 31.

6.4 Inspection of Contractor's Drawings

The Engineer shall have the right at all reasonable times to inspect, at Contractor's premises, all Contractor's Drawings of any part of the Works.

6.5 Erection Information

The Contractor shall provide, within the times stated in the Contract or in the Programme, drawings showing how the Plant is to be affixed and any other information required for:

(a) preparing suitable foundations or other means of support;

(b) providing suitable access on the Site for the Plant and any necessary equipment to the place where the Plant is to be erected; and

(c) making necessary connections to the Plant.

6.6 Operation and Maintenance Manuals

Before the Works are taken over in accordance with Clause 29 the Contractor shall supply operation and maintenance manuals together with drawings of the Works as built. These shall be in such detail as will enable the Employer to operate, maintain, adjust and repair all parts of the Works.

Unless otherwise stated in Part II the manuals and drawings shall be in the ruling language, and in such form and numbers as stated in the Contract.

Unless otherwise agreed, the Works shall not be considered to be completed for the purposes of taking over until such manuals and drawings have been supplied to the Employer.

6.7 Employer's Use of Contractor's Drawings

Contractor's Drawings may be used by the Employer for no other purpose than completing, operating, maintaining, adjusting and repairing the Works.

6.8 Contractor's Use of Employer's Drawings

The Employer's Drawings, Specification and other information submitted by the Employer or the Engineer to the Contractor shall remain the property of the Employer. These shall not, without the consent of the Employer, be used, copied or communicated to a third party by the Contractor unless necessary for the purposes of the Contract.

6.9 Manufacturing Drawings

Unless otherwise specified in Part II, the Contractor shall not be required to disclose to the Employer or the Engineer the Contractor's confidential manufacturing drawings, designs, know-how or manufacturing practices, processes or operations.

7.1 Errors in Contractor's Drawings

The Contractor shall be responsible for any errors or omissions in the Contractor's

Drawings unless they are due to incorrect Employer's Drawings or other written information supplied by the Employer or the Engineer. Approval by the Engineer of the Contractor's Drawings shall not relieve the Contractor from any responsibility under this Sub-Clause.

The Contractor shall bear any costs he may incur as a result of delay in providing Contractor's Drawings and other information or as a result of errors or omissions therein, for which the Contractor is responsible.

The Contractor shall at his own cost carry out any alterations or remedial work necessitated by such errors or omissions for which he is responsible and modify the Contractor's Drawings and such other information accordingly.

The performance of his obligations under this Clause shall be in full satisfaction of the Contractor's liability under this Clause but shall not relieve him of his liability under Sub-Clause 27.1.

7.2 Errors by Employer or Engineer

The Employer shall be responsible for the Employer's Drawings and for other written information supplied by the Employer or the Engineer and for the details of special work specified by either of them. If such Employer's Drawings, information or details are incorrect and necessitate alterations of the work, the Employer shall pay the Contractor the cost of the alterations together with profit as certified by the Engineer.

Obligations of the Contractor

8.1 General Obligations

The Contractor shall, in accordance with the Contract, with due care and diligence, design, manufacture, deliver to Site, erect, test and commission the Plant and carry out the Works within the Time for Completion. The Contractor shall also provide all necessary Contractor's Equipment, superintendence, labour and, except as stated in Part II, all necessary facilities therefor.

8.2 Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference given by the Engineer in writing and provide all necessary instruments, appliances and labour for such purposes.

If, at any time during the execution of the Works, any error appears in the positions, levels, dimensions or alignment of the Works, the Contractor shall rectify the error.

The Contractor shall bear the cost of rectifying the error, unless the error results from incorrect information supplied in writing by the Employer, the Engineer or from default by another contractor, in which case the cost together with profit shall be borne by the Employer.

The checking of any setting-out by the Engineer shall not relieve the Contractor of his responsibility for the accuracy thereof.

9.1 Contract Agreement

The Contractor shall, if called upon so to do, execute a Contract Agreement recording all the terms of the Contract, to be prepared by and completed at the cost of the Employer in the form annexed hereto.

10.1 Performance Security

If Part II requires the Contractor to obtain a Performance Security, he shall obtain the same in the sum required, within twenty eight (28) days after the receipt of the Letter of Acceptance. The Performance Security shall be provided by a person and in a form approved by the Employer. The cost of complying with the requirements of this Clause shall be borne by the Contractor.

10.2 Period of Validity

The Performance Security shall be valid until the Contractor has executed, completed and remedied defects in the Works in accordance with the Contract. No claim shall be made against the Performance Security after the issue of the Defects Liability Certificate and the Performance Security shall be returned to the Contractor within fourteen (14) days of the issue of the Defects Liability Certificate.

10.3 Claims under Performance Security

Whether or not the Performance Security is stated by its terms to be payable on the demand of the Employer the Employer shall not make a claim under the Performance Security unless one of the following conditions is satisfied:

(a) the Contractor is in breach of the Contract and fails to remedy the breach within forty two (42) days after receiving written notice from the Employer requiring him so to do. The notice shall state the intention to claim under the Performance Security, the amount claimed and the breach relied upon, or

(b) The Employer and the Contractor have agreed in writing that the amount demanded is payable to the Employer, and the amount has not been paid within forty two (42) days thereafter, or

(c) The Employer has obtained an award in arbitration under Clause 50 and the amount awarded has not been paid within forty two (42) days after the award, or

(d) the Contractor has gone into liquidation or is bankrupt.

In every case the Employer shall, when making the claim, send a copy to the Contractor.

11.1 Site Data

The Tender shall be deemed to have been based on such data on climatic, hydrological and general conditions on the Site and for the operation of the Works as the Employer or the Engineer has made available to the Contractor for the purposes of the Tender.

The Contractor shall be responsible for his own interpretation of such data.

11.2 Sufficiency of Contract Price

The Contractor shall be deemed to have satisfied himself on and taken account of in his Tender:

(a) all the conditions and circumstances affecting the Contract Price,

(b) the possibility of carrying out the Works as described in the Contract,

(c) the general circumstances at the Site (if access has been made available to him) and

(d) the general labour position at the Site.

The Contractor shall not be responsible for the accuracy of information given in writing by the Employer or the Engineer but shall be responsible for his interpretation of information received from whatever source.

11.3 Physical Obstructions and Conditions

If during the execution of the Works on Site the Contractor encounters physical obstructions or conditions of the kind stipulated in Sub-Clause 26.1.c) the Contractor shall be entitled to recover the additional cost incurred in consequence.

The Engineer shall certify and there shall be added to the Contract Price the additional cost of:

(a) complying with any instruction which the Engineer, after due consultation with the Employer and the Contractor, issues to the Contractor in connection therewith, and

(b) any necessary measures which the Contractor may take in the absence of specific instructions from the Engineer.

12.1 Programme to be Furnished

The Contractor shall submit to the Engineer for his approval the Programme which shall contain the following:

(a) the order in which the Contractor proposes to carry out the Works (including design, manufacture, delivery to Site, erection, testing and commissioning),

(b) the times when submission and approval of the Contractor's Drawing are required,

(c) the times by which the Contractor requires the Employer:

(i) to furnish any Employer's Drawings,

(ii) to provide access to the Site,

(iii) to have completed the necessary civil engineering work (including foundations for the Plant) and

(iv) to have obtained any import licences, consents, wayleaves and approvals necessary for the purpose of the Works.

The Contractor shall submit the Programme in the form stated in the Preamble within twenty eight (28) days after the Commencement Date.

The approval by the Engineer of the Programme shall not relieve the Contractor or the Employer from any obligation under the Contract.

12.2 Alteration to Programme

No material alteration to the Programme shall be made without the approval of the Engineer.

12.3 Revision of Programme

If the progress of the Works does not conform to the Programme, the Engineer may instruct the Contractor to revise the Programme.

If such modifications are required for reasons for which the Contractor is not responsible, the cost of preparing the revised Programme shall be certified by the Engineer and added to the Contract Price.

13.1 Contractor's Representative

The Contractor shall employ one or more competent representatives to superintend the carrying out of the Works on Site. They shall be fluent in the language for day to day communications. Their names shall be communicated in writing to the Engineer before work on Site begins.

Any instruction or notice which the Engineer gives to the Contractor's representative shall be deemed to have been given to the Contractor.

13.2 Objection to Contractor's Employees

The Contractor shall, upon the Engineer's written instruction, remove from the Works any person employed by him in the execution of the Works, who misconducts himself or is incompetent or negligent.

14.1 Contractor's Equipment

Except to the extent specified in Part II, the Contractor shall provide all Contractor's Equipment necessary to complete the Works.

All Contractor's Equipment shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any such equipment, except:

(a) when it is no longer required for the completion of the Works, or

(b) when the Engineer has given his consent.

14.2 Safety Precautions

The Contractor shall observe all applicable regulations regarding safety on the Site.

Unless otherwise agreed, the Contractor shall, from the commencement of work on Site until taking over provide:

(a) fencing, lighting, guarding and watching of the Works, and

(b) temporary roadways, footways, guards and fences which may be necessary for the accommodation and protection of owners and occupiers of adjacent property, the public and others.

14.3 Electricity Water and Gas

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details are given in the Preamble. The Contractor shall pay the Employer a fair price for such use. The Contractor shall at his own cost provide any apparatus necessary for such use.

14.4 Employer's Equipment

The Employer shall, if the Contractor so requests for the execution of the Works, operate any available equipment of which details are given in the Preamble. The Contractor shall pay the Employer a fair price for such use.

The Employer shall during such operation retain control of and be responsible for the safe working of the equipment.

14.5 Clearance of Site

The Contractor shall from time to time during the progress of the Works clear away and remove all surplus materials and rubbish. On completion of the Works the Contractor shall remove all Contractor's Equipment and leave the whole of the Site and the Works clean and in a workmanlike condition, to the satisfaction of the Engineer.

14.6 Opportunities for Other Contractors

The Contractor shall, in accordance with the Engineer's instructions, afford to other contractors engaged by the Employer to work on the Site and persons lawfully upon the Site all reasonable opportunities for carrying out their work provided that the same shall not obstruct or disturb the progress of the Works. The Contractor shall also afford such opportunities to the employees of the Employer.

If the Contractor, on the written request of the Engineer, makes available any Contractor's Equipment or provides any other service, the Employer shall pay the Contractor accordingly. The amount to be paid shall be certified by the Engineer and added to the Contract Price.

14.7 Authority for Access

No persons other than the employees of the Contractor and his Subcontractors shall be allowed on the Site except with the consent of the Engineer.

Facilities to inspect the Works shall at all times be afforded by the Contractor to the Engineer and his representative, the Employer's representatives, authorities and officials.

14.8 Information for Import Permits and Licenses

The Contractor shall submit to the Employer in good time such details of all Plant and Contractor's Equipment as will enable the Employer to obtain all necessary import permits or licenses.

15.1 Compliance with Statutes, Regulations

The Contractor shall, in all matters arising in the performance of the Contract, comply in all respects with, give all notices and pay all fees required by the provisions of any national or state statute, ordinance or other law or any regulation or bye-law of any duly constituted authority.

15.2 Compliance with Laws

The Contractor shall comply with the laws of the country of manufacture concerning the manufacture of the Plant, and the laws of the country where the Plant is to be erected so far as such laws concern the manufacture, erection and operation of the Works.

16.1 Patent Rights

The Contractor shall indemnify the Employer against all claims of infringement of any patent, registered design, copyright, trade mark or trade name or other intellectual property right provided that all of following conditions are satisfied:

(a) The claim or proceedings arise out of the design, construction, manufacture or use of Works or any Plant supplied by the Contractor.

(b) The right was protected at the date of the Contract in the Contractor's country or the country in which the Plant is to be manufactured or erected.

(c) The infringement or allegation of infringement was not caused by any use of the Works otherwise than for purpose indicated by or reasonably to be inferred from date Specification.

(d) The infringement or allegation of infringement was not caused by the use of any Plant in association or combination with any plant not supplied by the Contractor, unless such association or combination was disclosed to the Contractor prior to the due of the Tender.

(e) The infringement of or allegation of infringement was not caused by the Contractor following the design or instructions of the Employer or the Engineer.

16.2 Claims in respect of Patent Right

The Contractor shall be promptly notified of any claim under this Clause made against the Employer. The Contractor may at his own cost conduct negotiations for the settlement of such claim, and any litigation that may arise there from.

The Employer shall not make any admission which might be prejudicial to the Contractor unless the Contractor has failed to take over the conduct of the negotiations or litigation within a reasonable time after having been so requested.

The Contractor may not, however, conduct such negotiations or litigation before he has given the Employer such reasonable security as the Employer may require. The security shall be for an amount which is an assessment of the compensation, damages, expenses and costs for which the Employer may become liable and which are the subject of the indemnity under Sub-Clause 16.1.

The Employer shall, at the request of the Contractor, provide all available assistance for the purpose of contesting any such claim or action, and shall be repaid all reasonable costs incurred in so doing.

16.3 Employer's Warranty for Patent Rights

If any matter for which the Contractor is not liable to indemnify the Employer under Sub-Clause 16.1 causes the infringement or allegation of infringement by the Contractor of any patent, registered design, trade mark, copyright or other intellectual property right, the Employer shall indemnify the Contractor against all claims damages, expenses and costs which the Contractor may incur in relation thereto. The provisions of Sub-Clause 16.2 shall apply mutatis mutandis.

Obligations of the Employer

17.1 Access to and Possession of the Site

The Employer shall in reasonable time grant the Contractor access to and possession of the Site, which may, however, not be exclusive to the Contractor.

The Employer shall to the extent stated in the Specification provide means of access for the delivery of all Plant and Contractor's Equipment to the Site.

17.2 Assistance with Local Regulations

The Employer shall assist the Contractor in ascertaining the nature and extent of any laws, regulations, orders or bye-laws, and customs in the country where the Plant is to be erected, which may affect the Contractor in the performance of his obligations under the Contract. The Employer shall if so requested procure for the Contractor copies thereof and information relating thereto at the Contractor's cost.

17.3 Civil Works on Site

Any building, structure, foundation or means of access on the Site to be provided by the Employer shall be in a condition suitable for the reception, movement, installation and maintenance of the Works within the time or times indicated in the Programme.

17.4 Consents and Wayleaves

The Employer shall in due time obtain or grant all consents including permits-to-work, wayleaves and approvals required for the Works.

17.5 Import Permits and Licences

The Employer shall obtain all import permits or licences required for any part of the Plant or Works in reasonable time having regard to the time for delivery of the Plant and completion of the Works.

Labour

18.1 Engagement of Labour

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all labour and for their payment, housing feeding and transport.

18.2 Returns of Labour

The Contractor shall submit detailed returns showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor and Subcontractors on the Site. The returns shall be submitted in such form and at such intervals as the Engineer may prescribe.

18.3 Working Hours

On the Site, the Contractor shall observe the normal working hours stated in the Preamble. The Employer shall allow the Contractor to carry out work on the Site continuously during such working hours.

The Engineer may after consulting the Employer and the Contractor, direct that work shall be done at other times. The extra cost, together with profit, shall be added to the Contract Price unless it has become necessary for the completion of the Works within the Time for Completion, and this is due to the default of the Contractor.

18.4 Restriction on Working Hours

No work shall be carried out on the Site outside normal working hours or on the locally recognized days of rest, unless:

(a) the Contract so provides, or

(b) the work is unavoidable or necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer, or

(c) the Engineer gives his consent.

Workmanship and Materials

19.1 Manner of Execution

All Plant to be supplied shall be manufactured and all work to be done shall be executed in the manner set out in the Contract.

Where the manner of manufacture and execution is not set out in the Contract, the work shall be executed in a proper and workmanlike manner in accordance with recognized good practice.

19.2 Covering up Work

The Contractor shall give the Engineer full opportunity to examine, measure and test any work on Site which is about to be covered up or put out of view.

The Contractor shall give due notice to the Engineer whenever such work is ready for examination, measurement or testing.

The Engineer shall then, unless he notifies the Contractor that he considers it unnecessary, without unreasonable delay carry out the examination, measurement or testing.

19.3 Uncovering Work

If so instructed by the Engineer, the Contractor shall expose any parts of the Works. The Contractor shall reinstate and make good such parts to the Engineer's satisfaction.

If any parts of the Works have been covered up or put out of view by the Contractor after complying with Sub-Clause 19.2 and are found to be in accordance with the Contract the cost incurred by the Contractor in complying with the Engineer's instructions including profit shall be certified by the Engineer and added to the Contract Price.

20.1 Independent Inspection

The Engineer may, if so provided in the Contract or with the Contractor's consent, delegate inspection and testing of Plant to an independent inspector. Any such delegation shall be effected in the manner required by Sub-Clause 2.3 and for this purpose such independent inspector shall be considered as an Engineer's Representative. Notice of such appointment (being not less than 14 days) shall be given by the Engineer to the Contractor.

20.2 Inspection and Testing During Manufacture

The Engineer shall be entitled during manufacture to inspect, examine and test the materials and workmanship and check the progress of manufacture of all Plant to be supplied under the Contract. This shall take place on the Contractor's premises during working hours. If Plant is being manufactured on other premises, the Contractor shall obtain permission for the Engineer to carry out such inspection, examination and testing on those premises.

No such inspection, examination or testing shall release the Contractor from any obligation under the Contract.

20.3 Dates for Inspection and Testing

The Contractor shall agree with the Engineer the time and place for the testing of any Plant as provided in the Contract. The Engineer shall give the Contractor 24 hours notice of his intention to attend the tests.

If the Engineer does not attend on the date agreed, the Contractor may, unless the Engineer instructs the Contractor not to do so, proceed with the tests, which shall be deemed to have been made in the Engineer's presence.

The Contractor shall forthwith forward to the Engineer duly certified copies of the test results. If the Engineer has not attended the test, he shall accept the validity of the test readings.

20.4 Facilities for Testing

Where the Contract provides for tests on the premises of the Contractor or of any Sub-Contractor, the Contractor shall provide such assistance, labour materials, electricity, fuel, stores, apparatus and instruments as may be necessary to carry out the test efficiently.

20.5 Certificate of Testing

When Plant has passed the tests referred to in this Clause, the Engineer shall furnish to the Contractor a certificate or endorse the Contractor's test certificate to that effect.

21.1 Rejection

If, as a result of the inspection, examination or testing referred to in Clause 20, the Engineer decides that any Plant is defective or otherwise not in accordance with the Contract, he may reject such Plant and shall notify the Contractor thereof immediately. The notice shall state the Engineer's objections with reasons. The Engineer shall not reject any Plant for minor defects which do not affect the commercial operation of such Plant.

The Contractor shall then with all speed make good the defect or ensure that any rejected Plant complies with the Contract.

If the Engineer requires such Plant to be retested, the tests shall be repeated under the same terms and conditions. All costs incurred by the Employer by the repetition of the tests shall be deducted from the Contract Price.

22.1 Permission to Deliver

The Contractor shall apply in writing to the Engineer for permission to deliver any Plant or Contractor's equipment to the Site. No Plant or Contractor's Equipment may be delivered to the Site without the Engineer's written permission.

The Contractor shall be responsible for the reception on Site of the Plant and

Contractor's Equipment.

Suspension of Works, Delivery or Erection

23.1 Order to Suspend

The Engineer may at any time instruct the Contractor to:

(a) suspend progress of the Works, or

(b) suspend delivery of Plant or Contractor's Equipment which is ready for delivery to the Site at the time for delivery specified in the Programme, or if no time is specified, at the time appropriate for it to be delivered, or

(c) suspend the erection of Plant which has been delivered to the Site.

When the Contractor is prevented from delivering or erecting Plant in accordance with the Programme the Engineer shall be deemed to have instructed a suspension except when such prevention is caused by the Contractor's default.

The Contractor shall during suspension protect and secure the Works or Plant affected at the Contractor's works or elsewhere or at the Site, as the case may be, against any deterioration, loss or damage.

24.1 Cost of Suspension

The additional cost incurred by the Contractor in protection, securing and insuring the Works or Plant and in following the Engineer's instructions under Sub-Clause 23.1 and in resumption of the work, shall be added to the Contract Price.

The Contractor shall not be entitled to be paid any additional costs if such suspension is necessary by reason of a default on the part of the Contractor.

The Contractor shall not be entitled to additional costs unless he notifies the Engineer of his intention to make such claim, within twenty eight (28) days after receipt of the order to suspend progress or delivery or of the date of deemed suspension under Sub-Clause 23.1.

24.2 Payment in Event of Suspension

The Contractor shall be entitled to payment for Plant which has not been delivered to Site if the work on Plant or delivery of Plant has been suspended for more than twenty eight (28) days. After twenty eight (28) days of suspension, the Contractor shall be entitled to payment of the value of such Plant as at the date of suspension.

A certificate of payment shall be issued on condition that:

(a) the Contractor has marked the Plant as the Employer's property in accordance with the Engineer's instructions, and

(b) the suspension is not due to the Contractor's default.

24.3 Prolonged Suspension

If suspension under Sub-Clause 23.1. has continued for more than eighty four (84) days, and the suspension is not due to the Contractor's default, the Contractor may by notice to the Engineer require permission to proceed within twenty eight (28) days.

If permission is not granted within that time, the Contractor may treat the suspension as an omission under Clause 31 of the Section it affects, or if the suspension affects the whole of the Works, terminate the Contract and the provisions of Clause 46 shall apply.

24.4 Resumption of Work

If the Contractor chooses not to treat prolonged suspension as an omission or termination under Sub-Clause 24.3, the Employer shall upon the request of the Contractor, take over the responsibility for protection, storage, security and insurance of the suspended Works and the risk of loss or damage thereto shall thereupon pass to the Employer.

After receipt of permission or an order to proceed, the Contractor, shall after due notice to the Engineer, examine the Works and the Plant affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant that may have occurred during the suspension. Cost properly incurred by the Contractor which would not have been incurred but for the suspension shall be added to the Contract Price together with profit.

The Contractor shall not be entitled to payment for costs incurred in making good any deterioration, defect or loss caused by faulty workmanship or materials or by the Contractor's failure to take the measures specified in Sub-Clause 23.1.

If the Employer has taken over risk and responsibility for the suspended Works under this Sub-Clause, risk and responsibility shall revert to the Contractor fourteen (14) days after receipt of the permission or order to proceed.

Completion

25.1 Time for Completion

The Works shall be completed and shall have passed the Tests on Completion within the Time for Completion

26.1 Extension of Time for Completion

The Contractor may claim an extension of the Time for Completion if he is or will be delayed in completing the Works by any of the following causes:

(a) extra or additional work ordered in writing under Clause 31,

(b) exceptional adverse weather conditions,

(c) physical obstructions or conditions which could not reasonably have been foreseen by the Contractor,

(d) Employer's or Engineer's instructions, otherwise than by reason of the Contractor's default,

(e) the failure of the Employer to fulfil any of his obligations under the Contract,

(f) delay by any other contractor engaged by the Employer,

(g) any suspension of the Works under Clause 23, except when due to the Contractor's default,

(h) any industrial dispute,

(i) the Employer's Risks, or

(j) Force Majeure.

The Contractor shall give to the Engineer notice of his intention to make a claim for an extension of time within fourteen (14) days of the circumstances for such a claim becoming known to the Contractor. The notice shall be followed as soon as possible by the claim with full supporting details.

The Engineer shall, after due consultation with the Employer and the Contractor, grant the Contractor from time to time, either prospectively or retrospectively, such extension of Time for Completions as may be justified. The Engineer shall notify the Employer and the Contractor accordingly.

The Contractor shall be entitled to such extension whether the delay occurs before or after the Time for Completion.

26.2 Delays by Subcontractors

The Contractor shall be entitled to claim an extension of time if delay on the part of a Subcontractor is due to a cause mentioned in Clause 26.1 and such delay prevents the Contractor from meeting the Time for Completion.

26.3 Earlier Completion

The Employer may require completion of the Works or part thereof earlier than the Time for Completion, on the following conditions:

(a) The Employer and the Contractor shall first agree the extra sum to be paid for each day by which the Contractor completes the Works or part thereof earlier than the Time for Completion.

(b) The Contractor shall not become liable under Sub-Clause 27.1 for any failure to complete the Works or the part thereof by the earlier time.

27.1 Delay in Completion

If the Contractor fails to complete the Works within the Time for Completion, the Employer shall be entitled to a reduction in the Contract Price unless it can be reasonably concluded from circumstance that the Employer will suffer no loss.

The Employer shall within a reasonable time give the Contractor notice of his intention to claim a reduction.

The reduction shall be the percentage per day stated in the Preamble of that part of the Contract Price which is attributable to such part of the Works as cannot in consequence of the failure be put to the intended use. The reduction shall be computed for each day between the Time for Completion and the actual date of completion.

The reduction shall in no case exceed the maximum percentage of the Contract Price of such part stated in the Preamble.

Except as provided in Sub-Clause 27.2, such reduction shall be to the exclusion of any other remedy of the Employer in respect of the Contractor's failure to complete within the Time for Completion.

27.2 Prolonged Delay

If the Employer has become entitled to the maximum reduction under Sub-Clause 27.1 for any part of the Works, he may by notice require the Contractor to complete. Such notice shall fix a final time for completion which shall be reasonable.

If the Contractor fails to complete within such time, and this is not due to a cause for which the Employer or some other contractor employed by him is responsible, the Employer may by further notice to the Contractor either:

(a) require the Contractor to complete, or

(b) may himself complete at the Contractor's cost provided that he does so in a reasonable manner, or

(c) terminate the Contract.

If the Employer terminates the Contract, he shall be entitled to recover from the Contractor any loss he has suffered up to the maximum amount stated in the Preamble. If no maximum amount is stated, the Employer shall not be entitled to recover more than that part of the Contract Price which is attributable to that part of the Works which cannot by reason of the Contractor's failure be put to the intended use.

The Employer shall give credit for the value of any part of the Works which he retains.

Tests on Completion

28.1 Notice of Tests

The Employer shall give to the Engineer twenty one (21) days' notice of the date after which he will be ready to make the Tests on Completion (the Tests). Unless otherwise agreed, the Tests shall take place within fourteen (14) days after the said date on such day or days as the Engineer shall notify the Contractor.

28.2 Time for Tests

If the Engineer fails to appoint a time after having been asked to do so, or does not

attend at the time and place appointed, the Contractor shall be entitled to proceed with the Test in his absence. The Tests shall then be deemed to have been made in the presence of the Engineer and the results of the Tests shall be accepted as accurate.

28.3 Delayed Tests

If the Tests are being unduly delayed by the Contractor the Engineer may by notice require the Contractor to make the Tests within twenty one (21) days after the receipt of such notice. The Contractor shall make the Tests on such days within that period as the Contractor may fix and of which he shall give notice to the Engineer.

If the Contractor fails to make the Tests within twenty one (21) days the Engineer may himself proceed with the Tests. All Tests so made by the Engineer shall be at the risk and cost of the Contractor and the cost thereof shall be deducted from the Contract Price. The tests shall then be deemed to have been made in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

28.4 Facilities for Tests on Completion

Except where otherwise specified, the Employer shall provide free of charge such labour, materials, electricity, fuel, water, stores, apparatus and feedstock as may be reasonably required by the Contractor to carry out the Tests.

28.5 Retesting

If the Works or any Section fails to pass the Tests, the Engineer or the Contractor may require such Tests to be repeated on the same terms and conditions. All costs to which the Employer may be put by the repetition of the Tests under this Sub-Clause or under Sub-Clause 30.7 shall be deducted from the Contract Price.

28.6 Disagreement as to Result of Tests

If the Engineer and the Contractor disagree on the interpretation of the Test results, each shall give a statement of his views to the other within fourteen(14) days after such disagreement arises. The statement shall be accompanied by all relevant evidence.

28.7 Consequences of Failure to Pass Tests on Completion

If the Works or any Section fails to pass the Tests on the repetition thereof under Sub-Clause 28.5, the Engineer, after due consultation with the Employer and the Contractor, shall be entitled to:

(a) order one further repetition of the Tests under the conditions of Sub-Clause 28.5, or

(b) reject the Works or Section in which event the Employer shall have the same remedies against the Contractor as are provided under Sub-Clause 30.5 (c), or

(c) issue a Taking-Over Certificate, if the Employer so wishes, notwithstanding that the Works are not complete. The Contract Price shall then be reduced by such amount as may be agreed by the Employer and the Contractor or, failing agreement, as may be determined by arbitration.

28.8 Use by the Employer

In considering the results of Tests carried out under Sub-Clauses 29.3, 29.4 and 30.7, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the Certificate to the performance or other characteristics of the Works.

28.9 Test Certificate

As soon as the Works or any Section thereof has passed the Tests, the Engineer shall issue a Certificate to the Contractor and the Employer to that effect.

Taking Over

29.1 Taking Over

The Works shall be taken over by the Employer when they have been completed in accordance with the Contract, except in minor respects that do not affect the use of the Works for their intended purpose, have passed the Tests on Completion and a Taking-Over Certificate has been issued or deemed to have been issued in accordance with Sub-Clause 29.2.

29.2 Taking-Over Certificate

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than fourteen (14) days before the Works will in the Contractor's opinion be complete and ready for taking over under Sub-Clause 29.1.

The Engineer shall within twenty eight (28) days after the receipt of the Contractor's application either:

(a) issue the Taking-Over Certificate to the Contractor with a copy to the Employer stating the date on which the Works were complete and ready for taking over, or

(b) reject the application giving his reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of twenty eight (28) days he shall be deemed to have issued the Taking-Over Certificate on the last day of that period.

If the Works are divided by the Contract into Sections the Contractor shall be entitled to apply for separate Taking-Over Certificate for each such Section

29.3 Use before Taking Over

The Employer shall not use any part of the Works unless a Taking-Over Certificate has been issued in respect thereof.

If nevertheless the Employer uses any part of the Works, that part which is used shall be deemed to have been taken over at the date of such use. The Engineer shall on request of the Contractor issue a Taking-Over Certificate accordingly. If the Employer uses any part of the Works before taking over the Contractor shall be given the earliest

opportunity of taking such steps as may be necessary to carry out the Tests on Completion.

The provisions of Sub-Clause 27.1 shall not apply to any part of the Works while being so used by the Employer. Clause 30 shall apply as if the part had been taken over on the date it was taken into use.

29.4 Interference With Tests on Completion

If the Contractor is prevented from carrying out the Tests on Completion by a cause for which the Employer or the Engineer or other contractors employed by the Employer are responsible, the Employer shall be deemed to have taken over the Works on the date when the Tests on Completion would have been completed but for such prevention. The Engineer shall issue a Taking-Over Certificate accordingly.

The Works shall not be deemed to have been taken over if they are not substantially in accordance with the Contract.

If the Works are taken over under this Clause the Contractor shall nevertheless carry out the Tests on Completion during the Defects Liability Period. The Engineer shall require the Tests on Completion to be carried out by fourteen (14) days' notice and in accordance with the relevant provisions of Clause 28.

Any additional costs to which the Contractor may be put in making the Tests on Completion during the Defects Liability Period, shall be added to the Contract Price.

Defects after Taking Over

30.1 Defects Liability Period

Where any part of the Works is taken over separately from the Works the Defects Liability Period for that part shall commence on the date it was taken over.

30.2 Making Good Defects

The Contractor shall, subject to Sub-Clause 30.9, be responsible of making good any defect in or damage to any part of the Works which may appear or occur during the Defects Liability Period and which arises from, either:

(a) any defective materials, workmanship or design, or

(b) any act or omission of the Contractor during the Defects Liability Period.

The Contractor shall make good the Defects or damage as soon as practicable and at his own cost.

30.3 Notice of Defects

If any such defect appears or damage occurs, the Employer or the Engineer shall forthwith notify the Contractor thereof.

30.4 Extension of Defects Liability Period

The provision of this Clause shall apply to all replacements or renewals carried out by the Contractor as if the replacements and renewals had been taken over on the date they were completed.

The Defects Liability Period for the Works shall be extended by a period equal to the period during which the Works cannot be used by reason of a defect or damage. If only part of the Works cannot be used by reason of a defect, the Defect Liability Period shall be extended only for that part.

In neither case shall the Defects Liability Period be extended by more than one year.

When erection or delivery of Plant has been suspended under Sub-Clause 23.1, the Contractor's obligations under this Clause shall not apply to any defects occurring more than three years after it would have been delivered but for the suspension or such period as may be stated in Part II.

30.5 Failure to Remedy Defects

If the Contractor fails to remedy a defect or damage within a reasonable time, the Employer may fix a final time for remedying the defect or damage.

If the Contractor fails to do so, the Employer may:

(a) carry out the work himself or by others at the Contractor's risk and cost, provided that he does so in a reasonable manner. The costs properly incurred by the Employer in remedying the defect or damage shall be deducted from the Contract Price, but the Contractor shall have no responsibility for such work, or

(b) require the Contractor to grant the Employer a reasonable reduction in the Contract Price to be agreed or fixed by arbitration under Clause 50, or

(c) if the defect or damage is such that the Employer has been deprived of substantially the whole of the benefit of the Works or a part thereof, he may terminate the Contract in respect of such parts of the Works as cannot be put to the intended use. The Employer shall to the exclusion of any remedy under Clause 45 be entitled to recover all sums paid in respect of such parts of the Works together with the cost of dismantling the same, clearing the Site and returning Plant to the Contractor or otherwise disposing of it in accordance with the Contractor's instructions.

30.6 Removal of Defective Work

If the defect of damage is such that repairs cannot be expeditiously carried out on the Site, the Contractor may with the consent of the Engineer or the Employer remove from the Site for the purposes of repair any part of the Works which is defective or damaged.

30.7 Further Tests on Completion

If the replacements or renewals are such that they may affect the performance of the Works the Employer may request that Tests on Completion be repeated to the extent

necessary. The request shall be made by notice within twenty eight (28) days after the replacement or renewal. The Tests shall be carried out in accordance with Clause 28.

30.8 Right of Access

Until the Final Certificate of Payment has been issued, the Contractor shall have the right of access to all parts of the Works and to records of the working and performance of the Works.

Such right of access shall be during the Employer's normal working hours at the Contractor's risk and cost. Access shall also be granted to any duly authorized representative of the Contractor whose name has been communicated in writing to the Engineer.

Subject to the Engineer's approval, the Contractor may also at his own risk and cost make any tests which he considers desirable.

30.9 Defects in Employer's and Engineer's Designs

The Contractor shall not be liable for any defects resulting from designs furnished or specified by the Employer or the Engineer.

30.10 Contractor to Search

The Contractor shall, if required by the Engineer in writing, search for the cause of any defect, under the direction of the Engineer. Unless the defect is one for which the Contractor is liable under this Clause, the cost of the work carried out by the Contractor in searching for the cause of the defect shall be added to the Contract Price.

30.11 Defects Liability Certificate

When the Defects Liability Period for the Works or any part thereof has expired and the Contractor has fulfilled all his obligations under the Contract for defects in the Works or that part, the Engineer shall issue within twenty eight (28) days to the Employer and the Contractor a Defects Liability Certificate to that effect.

30.12 Exclusive Remedies

Except in the case of Gross Misconduct, the Employer's remedies under this Clause shall be in place of and to the exclusion of any other remedy in relation to defects whatsoever.

Variations

31.1 Engineer's Right to Vary

The Engineer may by Variation Order to the Contractor at any time before the Works are taken over, instruct the Contractor to alter, amend, omit, add to or otherwise vary any part of the Works.

The Contractor shall not vary or alter any of the Works, except in accordance with a Variation Order from the Engineer. The Contractor may, however, at any time propose

variations of the Works to the Engineer.

31.2 Variation Order Procedure

Prior to any Variation Order under Sub-Clause 31.1 the Engineer shall notify the Contractor of the nature and form of such variation.

As soon as possible after having received such notice, the Contractor shall submit to the Engineer:

(a) a description of work, if any, to be performed and a programme for its execution, and

(b) the Contractor's proposals for any necessary modifications to the Programme according to Sub-Clause 26.1 or to any of the Contractor’s obligations under the Contract, and

(c) the Contractor's proposals for adjustment to the Contract Price.

Following the receipt of the Contractor's submission the Engineer shall, after due consultation with the Employer and the Contractor, decide as soon as possible whether or not the variation shall be carried out.

If the Engineer decides that the variation shall be carried out, he shall issue a Variation Order clearly identified as such in accordance with the Contractor's submission or as modified by agreement. If the Engineer and the Contractor are unable to agree the adjustment of the Contract Price, the provisions of Sub-Clause 31.3 shall apply.

31.3 Disagreement on Adjustment of the Contract Price

If the Contractor and the Engineer are unable to agree on the adjustment of the Contract Price, the adjustment shall be determined in accordance with the rates specified in the Schedule of Prices.

If the rates contained in the Schedule of Price are not directly applicable to the specific work in question, suitable rates shall be established by the Engineer reflecting the level of pricing in the Schedule of Prices.

Where rates are not contained in the said Schedule, the amount shall be such as is in all the circumstances reasonable. Due account shall be taken of any over-or under-recovery of overheads by the Contractor in consequence of the variation.

The Contractor shall also be entitled to be paid:

(a) the cost of any partial execution of the Works rendered useless by any such variation,

(b) the cost of making necessary alterations to Plant already manufactured or in the course of manufacture or of any work done that has to be altered in consequence of such a variation,

(c) any additional costs incurred by the Contractor by the disruption of the progress

of the Works as detailed in the Programme, and

(d) the net effect of the Contractor's finance costs, including interest, caused by the variation.

The Engineer shall on this basis determine the rates or prices to enable on-account payment to be included in certificates of payment.

31.4 Contractor to Proceed

On receipt of a Variation Order, the Contractor shall forthwith proceed to carry out the variation and be bound to these Conditions in so doing as if such variation was stated in the Contract.

The work shall not be delayed pending the granting of an extension of the Time for Completion or an adjustment to the Contract Price under Sub-Clause 31.3.

31.5 Records of Costs

In any case where the Contractor is instructed to proceed with variation prior to the determination of the adjustment to the Contract Price in respect thereof the Contractor shall keep records of the cost of undertaking the variation and of time expended thereon. Such records shall be open to inspection by the Engineer at all reasonable times.

Ownership of Plant

32.1 Ownership of Plant

Plant to be supplied pursuant to the Contract shall become the property of the Employer at whichever is the earlier of the following times:

(a) when Plant is delivered to Site, or

(b) when by virtue of Sub-Clause 24.2 the Contractor becomes entitled to payment of the value of the Plant.

Certificates and Payment

33.1 Terms of Payment

The terms of payment shall be as stated in the Preamble.

33.2 Method of Application

Unless otherwise specified in Part II applications by the Contractor for payment shall be made to the Engineer as follows:

(a) in respect of the progress of the Works accompanied by such evidence of the value of the work done as the Engineer may require, and

(b) in respect of Plant shipped and en route to the Site identifying the Plant concerned and accompanied by such evidence of shipment and of payment of

freight and insurance and by such other documents as the Engineer may require, and

(c) for additional payment in accordance with Clause 34.

Any other application for payment shall state the amounts claimed and the detailed particulars in respect of which the application is made.

33.3 Issue of Certificate of Payment

Within twenty eight (28) days after receiving an application for payment which the Contractor was entitled to make the Engineer shall issue a Certificate of Payment to the Employer showing the amount due, with a copy to the Contractor.

A certificate of payment, other than the Final Certificate of Payment, shall not be withheld on account of:

(a) defects of a minor character which are not such as to affect the use of the Works, or

(b) any part of the payment applied for being disputed. In such case a certificate of payment for the undisputed amount shall be issued.

33.4 Corrections to Certificates of Payment

The Engineer may in any certificate of payment make any correction or modification that should properly be made in respect of any previous certificate.

33.5 Payment

Unless otherwise specified in Part II, the Employer shall pay the amount certified within twenty eight (28) days from the date of issue of each certificate of payment to the Contractor at his principal place of business.

33.6 Delayed Payment

If payment of any sum payable under Sub-Clause 33.5 is delayed, the Contractor shall be entitled to receive interest on the amount unpaid during the period of delay. Unless otherwise stated in Part II the interest shall be at the annual rate three percentage points above the discount rate of the central bank in the Contractor's country. The Contractor shall be entitled to such payment without formal notice and without prejudice to any other right or remedy.

33.7 Remedies on Failure to Certify or Make Payment

The Contractor shall be entitled to stop the Works by giving twenty one (21) days' notice to the Engineer and the Employer, if either:

(a) the Engineer fails to issue a certificate of payment upon proper application by the Contractor, or

(b) the Employer fails to make any payment as provided in this Clause.

The cost to the Contractor together with profit occasioned by the stoppage and the subsequent resumption of work, shall be added to the Contract Price.

The Contractor shall also be entitled to terminate the Contract by giving forty two (42) days' notice to the Engineer and the Employer in any case where the Engineer has failed to issue a certificate of payment upon proper application by the Contractor.

33.8 Payment by Measurement

For any part of the Works which is to be paid according to quantity supplied or work done, the provisions for measurement shall be stated in Part II.

33.9 Application for Final Certificate of Payment

The Contractor shall make application to the Engineer for the Final Certificate of Payment within forty two (42) days after the issue of the Defect Liability Certificate, or if more than one, the last Defect Liability Certificate.

The application for the Final Certificate of Payment shall be accompanied by a final account prepared by the Contractor. The final account shall give full details of the value of all Plant supplied and work done under the Contract together with:

(a) such additions to or deductions from the Contract Price as have been agreed, and

(b) all claims for additional payment to which the Contractor may consider himself entitled.

33.10 Issue of Final Certificate of Payment

The Engineer shall issue to the Employer with a copy to the Contractor, the Final Certificate of Payment within twenty eight 28 days after receiving an application in accordance with Sub-Clause 33.9.

If the Contractor has not applied for a Final Certificate of Payment within the time specified in Sub-Clause 33.9 the Engineer shall request the Contractor to do so within a further period of twenty eight 28 days. If the Contractor fails to make such an application, the Engineer shall issue the Final Certificate of Payment for such amount as he deems correct.

33.11 Final Certificate of Payment Conclusive

A Final Certificate of Payment shall be conclusive evidence of the value of the Works, that the Works are in accordance with the Contract and that the Contractor has performed all his obligations under the Contract.

Payment of the amount certified in the Final Certificate of Payment shall be conclusive evidence that the Employer has performed all his obligations under the Contract.

A Final Certificate of Payment or payment shall not be conclusive:

(a) to the extent that fraud or dishonesty relates to or affects any matter dealt with in the certificate, or

(b) if any arbitration or court proceedings under the Contract have been commenced by either party before the expiry of 84 days after the issue of the Final Certificate of Payment.

Claims

34.1 Procedure

In any case where under these Conditions there are circumstances which the Contractor considers entitle him to claim additional payment, the Contractor shall:

(a) if he intends to make any claim for additional payment give to the Engineer notice of his intention to make such claim within twenty eight (28) days after the said circumstances became known to the Contractor stating the reasons for his claim, and

(b) as soon as reasonably practical after the date of such notice submit to the Engineer full and detailed particulars of his claim but not later than one hundred and eighty two (182) days after such notice unless otherwise agreed by the Engineer. In any event such particulars shall be submitted no later than the application for the Final Certificate of Payment. The Contractor shall thereafter promptly submit such further particulars as the Engineer may reasonably require to assess the validity of the claim.

34.2 Assessment

When the Engineer has received full and detailed particulars of the Contractor's claim in accordance with Sub-Clause 34.1 and such further particulars as he may reasonably have required he shall after due consultation with the Employer and the Contractor determine whether the Contractor is entitled to additional payment and notify the parties accordingly.

The Engineer may reject any claim for additional payment which does not comply with the requirements of Sub-Clause 34.1.

Foreign Currency and Rates of Exchange

35.1 Payment in Foreign Currencies

Arrangements for payment in foreign currencies shall be as stated in the Preamble.

35.2 Currency Restrictions

The Employer shall reimburse the Contractor for any loss arising from:

(a) currency restrictions, and

(b) restrictions on the transfer of currency in which the Contractor is to be paid which are imposed by the government or authorized agency of the government of the country from which any payments under the Contract are to be made.

This Sub-Clause only applies to restrictions imposed after the date 28 days prior to the latest date for submission of tenders for the Works.

35.3 Rates of Exchange

Where the Contract provides for payment in Foreign Currency the rates of exchange between the currencies shall be fixed for the purpose of the Contract and shall be as stated in the Preamble.

If such rates of exchange are not stated in the Preamble the rates to be used shall be those quoted by the central bank of the country whose currency is to be sold 28 days or the nearest day thereto prior to the latest date for submission of tenders for the Works.

Provisional Sums

36.1 Use of Provisional Sums

A Provisional Sum shall only be used, in whole or in part in accordance with the Engineer's instructions.

The total sum paid to the Contractor shall include only such amounts in respect of work, supplies or services to which such Provisional Sums relate as the Engineer shall have instructed.

36.2 Ordering Work against Provisional Sums

In respect of every Provisional Sum the Engineer may after due consultation with the Employer and the Contractor order:

(a) work to be executed, including goods, materials or services to be supplied by the Contractor. The value of such work executed, determined in accordance with Clause 31, shall be paid to the Contractor in accordance with Clause 33, and

(b) goods and materials to be purchased by the Contractor, for which payment will be made in accordance with Sub-Clause 36.4.

36.3 Invoices and Receipts

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums.

36.4 Payment against Provisional Sums

For all work executed or goods, materials or services supplied or purchased by the Contractor under Sub-Clause 36.2(b), there shall be included in the sums paid to the Contractor:

(a) the actual price paid or due to be paid by the Contractor, and

(b) in respect of all other charges and profit, a percentage of the actual price paid or

due to be paid. Such percentage shall be as stated in the Preamble.

Risk and Responsibility

37.1 Allocation of Risk and Responsibility

The Risks of loss of or damage to physical property and of death and personal injury which arise in consequence of the performance of the Contract shall be allocated between the Employer and the Contractor as follows:

(a) the Employer: the Employer’s Risks as specified in Sub-Clause 37.2

(b) the Contractor: the Contractor's Risks as specified in Sub-Clause 37.3.

37.2 Employer's Risks

The Employer's Risks are:

(a) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,

(b) rebellion, revolution, insurrection, military or usurped power or civil war insofar as it relates to the country in which the Works are located or countries through which plant must be transported,

(c) ionising radiation or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosives or other hazardous properties of any explosive nuclear assembly or nuclear components thereof,

(d) pressure waves caused by aircraft travelling at sonic or supersonic speed,

(e) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors,

(f) use or occupation of the Works or any part thereof by the Employer,

(g) fault, error, defect or omission in the design of any part of the Works by the Engineer, Employer or those for whom the Employer is responsible,

(h) the use or occupation of the Site by the Works or any part thereof, or for the purposes of the Contract; or interference, whether temporary or permanent with any right of way, light, air or water or with any easement, wayleaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract,

(i) the right of the Employer to construct the Works or any part thereof on, over, under, in or through any land,

(j) damage (other than that resulting from the Contractor's method of construction) which is the inevitable result of the construction of the Works in accordance with the Contract,

(k) the act, neglect or omission or breach of contract or of statutory duty of the Engineer, the Employer or other contractors engaged by the Employer or of their respective employees or agents,

and all risks which an experienced contractor could not have foreseen or, if foreseeable, against which measures to prevent loss, damage or injury from occurring could not reasonably have been taken by such contractor.

37.3 Contractor's Risks

The Contractor's Risks are all risks other than those identified as the Employer's Risks.

Care of the Works and Passing of Risk

38.1 Contractor's Responsibility for the Care of the Works

The Contractor shall be responsible for the care of the Works or any Section thereof from the Commencement until the Risk Transfer Date applicable thereto under Sub-Clause 38.2.

The Contractor shall also be responsible for the care of any part of the Works upon which any outstanding work is being performed by the Contractor during the Defects Liability Period until completion of such outstanding work.

38.2 Risk Transfer Date

The Risk Transfer Date in relation to the Works or a Section thereof is the earliest of either:

(a) the date of issue of the Taking-Over Certificate, or

(b) the date when the Engineer is deemed to have issued the Taking Certificate or the Works are deemed to have been taken over in accordance with Clause 29, or

(c) the date of expiry of the notice of termination when the Contract is terminated by the Employer or the Contractor in accordance with these Conditions.

39.1 Passing of Risk of Loss of or Damage to the Works

The risk of loss of or damage to the Works or any Section thereof shall pass from the Contractor to the Employer on the Risk Transfer Date applicable thereto.

39.2 Loss or Damage Before Risk Transfer Date

Loss of or damage to the Works or any Section thereof occurring before the Risk Transfer Date shall:

(a) to the extent caused by any of the Contractor's Risks, be made good forthwith by the Contractor at his own cost, and

(b) to the extent caused by any of the Employer's Risks, be made good by the Contractor at the Employer's expense if so required by the Engineer within twenty eight (28) days after the occurrence of the loss or damage. The price for

making good such loss and damage shall be in all circumstances reasonable and shall be agreed by the Employer and the Contractor, or in the absence of agreement, shall be fixed by arbitration under Clause 50.

39.3 Loss or Damage After Risk Transfer Date

After the Risk Transfer Date, the Contractor's liability in respect of loss of or damage to any part of the Works shall, except in the case of Gross Misconduct, be limited:

(a) to the fulfillment of the Contractor's obligations under Clause 30 in respect of defects therein, and

(b) to making good forthwith loss or damage caused by the Contractor during the Defects Liability Period.

Damage to Property and Injury to Persons

40.1 Contractor's Liability

Except as provided under Sub-Clause 41.1, the Contractor shall be liable for and shall indemnify the Employer against all losses, expenses and claims in respect of any loss of or damage to physical property (other than the Works), death or personal injury occurring before the issue of the last Defects Liability Certificate to the extent caused by:

(a) defective design, material or workmanship of the Contractor, or

(b) negligence or breach of statutory duty of the Contractor, his Subcontractors or their respective employees and agents.

40.2 Employer's Liability

The Employer shall be liable for and shall indemnify the Contractor against all losses, expenses or claims in respect of loss of or damage to any physical property or of death or personal injury whenever occurring, to the extent caused by any of the Employer's Risks.

41.1 Accidents

The Contractor shall be liable for and shall indemnify the Employer against all losses, expenses or claims arising in connection with the death of or injury to any person employed by the Contractor or his Subcontractors for the purposes of the Works, unless caused by any acts or defaults of the Engineer, the Employer, or other contractors engaged by the Employer or by their respective employees or agents. In the latter cases the Employer shall be liable for and shall indemnify the Contractor against all losses, expenses and claims arising in connection therewith.

Limitations of Liability

42.1 Liability for Indirect or Consequential Damage

Neither party shall be liable to the other for any loss of profit, loss of use, loss of

production, loss of contracts or for any other indirect or consequential damage that may be suffered by the other, except:

(a) as expressly provided in Clause 27, and

(b) those provisions of these Conditions whereby the Contractor is expressly entitled to receive profit.

42.2 Maximum Liability

The liability of the Contractor to the Employer under these Conditions shall in no case exceed the sum stated in the Preamble or, if no such sum is stated, the Contract Price.

42.3 Liability after Expiration of Defects Liability Period

The Contractor shall have no liability to the Employer for any loss of or damage to the Employer's physical property which occurs after the expiration of the Defects Liability Period unless caused by Gross Misconduct of the Contractor.

42.4 Exclusive Remedies

The Employer and the Contractor intend that their respective rights, obligations and liabilities as provided for in these Conditions shall alone govern their rights under the Contract and in relation to the Works.

Accordingly, the remedies provided under the contract in respect of or in consequence of:

(a) any breach of contract, or

(b) any negligent act or omission, or

(c) death or personal injury, or

(d) loss or damage to any property

are, save in the case of Gross Misconduct, to be to the exclusion of any other remedy that either may have against the other under the law governing the Contract or otherwise.

42.5 Mitigation of Loss of Damage

In all cases the party claiming a breach of Contract or a right to be indemnified in accordance with the Contract shall be obliged to take all reasonable measures to mitigate loss or damage which has occurred or may occur.

42.6 Foreseen Damage

Where either the Employer or the Contractor is liable in damages to the other these shall not exceed the damage which the party in default could reasonably have foreseen at the date of the Contract.

Insurance

43.1 The Works

The Contractor shall insure the Works in the joint names of the Contractor and the Employer to their full replacement value with deductible limits not exceeding those stated in the Preamble.

(a) from the Commencement Date until the Risk Transfer Date against any loss or damage caused by any of the Contractor's Risks and any other risks specified in the Preamble, and

(b) during the Defects Liability period against any loss or damage which is caused either:

(i) by the Contractor in completing any outstanding work or complying with his obligations under Clause 30, or

(ii) by any of the Contractor's Risks which occurred prior to the Risks Transfer Date.

43.2 Contractor's Equipment

The Contractor shall insure Contractor's Equipment for its full replacement value whilst in transit to the Site, from commencement of loading until completion of unloading at the Site and while on the Site against all loss or damage caused by any of the Contractor's Risks.

43.3 Third Party Liability

The Contractor shall insure against liability to third parties for any death or personal injury and loss of or damage to any physical property arising out of the performance of the Contract and occurring before the issue of the last Defects Liability Certificate.

Such insurance shall be effected before the Contractor begins any work on the Site. The insurance shall be for not less than the amount specified in the Preamble.

43.4 Employees

The Contractor shall insure and maintain insurance against his liability under Sub-Clause 41.1.

43.5 General Requirements of Insurance Policies

The Contractor shall:

(a) whenever required by the Employer produce the policies or certificates of any insurance which he is required to effect under the Contract together with receipts for the premiums,

(b) effect all insurances for which he is responsible with an insurer and in terms approved by the Employer,

(c) make no material alterations to the terms of any insurance without the Employer's approval. If an insurer makes any material alteration to the terms the Contractor shall forthwith notify the Employer, and

(d) in all respect comply with any conditions stipulated in the insurance policies which he is required to place under the Contract.

43.6 Permitted Exclusions from Insurance Policies

The insurance cover affected by the Contractor may exclude any of the following:

(a) the cost of making good any part of the Works which is defective or otherwise does not comply with the Contract provided that it does not exclude the cost of making good any loss or damage to any other part of the Works attributable to such defect or non-compliance,

(b) indirect or consequential loss of damage including any reductions in the Contract Price for delay,

(c) wear and tear, shortages and theft, or

(d) risks relating to vehicles for which third party or other insurance is required by law.

43.7 Remedies on the Contractor's Failure to Insure

If the Contractor fails to produce evidence of insurance cover as stated in Sub-Clause 43.5 (a) then the Employer may effect and keep in force such insurance. Premiums paid by the Employer for this purpose shall be deducted from the Contract Price.

43.8 Amounts not Recovered

Any amounts not recovered from the insurers shall be borne by the Employer or Contractor in accordance with their responsibilities under Clause 37.

Force Majeure

44.1 Definition of Force Majeure

Force Majeure means any circumstances beyond the control of the parties, including but not limited to:

(a) War and other hostilities, (whether war be declared or not), invasion, act of foreign enemies, mobilization, requisition or embargo,

(b) Ionizing radiation or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosives, or other hazardous properties of any explosive nuclear assembly or nuclear components thereof,

(c) rebellion, revolution, insurrection, military or usurped power and civil war,

(d) riot, commotion or disorder, except where solely restricted to employees of the

Contractor.

44.2 Effect of Force Majeure

Neither party shall be considered to be in default or in breach of his obligations under the Contract to the extent that performance of such obligations is prevented by any circumstances of Force Majeure which arise after the date of the Letter of Acceptance or the date when the Contract becomes effective, whichever is the earlier.

44.3 Notice of Occurrence

If either party considers that any circumstances of Force Majeure have occurred which may affect performance of his obligations he shall promptly notify the other party and the Engineer thereof.

44.4 Performance to Continue

Upon the occurrence of any circumstances of Force Majeure the Contractor shall endeavour to continue to perform his obligations under the Contract so far as reasonably practicable. The Contractor shall notify the Engineer of the steps he proposes to take including any reasonable alternative means for performance which is not prevented by Force Majeure. The Contractor shall not take any such steps unless directed so to do by the Engineer.

44.5 Additional Costs caused by Force Majeure

If the Contractor incurs additional costs in complying with the Engineer's directions under Sub-Clause 44.4, the amount thereof shall be certified by the Engineer and added to the Contract Price.

44.6 Damage Caused by Force Majeure

If in consequence of Force Majeure the Works shall suffer loss or damage the Contractor shall be entitled to have the value of the work done, without regard to the loss or damage that has occurred, included in a Certificate of Payment.

44.7 Termination in Consequence of Force Majeure

If circumstances of Force Majeure have occurred and shall continue for a period of one hundred and eighty two (182) days then, notwithstanding that the Contractor may by reason thereof have been granted an extension of Time for Completion of the Works, either party shall be entitled to serve upon the other twenty eight (28) days' notice to terminate the Contract. If at the expiry of the period of twenty eight (28) days Force Majeure shall still continue the Contract shall terminate.

44.8 Payment on Termination for Force Majeure

If the Contract is terminated under Sub-Clause 44.7 the Contractor shall be paid the value of the work done.

The contractor shall also be entitled to receive:

(a) the amounts payable in respect of any preliminary items so far as the work or service comprised therein has been carried out and a proper proportion of any such item in which the work or service comprised has only been partially carried out,

(b) the cost of materials or goods ordered for the Works or for use in connection with the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery. Such materials or goods shall become the property of and be at the risk of the Employer when paid for by the Employer and the Contractor shall place the same at the Employer's disposal,

(c) the amount of any other expenditure which in the circumstances was reasonably incurred by the Contractor in the expectation of completing the whole of the Works,

(d) the reasonable cost of removal of Contractor's Equipment from the Site and the return thereof to the Contractor's works in his country or to any other destination at no greater cost, and

(e) the reasonable cost of repatriation of the Contractor's staff and workmen employed wholly in connection with the Works at the date of such termination.

44.9 Release from Performance

If circumstances of Force Majeure occur and in consequence thereof under the law governing the Contract the parties are released from further performance of the Contract, the sum payable by the Employer to the Contractor shall be the same as that which would have been payable under Sub-Clause 44.8 if the Contract had been terminated under Sub-Clause 44.7.

44.10 Force Majeure Affecting Engineer's Duties

The provisions of Clause 44 shall also apply in circumstances where the Engineer is prevented from performing any of his duties under the Contract by reason of Force Majeure.

Default

45.1 Notice of Default

If the Contractor is not executing the Works in accordance with the Contract or is neglecting to perform his obligations thereunder so as seriously to affect the carrying out of the Works, the Engineer may give notice to the Contractor requiring him to make good such failure or neglect.

45.2 Contractor's Default

If the Contractor:

(a) has failed to comply within a reasonable time with a notice under Sub-Clause 45.1, or

(b) assigns the Contract or subcontracts the whole of the Works without the Employer's written consent, or

(c) becomes bankrupt or insolvent, has a receiving order made against him or compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors or goes into liquidation.

The Employer may, after having given seven (7) days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site.

Any such expulsion and termination shall be without prejudice to any other rights or powers of the Employer, the Engineer or the Contractor under the Contract.

The Employer may upon such termination complete the Works himself or by any other contractor.

45.3 Valuation at Date of Termination

The Engineer shall, as soon as possible after such termination, certify the value of the Works and all sums then due to the Contractor as at the date of termination in accordance with Clause 33.

45.4 Payment after Termination

The Employer shall not be liable to make any further payments to the Contractor until the Works have been completed. When the Works are so complete, the Employers shall be entitled to recover from the Contractor the extra costs, if any, of completing the Works after allowing for any sum due to the Contractor under Sub-Clause 45.3. If there is no such extra cost the Employer shall pay any balance due to the Contractor.

45.5 Effect on Liability for Delay

The Contractor's liability under Clause 27 shall immediately cease when the Employer expels him from the Site without prejudice to any liability thereunder that may have already occurred.

46.1 Employer's Default

The Contractor may, by giving fourteen (21) days notice to the Employer and the Engineer, terminate the Contract if the Employer:

(a) fails to pay the Contractor the amount due under any certificate of the Engineer within twenty eight (28) days after the amount became payable, or

(b) interferes with or obstructs the issue of any certificate of the Engineer, or

(c) becomes bankrupt or insolvent, has a receiving order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors or goes into liquidation, or goes into liquidation, or

(d) consistently fails to meet his contractual obligations, or

(e) appoints, a person to act with or in replacement of the Engineer without the Contractor's consent.

Any such termination shall be without prejudice to any other rights of the Contractor under the Contract.

46.2 Removal of Contractor's Equipment

On such termination, the Contractor shall be entitled to remove immediately all Contractor's Equipment which is on the Site.

46.3 Payment on Termination for Employer's Default

In the event of such termination the Employer shall pay the Contractor an amount calculated in accordance with Sub-Clause 44.8.

The Employer shall pay in addition the amount of any loss or damage, including loss of profit which the Contractor may have suffered in consequence of termination. The additional amount shall, however, not exceed the limit specified in the Preamble.

Change in Cost and Legislation

47.1 Labour, Materials and Transport

Where the Contract Price is to be adjusted for changes in the cost of labour, materials, transport or other costs of execution of the Works, the method for calculating such adjustment shall be specified in the Preamble.

When calculating the adjustment no account shall be taken of any increased cost which results from the Contractor's default or negligence.

47.2 Statutory and Other Regulations

The Contract Price shall be adjusted to take account of any increase or decrease in cost resulting from changes in legislation of the country where the Site is located or in its generally accepted interpretation.

Legislation means any law, order, regulation or bye-law having the force of law, which affects the Contractor in the performance of his obligations under the Contract, made after the date 28 days prior to the latest date for submission of tenders for the Works.

The Engineer shall certify the amount of the resulting increase or decrease in cost, which shall be added to or deducted from the Contract Price.

Customs

48.1 Customs and Import Duties

Unless otherwise stated in Part II the Employer shall pay all customs, import duties and taxes in consequence of the importation of Plant. If the Contractor is required to pay such customs, import duties and taxes, the Employer shall reimburse the amount thereof.

48.2 Clearance through Customs

The Employer shall assist the Contractor in obtaining clearance through the customs of all Plant and Contractor's Equipment and in procuring any necessary government consent to the re-export of Contractor's Equipment when it is removed from the Site.

Notices

49.1 Notices to Contractor

All certificates, notices or written orders to be given to the Contractor by the Employer or the Engineer under these Conditions shall be sent by airmail post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or such other address as the Contractor shall nominate for that purpose, or may be handed over to the Contractor's representative.

49.2 Notice to Employer and Engineer

Any notice to be given to the Employer or to the Engineer under these Conditions shall be sent by airmail post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in the Preamble, or handed over to the Engineer's or the Employer's representative authorized to receive it.

49.3 Minutes of Meetings

Instructions or notices to the Contractor and notices from the Contractor to the Engineer or the Employer recorded in a minute or protocol signed by the authorized representatives of the giver and recipient of such notice or instruction shall be valid notice or instruction for the purposes of the Contract.

Disputes and Arbitration

50.1 Disputes concerning Engineer's Decisions

If either party is dissatisfied with a decision or instruction of the Engineer as confirmed, reversed or varied in accordance with Clause 2 he may refer the matter to arbitration pursuant to Sub-Clause 50.2.

Unless the dissatisfied party has notified the other party and the Engineer within fifty six (56) days of such decision or instruction of his intention to refer the matter to arbitration, he shall be deemed to have accepted the decision as final.

Reference to arbitration shall not relieve the Contractor of his obligation to proceed with the Works in accordance with the Engineer's decision or instruction, nor relieve the Employer of any of his obligations under the Contract.

The Contractor shall in any such arbitration be at liberty to rely on reasons additional to the reasons stated in the notice given under Sub-Clause 2.7.

50.2 Arbitration

If at any time any question, dispute or difference shall arise between the Employer and

the Contractor in connection with or arising out of the Contract or the carrying out of the Works either party shall be entitled to refer the matter to be finally settled by arbitration in accordance with the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with those Rules, or by arbitration in accordance with such other rules as are specified in Part II.

The Arbitrators(s) shall have full power to open up, review and revise:

(a) any decision or instruction of the Engineer referred to arbitration pursuant to Sub-Clause 50.1, and

(b) any certificate of the Engineer related to the dispute.

50.3 Works to Continue

Performance of the Contract shall continue during arbitration proceedings unless the Employer shall order suspension. If any such suspension is ordered the reasonable costs incurred by the Contractor and occasioned thereby shall be added to the Contract Price.

No payments due or payable by the Employer shall be withheld on account of pending reference to arbitration.

50.4 Time Limit for Arbitration

Formal notice of arbitration must be given to the other party, and where required to the appropriate arbitration body, no later than eighty four (84) days after the issue of the Final Certificate of Payment

Law and Procedure

51.1 Applicable Law

The law which is to apply to the Contract and under which the Contract is to be construed is stated in the Preamble.

51.2 Procedural Law

The law governing the procedure and administration of any arbitration instituted pursuant to Clause 50 is stated in the Preamble.

51.3 Language

The language and place of the arbitration are stated in the Preamble.

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EDITORIAL AMENDMENTS

Following publication of the Third Edition of the Conditions of Contract for Electrical and Mechanical Works in 1987, a number of editorial amendments were agreed by FIDIC. The amendments have been incorporated during reprinting and the list below clarifies the differences between this copy and the original document.

Page 1	The following additional text has been inserted:
Commencement date	Sub-Clause 1.1.1.(i) The date for commencement of the Works is _____
Page 2	Sub-Clause 36.4(b) was previously Sub-Clause 36.4
	The word ‘Sums’ following ‘ shall be’ has been deleted.
Page 8	Sub-Clause 2.7. The missing letter ‘D’ has been inserted in ‘Disputing’ (margin note.)
Page 33	Sub-Clause 44.8(b). The word ‘Contractor’ on the last line was previously ‘Contract’.
Page 35	Sub-Clause 49.3. The word ‘or’ between ‘minute’ and ‘protocol’ was previously ‘of’.
Index, page (i)	The words ‘Adverse physical conditions and artificial obstructions’ have been deleted.
Index, page (v)	The word ‘adverse’ has been deleted after ‘Physical conditions’.
Contract Agreement	The word ‘Agreement’ in the title has been capitalized.
Line 4	Inverted commas have been inserted after ‘Employer’.
Line 6	Inverted commas have been inserted before the word ‘the’ and deleted before the word ‘Contractor’.
Line 7	The comma following the word ‘executed’ has been deleted.
Line 15	Inverted commas have been inserted before the word ‘the’ and deleted after the word ‘the’.
Item 4, line 2	The word ‘defects’ was previously ‘defect’.
Item 4, line 3	The words ‘become’ was previously ‘become’.
Item 5, line 1	The words ‘and statutes or constitutions’ have been inserted after the word ‘laws’.
Item 5, line 2	The words ‘by their duly authorized signatories’ have been inserted after the word ‘hereof’.

Item 5	The remaining text of the original document has been deleted and is replaced by: ‘Binding Signatures(s) on behalf of the Employer _____, and ‘Binding Signatures(s) on behalf of the Contractor _____,

PARTICULAR CONDITIONS
OF
CONTRACT

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PART-II: PARTICULAR CONDITIONS OF CONTRACT

These Conditions of Particular Application Part-II are additions, deletions and amendment to General Conditions of Contract Part-I. Clause Nos., if similar as of Part-I are amendments therein otherwise these are additional clauses or sub-clauses thereto.

This Contract is a single responsibility EPC/Turnkey Contract for all the purposes. Any mentions or descriptions and intents in this Contract Agreement which are contrary to the spirit of EPC/Turnkey Contract shall be ignored.

1.1 Definitions

The text of Sub-Clause 1.1.1 is deleted and substituted by the following:

"Commencement Date" means the date specified in the Preamble to Conditions of Contract.

The text of Sub-Clause 1.1.2 is deleted and substituted by the following:

"Conditions" means the Preamble to Conditions of Contract, General Conditions of Contract (GCC) and Particular Conditions of Contract (PCC).

Sub-Clause 1.1.3

At the end of Sub-Clause, the following is added:

"Any subsequent document mutually agreed and signed by the Employer and the Contractor, shall be the part of the Contract."

Sub-Clause 1.1.5

The text of Sub-Clause 1.1.5 is deleted and substituted by the following:

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

Sub-Clause 1.1.11

The Defects Liability Period is the period mentioned in the Preamble to Conditions of Contract.

Sub-Clause 1.1.15

The following is added at the beginning of this Sub-Clause:
"For the purpose of this EPC/Turnkey Contract, based on two party agreement, the term Engineer is construed as Project Manager/Engineer. The Project Manager is a Person appointed by the Employer to act on behalf of the Employer for the purpose of the Contract whereas the Engineer has the same meaning as defined in GCC Sub-Clause 1.1.15."

The following is added at the end of the Sub-Clause:
"or any other competent person appointed by the Employer as his replacement."

Sub-Clause 1.1.16

The term "Engineer's Representative" is replaced with the term "Project Manager/Engineer's Representative".

Sub-Clause 1.1.23

The following paragraph is added:

The word 'Good' is synonymous with the word "Plant".

The text of **Sub-Clause 1.1.27** is deleted and substituted by the following:

"Schedule of Prices" means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Bid or revised and mutually agreed and forming a part of the Contract Documents.

Add the following at the end of Sub-Clause 1.1.33:

The word "Tender" is synonymous with the word "Bid" and the word 'Tender Documents' with "Bidding Documents" including technical bid is also part of it.

The following new Sub-Clauses 1.1.38 to 1.1.49 are added:

1.1.38 "Month" means calendar month according to Gregorian calendar.

1.1.39 "Operation and Maintenance Manuals" has the meaning described in Sub-Clause 6.6."

1.1.40 "Warranty Certificate" means the certificate against specified goods/equipment, for the period mentioned in the Preamble to Conditions of Contract, to be issued by the Contractor that the goods/equipment supplied under the Contract are new, unused and incorporate all recent improvements in design and materials unless provided otherwise in the Contract and that the Contractor will be responsible for making good or replacing any defective goods/equipment during the Warranty Period specified in the Preamble to Conditions of Contract which should commence after expiry of Defect Liability Period.

Sub-Clause 1.1.41

The word 'Part II' wherever appearing in FIDIC Conditions of Contract is synonymous with the words "Particular Conditions of Contract".

Sub-Clause 1.1.42

The words 'Local Goods' is synonymous with the words "Indigenous Goods" and the word 'Installation' with "Erection".

Sub-Clause 1.1.43

"EPC/Turnkey Basis" means where the Contractor takes total responsibility for design and execution of the project with little involvement of the Employer. Under the usual arrangements of turnkey projects the contractor carries out all the Engineering, Procurement and Construction (EPC) providing a fully equipped facility ready for operation.

Total responsibility of the Contractor include; but not limited to; design, supply, installation and commissioning of all mechanical and electrical equipment, civil and other works necessary for the completion and commercial operation of the Plant and shall include all such items of Plant and equipment or work, whether mentioned in the Specifications, Bid drawings, Schedule of Prices or not, which are required to make the Plant operationally complete in accordance with the guarantees prescribed under the Contract

Sub-Clause 1.1.44

"Constructional Plant" means all appliances or things of whatsoever nature (other than Temporary Works) required for execution and completion of the Works and the remedying of any defects therein but does not include Plant, materials or other things intended to form or forming part of Permanent Works. The word 'Constructional Plant' is synonymous with "Contractor's Equipment".

Sub-Clause 1.1.45

"Contractor's Agent" means the person for the time being or from time to time appointed by the Contractor pursuant to the provisions of Clause 13. The word "Contractor's Agent" is synonymous with "Contractor's Representative".

Sub-Clause 1.1.46

"Performance Tests" means tests intended to demonstrate the attainment of guaranteed contract performance to be conducted in accordance with the requirement of the Specifications.

Sub-Clause 1.1.47

"Reliability Test" means such test or tests as are provided for in the Contract, or as may be agreed upon, which shall be successfully completed as a pre-requisite to Taking Over.

Sub-Clause 1.1.48

"Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.

Sub-Clause 1.1.49

"Permanent Works" means the permanent works to be executed (including Plant) in accordance with the Contract.

Sub-Clause 1.6 Costs, Overhead Charges and Profit

The last sentence "Any profit _____ stated in the Preamble" is deleted and substituted by the following:
"Any profit entitlement shall be added to cost at the percentage stated in the Bid and agreed in the Contract Agreement."

Sub-Clause 2.1 Project Manager/Engineer's Duties

The text of Sub-Clause 2.1 is deleted and substituted by the following:

“The Project Manager/Engineer shall carry out the duties specified in the Contract.

The Project Manager/Engineer may exercise the authority attributable to the Project Manager/Engineer as specified in or necessarily to be implied from the Contract. The Project Manager/Engineer is required to obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses of General Conditions of Contract (GCC):

(a) approval of Subcontractor under Sub-Clause 4.1,

(b) certifying additional sums under Sub-Clause 5.4,

(c) certifying additional costs under Sub-Clauses 11.3 & 12.3,

(d) certifying any cost under Sub-Clause 14.6,

(e) approval of extension of time under Clause 26,

(f) issuing a Taking–Over Certificate under Sub-Clause 29,

(g) issuing a Defects Liability Certificate under Sub-Clause 30.11,

(h) issuing a Variation Order under Clause 31,

(i) fixing rates or prices under Clauses 31 and 34,

(j) certifying additional costs under Sub-Clause 44.5 and

(k) certifying additional costs under Sub-Clause 47.2;

Except for such variations pursuant to Sub-Clause 31.1 of the GCC which may be necessary in an emergency affecting safety of life, the Works or of adjoining property.

Except as expressly stated in the Contract, the Project Manager/Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.”

Sub-Clause 2.6 Confirmation in Writing

(i) In line 3 after the words “undue delay” the following is added:
“but not after the number of days mentioned in the Preamble to Conditions of Contract from the instruction or decision”.

(ii) At the end of Sub-Clause 2.6, the following is added:

"The Project Manager/Engineer shall confirm or otherwise within the period mentioned in the Preamble to Conditions of Contract from the receipt of requirement(s) from the Contractor”.

Sub-Clause 2.8 Replacement of Project Manager/Engineer

The text of Sub-Clause 2.8 is deleted in its entirety and substituted by the following:

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

The following new Sub-Clause 2.9 is added:

“Sub-Clause 2.9 Project Manager/Engineer Not Liable

Approval, reviews and inspection by the Project Manager/Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of remaining materials and equipment for the Works and parts thereof and complete the remaining erection works and testing and commissioning in accordance with the Contract and neither the Project Manager/Engineer's authority to act nor any decision made by him in good faith as provided for under this Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Project Manager/Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any of the Works. However the Contractor shall be compensated if any loss/damage is occurred due to the decision of the Project Manager/Engineer.”

The following new Sub-Clause 4.2 is added:

“Sub-Clause 4.2 No Contractual Relation between Subcontractor and the Employer

Nothing contained in the Contract Documents shall create any contractual relation between any Subcontractor and the Employer.”

Sub-Clause 5.3 Priority of Contract Documents

The text of Sub-Clause 5.3 is deleted and substituted by the following:

“Unless otherwise provided in the Contract, the priority of the Contract Documents shall be as follows:

1. The Contract Agreement (if completed)
2. The Letter of Acceptance
3. The complete Letters of Technical and Price Bids (BOQ)
4. Preamble to Conditions of Contract
5. The Particular Conditions of Contract
6. The General Conditions of Contract
7. The priced Schedule of Prices
8. The completed Schedules to Bid (A to L)
9. The Specifications
10. The Drawings
11. Any other document forming part of the Contract.

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by drawing(s) of a later date regardless of scale. All drawings and specifications shall be interpreted in conformity with the Contract Agreement and these conditions.”

Sub-Clause 5.4 Documents Mutually Explanatory

The text appearing in the last line after the words “the Contract Price” is deleted and the following text is added:

“The Technical Specifications are taken to be correct, but complete accuracy is not guaranteed. Any error or ambiguity must be reported to the Employer and the Project Manager/Engineer before starting the work affected. In the event of any dispute arising as to the true intended meaning of Technical Specification, the Project Manager/Engineer shall interpret the same and his interpretation shall be accepted as final and binding upon all parties concerned, except to the extent provided for in the Arbitration provisions hereof.”

Sub-Clause 6.2 Consequences of Disapproval of Contractor's Drawings

Full stop in the last line is deleted and the following words are added at the end of the Sub-Clause:
“for the approval of the Project Manager/Engineer. However, the Contractor shall not be entitled for time extension on this account”.

Sub-Clause 6.6. Operation and Maintenance Manuals

Paras 2 & 3 are deleted and the following text is added at the end of Para 1 of Sub-Clause:
“The Operation and Maintenance Manuals shall include full instructions for the operation, servicing and maintenance of the Plant, not only during the period of the Contractor's liability but more particularly during its operating life.

The directions shall be set out simply, clearly and systematically. This may be divided into two volumes if desirable, one for operation and the second for servicing and maintenance (in sub–volumes for major items of Plant).

The operational data shall include a complete physical and functional description of the Plant (in sub–volumes for major items of Plant) and step–by–step procedures for inspection, checking and adjustments for proper operation of the Plant.

The maintenance data shall include complete instructions for routine checks, servicing, maintenance and repair of all parts and for dismantling, handling and re–assembly of all equipment, sub–assemblies and all separate components. The maintenance data shall also include where possible parts catalogues. The lists shall provide all necessary information for identifying the parts and for re–ordering the parts including name of part, part number and catalogue references where applicable, name of manufacturer, size, capacity and other characteristics .

General arrangements, single line diagrams and detailed drawings shall be provided for ready reference in the operation and maintenance instructions.

The manuals shall be printed on ISO paper size A4 (210x297 mm) with offset or equivalent printing strongly bound in a durable stiff cover bearing the title in approved legend. Drawings shall be folded or reduced to 297 mm height. All volumes shall bear on the spine an approved shortened version of the title.

The Contractor shall submit three (3) draft copies for approval of the Project Manager/Engineer prior to producing finished volumes.

The Contractor shall provide seven (7) copies of the approved Operation and Maintenance Manuals prior to Taking Over by the Employer. Supplementary Operation and Maintenance Manual shall be provided by the Contractor, if required, to incorporate changes resulting from experience during the operation and maintenance period. The work shall not be considered to be completed for the purpose of taking over until such manual and drawings have been supplied to the Employer.”

Sub-Clause 6.9 Manufacturing Drawings

The words "Unless otherwise specified in Part-II" are deleted and the following is added at the end of Sub-Clause:

"However, the Contractor is required to disclose to the Project Manager/Engineer or the Employer any confidential information necessary to justify the reliability, the efficiency and the operation and maintenance of the Plant supplied by him."

The following new Sub-Clauses 6.10 and 6.11areadded:

Sub-Clause 6.10 "As–Built" Drawings

The Contractor shall furnish to the Project Manager/Engineer six (6) copies and one (1) reproducible of approved quality of all "As–Built" drawings within the period mentioned in the Preamble to Conditions of Contract. All drawings shall also be provided in an electronic form (CD).

Sub-Clause 6.11 Shop Drawings

The Contractor shall submit to the Project Manager/Engineer for review three (3) copies of all shop and site erection work drawings in 1:4 scale seeking approval of the Project Manager/Engineer.

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

Sub-Clause 8.1 General Obligations

The text of Sub-Clause 8.1 is deleted and substituted by the following:

"(a) The Contractor shall commence the work on the date specified in the Preamble to Conditions of Contract and shall proceed with the same with due expedition and without delay.

(b) The Contractor shall, in accordance with the Contract, with due care and diligence, complete the Works and test and commission the Plant and carry out the Works within the Time for Completion. The Contractor shall also provide all necessary Contractor's Equipment, superintendence, labour and except as stated herein below, all necessary facilities therefor.

The Employer will permit use of the Erection and Testing Equipment and Maintenance Tools as given in the Preamble to Conditions of Contract.

The above facilities shall be provided at no cost to the Contractor but he shall procure at his cost all required consumable materials and any other items necessary for the proper execution of the Works. These shall be properly used and maintained by the Contractor and returned to the Employer upon handing over of the Works in good condition, fair wear and tear excepted. In case

of any damage, loss or theft, the items shall be replaced by the Contractor at his own cost."

Sub-Clause 10.1 Performance Security

The text of Sub-Clause 10.1 is deleted and substituted by the following:

"The Contractor shall provide a Performance Security in the prescribed Form annexed to these Documents. The said Security shall be furnished by the Contractor within twenty eight (28) days after the receipt of Letter of Acceptance. The Performance Security shall be of an amount equal to 5 percent of the Contract Price in the currency (Rs) of the Contract in the form of Bank Guarantee from any Scheduled Bank of Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank of Pakistan or from any Insurance Company enlisted in Category AA with PACRA or JCR.

The performance security shall be valid for twenty eight (28) days beyond defect liability period and the amount shall be reduced to 5% during defects liability period.

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

Sub-Clause 10.3 Claims under Performance Security

Sub-Clause 10.3 is deleted in its entirety.

The following new Sub Clause 10.4 is added:

Sub-Clause 10.4 Performance Security Binding on Variations and Changes

"The Performance Security shall be binding irrespective of variations and changes in the quantities of the Works or extensions in completion time of the Works, which are granted or agreed upon under the provisions of the Contract."

Sub-Clause 11.1 Site Data

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

"The Contractor shall satisfy himself as to the nature of the ground, the hydrological and climatic conditions, the form and nature of the Site, the quantities and nature of the Work and materials necessary for the completion of the Works, and the means of access to the Site, the accommodation he may require and in general shall himself obtain all necessary information as to risks, contingencies, and other circumstances which may influence or affect his Bid.

The Employer does not guarantee the correctness of any data/information/drawings either verbal and/or written provided herein nor any interpretations, deductions or conclusions relative to conditions at Site. The Contractor must form his own opinion of the character of the work and of the materials to be excavated etc. He must make his own interpretations, and satisfy himself by his own investigations and research regarding all conditions affecting the work to be done. The Contractor must assume all responsibility for deductions and conclusions as to the nature or conditions of the materials to be excavated and of doing other work affected by the geology at the Site."

Sub-Clause 12.1 Programme to be Furnished

(1) The text of Sub-Clause 12.1(a) is deleted and substituted by the following:

"(a) the order in which the Contractor proposes to carry out the Works (including preliminaries, required material ordering, delivery to Site, construction, erection and rectifications work, testing, commissioning of the Plant including design and construction of associated civil works and taking–over by the Employer). The programme on critical activity based format and resource planning schedule shall be prepared. The programme shall also include the following:

(i) Employment of local and expatriate labour of various categories;

(ii) Local material procurement; and

(iii) Material imports, if any."

(2) The text of Sub-Clause 12.1(c) is deleted and substituted by the following:
"(c) The Contractor requires the Employer:

(i) to furnish any Employer's Drawings;

(ii) to provide access to the Site;

(iii) to have completed the civil engineering works; and

(iv) to have obtained consents, way leaves and approvals necessary for the purpose of the Works."

(3) The second last sentence of Sub-Clause 12.1 is deleted and substituted by the following:

"The programme is to be furnished by the Contractor within twenty eight (28) days from the date of receipt of Letter of Acceptance. Rs1000/ (Rupees One thousand) per day as delay damages shall be deducted for delay beyond this period. "The Project Manager/Engineer" proposed changes/modifications may also be incorporated and revised program shall be submitted within fifteen (15) days."

The following new Sub-Clauses 12.4 and 12.5areadded:

Sub-Clause 12.4 Monthly Progress Report

During the period of the Contract, the Contractor shall submit six (6) sets of monthly progress report to the Project Manager/Engineer not later than the 8th day of each month including:

(i) a construction schedule indicating the progress achieved during the preceding month;

(ii) description of all work carried out since the last report;

(iii) description of the work planned for the next forty-two (42) days sufficiently detailed to enable the Project Manager/Engineer to determine his programme of inspection and testing;

(iv) summary of daily job record for the preceding month;

(v) colour digital photographs to illustrate progress.

Sub-Clause 12.5 Daily Job Record

"During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Project Manager/Engineer as and when requested.

The daily record shall include particulars of weather conditions, number of men working in different categories, deliveries of materials, quantity, location and assignment of equipment."

Sub-Clause 13.1 Contractor's Representative

At the end of the Sub-Clause, the following is added:
"The Contractor's Representative shall be a competent and skilled person approved by the Project Manager/Engineer (which approval may at any time be withdrawn). He shall be present on the Site during all working hours and shall not be transferred from the Site without the consent of the Project Manager/Engineer. The Contractor's Representative shall be a registered professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976)."

The following new Sub-Clauses 13.3 and 13.4areadded:

Sub-Clause 13.3 Language Ability of Superintending Staff of Contractor

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language.

Sub-Clause 13.4 Employment of Local Personnel
"The Contractor shall, to the extent practicable and reasonable, employ staff and labour from sources within Pakistan."

Sub-Clause 14.1 Contractor's Equipment

Replace the word "or" at the end of Sub-paragraph (a) by "and" and insert the following at the end of Sub-paragraph (b):

"which shall not be unreasonably withheld."

Sub-Clause 14.2 Safety Precautions

At the end of the Sub-Clause, the following is added:

"In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the safety requirements of the Government of Pakistan with such modifications thereto as the Project Manager/Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Project Manager/Engineer may determine to be reasonably necessary for such purpose.

The Contractor shall make, maintain, and submit reports to the Project Manager/Engineer concerning safety, health and welfare of persons and damage to property as the Project Manager/Engineer may from time to time prescribe."

Sub-Clause 14.3 Electricity, Water and Gas

The text of Sub-Clause 14.3 is deleted and substituted by the following:

"The Contractor shall be responsible for making his own arrangements for the adequate supply of electricity, water and gas required for the effective performance of his obligations under the Contract. Subject to the aforesaid, the Contractor shall be entitled to use for the purposes of the Works such supplies and services as may be available on the Site. The Contractor shall, before the commencement of the work at Site, seek the approval of the Project Manager/Engineer as to his detailed requirements of electricity, water and gas for the entire Contract period. The Contractor

shall pay the Employer at the rates/cost incurred by the Employer. The Contractor shall at his own cost provide any apparatus necessary for such use". The contractor will bear the cost of distribution network for electricity, potable water, telephone, gas and their consumption by his own personnel for the purpose of the work."

Sub-Clause 14.4 Employer's Equipment

The text of Sub-Clause 14.4 is deleted and substituted by the following:

"The Employer shall, if the Contractor so requests for the execution of the works, operate any available equipment of which details are given in the Preamble to Conditions of Contract. The Contractor shall pay the Employer a mutually agreed price for such use.

The Employer shall during such operation retain control of and be responsible for the safe working of the equipment."

Sub-Clause 14.8 Information for Import Permits & Licenses

The text of Sub-Clause 14.8 is deleted and substituted by the following:

"The Contractor shall submit to the Employer in good time such details of all Plant and Contractor's Equipment to be imported into Pakistan and identify as to what assistance of the Employer is required for obtaining by the Contractor of all necessary import permits or licenses".

Sub-Clause 15.2 Compliance with Laws

The text of Sub-Clause 15.2 is deleted and substituted by the following:

"The Contractor shall comply with the Laws of country of manufacture and the Laws of Pakistan where the Plant is to be erected".

The following new Sub-Clauses 16.4 and 16.5areadded:

Sub-Clause 16.4 Photographs of Works and Advertisement Prohibited

Except with the prior written authorization of the Employer the Contractor shall not exhibit or permit to be exhibited any photographs or advertisement on the Works. Any authorized exhibition shall be immediately removed if the Employer so requires.

Sub-Clause 16.5 Training of Employer's/Consultant's Staff

The Contractor shall provide such facilities for the training of such numbers of Pakistani engineers, engineering students, apprentices and trade apprentices on such sections of the Works at the Site or on the Contractor's premises or Contractor selected plant manufacturer's premises and factories, or wherever else work is in hand, as specified or directed by the Project Manager/Engineer. The Employer shall direct what sums by way of wages and allowances are to be paid by the Contractor to such persons and shall reimburse the Contractor for such sums as are so directed to be paid and are paid. The Contractor shall also provide medical expenses or medical insurance and travelling expenses for trainees if required by the Employer which shall be reimbursed by the Employer.

The language of training at the above stated premises shall be English and Urdu."

Sub-Clause 17.4 Consents and Way Leaves

The text of Sub-Clause 17.4 is deleted and substituted by the following:

"The Employer shall issue permissions, letters, certificates and provide such other assistance to the Contractor for his obtaining permits-to-work, way leaves and approvals from any other department/authority and right of way from private owners, if required. The Contractor will bear the cost of logistics, fees, etc. for such activities. The Employer, will reimburse the Contractor only the payments made by him in respect of any land compensation for obtaining such way leaves, required for the Works."

Sub-Clause 17.5 – Import Permits and Licenses

The word "Employer" is deleted and substituted by the word "Contractor" and the following is added at the end of Sub-Clause 17.5:

"The Employer will provide assistance for this purpose."

Sub-Clause 18.1 – Engagement of Labour

At the end of the Clause the following is added:

"in accordance with the regulations, orders and requirements of the Government of Pakistan".

The following new Sub-Clauses 18.5 to 18.16 are added:

Sub-Clause 18.5 Employment of Persons in the Service of Others

The Contractor shall not recruit or attempt to recruit his staff and labour from amongst the persons in the service of the Employer or the Project Manager/Engineer and vice–versa, unless mutually agreed between the Employer/Project Manager/Engineer and the Contractor.

Sub-Clause 18.6 Alcoholic Liquor or Drugs

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

Sub-Clause 18.7 Arms and Ammunition

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

Sub-Clause 18.8 Festivals and Religious Customs

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

Sub-Clause 18.9 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly conduct by or amongst his staff and labour and for the preservation of peace and

protection of persons and property in the neighborhood of the Works against the same.

Sub-Clause 18.10 Records of Safety and Health

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

Sub-Clause 18.11 Reporting of Accidents

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

Sub-Clause 18.12 Compliance by Subcontractors

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

Sub-Clause 18.13 Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Project Manager/Engineer.

Sub-Clause 18.14 Epidemics

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

Sub-Clause 18.15 Supply of Water

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

Sub-Clause 18.16 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the foregoing provisions."

Sub-Clause 19.1 Manner of Execution

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

"The Contractor shall submit for approval of the Project Manager/Engineer, his detailed method

statement(s) for the execution of such items of work as may be desired by the Project Manager/Engineer. Approval of such method statement(s) shall neither relieve the Contractor of his responsibilities under the Contract nor form any basis for claiming additional costs."

Sub-Clause 19.3 Uncovering Work

The following is added at the end of second paragraph of Sub-Clause 19.3:

"In any other case, all costs shall be borne by the Contractor."

The following new Sub-Clause 19.4 is added:

Sub-Clause 19.4 Use of Pakistani Materials

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

The following new Sub-Clause 20.6 is added:

Sub-Clause 20.6 Witnessing of Factory Acceptance Tests (as applicable):

Factory acceptance tests shall be witnessed by the personnel (one each) of the Employer and the Project Manager/Engineer. All costs in connection with witnessing of the factory acceptance tests by the Employer and the Project Manager/Engineer shall be borne by the Contractor. These shall include the costs of air travel (economy class) from Pakistan to place of inspection/testing and back, hotel accommodation/boarding/lodging (as per actual), inland transportation and daily allowance @ US Dollars …… per day per person for inspection/testing to be conducted outside Pakistan and Rs. ……..per day per person [besides other costs of travelling and lodging etc. (as above)] for inspection/testing to be conducted inside Pakistan for each visit of every person to witness these tests.

Sub-Clause 24.1 Cost of Suspension

At the end of the second paragraph after the word "Contractor" the following is added:

"or for the proper execution or for the safety of the Works or Plant unless such necessity results from any act or default of the Project Manager/Engineer or the Employer or in consequence of any of the Employer's Risks under Sub-Clause 37.2."

Sub-Clause 24.4 Resumption of Work

First paragraph of Sub-Clause 24.4 is deleted and substituted by the following:

"If the Contractor chooses not to treat prolonged suspension as an omission or termination under Sub-Clause 24.3, the Employer shall, upon the request of the Contractor, take over the responsibility for protection, storage, security and insurance of the suspended Works and of the Plant which has been delivered to the Site and which is affected by suspension and the risk of loss or damage thereto shall thereupon pass to the Employer".

Sub-Clause 25.1 Time for Completion

The text of Sub-Clause 25.1 is deleted and substituted by the following:

"The Works at the place of the project mentioned in the Preamble to Conditions of Contract shall be completed tested and commissioned within the period mentioned in the Preamble to Conditions of Contract."

Sub-Clause 26.1 Extension of Time for Completion

Sub-Clause 26.1(h) is deleted.

Sub-Clause 26.3 Earlier Completion

(i) At the end of Sub-Clause 26.3(a) the following text is added and Clause is re-designated as 26.3.

"The extra sum to be paid to the Contractor for Completion of Works prior to the date of Completion established under Sub-Clause 25.1 shall be computed on the basis of the sums mentioned in the Preamble to Conditions of Contract."

(ii) Sub-Clause 26.3 (b) is deleted.

The following new Sub-Clause 26.4 is added:

Sub-Clause 26.4 Rate of Progress

"If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Project Manager/Engineer, too slow to comply with the Time for Completion, the Project Manager/Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Project Manager/Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Project Manager/Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Project Manager/Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Sub-Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Project Manager/Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any moneys due or to become due to the Contractor and the Project Manager/Engineer shall notify the Contractor accordingly, with a copy to the Employer."

Sub-Clause 27.1 Delay in Completion

The text of Sub-Clause 27.1 is deleted and substituted by the following:

"If the Contractor fails to deliver the Works, or any part thereof, within the time stated in Sub-Clause 25.1, or fails to complete the whole of the Work, or, if applicable, any Section within the relevant time prescribed by Sub-Clause 25.1, then the Contractor shall pay to the Employer the relevant sum stated herein below as liquidated damages for such default (which sum shall be the only moneys due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant time for Delivery or Time for Completion and the actual date of delivery at site or the date stated in a Taking–Over Certificate of the whole of the Works or the

Not Applicable

relevant Section, as the case may be, subject to the applicable limit stated herein below.

The Employer may deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

The liquidated damages for each day of delay and the maximum amount of liquidated damages shall be the amounts mentioned in the Preamble to Conditions of Contract."

Sub-Clause 28.7 Consequences of Failure to Pass Tests on Completion

The words "by arbitration" appearing at the end of the Sub-Clause 28.7(c) are deleted and substituted by the words "by the Project Manager/Engineer".

Sub-Clause 30.4 Extension of Defects Liability Period

At the end of 4th paragraph of Sub-Clause the following is added:
"or a mutually agreed period."

Sub-Clause 30.5 Failure to Remedy Defects

In first line after the words "reasonable time" the following is added:
"fixed by the Project Manager/Engineer".

The following new Sub-Clause 30.13 is added:

Sub-Clause 30.13 Unfulfilled Obligations

"After the Defects Liability Certificate has been issued, the Contractor and the Employer shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force."

Sub-Clause 31.1 Project Manager/Engineer's Right to Vary

The following is added at the end of second paragraph:

"No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 31. Provided that whether the issue of an instruction to vary the Works is necessitated by some default of or breach of Contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor".

Sub-Clause 31.5 Records of Costs

The word "Engineer" in 4th line of Sub-Clause is deleted and substituted by "Project Manager/Engineer/Employer".

The following new Sub-Clauses 31.6 and31.7 is added:

Sub-Clause 31.6 Day work under Variation Order

A Variation Order may provide that work done pursuant thereto shall be executed as Daywork, if applicable in the opinion of the Project Manager/Engineer. In such case the Contractor shall be paid for such work under the conditions and the rates and prices set out in the Day Work Schedule.

Sub-Clause 31.7 Value Engineering

The Contractor may, at any time, submit to the Project Manager/Engineer a written proposal which in the Contractor's opinion will reduce the cost of constructing, maintaining or operating the works, or improve the efficiency or value to the Employer of the completed Works or otherwise be of benefit to the Employer. Any such proposal shall be prepared at the cost of the Contractor. However Employer is not bound to accept such proposal."

Sub-Clause 33.1 Terms of Payment

The text of Sub-Clause 33.1 is deleted and substituted by the following:

"The EPC/Turnkey Contract shall be payable for the following items:

Schedule No.1 Civil Works (BOQ measurement basis)
Ten percent (10%) of the mobilization advance payment against bank guarantee for the equivalent amount made out in favor of the Employer
The Interim Payment Certificate will be released by the Project Manager/Engineer within twenty eight (21) days of the date of submission of each certificate on basis of actual measurement basis.
Five percent (5%) of the total or partial amount upon successful completion of defects liability period, by the Project Manager / Project Engineer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Schedule No.2 Foundation Works (BOQ measurement basis)
Ten percent (10%) of the mobilization advance payment against bank guarantee for the equivalent amount made out in favor of the Employer
The Interim Payment Certificate will be released by the Project Manager/Engineer within twenty one (21) days of the date of submission of each certificate on basis of actual measurement basis.
Five percent (5%) of the total or partial amount upon successful completion of defects liability period, by the Project Manager / Project Engineer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Schedule No. 3 Supply of Plant (Pre Engineered Structures) including Fixtures and other materials & goods and spare parts (if any) (Schedule of Price basis)

In respect of pre-engineered structure supplied within the country, the following payments shall be made:

Ten percent (10%) of the mobilization advance payment shall be made against bank guarantee for the equivalent amount made out in favor of the Employer.

The payment shall be made on pro-rata basis for the supply of LGS etc., including fixtures and fittings to the Contractor, after supply of the material stored at designated warehouse / factory and inspection by the Consultant / Employer, subject to the conformance of the material in accordance with the specification and Schedule-3.

Five percent (5%) of the total or prorate EXW amount upon successful completion of defects

liability period, by the Project Manager / Project Engineer (After all deduction / deductions) eer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Schedule No. 4 Installation, Fabrication and other Services (Schedule of Price basis)

In respect of installation & Fabrication services for both the foreign and local currency portions, the following payments shall be made:

Ten percent (10%) of the mobilization advance payment against bank guarantee for the equivalent amount made out in favor of the Employer

The IPC will be released by the Project Manager/Engineer within twenty one (21) days of the date of submission of each certificate on basis of actual measurement basis.

Five percent (5%) of the total or partial amount upon successful completion of defects liability period, by the Project Manager / Project Engineer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Schedule No. 5 Design Services (Schedule of Price basis)

In respect of design services for both the foreign currency and the local currency portions, the following payments shall be made:

- Ten percent(10%) of the mobilization advance payment against bank guarantee for the equivalent amount made out in favor of the Employer.
- 25% upon submission of main building design and drawings.
- 25% upon submission of external development (UG tank, Septic tank, Soakage pit, Boundary wall etc.) design and drawings.
- 25% upon approval of design and drawings of main building
- 20% upon approval design and drawings of external development (UG tank, Septic tank, Soakage pit, Boundary wall etc.) design and drawings of main building (After all deduction / deductions).

Five percent (5%) of the total or prorata design services amount upon successful completion of defects liability period by the Project Manager / Project Engineer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Schedule No. Miscellaneous works

Ten percent (10%) of the mobilization advance payment against bank guarantee for the equivalent amount made out in favor of the Employer

The IPC will be released by the Project Manager/Engineer within twenty eight (21) days of the date of submission of each certificate on basis of actual measurement basis.

Five percent (5%) of the total or partial amount upon successful completion of defects liability period, by the Project Manager / Project Engineer (with the approval of the Employer) within Twenty one (21) days after receipt of invoice.

Grand Summary of Bid Prices

Grand summary will include total price of each schedule.

The mobilization advance will be deducted in four equal installments whereas the rate of recovery can be increased by the employer at any time.

Secured Advance

(Employer may opt either "Secured Advance on Materials" if applicable shall be given after the Contractor has provided indemnity bond for secured advance as per standard format, in accordance with the provision of PEC standard condition of contract.

Advance Payment Security

The Contractor will submit advance payment security for all advance payments in the form of Bank Guarantee issued by a Scheduled Bank of Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan in favor of the Employer valid for a period twenty eight (28) days beyond issue of taking over certificate."

Not Applicable

The following new Sub-Clauses 33.1.1 to 33.1.5 are added:

Sub-Clause 33.1.1 Retention of Payment

Retention money shall be deducted at the rate of 5% from each running bill of the contractor. The rate of recovery can be increased as following condition. 50% retention money shall be released after and handing taking over & balance 50% after successful completion of defect liability period.
"If at any time any payment would fall due for Works or part of Works and, if there shall be any defect in part of such Works in respect of which such payment is proposed, the Employer may retain the whole or any part of such payment. Any sum retained by the Employer pursuant to the provisions of this Clause shall be paid to the Contractor after the said defect is removed."

Sub-Clause 33.1.2 Payment Where Taking-Over Certificate Issued for Section or Part of Works

"If any section or part of the Works shall be taken-over separately under Clause 29 (Taking-Over) hereof, the payments herein provided for on or after Taking-Over shall be made in respect of the section or part taken-over and reference to the price shall mean such part of the price as shall, in the absence of agreement, be apportioned thereto by the Project Manager/Engineer."

Sub-Clause 33.1.3 Extra Payment

No extra payment in respect of overtime, additional materials, or special conditions or hardship shall be claimed by the Contractor unless otherwise provided in the Contract or such payments have been previously authorized in writing by the Project Manager/Engineer or the Employer.

Sub-Clause 33.1.4 Breakdown of Lump Sum Items

For the purposes of statements to be submitted in accordance with Sub-Clause 33.1 hereof, the Contractor shall submit to the Project Manager/Engineer, within twenty one (21) days after the receipt of the Letter of Acceptance, a breakdown for each of the lump sum items contained in the Bid. Such breakdowns shall be subject to the approval of the Project Manager/Engineer."

Sub-Clause 33.2 Method of Application

The following paragraphs are added:

"The Contractor shall submit to the Employer/Project Manager/Engineer six (6) copies of the Application for Certificate of Payment (invoices) each signed by the Contractor and in such form as the Employer/Project Manager/Engineer may from time to time prescribe.

The Employer/Project Manager/Engineer shall examine such invoices within the times stated in Sub-Clauses 33.3 and 33.5. After such time each invoice will be deemed to have been accepted. If the invoice amount is not accepted by the Employer/Project Manager/Engineer, the disputed amount which is retained, shall be communicated, giving the reasons in writing, to the Contractor within the same time. If the objections of the Employer/Project Manager/Engineer are not acceptable to the Contractor he will justify his claims with necessary documentation and include left over amounts / items in the next invoice. However, the portions of such invoices accepted by the Employer/Project Manager/Engineer shall be paid as per Sub-Clause 33.5."

Sub-Clause 33.5 Payment

The text of Sub-Clause 33.5 is deleted and substituted by the following:

"The amount due to the Contractor under any Interim Payment Certificate issued by the Project Manager/Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 27, be paid by the Employer to the Contractor within twenty one (21) days, in case of fail Certificate (referred to in Sub-Clause 33.10) within forty two (42) days after submission.

Deduction shall be made from the net amounts payable to the Contractor of any sum(s) in accordance with the prevalent Federal and/or Provincial laws, provided that no such deduction shall be made from those payments in respect of which the Contractor has obtained exemption under the Law."

Sub-Clause 33.6 Delayed Payment

The text of Sub-Clause 33.6 is deleted and substituted by the following:

"In the event of the failure of the Employer to make payment within the times stated in Sub-Clause 33.5, the Employer shall pay to the Contractor compensation at the rate of KIBOR + 2 percent for local currency per annum upon all local currency sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to Contractor's entitlement under Sub-Clause 46.1."

Sub-Clause 33.8 Payment by Measurement

The work shall be measured for the units mentioned in the Schedule of Prices according to the Contract as determined by the Project Manager/Engineer from approved drawings, Specifications and Contract Documents.

Sub-Clause 33.11Issue of Final Certificate of Payment
The following paragraph is added at the end:
"The final certificate of payment is also subject to the production of "As-Built Drawings" by the Contractor as per Sub-Clause 6.10 of particular Conditions of Contract.

The following Sub-Clauses 33.12 and33.13are added:

Sub-Clause 33.12 Withholding of Payment

If the Works or any parts thereof are not being carried out to the Project Manager/Engineer's satisfaction and in order to protect the Employer from loss on account of:

(a) defective work not rectified
(b) guarantees not met
(c) claims filed against the Contractor
(d) failure of the Contractor to make payments due for Plant procured or labour employed by him
(e) damage to any other contractor employed by the Employer
(f) Contractor's non–compliance with the Contract
(g) any Government dues recoverable from the Contractor if notified by the Government

The Project Manager/Engineer may notify withholding of such payments or part thereof as may, in his opinion, be related to the aforesaid reasons/grounds. When the reasons/grounds for withholding the payment are removed by the Contractor, the Project Manager/Engineer shall upon being satisfied to that effect issue Certificate of Payment in respect of withheld amounts.

Sub-Clause 33.13 Payment Schedule

Within twenty eight (28) days after receipt of the Letter of Acceptance, the Contractor shall submit a proposed payment schedule indicating the estimated payment throughout the currency of the Contract. This schedule shall be in a format satisfactory to the Employer and the Project Manager/Engineer, shall be consistent with the Program of Works, the advance, progress and final payment provisions included herein, and shall be in sufficient detail to permit preparation of cash flow projections for use by the Employer."

Sub-Clause 35.2 Currency Restrictions
The text of Sub-Clause 35.2 is deleted and substituted by the following:

"Any required foreign currency transactions shall be met by the Contractor at his cost from his own resources."

Sub-Clause 35.3 Rates of Exchange
The text of Sub-Clause 35.3 is deleted and substituted by the following:

"Any import, if required and approved by the Employer shall also be paid in local currency with exchange rate for the period as notified by the State Bank of Pakistan.

Sub-Clause 36.4 Payment Against Provisional Sums

The text of Sub-Clause 36.4 is deleted and substituted by the following:

"Provisional Sums, if any will be expended on the direction of the Project Manager/Engineer through Variation Orders which would be valued in accordance with the provisions of Clause 31 Conditions of Contract."

Sub-Clause 37.2 Employer's Risks

The text of Sub-Clause 37.2 is deleted and substituted by the following:

"The Employer's Risks are:

(a) (Insofar as they relate to Pakistan) war and hostilities (whether war be declared or not), invasion, act of foreign enemies;

(b) (Insofar as they relate to Pakistan) rebellion, revolution, insurrection, military or usurped power or civil war;

(c) ionizing radiation or contamination by radioactivity from any nuclear fuel, radio-active toxic explosives or other hazardous properties of any explosive nuclear assembly or nuclear components thereof;

(d) pressure waves caused by aircraft travelling at sonic or supersonic speed;

(e) (Insofar as they relate to Pakistan) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors.

(f) use or occupation of the Work or any part thereof by the Employer;

(g) fault, error, defect or omission in the design of any part of the Works by the Project Manager/Engineer, Employer or those for whom the Employer is responsible for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of such design;

(h) the use or occupation of the Site by the Works or any part thereof, or for the purposes of the Contract: or interference, whether temporary or permanent with any right of way, light, air or water or with any easement, way leaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract;

(i) the right of the Employer to construct the Works or any part thereof on, over, under, in or through any land;

(j) damage (other than that resulting from the Contractor's method of construction) which is the inevitable result of the construction of the Works in accordance with the Contract; and

(k) the act, neglect or omission or breach of contract or of statutory duty of the Project Manager/Engineer, the Employer or other contractors engaged by the Employer or of their respective employees or agents."

Sub-Clause 39.2 Loss or Damage Before Risk Transfer Date

The words "by arbitration under Clause 50" are deleted and substituted "by the Project Manager/Engineer".

The following new Sub-Clause 39.4 is added:

"Sub-Clause 39.4 Duty to Minimize Delay

Each Party shall at all times use all reasonable endeavors to minimize any delay in the Performance of the Contract as a result of Risks.

The Contractor shall give notice to the Employer and vice versa the Employer shall give notice to the Contractor in case of foreseeable delay by the Risks."

Sub-Clause 40.2 Employer's Liability

The text of Sub-Clause 40.2 from the words "death or personal injury" to the end of the Sub-Clause, is deleted and substituted by the following:

"..... (other than the Works) or of death or personal injury to the extent caused by those of the Employer's Risks listed in paragraphs (f), (g), (h), (i), (j), and (k) of Sub-Clause 37.2 but not otherwise."

Sub-Clause 42.2 Maximum Liability

The words "the sum stated in the Preamble to Conditions of Contract or if no such sum is stated" appearing in 2nd line of Sub-Clause are deleted.

Sub-Clause 42.6 Foreseen Damages

Sub-Clause 42.6 is deleted in its entirety.

Sub-Clause 43.1(a) The Works (Insurance)

The other risks to be insured are:

(i) Fire, smokes, explosion, falling objects, earthquake, perils of the sea, tempest, impact by aircraft or land vehicle, aircraft and other aerial devices or articles dropped therefrom, lightning, strike, riot, civil commotion, escape of water, inundation, rain, snow, land slides, flood, act of God, vandalism or malicious damage, windstorm or hail storm.

(ii) Collision, upset, overturn, derailment, stranding or sinking of an automobile or any conveyance of a common carrier by land, water or air in which the Plant or any part thereof is being carried including overland transportation in Pakistan from port of entry to the Site.

(iii) Theft, burglary or attempted theft or burglary.

(iv) Any loss or damage during pre-erection storage.

(v) Faults in construction and erection, lack of skill, lack of experience, negligence, malicious act.

(vi) any other sudden and unforeseen event such as loss or damage due to collapse etc. on site, transport of items to be erected.

(vii) Actions of the Employer in the operation of plant or part thereof on behalf of the Contractor.

The following further Sub-Clauses are 43.1.1, 43.1.2 and 43.1.3 are added:

Sub-Clause 43.1.1 Marine Insurance of Plant

(1) The Contractor shall in the joint names of the Contractor and the Employer, obtain Marine Cargo All Risks Insurance to cover loss or damage to the Plant or part thereof during transport.

(2) The insurance for each consignment of Plant or part thereof shall attach from the time the Plant or part thereof leave the warehouse or place of storage and terminate after ninety (90) days on its completion of unloading at the Site or until insurance survey whichever occurs first. Upon arrival of each consignment at the Site, the Contractor shall, immediately arrange insurance survey by the insurance company.

(3) The sum insured for imported Plant or part thereof shall be for its full replacement value at the Site i.e. 100 % CIF value at the Site for each consignment of the Plant or part thereof plus not less than 30 % of CIF value at the Site to cover any additional costs resulting from loss or damage thereof.

(4) The Insurance Policy for imported Plant etc. shall be on "All Risks" basis and shall not be limited to the attachment/endorsement of following clauses:

(a) Institute Cargo Clauses (A)

(b) Institute War Clauses (Cargo)

(c) Institute Strikes Clauses (Cargo)

(d) Institute Cargo Clauses (Air) excluding sending by Post

(e) Institute War Clauses (Air Cargo) excluding sending by Post.

(f) Institute Strikes Clauses (Air Cargo)

(g) Special Replacement Clauses (Air)

(h) Institute Theft, Pilferage and Non-delivery Clauses

Sub-Clause 43.1.2 Erection/Construction All Risks Insurance

(1) The Contractor shall insure the Works or part thereof in the joint names of the Contractor and the Employer.

(a) from the date following the completion of the first unloading at the Site of the Plant or part thereof and other materials (to be used for construction or erection) and from commencement of Works at Site until the Risk Transfer Date against any loss or damage caused by any of the Contractor's risks and any other risks specified in Sub-Clause 43.1.(a) above and

(b) during the Defects Liability Period against any loss or damage which is caused either:

(i) by the Contractor in completing any outstanding work or complying

with his obligations under Clause 30, or

(ii) by any of the Contractor's risks and any other risks specified in Sub-Clause 43.1(a) above, which occurred prior to the Risk Transfer Date.

(2) The sum insured shall be the full replacement value at the Site, which includes:

(a) (i) FOB value of imported Plant to be erected

(ii) Ex-factory value of Indigenous Plant to be erected, if any

(b) freight and insurance including local transport

(c) customs duties and taxes etc.

(d) cost of erection

(e) cost of civil engineering work including escalation

(f) clearance of debris, maximum @ 5 % of minimum amount of Third Party Liability Insurance

Plus 30% to cover any additional costs resulting from loss or damage thereof.

Sub-Clause 43.1.3 General

Should a loss be sustained, the Contractor shall replace or repair any loss or damage at his own cost and complete the Works in accordance with the Contract as soon as possible after occurrence of such loss or damages, without waiting for the settlement of the insurance claim."

Sub-Clause 43.2 Contractor's Equipment

The text of Sub-Clause 43.2 is deleted and substituted by the following:

"The Contractor shall insure the Contractor's Equipment for its full replacement value while on the Site against all loss or damage caused by any of the Contractor's Risks."

Sub-Clause 43.7 Remedies on the Contractor's Failure to Insure

In 3rd line after the word, "purpose", the expression "and reasonable costs including the man-hours costs of Employer's Personnel" is added.

The following new Sub-Clauses 43.9 to 43.12 are added:

Sub-Clause 43.9 Currency of Insurance

All policies of Insurance of the Plant shall provide for payment of indemnity to be made in such amounts as will allow making good of loss of or damage to the whole or any part of the Works.

Sub-Clause 43.10 Contractor to Notify

It shall be the responsibility of the Contractor to notify the insurance company of any changes in

nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times in accordance with the provisions of the Contract.

Sub-Clause 43.11 Procurement of Insurance Policies

The Contractor shall procure and submit the insurance cover under this Clause within a period of twenty eight (28) days from the date of receipt of Letter of Acceptance from the Employer.

Sub-Clause 43.12 Insurance Company

The policies of marine insurance and all other insurances with respect to Contractor's operations in Pakistan shall be effected with any of the insurance company acceptable to the Employer operating in Pakistan with financial strength rating of AA approved by Pakistan Credit Rating Agency (PACRA) or JCR including National Insurance Corporation (NIC) of Pakistan."

Sub-Clause 44.6 Damage Caused by Force Majeure

At the end of the Sub-Clause 44.6 the following is added:

"However the Contractor shall put up his claim to the Employer / Project Manager/Engineer with full details and justification."

Sub-Clause 44.8 Payment on Termination for Force Majeure

Text in sub-Para (c) is deleted and Paras(d) and (e) are re-numbered as (c) and (d).

Sub-Clause 44.10 Force Majeure Affecting Project Manager/Engineer's Duties

Sub-Clause 44.10 is deleted in its entirety.

Sub-Clause 45.2 Contractor's Default

The following paragraph is added at the end of Sub-Clause 45.2.

"The Employer or such other contractor may use for such completion any Contractor's Equipment which is upon the Site as he or they may think proper, and the Employer shall pay the Contractor a reasonable compensation for such use".

Sub-Clause 45.4 Payment after Termination

The text of Sub-Clause 45.4 is deleted and substituted by the following:

"The Employer shall not be liable to make any further payments to the Contractor until the Works have been completed. When the Works are so complete, the Project Manager/Engineer shall certify the total cost of such completion of Works.

The Employer may recover the extra cost of such completion, as certified by the Project Manager/Engineer, from any sums otherwise due and payable to the Contractor and/or by disposing of the Contractor's Equipment and stores taken over by the Employer under this Clause or as otherwise provided by law. If there is no such extra cost the Employer shall pay any balance due to the Contractor."

The following new Sub-Clause 45.6 is added:

Sub-Clause 45.6 Integrity Pact

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

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
(b) terminate the Contract; and
(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 45.2 to 45.5 and the payment under Sub-Clause 45.4 shall be made after having deducted the amounts due to the Employer under Sub-Paras (a) and (c) of this Sub-Clause.

Sub-Clause 46.1 Employer's Default

The comma and the word "or" at the end of paragraph (d) of Sub-Clause 46.1 are deleted and substituted by period (.) Paragraph (e) of Sub-Clause 46.1 is deleted.

Sub-Clause 46.3 Payment on Termination for Employer's Default

The words "including loss of profit" in the second paragraph of Sub-Clause 46.3 are deleted.

Sub-Clause 47.1 Labour, Materials and Transport

(The user may extract the formula:
i. from Clause 70.1 of PCC of PEC Civil Works Bidding Documents.
ii. with reference to PEC Documents "Standard Guidelines and Formula for Price Adjustment".
iii. from Clause 15.2 of GCC of PEC Bidding Documents for Supply of Goods and Services.)

Sub-Clause 48.1 Local Taxation-Custom and Import Duties

The rates and prices quoted by the Contractor in the Schedule of Prices shall be deemed to have included (i) business taxes, income tax, super tax, customs, import duties and other taxes on income, and (ii) fees charged for services provided under this Contract. The taxation is livable as per income tax ordinance 2001 issued by FBR Government of Pakistan including adjustment in prices as per clause 47.

The following Sub-Clause 48.3 is added:

Sub-Clause 48.3 Port Charges and Port Congestion

"The Contractor shall be deemed to have obtained all the information regarding facilities and

charges, in respect of port clearance, loading and unloading, storage, transportation, congestion and confirmed the requirements thereof at his own responsibility and all such costs and charges are deemed to be included in the rates and prices of the Schedule of Prices."

Sub-Clause 49.1 Notices to Contractor

The following paragraph is added at the end of Sub-Clause 49.1:

"For the purposes of Sub-Clause 49.1, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Project Manager/Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract."

Sub-Clause 50 Disputes & Arbitration

Clause 50 is deleted and in its place the following Sub-Clauses 50.1 to 50.5 are inserted:

"50.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Project Manager/Engineer, the matter in dispute shall, in the first place, be referred in writing to the Project Manager/Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the fifty sixth (56) day after the day on which he received such reference, the Project Manager/Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence, and the Contractor and the Employer shall give effect forthwith to every such decision of the Project Manager/Engineer unless and until the same shall be revised, as hereinafter provided in an amicable settlement or in an arbitral award.

In any case where the Conditions of Contract provide that the decision of the Project Manager/Engineer is to be final and conclusive, such decision shall not be referable to arbitration under this Clause nor shall the same be questioned in any other form of proceedings whatsoever.

50.2 If either the Employer or the Contractor be dissatisfied with a decision of the Project Manager/Engineer or if the Project Manager/Engineer fails to give notice of his decision on or before the fifty sixth (56) day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the twenty eighth (28) day after the day on which the said period of fifty six (56) days expired, as the case may be, give notice to the other party to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 50.5, no arbitration in respect thereof may be commenced unless such notice is given.

If the Project Manager/Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notification of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor on or before the twenty eighth (28) day after the day on which the parties received notice as to such decision from the Project Manager/Engineer the said decision shall become final and binding upon the Employer and the Contractor.

50.3 Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 50.2, arbitration of such dispute shall not be commenced unless an attempt has first been made by the parties to settle such dispute amicably through mutual negotiation within ninety (90) days from the date of notification of Project Manager/Engineer's decision.

50.4 Any dispute in respect of which:

(a) the decision, if any, of the Project Manager/Engineer has not become final and binding pursuant to Sub-Clause 50.1 and

(b) amicable settlement has not been started/reached within the period stated in Sub-Clause 50.3

shall be finally settled, unless otherwise specified in the Contract, under the Rules of Pakistan Arbitration Act, 1940 (Act No. X of 1940) and Rules made thereunder as amended, by one or more arbitrators appointed under such Rules.

The said arbitrator(s) shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Project Manager/Engineer for the purpose of obtaining said decision pursuant to Sub-Clause 50.1. No such decision shall disqualify the Project Manager/Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

The venue of arbitration proceedings shall be the place in Pakistan as mentioned in the Preamble to Conditions of Contract.

50.5 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 50.1 or 50.2 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 50.4. The provisions of Sub-Clauses 50.1 to 50.2 shall not apply to any such reference."

Additional Conditions

52. Liens

Each contractor, for himself and for any persons directly or indirectly responsible to him, and for his or their material, equipment and employees, and for all other persons performing any labor or furnishing any labor or material for any/or all of the Work covered by his Contract, will be required to release or waive, to the full extent permitted by law, all mechanical and other liens, for or on account of the Work done or equipment and material furnished hereunder and the improvements or structures herein same may be incorporated, and the land to which they are appurtenant shall at all times be free and clear of all such liens.

53.1 Payment of Income Tax, Etc.

The Contractor shall be responsible for the payment, if any is required, of all Pakistani Income Tax, Super Tax, and other taxes on income arising out of the Contract, and the rates and prices stated in the priced Schedule of Prices shall be deemed to cover all such taxes.

53.2 Personnel, Taxes and Duties

The Contractor or his personnel shall pay all personal income tax or other taxes due in Pakistan, if any, for the personnel employed by the Contractor for implementing the work or any other activity required by the Contract. The Contractor shall obtain, at his own cost, work permits from competent authorities to enable any foreign personnel to work in Pakistan. The Contractor shall be responsible for all formalities in connection with passports, obtaining visas, police permits, and expenses for customs duties, if any, related to personal goods of foreign personnel employed on the Project. However, the Employer will, if requested, assist the Contractor in obtaining visas and work permits.

53.3 Income Taxes Provisions in Subcontracts

Provisions to the like effect as those contained in this Clause shall be incorporated in Subcontracts.

54. Liability of the Contractor

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

55. Joint and Several Liability

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

56. Details to be Confidential

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

57. Engineers Facilities

Site Office

The Contractor shall construct, provide and maintain Consultant's Site office of about 1000-1500 square Feet covered area as per the specification at each location. A preliminary layout of the site office shall be provided by the Consultant. After receiving letter of award the Contractor will submit to the Engineer detailed shop drawings for review and approval. Specification for construction of site office shall be the same as provided in Volume-II of the tender documents.

The Consultant's site office shall be furnished and equipped with new and unused furniture, equipment, air-conditioners, electrical fittings etc. as per the list given below.

1.	Wooden office table with drawers and side racks	3 (Three) Nos.
2.	Office Chairs	3 (Three) Nos.
3.	Wooden sitting visitors chairs with arms (standard size)	10 (Ten) Nos.
4.	Steel filing cabinet (standard size)	3 (Three) Nos.
5.	Split type (1-1/2 ton)	3 (Three) Nos.
6.	Electric Kettle	3 (Three) Nos.
7.	Computer dual Core, Original Intel Processor 2GB DDRS Ram, 160 GB hard disk, 17" LCD Monitor along with Laser Printer (A-3), Scanner, DVD Writer, Speakers, Licensed Software for Microsoft, MS Office and AutoCAD.	3 (Three) Nos.
8.	56 k speed Modem Card etc.	3 (Three) Nos.
9.	Computer table & chair	3 (Three) Nos.
10.	Conference table (1.5 meter x 1.0 meter) & chairs	2 (Two) sets.
11.	Internet Connection	2 (Two) Nos.

Mobile & Landline Telephone with connections 1 (One) No. each Engineer.
If any equipment, furniture and installation become unserviceable for any reason whatsoever the Contractor shall promptly replace the same as and when directed by the Consultant. The Consultant's site office with fittings, fixtures and all other equipment/accessories shall be maintained and operated for the entire duration of construction period as well as for the duration of subsequent defects liability period.

The site office including fittings, fixtures, furniture, furnishing and all other equipment/accessories shall be the property of the Employer on completion of the Contract.

Transport

The Contractor shall provide, operate and maintain Three brand new Toyota Corolla 1300CC (with AC) or equivalent for the exclusive use of the Consultant's site supervision / monitoring team to meet his transportation needs for the entire duration of actual construction period as well as for the duration of subsequent defects liability period. The use of such transport facility shall be under the control of the Engineer and the Contractor shall be wholly responsible for providing at all times satisfactory operating services for the Engineer. The Contractor shall furnish, supply and provide, as may be necessary without specific direction of the Engineer, all fuels, lubricants, tires and other supplies, all maintenance, repair and running costs and suitable qualified drivers at all times. The Contractor shall furnish Rupees 35,000/= per month per car to the Engineer for the fuel (CNG / Petrol) purposes.

Prior to ordering the vehicles, the Contractor shall furnish to the Engineer for approval, detailed specification, name of manufacturer and model no. of the vehicles to be supplied. These data shall be presented within one week from the date of Engineer's order to proceed with the works and the vehicles shall be furnished to the Engineer upon approval within two weeks from the date of Engineer's order to supply the vehicles.

Failure of the Contractor to do so shall make him liable to bear its cost up to Rs. 60,000 per month, per car / vehicle. The vehicles shall be right hand drive and shall be brand new, properly serviced and ready for use. The Contractor shall provide vehicle to replace any such motor vehicle that is temporarily or permanently rendered unserviceable for any reason or declared to be beyond repair by the Engineer at no additional cost to the Employer. The vehicles shall become the property of the Contractor on completion of the Contract including defects liability period. If the contractor fails to provide the facilities as per tender documents then deductions as specified in tender documents will be made from contractors running bill and same will be compensated / paid to consultant.

STANDARD FORMS

STANDARD FORMS

Standard Forms include the following:

- Form of Bid Security
  (Bank Guarantee)

- Form of Contract Agreement

- Form of Performance Security
  (Bank Guarantee/ Insurance Bond)

- Form of Bank Guarantee for Advance Payment

- Indemnity Bond For Secured Advance (N/A)

FORM OF BID SECURITY

(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

Name of Guarantor (Bank) with address: _____

Name of Principal (Bidder) with address: _____
_____

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

Bid Reference No._____ Date of Bid Opening_____

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

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid numbered dated as above for _____ (Particulars of Bid) to the said Employer; and

WHEREAS, the Employer has required as a condition for considering the said Bid that thePrincipal furnishes a Bid Security in the above said sum to the Employer, conditioned as under:

(1) that the Bid Security shall remain valid for a period 28 days beyond the period of validity of the Bid,

(2) that in the event of;

- (a) the Principal withdraws his Bid during the period of validity of Bid, or
- (b) the Principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 24.2 of Instructions to Bidders, or
- (c) failure of the successful Bidder to
  - (i) furnish the required Performance Security, in accordance with Clause 34 of Instructions to Bidders, or
  - (ii) sign the proposed Contract Agreement, in accordance with Clause 35 of Instructions to Bidders,

then the entire sum be paid immediately to the said Employer as liquidated damages and not as penalty for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer

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

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

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

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

_____
Guarantor (Bank)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
(Name, Title & Address)

Signature _____

Name _____

Title _____

_____

_____
Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

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

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

NOW this Agreement 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 after incorporating addenda, if any except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:

   (a) The Contract Agreement
   (b) The Letter of Acceptance
   (c) The completed Form of Bid
   (d) The Preamble to Conditions of Contract
   (e) The Particular Conditions of Contract
   (f) The General Conditions of Contract
   (g) The priced Schedule of Prices
   (h) The completed Schedules to Bid (A to L)
   (i) The Specifications
   (j) The Drawings

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

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

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

Signature of the Contactor	Signature of Employer
_____	_____
(Seal)	(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:	Witness:
_____	_____
(Name, Title and Address)	(Name, title and Address)

FORM OF PERFORMANCE SECURITY
(Bank Guarantee/ Insurance Bond)

Guarantee No._____
Executed on _____
Expiry date _____

Name of Guarantor (Bank/Approved Insurance Company) with address:_____

Name of Principal (Contractor) with address:_____
_____

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

Letter of Acceptance No. _____Dated _____

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

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

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 30, Defects after Taking Over, of Conditions of Contract are fulfilled.

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

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

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

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

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

_____
Guarantor (Bank/Approved Insurance Co.)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
Name, Title & Address

Signature _____

Name _____

Title _____

_____
Corporate Guarantor (Seal)

FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No._____
Executed on_____
Expiry date _____

WHEREAS the _____ (hereinafter called the Employer) has entered into a Contract for _____ _____ _____ (Particulars of Contract), with _____ _____ (hereinafter called the Contractor).

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

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

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

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

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

This guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This guarantee shall expire not later than _____
by which date we must have received any claims by registered letter, telegram, telex or telefax.

It is understood that you will return this Guarantee to us on expiry or after settlement of the total amount to be claimed hereunder.

_____
Guarantor (Bank)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
Name, Title & Address

Signature _____

Name _____

Title _____

_____
Corporate Guarantor (Seal)

INDEMNITY BOND FOR SECURED ADVANCE

AGAINST MATERIALS BROUGHT AT SITE

(ON RS.100 NONJUDICIAL STAMP PAPER)

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

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

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

THEREFORE THIS DEED OF INDEMNITY WITNESSETH AS FOLLOWS:

I/We _____ _____

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

I/We_____ shall indemnify _____ against any or all claims, action, damages arising out of or resulting to the said material.

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

I/We_____do hereby also declare that in the event of my/our infringement of the declaration made above _____ will be entitled to forfeit all such material and also proceed against me/us according to the relevant clause pertaining to breach of contract and further invoke the power or seek any remedies secured of _____ under the contract Agreement signed with us or otherwise available under law.

Place_____ Dated _____

Contractor _____

Not Applicable

SPECIFICATIONS
SPECIAL PROVISIONS

SPECIFICATIONS
TECHNICAL PROVISIONS

SPECIFICATIONS
SPECIAL & TECHNICAL PROVISIONS
SPECIFICATIONS-SPECIAL & TECHNICAL PROVISIONS

1. Scope of Work

The works to be performed include:

- Preparation of Layout Plans and architectural details to suit site specific requirements including location, orientation, configuration, topography and land availability etc. giving due consideration to aesthetics and acceptability by the local population, end user and other stakeholders

- Structural Design of all proposed elements including sub and super structure, and its approval from the Engineer/Employer.

- Design of internal electrification, water supply/plumbing, Fire Fighting extinguishers and its approval from the Engineer/Employer.

- Clearing the site from debris, shrubs, removal of trees including roots, stumps etc. leveling and dressing including excavation up to 12" depth and making the site ready for construction.

- Trench Excavation for foundation, construction of foundation (Separately Measured) but excavation for termite treatment will be measure as per plinth area of Building, bituminous coating, provisions and erection of fast track steel superstructure (fabricated using automatic plants and erected using supplier's patent / recommended connections)as specified in the scope of work, exterior & interior wall cladding with insulation, floor decking, roof decking, false ceiling, flooring, skirting, bath room tiles, marble counter tops, all required of exterior & interior paints, door frames with shutter, windows & ventilators, Sami solid wooden doors M.S Grill for windows, water proof treatment over roof, plinth protection, required wood works, water spouts, internal & exterior wall electrification including testing & commissioning, internal water supply and internal sewerage system including fittings & fixture with required testing, water proofing painting etc. complete in all respects.

- Contractor shall be responsible to carry out all the item of works which deemed to be essential for carry out the completion of the project.

- The Contractors are encouraged to setup plant in Pakistan for fabrication and take all necessary measures for promotion of technology in Pakistan.

- Total covered as per Schedule.

2. Codes & Standards

All Fast track buildings along with their foundations shall be at least designed in accordance with the following codes and standards:

i. Manual of Steel Construction _ ASD-9th Ed. / LRFD 3RD Ed, by American Institute of Steel Construction, Inc. (AISC).

ii. Uniform Building Code (UBC-97).
iii. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by Hot-Dip Process.
iv. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot – Dip Galvanized Coatings; 2000
v. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
vi. ASTM C955 – Standard Specification for Load – Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Birding.
vii. ASTM C1513 – Standard Specification for Steel Taping Screws for Cold-Formed Steel Framing Connections.
viii. ASTM C1007 – Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
ix. AISI – Standard for Cold – Formed Steel Framing General Provisions.
x. AISI – Specification for the Design of Cold – Formed Steel Structural Members; 1996.
xi. Structural design of steel members is in accordance with ‘ AS/NZS 4600:2005 Cold Formed Steel Structures.
xii. ASTM C1186 – Standard specifications for flat non-asbestos fiber cement sheets.
xiii. ASTM C1229 – Standard test Method for Determination of Glass Fiber Content in Glass Fiber Reinforced Concrete. (GFRC)
xiv. ACI 318-08 – Building Code Requirements for Structural Concrete.

Except as otherwise provided by these specifications, all materials, plant fabrication and testing thereof shall conform to the latest applicable standards and specifications. Copies of these standards and specifications may be purchased from the indicated agencies which publish them.

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

3. Design

Design life of the structural elements of the building including frames, foundation, roof, windows and doors as well as cladding (both interior and exterior) should be at least 50 years. The supporting of the building shall be frame/panel system comprising light gauge cold formed galvanized steel sections conforming to ASTM A-653 or equivalent standards. Structural connection for joints should be done using nuts and bolts, screws or rivets. Welded connections shall not be permitted for light gauge steel components.
The maximum weight of the parts of the buildings shall be designed to assemble by manpower only and shall be light enough to be easily handled by the local labor. The structure shall be designed in modular form for any changes in future.

Design shall be disable friendly with provisions of rams, toilets, railings etc. to the standard requirements.

6. Design Criteria

06.1 Building Dimensions and Number of Stories.

The number of rooms, building length, width, height and roof slop shall be according to the specifications / requirements provided in this document and the clear height of the buildings shall not be less than 12 feet Approx.

The buildings shall be designed and constructed according to the site/land available for construction.

6.2 Design Loads

Fast Track Steel Structures comprising light gauge cold formed sections should be designed for all anticipated loads during the life of the structure and shall at least cater for the following:

a. Dead Loads

It comprises the self-weight of structural frame, Decking, false ceiling, insulation and other supporting members.

b. Live Loads

The live load for floor and roof as per ASEC-07 with respect to category building.

c. Wind Loads

Wind load shall be calculated according to UBC-97 with following parameters:

Basic Wind Speed (V)	= 155Km/hr.
Exposure Category	= C
Importance Factor (I)	= 1.00

d. Earthquake Loads

Earthquake Loads shall be calculated according to the UBC-97 Provisions with following parameters.

Seismic Zone	= As per Seismic Zoning of the Area.
Soil Profile Type	= As per Soil Report
Importance Factor (I)	= As per UBC-97 or Pakistan Building Code.

Parameters R & T shall be set according to the basic structural system adopted.

e. Load Combinations

All load combinations shall conform to ASCE-07.

6.3 Serviceability Limits

Deflections shall be within the following limits:

a. Vertical deflections due to Live Loads shall not exceed L/360, where L is the effective span of the member under consideration.

While members are loaded with live load as well as dead load, the deflection should not

exceed the maximum allowable deflection of L/240.

b. Horizontal Deflections/Sway:

(i) The horizontal deflections for wall panels and grits shall not exceed L/120.
(ii) The horizontal deflections for man structural frame shall not exceed H/100.

7. Fabrication of Fast Track Steel Structure

a. Fabricated assemblies to size and configuration required; fitted and connected to meet design requirements.
b. Assemble in largest practical sections for delivery to site.
c. Reinforce and brace assemblies to withstand handling stresses.

8. Installation

a. Install fast track steel structure plumb, square, true to line and securely fastened as required by structural design calculations.
b. Cut members by shearing or sawing and filled with machines shall be protected by protective paint approved by the Engineer.
c. Install members in single piece lengths except that tracks may be spliced, or each length anchored to a common building frame element.
d. Install insulation in framing spaces of insulated assemblies made inaccessible after erection.
e. Repairs and Touch-Up: Clean damaged surfaces and coatings. Touch-Up damaged galvanized surfaces with galvanized repair compound.

9. Tolerances

a. Variation from plum, level, and true line: 1/8 inch in 10 feet (1:960).
b. Member spacing: Not more than 1/8 inch (3mm) plus or minus from spacing indicated.

10. Storage and Protection

Materials stored on site before erection shall be stacked above ground and covered with suitable weather tight covering. Metal panels shall be stored in such a manner so that any accumulated water will drain off. Panels shall not be stored in contact with materials that cause staining. Materials having defects or damages that effect appearance, serviceability or use will be rejected.

11. Warranty

Pre-engineered fast track cold formed metal building shall be warranted against defects in materials and workmanship and that after erection shall be weather tight and shall be subject to the terms of the warranty clause in general conditions of the contract. The defect liability period shall be two years.

Components shall be capable of supporting design loads without permanent deformation, loss of

water-tightness, or disengagement of any part of installation.

12. Submittals

12.1 Product Data

Submit manufacturer's product literature, data sheets and installation recommendations for specified products.

12.2 Structural Calculations

Submit structural calculation prepared by manufacturer for approval. Submittal shall be sealed by a professional engineer registered with Pakistan Engineering Council.

The Structure design of the building shall be carried out using well reputed structural analysis and design software such as SAP 2000, STAADPRO, Framecad Pro and E-TABS. The software other than specified above may be used provided the contractor provides fully functional copies of each software used along with manuals and other reference material.

Contractor's Site Engineer shall have a minimum of 5 years' experience with projects of similar scope.

12.3 Shop Drawings

All drawings shall be in English language and all dimensions shall preferably by in FPS system or otherwise Metric System. Symbols shall be in accordance with IEC standards.

Submit shop drawings prepared by the manufacturer showing plans, sections, elevations, layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories and finishes. Show connection details with screw types and locations and other fastener requirements. Where prefabricated or pre-finished panels are to be provided, provide drawings depicting panel configurations, dimensions and locations.

"Letter of Certification" for building design mentioning the codes, design loads and design criteria to which the building has been designed shall be provided. This document shall be approved and duly stamped by Registered Professional Engineer.

Approval by the Engineer of Shop drawings or erection drawings prepared by the fabricator indicates that the fabricator has correctly interpreted the general layout and framing of the metal building specified in the contract requirements and it's released by the Engineer to start fabrication. This approval does not constitute the Engineer's acceptance of any responsibility for the design adequacy of any structural components designed by the bidder. The bidder is responsible for all structural design services performed by it on this project. Approval does not relive the fabricator of the responsibility for accuracy of detailed dimensions on shop drawings, nor the general fit-up of parts to be assembled on the site.

12.4 As-built Drawings

The Contractor shall at all-time keep on the Site, a separate set of prints on which all significant changes between the work shown on the Drawings and that which is actually constructed shall be noted neatly, accurately and promptly as the work progresses. The contractor/subcontractor(s) for

plumbing, mechanical, and electrical shall, at all times, keep on the Site, a separate set of prints of the drawings (showing their part of the Works) on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. Such drawings shall show the exact physical location and configuration of the work as actually installed.

The Contractor shall, within fourteen (14) days of issuing Taking-over Certificate for whole of the Works, furnish to the Engineer for his approval, two (2) copies of such marked up drawings. One (1) copy of each of the marked up drawings approved by the Engineer shall be returned to the Contractor by the Engineer and these be used for the preparation of the As-Built Drawings.

The Contractor shall furnished to the Engineer six (6) complete sets of all As-Built Drawings within thirty (30) days of receipts of drawings started above from the Engineer.

12.5 Material and Testing

All the material procured by the Bidder/Contractor shall be obtained only from manufacturers approved by a competent body/organization (i.e. I.S.O). Each consignment of material shall be accompanied by the manufacturer's certificate or shall refer to a previous certificate, if the consignment is from the same batch, showing that the material complies with the specified requirements. If such certificate is not made available or if the Employer/Engineer consider that the manufacturer's tests are inadequate, samples shall be taken for acceptance test from different consignments as the Employer/Engineer may direct and shall be tested at the Contractor's cost. Should the result of such test show that the sample does not meet with the specification, the whole consignment shall be rejected and removed from the site at the Contractor's cost.

Note: Goods, materials and workmanship meeting other authoritative standards and which promise to ensure equal or higher quality than the Standards specified will also be acceptable. Brand names of a product, where specified are only indicative and not restrictive; any other product which is equivalent or better than that specified brand will also be acceptable.

13. Testing

Testing except as otherwise specified herein, shall be performed by a testing agency as proposed by the Contractor and approved by the Engineer, at no extra cost to the Employer. The Engineer may require all testing to be carried out under his supervision only.

The quality control testing shall be performed by the Contractor's component personnel in accordance with the procedure/requirements approved by the Engineer.
The Contractor shall keep a complete record of all quality tests performed on Site.

13.1 Testing Laboratory Certificates.

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

13.2 Inspection

All materials and plant furnished and all work performed under which Contract will be subject to inspection by the Engineer at all times and in all states of completion both off Site and on Site. The

Contractor shall furnish promptly without additional charge, all facilities, labor and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

13.3 Approved Sample at Site

The Contractor shall, at all times keep on the Site approved samples. All such samples shall be made available to the Engineer as and when required.

13.4 Site Laboratory

The Contractor shall establish a Site laboratory (Three Nos. 03 Nos. for Each Package) for the purpose of field testing. The laboratory equipment shall remain the Contractor's property at all times. The Contractor shall keep a complete record of all quality test performed on site. The Contractor shall be also provided laboratory helpers to the Engineer for testing.

14. Safety

The Contractor's shall comply and enforce compliance by all his subcontractors with the highest standard of safety and accident prevention in accordance with international standards, and in compliance with all applicable laws, ordinance and statutory provisions.

When overhead work is being carried out, warning signs shall be installed at ground level clearly warning of the overhead work.

All warnings signs shall be in two languages, English and Urdu, and shall at all times are maintained in clean and legible conditions, to the satisfaction of the Engineer. Trash shall be removed at frequent intervals to the satisfaction of the Engineer.

15. Payment

Unless otherwise specifically stated in the Contract, the price of all the works required by Specifications-Technical & Special Provisions shall be considered to be included in the Contract Price.

DRAWINGS

BID EVALUATION CRITERIA

BID EVALUATION CRITERIA

The Criteria for evaluation of technical bid shall be as following details:

Sr. #	General Screening of Technical Evaluation of Various Parameters		Minimum, threshold detail for qualifying for the Project	Pass / Fail
i	Experience	General Experience of the firm as per Schedule H.	If any one project completed in last three year of Rs. 400 Million then pass.	
		Specific Experience of the firm Schedule H.	The bidder should have completed two similar project of Rs. 400 Million each in the last 3 year.	
ii	Competence	Design capacity of multi storied as per IB 13.4 (a) (ii) (Certificate of technology Provider is mandatory)	Have design capacity of at least two storied building then pass. Must show 2 projects approved LGS design.	
		construction Schedule / Work Methodology / Resource Scheduling plan as per Schedule B, C and D.	If construction Schedule, work methodology and resource schedule plan is in line with targeted completion period then pass.	
		Available Resource of the firm i.e. Equipment (technology brochure of equipment production capacity is to be submitted), Material (Sufficient Available Stock Raw Material for execution of project) and manpower as per Schedule F.	if minimum production capacity at least 15m tones per day and minimum stock of galvanized steel of SS grad at least 75m ton then pass.	
iii	Performance	Past performance as per Schedule H.	LGS projects, satisfactory performance certificate of at least 3 projects then pass (Govt. Projects only)	
		Current work commitments.	Detail to be provided	
iv	Financial	Financial soundness as IB 13.4 (b)	Average turnover in last three year should not be less than Rs.800 Million.	
v	Preference will be given to those firm who worked in Sindh Province of Similar nature of work.			

VOLUME-II

TECHNICAL SPECIFICATION & DRAWINGS

SPECIFICATIONS

VOLUME -II (PART-A)

TECHNICAL SPECIFICATIONS

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SECTION- 1 GENERAL REQUJREMENTS

1. General

The General Conditions of Contract & Special Conditions of Contract shall form an integral part of these General Requirements.

The Contractor shall notify all sub-contractors of the provisions of the Conditions of Contract and the General Requirement of this Specification.

The arrangement and division of these Specifications is not to be construed as establishing the limits of responsibility of sub-trades.

The Contractor is responsible for delineating the scope of Sub-Contracts and for coordinating all the Works.

All works shall be carried out in accordance with the following specifications, supplemented by detailed specifications contained in the following sections. Any inconsistencies or ambiguities shall be brought to the notice of the Engineer for his clarification/decision. Decision and direction of the Engineer, in all such cases shall be final and binding.

The Contractor shall *make* himself thoroughly familiar with the site conditions, foresee any and all problems likely to the encountered during execution of the works, and shall be able and ready to solve them effectively. Proposals for solutions to the problems shall be submitted to the Consultant for approval before proceeding with the work.
The Tender Drawings, Design Criteria and Specifications are to be read [n conjunction and shall be mutually explanatory. In case of any conflict the order of preference shall be as under duly followed by the Special and General Conditions of Contract in Volume I of Tender & Contract documents.

i) Specifications
ii) Tender Drawings
iii) Bill of Quantities

2. Scope of Work

The scope of work Comprises Investigation, Design, Drawing, Supply, Fixing & Erection / Installation of Pre – Engineered Building (Light Gauge Cold Formed Galvanized Steel Structures) for Comprehensive School along with Civil, Electrical, Plumbing & Mechanical Works at Shaheed Benazirabad, Sanghar, Khairpur, Shadad Kot and Dadu works as per drawings and specification as defined hereunder and as specified in subsequent sections of tender documents. The Contractor shall perform all relevant engineering, procurement, installation, construction and execution, coordination with other services, testing and commissioning including all documentation, drawings, calculations and supply of manuals as required to complete the work.The Contractor shall also be responsible to supply and install all other items not specifically mentioned in these documents but which are necessary for proper completion of the works included in the scope of this Contract.

3. Applicable Codes and Standards

In the absence of other Standards being required by the Contract Documents, all work and materials shall meet the requirement of the Uniform Building Code of the United States, and/or applicable American Society for Testing Materials. (ASTM) American Association of State Highway and" Transportation Officials (AASHTO) Specifications and the latest American Concrete Institute Manual of Concrete Practice and American.

Institute of Steel. Construction (AISC) Manual relevant to the Works

except in cases where the Pakistan Building Code requires s higher standard. In such cases the Pakistani. Code shell govern, where the abbreviations, listed below are used, it refers to the latest code, standards, or· publications of the following organizations:

AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSJ	American- National Standards Institute
ASA	American Standard Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing And Material
AWS	American Welding Society
BSI	British Standards Institute
ICAO	International Civil Aviation Organization
BSICP	British Standard Institute Code of Practice
PCA	Portland cement Association
PSI	Pakistan Standard Institute
UBC	Uniform Building Code

Should the Contractor, at any time and for any specific reasons wish to deviate from the above standards .or desires to use materials or equipment other than those: provided for by the above standards, then he shall state: the exact nature of the change giving the reasons for making the change and shall submit .complete specifications of the materials and descriptions of the equipment for the Engineer's approval, whose decision shall be conclusive and binding upon the Contractor.

4. Codes, Standards and Certificates

The Contractor·shall supply- and have at his site office:

Copies of all latest editions of codes and) standard referred to in these specifications by number, or equivalent codes: and standards approved by the Engineer.

Catalogues and published, recommendations from manufacturers supplying. Products and materials forthe project

The Contractor shall provide manufacturer's or supplier's certificates to the Engineer for all products and materials which. Must meetthe requirements of a specific code or standard as stated in these Specifications.

5. Units of Measurements

The British System of Units (FPS) shall be used throughout this Project.

6. Manufacturer’s Recommendations

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

7. Existing Condition at Site

Drawings and information pertaining to existing project conditions are furnished for reference. Neither the Employer nor the Engineer warrants the adequa9y or correctness of these.

8. Protection and Precautions

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

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

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

The Contractor shall cooperate with trades performing work u n d e r other Contracts as necessary for completion.

9. Setting Out of Work

Establish all boundaries, markers, leveling stakes and benchmarks on the site to adequately set out all work. Verify all data and their relationship to establish and Engineer's survey control points and public benchmarks and report discrepancies to the Engineer.

Permanently mark the necessary controls for distance and elevation sufficient to serve throughout the Contract and protect these control points adequately against damage and displacement.

Project setting out is 1or the use of all trades; each trade is responsible for the layout of its own work.

10. Sequence of Construction

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

11. Lines and Levels

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

12. Partial Possession

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

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

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

13. Existing Services

The Contractor shall search for, find locate and protect any visible/invisible wiring, cable, duct, pipe work, etc., within or immediately adjoining the site area.

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

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

Existing utilities which are to remain in service or after the works are to be determined by the Contractor. If any existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during these operations, they shall be safeguarded, protected from damage and supported.

14. Plant and Equipment

The Contractor shall submit a detailed list of plant and equipment, which he shall undertake to bring to the site to carry out the work. The list shall satisfy the Engineer as to type, size and quantity. The list shall include for each piece of equipment the type, manufacturer, model, identification number and year of manufacture.The· Contractor shall provide on the site of the work at his cost all of the equipment listed and all subsequent equipment required for approval of the detailed program of work and such equipment which may be directed

by the Engineer. The Contractor shall supply all plant and equipment necessary for the construction of each phase of the work and it must be on site, inspected and approved by the Engineer.

15. Construction Area and Access

The Contractor shall confine his operations to the areas that are actually required for the Works and shall fence the area accordingly Arrangements for access roads, storage areas and routes for haulage of materials are to be made by the Contractor at his own cost, subject to the approval of the Engineer.

16. Storage & Handling Facilities

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

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

17. Test Laboratory and Testing

17.1 Testing, except as otherwise specified herein, shall be performed by an approved testing agency as proposed by the Contractor and at no extra cost to the Employer. The Engineer may require all testing to be carried out under his supervision only.

17.2 It suitable and adequate material testing laboratory is not availablele in the vicinity, then the Contractor shall provide and maintain a materials testing laboratory in the vicinity of the Contractor's Camp and the laboratory shall have sufficient working area and shall be equipped with all necessary facilities including a suitable store room.

17.3 The Contractor shall supply and maintain to the satisfaction of the Engineer or his representative complete testing equipment, apparatus, tools, gauges, instruments, etc. in sufficient number and adequate for all tests to be carried out as specified in these specifications. Valid calibration certificates of gauges instruments requirement

shall be provided by the Contractor.

17.4 The Contractor, after the approval by the Engineer for the source of cement and steel "shall make available at the site sufficient stock of the materials in advance in order to allow sample testing for quality control prior to use.

17.5 The quality contract testing shall be performed" by the Contractor's competent personnel in accordance with a site testing and quality control program to be established by the Contractor and approved by the Engineer or his Representative. The Contractor shall keep a complete record of all quality tests performed on site and submit the same to the Engineer. All quality control and related...tests shall be carried out in accordance with applicable standards and.

18. Construction & Checking At Site

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

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

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

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

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

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

19. Bar Bending Schedule

Bar bending (reinforcement bars) schedule of all drawings shall be prepared by the Contractor and submitted to Consultants' Head Office for approval. The approved bar bending scheduled shall be followed for cutting of steel and preparation of bills.

20. Drawings

20.1 Tender Drawings: The drawings listed in the General Conditions of contract, Volume I and provided in Volume Ill are referred to as Tender Drawings and these show the scope of work to be performed by the Contractor. Tender Drawings shall not be used as a basis for fabrication or construction but may be used as a basis for placing preliminary order for materials, subject to corrections based on the future issue of Drawings as provided under sub-clause 19.2 Drawings Issued for Construction. Tender Drawings are subject *to* be modified and supplemented by additional detail by the Engineer.

20.2 Drawings Issued for Construction: After Award of Contract, Tender Drawings shall be replaced by Drawings Issued for Construction including supplementary Specifications as may be necessary. Such drawings and specifications shall be construed to be included in the expression Custody of Drawings under Sub-Clause 6.1 of General Conditions of Contract Part I. Drawings Issued for Construction may include some of the Tender Drawings with or without modification and additional drawings as required to express design intent in greater detail. Such drawings may also be modified from time to time. Drawings Issued for Construction will be the drawings from which shop, fabrication, erection installation, concrete placing, formwork, or other construction detail drawings shall be preparedby the Contractor. The work shall be executed in conformity with Drawings Issued for Construction. The Contractor shall prepare a schedule of Drawings Issued for Construction of various parts of the Works based on Construction program me approved by the Engineer for issuance to the Contractor from time to time.

20.3 Study of Drawings: The Contractor shall study all Drawings issued for Construction carefully as soon as practicable after receipt thereof, and any errors discovered shall promptly be brought to the knowledge of the Engineer for his instructions.

20.4 Copies of Drawing: Drawings will be issued to the Contractor free of charge as follows:

Drawings Issued tor Construction - Two copies as specified in sub- clause 6.1 Custody of Drawings, of General Conditions of Contract - Part IVolume I.

20.5 Drawings to be furnished by the. Contractor:

Shop Drawings

Ail shop drawings required for the work including all kinds of fabrication, field erection, installation, placement and layout drawings shall be furnished by the Contractor for approval of the Engineer. If additional detail drawings are necessary to complete any part of the work, such including reinforcing steel, drawings shelf be prepared by the Contractor and submitted to the Engineer for approval. All drawings shall be complete and shall be submitted in due time and in logical order to facilitate proper coordination.

a. Lift and placement Drawings.

At least thirty calendar. Days prior to starting construction of any concrete lift or other placement, the Contractor shall submit lift or other placement drawings to the Engineer for approval Lift or other placement drawings shall be submitted for each Hit or other placement of concrete to be placed. These drawings shall be to such scale as to clearly show all recesses, openings, and embedded parts, including embedded structural steel, mechanical and electrical items, reinforcement placement in each lift in sufficient detail for proper execution of the work.

b. Construction Plant Layout Drawings.

Three prints of drawings, showing the layout of construction plant and equipment the Contractor proposes to use on the work, shelf be submitted by the Contractor for review to the Engineer. The drawings shall show the locations of the principal components of the construction plant, offices, storage areas and yards which the Contractor proposes to construct or use at the site of the work and elsewhere. The drawings shall also show the unloading facilities for materials and equipment at the work site.

c. Submission and Approval:

Except as otherwise specified, three copies of each drawing for approval or review shall be furnished to the Consultant. Within thirty calendar days after receipt the Consultant will send one copy to the Contractor marked Approved, Approved/Except as Noted, or Returned for Correction. The notations approved and approved/except as Noted will authorize the Contractor to proceed with the fabrication of the materials and equipment covered by such drawings subject to the corrections, if any, indicated thereon. Drawings returned for correction will be resubmitted for approval in the same manner as for new drawings. Every revision made during the life of the Contract shall be shown by number, date and subject in a revision block.

Upon receipt of prints which have been Approved or Approved Except as Noted, the Contractor shall furnish three prints plus one reproducible of each drawing to the Engineer. If revisions are made after a drawing has been approved, the Contractor shall

furnish 3 additional prints- and one reproducible subsequent to each approved - revision.

d. Shop drawings to be prepared by a· Sub-contractor shall be submitted in the same manner as (a) & (b) above but they will be submitted through the Contractor.

e. All of the applicable requirements of this Clause with reference to drawingsto be prepared by the Contractor, including Subcontractors, shall apply equally to catalogue cuts, illustrations, printed specifications, or other data submitted for approval.

f. Any work done on Contractor's drawings shall be at the Contractor's risk. The Engineer will have the right to request any additional details and to require the Contractor to make any changes in the drawings which are necessary to conform to the provisions and intent of design and specifications without additional cost to the Employer. The approval of the drawings by the Consultant shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Approval by· the- Engineer of the Contractor's drawings shall not be held to relieve the Contractor of his obligation to meet all the requirements of the Specifications or of his responsibility for the correctness of the Contractor's drawings or of his responsibility for correct fit of assembled parts in final position or of his· responsibility for the adequacy of method of construction.

21. As-Built Drawings

The Contractor shall, at all times, keep on the site one copy of all drawings and approved samples together with copies of all building, mechanical, electrical and public safety codes and. relevant standards applicable to the works . All such material shelf be made available to the Engineer.

In addition, the Contractor shall, at all times, keep on site a separate set of prints on which shall be noted neatly, accurately and promptly as the work progresses all significant changes between the work shown on the drawings and that which is actually constructed. The sub-Contractors shall each keep on site, at all times, a separate set of prints of the drawings showing their parts of the work on which shall be noted, neatly accurately and promptly as work progresses the exact physical location and configuration of the works as actually installed, including any revisions or deviation from the Contract Documents.

At the completion of the works, the Contractor shall at his expense, supply to the Engineer six copies and one reproducible copy of all drawings along with CD containing ail as built drawings amended to comply with the work "As Built". The .Contractor shall provide in the same format as the original drawings, any additional drawing required to record the work.

22. Restoration and Cleaning

The Contractor shall do regular cleaning and·clean away all rubbish and excess materials that may accumulate from time to time on completion and before handing over. Upon completion of the works he shall obliterate all signs of temporary construction facilities such as work areas, structures, foundations · of temporary structures, stock piles of excess · or waste materials, or any other vestiges of construction, unless otherwise directed by the Consultant/Engineer Incharge . The works and site shall be left in a clean and satisfactory state for immediate use and occupation. Care shall be taken not to use any cleaning materials which may cause damage to the surface to be cleaned.

23. Protection of the Works

The Contractor shall whenever necessary cover up and protect the works from Weather damage by his own or other workmen performing subsequent operation. He shall provide all necessary dust sheets, barriers and guard rails and clear away the same at completion.

The Contractor shall take all proper steps for protection at all places on or about the works which may be dangerous to his workmen or any other person or to traffic .The Contractor shall provide and maintain warning signs, warning lamps and barricades as necessary.

24. Product Data

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

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

25. Samples

25.1 The Contractor shall furnish for approval of the Engineer with reasonable Promptness all samples as directed by the Consultant or specifically called for in_ these Specifications. The Consultant shall check and approve such samples with reasonable promptness for compliance with the requirements of Contract Documents. All work shall be in accordance with approved samples.

25.2 Duplicate final approved samples, in addition to any required for the contractor’s use shall be furnished to the Consultant, one for office use and the other for the Site.

25.3 Samples shall be furnished so as not to delay fabrication, allowing the Consultant/Engineer Incharge reasonable time for consideration of the sample' submitted.

25.4 Each sample shall be properly labeled with the name and quality of the material, manufacturers name, name of the project, the contractor's name and the date of submission, and the Specifications Article number in which the sample refers.

25.5 The manufacturer's installation directions shall be provided with each sample. The Contractor shall pay all transportation costs and deliver samples to the Engineer's office. & Consultants' Head office, S te or testing laboratory as directed by the Engineer. Samples will not be returned unless return is requested at the time of submission; all packing and transportation costs for the return of samples shall be paid by the Contractor.

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

25.7 If both Shop Drawings and samples are required for the same item, the Consultant/Engineer Incharge may require both to be submitted before approving either,25.7 No acceptance or approval of any Shop Drawings or sample, or any indication or directions by the Engineer on any Shop Drawings shall constitute an authorization for any-increase in the Contract Sum.

In the event that the site cannot be connected to a local electricity network or where the available power is insufficient the Contractor has to make his own provision and maintain such installation.

A temporary fighting system shall be furnished, installed and maintained by the Contractor as required to satisfy the minimum requirements for safety and security. The temporary lighting system shall afford adequate general illumination to all building areas. Adequate outdoor lighting shall be provided to illuminate staging trenches and the like to the satisfaction of the Engineer Incharge and general illumination throughout adequate for watchmen and emergency personnel.

Temporary equipment and wiring for power and lighting shall be in· accordance with the applicable provisions of governing codes. Temporary wiring shall be maintained in a safe manner and utilized so as not to constitute a hazard to persons or property.

When the permanent electrical power and lighting systems are in an operating condition, they may be used for temporary power and lighting for construction purposes provided that the Contractor obtains the written approval of the Client and assumes full responsibility for the entire power and lighting system and pays all charges/costs for operation and maintenance of the system mutually agreed between the Employer and the Contractor.

Approval, license etc. if required under local laws will be obtained by the Contractor on his own responsibility and cost. At completion of construction work, or at such time as the Contractor makes use of permanent electrical equipment and devices, temporary electricity services shall be removed by the Contractor as his own expense.

25.6.1 Waste Disposal

The Contractor shall make such temporary provisions as may be required in order to dispose of any chemicals, fuels, grease, bituminous materials, waste and soil waste and the like without causing pollution to either the site or the environment. Disposal of any materials, wastes, effluents, garbage, oil, grease, chemicals and the like shall be in areas specified by the concern d local authority proposed by the Contractor and subject to the approval of the Engineer. If any waste material is dumped in unauthorized areas the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as directed by the Engineer In charge and replaced with suitable fill material compacted and finished with topsoil all at the expense of the Contractor.

25.6.2 Fire Protection

The Contractor shall provide and maintain adequate fire protection in the form of barrels of water with buckets, fire bucket tanks, fire extinguishers, or other effective means ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of the works.

Gasoline and other flammable liquids shall be stored in and dispensed from safety containers approved by the Engineer In charge and storage shall not be within building.

Torch-cutting and welding operations performed by the Contractor shall have the approval of the Engineer In charge before such work is started and a chemical extinguisher is to be available at the location where such work is in progress.

The Contractor shall follow the instructions and specifications of the relevant department and or other local authority.

25.6.3 Telephone

The Contractor shall immediately after receiving the Letter of Acceptance take the necessary steps to obtain mobile and land line telephone on site. He shall be responsible for all installation and connection charges and periodic mobile and landline telephone accounts. The telephone shall be made available to the Engineer for the due performa nce· of his duties at all times and free 0', charge during construction and defects liability period.

26. Construction Schedule

A Construction schedule shall be maintained in accordance with the provisions of the General Conditions of Contract.

The schedule shall be accompanied with sufficient data and information including all necessary particulars of constructional plant, equipment machinery, temporary Works, arrival of plant, equipment at site and their installation, method of operation, work forces employed, etc. for an activities of the Works.

Should the Consultant / Engineer consider any alteration or addition in the program and time schedule, the Contractor shall conform thereto without any cost to the Employer.

Whenever necessary and wherever the progress of the actual work shows departure, the program and time schedule shall be undated and submitted to the Consultant/Engineer In charge for his approval.

27. Notification to the Engineer

The Enquirer's Representative shall be notified daily in writing, of the nature and location of the Works the Contractor intends to perform the next day so as to enable necessary inspection and measurement to be carried out. The Engineer may, if necessary, direct that longer notice be given of certain operations.

28. Night Work

When work is done at night the Contractor shall maintain from sunset to sunrise such lights on or about his work and plant as the Engineer may deem necessary for the proper observations of the work and the efficient prosecution hereof.

29. Weather

No work is to be undertaken when, in the opinion of the Engineer, the weather is so unsuitable that proper protection of the work cannot be ensured.

30. Co-Ordination With Other Contractors

The Contractor shall make all necessary coordination with other Contractor and shall make sure that all embedding components such as pipes, steel bases etc. (as required for completion of electrical works) are property, accurately and timely installed. The Contractor shall inform the other contractor the schedule of any construction activity well in advance giving him sufficient time to finish his part of job, before any compaction/concreting etc. The Contractor shall get the signature of the authorized representation of the other contractor before carrying out any construction activity.

If any part of electrical work is damaged or has to be dismantled or redone due to negligence omissions / incorrect position of the embedding etc. on part of the Contractor, a![such losses/expensed shall be borne by the Contractor.

All expenses incurred for the above works including coordination are deemed to be covered in his tendered cost and no separate/extra payment shall be paid against such item.

31. Submission Requirements

31.1 Schedule submission at least sixty days before the dates when reviewed submittals well be needed.

31.2 Submit Shop Drawings as per provision given in Sub-Clause 20.5 (a) and number of copies of Product Data which the Contractor requires for distribution plus four copies which will be retained by the Engineer.

31.3 Submit three samples unless otherwise specified.

31.4 Accompany submittals with transmittal letter, in duplicate, containing: Date Project title and number Contractor's name and address The number of each Shop Drawing, Product Data and the Sample submitted. Notification of deviations from Contract Documents. Other pertinent data.

32. Resubmission Requirements Shop Drawings:

Revise initial drawings as required and resubmit as specified for initial submittal. Indicate on drawings any changes which have been made by the Engineer. Product Data and Samples: Submit new data and samples as required for initial submittal.

33. Survey Instruments

Ail the instruments, equipment, ·stakes and other material necessary to perform all work shall be provided by the Contractor. The survey work shall be carried out by competent staff consistent with the current practices. The Contractor shall maintain on site surveying instruments in perfect working conditions to enable the Engineer' to check lines and level at all times.

Survey instruments and equipment shall include but not limit to the following:

Electronic Total Station Laser Meter
Precision Level invert Staff Automatic Levels
Power level

Compass, steel tape, ranging poles

34. Weekly Progress Report and Photographs

34.1 During the continuance of the Contract, the Contractor shall submit weekly progress reports on forms as approved by the Consultant. Such weekly reports shall show the actual progress completed as of date of the report plotted against the schedule as given by the Contractor at the start of work and shall be broken down so as to indicate status of all activities associated - with mobilization design, material procurement, manufacture, surveys works, tests with regard to the agreed contract program.

34.2 The Employer and the Engineer reserve the right to coordinate the schedules of this Contractor and other Contractors working at the Site, and to adjust and/or change any and all such schedules as required during the course of construction in order to achieve a coordinated project in harmony with the Employer's completion date.

34.3 Commencing after the first week of construction, and continuing every week until completion, the Contractor shall take and submit photographs to the Engineer's Representative, to show progress of his work and completion of each structure or major feature.

35. Contractor to Notify Delays Etc.

Any delay which will affect the completion of Works shall be detailed by the Contractor who shall state the action he is taking for effective completion of the Contract program.

The Contractor shall give a summary of the detailed progress report giving the position with regard to the agreed Contract program.

The progress reports shall be set out in a format to the approval of the Consultant, and forwarded promptly so that on receipt the information contained therein is not more than 2i days out of date.

If during execution of the Contract, the Employer considers the progress position of any section of the work· to be unsatisfactory, or for any other reason relating to the Contract, he will beat liberty to convene a meeting and the contractor's Representatives are to attend such meeting.

The Contractor's Site Office shall prepare and submit 6 copies of a weekly progress report to the Employer and Engineer's Site Office. This report shall summarize site activities and .record and details where difficulties in maintaining the agreed program are being experienced or are likely to cause subsequent delay.

The Contractor's Site Office shall also prepare and submit to 'the Engineer's Site Office 2 copies of Daily Activity Report summarizing the main activities to be undertaken each day, noting special activities such a tests, alignment checks, etc. The Contractor shall be responsible for expediting the delivery of all material and equipment *to* be provided by him and his subcontractors.

36. Photographs

As soon as work commences on Site, the Contractor shall provide photographs (at least 10 to 12) of the works from positions to be selected by the Engineer. Each photographic print shall not be less than 297 mm x 210 mm and shall bear a printed description, a serial number and the date when taken.

The negatives of all photographs shall be held at the Contractor's Site Office, numbered and handed over to the Employer at the completion of the Contract.

37. Contractor's Employees

The Contractor shall be provide and employ on the site for the purpose of or in connection with the contract:

Sr.#	Staff to be Employed with Qualification	No.	Experience
1	Project Manager. (Graduate B.E. Civil Engineering)	1	Minimum 15 years
2	Senior Site Engineer. (Graduate B.E. / B-Tech in Civil)	2	Minimum 8 years
3	Material Engineer. (Graduate B.E. / M.Sc. In Geology	1	Minimum 10 years
4	Site inspector (DAE 3 year) in Civil	2	Minimum 5 years
5	Site inspector (DAE 3 year) in Electrical / Mechanical	1	Minimum 5 years
6	Surveyor (DAE 3 year) in Civil	1	Minimum 5 years
7	Quantity Surveyor (DAE 3 year) in Civil	1	Minimum 10 years
Additional Staff if all Civil, Electrical and Mechanical Works			
1	Work Superintendents	2	Metric non-metric with 10 to 15 year experience in the construction of R.C.C. work and can understand drawing well
2	Remaining staff be employed by the contractor as required at site as per schedule of work		

38. Payment of Work

No payment shall be made for the works involved within the scope of this section of specification.

The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities.

SECTION – 2 CONTRACTOR'S CAMP

1. **Scope**

The work to be done under this item consists of construction, erection, installation and maintenance of the Contractor's Project Site Offices or main camp and the Contractor's sub-camps or temporary camps, if any, and shall include all offices, shops, warehouses, and other operational buildings; all housing and related facilities including accommodations for the Contractor's personnel.

The location of the Contractor's camps, including all buildings, utilities and facilities there for, and of the camps or establishments of all persons/parties in the vicinity operating or associated with the Contractor shall be subject to approval of the Engineer.

The work to be done under this item will terminate upon the actual Completion Date. However, if directed by the Consultant or the Employer, the Contractor shall continue such work to the extent required by the Contractor's personnel during the period of maintenance. No compensation shall be paid for the continued operation and maintenance of the Contractor's Camps during the period of maintenance.

Upon completion of the Works, or at such time within the period of maintenance as directed by the Consultant, the Contractor shall remove all buildings utilities and other facilities from the Site and restore all camp areas to a neat and clean condition.

The construction, operation and maintenance of all camps of the Contractor shall comply with all applicable provisions of current Pakistan Labour Camp Rules.

Adequately equipped and properly staffed portable first aid stations or dispensaries shall be provided by the Contractor at camps and other strategic locations to administer first aid treatment at any time required and free of charge to all persons on the Site, including employees of the Consultant and the Employer.

2. **Payment of Work**

No payment shall be made for the works involved within the scope of this section of Specifications unless otherwise specifically stated in the Bills of Quantities or herein

The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities

SECTION – 3 STAKE-OUT SURVEY

1. **Scope**

Under this item the Contractor shall make the stakeout survey for construction purposes with competently qualified men, consistent with the current practices. The work shall proceed immediately upon the award of the contract and shall be expeditiously progressed to completion in a manner and at a rate satisfactory to the Engineer. The Contractor shall keep the Engineer fully informed as to the progress of the stakeout survey. The scope of this section of specifications is covered by detailed specifications as laid down herein.

2. **Material and Equipment**

All instruments, equipment, stakes and other material necessary to perform all work shall be provided by the Contractor. These instruments and equipment shall be available to Engineer at all times for the purpose of checking the work of the Contract.

All stakes used shall be of a type approved by the Engineer, clearly and permanently marked so as to be legible at all times. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times. Any existing stakes or markers defining property lines and survey monuments which may be disturbed during construction shall be properly tied into fixed reference point before being disturbed and accurately reset in their proper position upon completion of the work.

3. **Construction**

The Contractor shall trim trees, bushes and other interfering objects, not consistent with the plan, from survey lines in advance of all survey work to permit accurate and unimpeded work by his stake-out survey crews and the Engineer's survey crews The exact position of all work shall be established from control points, which are shown on the plans or modified by the Engineer. Any error, apparent discrepancy in or absence of data shown or required for accurately accomplishing' the stakeout survey shall be referred to the Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc. throughout the life of the contract. Damaged, destroyed or inaccessible reference points, bench marks or stakes shall be replaced by the Contractor Existing or new control points that will be or are destroyed during construction shall be re-established and all reference ties recorded thereon shall be furnished to the Engineer All stakeout survey work shall be referenced to the centerlines shown on the Plans All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be kept neatly and made available to the Engineer upon request and furnished to the Employer upon Contract completion.

The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and any necessary correction to the work shall be immediately made. Such checking by the Engineer shall not relieve the

Contractor of any of his responsibilities for the accuracy or completeness of his work.

Reference points, base lines, stakes and benchmarks for borrow pits shall be established by the Contractor.

All required right-of-way and easement limits shall be established, staked and referenced by the Contractor concurrent with the construction stakeout survey.

The Contractor shall place at least two offset stakes or references at each centre lines station and at such intermediate stations as the Engineer may direct. From computations and measurements made by the Contractor, these stakes shall be clearly marked with the correct centre line, station number, offset and cut or fill so as to permit the establishment of the true centre line location during construction. He shall locate and place all cut, fill, slope, line grade or other stakes and points as the Engineer may direct to be necessary for the proper progress of the work.

4. Payment of Work

No payment shall be made for the Works involved within the scope of this section of Specifications unless otherwise specifically stated in the Bills of Quantities or herein.

The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities

SECTION – 4 CLEARING AND GRUBBING

1. Scope

The clearing and grubbing shall consist of clearing the designated area of all trees, down timber, snags, bush, other vegetation, rubbish and all other objectionable material, and shall include grubbing stumps, roots, and matted roots, and disposal of all spoil material resulting from the clearing and grubbing It shall also include the removal and disposal of structures that protrude, encroach upon, or otherwise obstruct the work, except when other vise provided for on the plans or directed by the Engineer to be saved The scope of this section of specifications is covered with detailed specifications laid down herein.

2. Limit of Area

2.1 Location of Works

The Engineer will define the limit of areas where clearing and grubbing is to be done. Normally it will include all land within the right of way and all other construction area including ditches, detours, minor road crossings and other areas shown on the plans or as specified or as directed by the Engineer. The Engineer will designate the fences structures and debris and trees and bushes to be cleared where grubbing is not required. It shall not include clearing and grubbing of borrow or other pit areas from which material is secured. It shall include the leveling or removal of all bunds or mounds within the right of way unless otherwise directed by the Engineer.

2.2 Grubbing and Cutting

All roots and stumps within the limits of the site shall be grubbed and excavated unless otherwise specified or approved by the Engineer.

2.3 Disposal

All wood and bush shall be burned or otherwise disposed off within fifteen (15) days after cutting or felling unless otherwise approved No tree trunks, stumps or other debris shall be left within Site unless approved in writing by the Engineer. The location of disposal areas shall be within or outside the limits of the project or as approved in writing by the Engineer and shall be acquired by the Contractor at his own expense. Any useable material shall remain the property of the Employer.

2.4 Protection and Restoration

The Contractor shall prevent all damage to pipes, conduits, wires, cables or structures above or below ground. No land monuments, property markers, or official datum points shall be damaged or removed until the Engineer has witnessed or otherwise referred their location and approved their removal. The Contractor shall so control his operations as to prevent damage to trees and shrubs, which are to be preserved. Protection may include fences and boards lashed to trees tv prevent damage from machine operations. The existing covered or open benchmarks should be relocated as directed by the Engineer. In the event that anything specified herein to be saved and protected is damaged.

SECTION – 5 DISMANTLING WORKS

1. Scope

The work covered by this Section of the Specifications consists of furnishing all plant, labour, equipment, appliances and performing all operations in connection with demolition! dismantling and removal of existing building components, walls, floors, skirting, plaster and removing of doors, windows and ventilators, removal / re-routing of utility services of the building with accessories, removal of existing roof finishes and disposal/stacking of material to designated places. Whole work shall be done in accordance with these and other relevant specifications and as directed by the Engineer.

2. Procedures

2.1 The Engineer will define the limits where demolition/ dismantling and removal activity is to be done and shall approve the procedures/methods to be adopted by the Contractor.

2.2 Whole work shall be performed in an orderly manner and the Contractor shall take all necessary precautions and expedients to prevent damages to the adjacent structures, installed equipment/machinery, pipes, conduits etc. Any damage caused to the structures and installations due to negligence of the Contractor during demolition dismantled and removal operations shall be repaired/replaced by the Contractor at his cost and to the satisfaction of the Engineer.

3. Demolition of Building Components

3.1 The Contractor shall demolish walls, floors skirting, cutting of plaster, removing of doors, windows, ventilators, concrete/ masonry works and other associated parts to the line and depth as shown on the Drawings or as directed by the Engineer. Explosives shall not be used to remove the plain and reinforced cement concrete or any other material whatsoever. Manually or where required mechanically operated breakers, concrete saws, chipping hammers or other approved methods shall be employed for cutting. Care shall be taken that existing services and structures are not damaged. It shall be the responsibility of the Contractor to replace at his cost any services, Structures damaged by the Contractor due to his negligence during cutting operations or thereafter until the whole of cut parts areas are restored to original condition to the satisfaction of the Engineer

4. Removal of Existing Services/ Utilities/Finishes

4.1 The Contractor shall mark all the services/ utilities falling within the Contract area. After getting approval from the Engineer, the contractor shall remove all such Services/utilities/finishes as per the requirement specifications of the relative department whose utilities/services finishes are being removed/ shifted.

5. Disposal

5.1 All debris materials resulting from demolition / dismantling works shall be disposed off to places designated by the Engineer in the manner of disposition required and directed by the Engineer.

5.2 All useable materials resulting from demolition and removal shall remain the property of the Employer and shall be stacked at

designated places.

6. Measurement and Payment

6.1 General

Except otherwise specified herein or elsewhere in the Bill of Quantities/Contract Documents no measurement and payment will be made for the under mentioned items related to this section. The cost thereof shall be deemed to have been included in the quoted unit rate of the other items of the Bill of Quantities under this section.

6.1.1 Temporary diversion and safety measures.

6.1.2 Loading, unloading, transportation and disposal of demolished dismantled/removed/useable material to the place designated by the Engineer.

6.1.3 Permissions/approvals, if required, from the relative department.

6.1.4 Stacking of all useable material to the place designated by the Engineer.

6.1.5 Earth work

6.2 Dismantling of Tile Floors/Dado/Skirting / Wall fly proof jali

6.2.1 Measurement

Measurement for acceptably completed works of dismantling and removal of existing tile floors/dada/skirting/wall/fly proof jali and staking of useable material at designated places will be made on the basis of actual area in square foot of dismantled floor/dado/skirting/wall/fly proof jali as directed by the Engineer.

6.2.2 Payment

Payment will be made for acceptably measured quantity of dismantled tile floor/dado/skirting/wall/fly proof jali on the basis of unit rate per square foot quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item. If this item is not covered in the BOQ the cost thereof shall be deemed to have been included in the quoted unit rate of other items of bill of quantities.

6.3 Removal of Doors and Windows with Chowkhats

6.3.1 Measurement

Measurement for acceptably completed works of removal of existing doors/windows with chowkhats and staking of useable material at designated places will be made on the basis of actual number of removed doors/windows with chowkhats as directed by the Engineer.

6.3.2 Payment

Payment will be made for acceptably measured quantity of removal of existing doors/windows with chowkhats on the basis of unit rate per number quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item If this item is not covered in the BOQ the cost

thereof shall be deemed to have been included in the quoted unit rate of other items of bill of quantities.

6.4 RCC Slab

6.4.1 Measurement

Measurement for acceptably completed works of removal of existing RCC slab will be made on the basis of actual volume in cubic feet of dismantled concrete as directed by the Engineer.

6.4.2 Payment

Payment will be made for acceptably measured quantity of dismantling of existing RCC slab on the basis of unit rate per cubic feet quoted in the Bill of Quantities full compensation for all the works related to the item.

SECTION – 6 EARTH WORK

1. Scope of Work

The work under this section of the specification consist of furnishing all plant, labour equipment, appliances and materials and in performing all operations in connection with earthworks of all underground services and structural units, stock piling of suitable excavated material, disposal of unsuitable and surplus excavated material in accordance with this section of specifications, the applicable drawings and subject to terms and conditions of the Contract.

2. General

2 1 The Contractor shall be deemed to have made. local and independent inquires as to, and shall take the whole risk of, the nature of the ground subsoil or material to be excavated or penetrated and the Contractor shall not be entitled to receive an extra or additional payment nor to be relieved from any of his obligations by reasons of the nature of such ground subsoil or material.

2 2 All excavations cut and fills shall be constructed to the lines, levels and gradients specified with any necessary allowance for consolidation, settlement and drainage so that at the end of the Period of Maintenance the ground shall be at the required lines, levels and gradients During the course of the Contract and during the Period of Maintenance any damage or defects in cuts and fills, in structures and other works, caused by slips, falls of wash-ins or any other ground movement due to the Contractor's negligence shall be made good by the contractor at his own cost.

3. Site Preparation

3 1 The Contractor shall set out the works and shall be responsible for true and perfect Setting out of the same and for correctness of the 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 works, the Contractor shall at his own expense rectify such error, to the satisfaction of the Engineer.

3 2 The Contractor shall construct and maintain accurate bench marks so that the Lines and Levels can be easily checked by the Engineer.

3.3 The Contractor shall perform a joint surely with the Engineer's Representative, of the area where earth work is required, plot the ground levels on the drawings and obtain approval from the Engineer before starting the earth work and shall supply a copy to the Employer duly checked, signed and authenticated by the Engineer before start of work

4. Excavations

4 1 Excavation shall include the removal of all material of every name and nature. It is expected that rock and other hard material will be encountered during excavation, The rate of excavation shall include the removal of all sub-surface material of every name and nature and no classification of sub-surface material shall be made nor any additional payment shall be made.

4 2 The major portion of excavations shall be carried out by mechanical

excavators and excavated materials disposed off to stock on spoil as directed by the Engineer. The excavation may be done by normal means, unless otherwise specified by the Engineer, leveling, trimming and finishing to the required levels and dimensions shall be done manually. The material suitable for fill and backfill if approved by the Engineer shall be stockpiled within the limits of whole of the Site as directed by the Engineer. Excavated material unsuitable for use as fill and backfill shall be disposed off by the Contractor at locations approved by the Engineer within specified free haulage limit.

4.3 The Contractor shall give reasonable notice that he intends to commence any excavation and he shall submit to the Engineer full details of his proposals. The Engineer's approval shall not relieve the Contractor of his responsibility with respect to such work.

4.4 The Contractor shall preserve the completed excavation from damage due to slips' and earth movements, ingress of water from any source whatsoever and deterioration by exposure to the sun and the effects of the weather.

All excavations shall be kept free of water and shall be maintained dry to the satisfaction of the Engineer. Prevent surface water and sub-surface water and sub surface ground water from flowing into the excavation and flooding the project site and surroundings

Do not allow water to accumulate in excavations, remove water from excavations to present softening of foundation bottoms, under cutting footings and soil changes determined to the stability of sub-grades and foundations. Provide and discharge lives necessary to convey the water away from the excavations convey water removed from excavation and rain water to outside the limits in manner that no damages is caused to the surrounding services properties.

4.5 Excavation for pits, cable trenches, equipment-foundations and other structures shall be taken out to the levels and dimensions shown on Drawings or such other levels and dimensions as the Engineer may direct.

4.6 Excavation shall extend to adequate distance from walls and footings to allow for placing and removal of forms, installations of services and for inspection, except where the concrete for walls and footings is authorized to be deposited directly against excavated surfaces Undercutting will not be permitted. The additional excavation for placing and removal of forms, installation of services, for inspection and generally for working area on slopes for stability shall not be measured for payment and shall be deemed to be included in the rates for excavation as measured net.

4.7 All' excavations in foundations shall be taken to 6 inch above the final excavation elevations shown on the drawings and the 6-inch shall be trimmed carefully to a smooth and level surface. Immediately after trimming to the final elevation, a layer of blinding concrete shall be placed to the thickness shown on the drawings. All excavations for foundations which have been trimmed and disturbed shall be compacted and covered by lean concrete by the end of the day.

4.8 No excavation shall be refilled nor any permanent work commenced until the foundation has been inspected by the Engineer and his

permission to proceed is given.

4.9 If excavation for sub-structures are carried below the required level, as shown on the Drawings or as directed by the Engineer, the surplus depth shall be filled in with concrete of same grade as of blinding concrete at the sole cost of the Contractor.

4.10 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.

4.11 Shoring, where required during excavation, shall be installed to protect workmen and the bank, adjacent paving, structures and utilities. The term shoring shall also be deemed to cover whatever methods the Contractor elects to adopt, with prior approval of the Engineer, for upholding the sides of excavation and also for planking and strutting to excavation against the side of roadways and adjoining properties in existing hardcore of any other material. The 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.

4 12 Existing utility lines that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation and that are to be retained, as well as utility lines constructed 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 the Contractor in sufficient time to avoid damage, if inadvertently damaged during excavation, shall be repaired by the Contractor and adjustment in payment will be made as approved by the Engineer. When utility lines which are to be removed, ace encountered within the area of operations the Contractor shall notify the Engineer in. ample time for the necessary measures to be taken to prevent interruption of the service.

4 13 Where applicable the excavation work shall include the excavation in above water table and excavation below water table. The Contractor shall provide all plant, equipment, pumps, sheeting, well points as required to keep the water table 3.0 feet below the deepest foundation as shown on the drawings till the completion of foundation works.

4.14 4.14 Before starting the excavation for pipelines, the Contractor shall ensure the correct alignment of the pipeline on the ground the depth and width of excavation of the trench, all in accordance with the Drawings and instructions of the Engineer. The Contractor shall make profile with cement concrete pillars.

4.15 Excavation shall be carried out true to lines, levels, grades and widths as shown on the drawings or as directed by the Engineer ensuring proper laying of the pipe line, the bedding fill, construction of chambers for appurtenances and any other structures. The trench bottom shall be graded to provide even and substantial bearing over the specified bedding and of the structure.

Without the written permission of the Engineer, not more than 600 feet of the trench shall be opened in advance of the completed pipeline

4.16 The Engineer may require the Contractor to excavate below the

.elevations shown on the drawings or he may order him to stop above the elevations shown depending upon the suitable foundation material encountered,.

4.17 If for any reason, the levels, grades or profiles of the excavations are changed adversely by the Contractor, the Contractor shall at his own cost, be liable to bring the excavations to the required levels and profiles as shown on the drawings or as directed by the Engineer.

5. **Excavation Tolerances**

Excavation shall be performed within the tolerances for excavation limits indicated on the drawings, where no tolerance limits are indicated excavation shall be performed to tolerances established by the Engineer as acceptable for the design and type of work involved.

6. **Fill and Backfill**

6.1 The backfilling shall include filling under the floors, around the foundation trenches, pipes, conduits, ducts and channels

The backfilling shall include loading, unloading, transporting, placing, stacking, spreading of earth, watering, rolling, ramming and compacting, etc., complete as specified herein.

6.2 The excavated material if found suitable shall be stockpiled within the free haulage limit of the Project Boundary. This material shall be used for filling/back-filling if approved by the Engineer and shall be transported by the Contractor anywhere required for the purpose of filling/back-filling work in this Contract.

The Contractor shall provide the approved quality of backfill and fill material required to complete the fill and back- filling work from the places /borrow areas as designated by the Engineer. All necessary permissions from any authority for excavation within Borrow areas/ designated places shall be of contractor's responsibility. Deep filling shall be predominantly granular material and free from slurry mud, organic or other unsuitable matter and capable of compaction by ordinary means.

6.3 Material for backfilling shall be as approved by the Engineer and shall be placed in layers not exceeding 6 inches measured as compacted material with sufficient water and compacted to produce in-situ density not less than 95% of the maximum dry density at optimum moisture content

6.4 Depending on the depth of fill the Engineer may instruct increased thickness of successive layers to be placed. The filling shall be compacted by mechanical means as approved by the Engineer

6.5 Filling around pipes and cables shall be carefully placed with fine material to cover the pipe or cable completely before the normal fill is placed.

6.6 Backfilling of trenches/foundations shall be carried out only after the pipe line/structural works within the excavations have been inspected, tested and approved by the Engineer

Fill shall not be placed against foundation walls prior to approval by the Engineer. Fill shall be brought up evenly on each side of the walls as far as practicable. Heavy equipment for spreading and compacting

the fill shall not be operated closer to the wall than a distance equal to the height of the fill above the wall.

7. Tolerances

The stabilization of compacted backfill / fill surface shall be smooth and even and shall not vary more than 3/8 inch in 10 feet from true profile and shall not be more than 1/2 inch from true elevation.

8. Disposal of Surplus Excavated Material

8.1 The rejected unsuitable material and surplus excavated material shall be disposed off at designated place or as directed by the Engineer. No compensation of any lead/lift is . admissible and rates quoted shall be deemed to include the same.

8.2 The disposal of surplus/unsuitable excavated material shall include loading, unloading, transporting, stacking, spreading and leveling as directed by the Engineer.

9. Measurement and Payment

9.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned works related to the relevant BOQ items. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

9.1.1 Timber shoring, planking, strutting and providing slope for upholding the sides of excavations.

9.1.2 Any fill with approved material necessitated by over excavation due to fault or convenience of the Contractor except under structural members.

9.1.3 Stockpiling the excavated material at approved location within free haulage limit of the Project Boundary and transporting back suitable material to places requiring fill or backfill.

9.1.4 Specified foundation bed preparation.

9.1.5 Excavation involved in providing adequate working space around sides of foundation and service line trenches.

9.1.6 Providing approved quality fill/backfill material obtained from excavated material as designated by the Engineer.

9.1.7 Rolling, leveling, watering & compacting the fill and backfill to required density

9.1.8 All laboratory and field tests stipulated in these specifications.

9.1.9 Disposal of rejected surplus and unsuitable excavated material at designated place or as directed by the Engineer No compensation of any lead/lift is admissible and rates quoted shall be deemed to include the same.

9.1.10 De-watering to keep the foundations dry during construction

9.1.11 All cost inclusive of borrow area's royalty charges

9.1.12 Testing of Sub-grade material equal to or greater than CBR

value 10%

9.1.13 Providing and testing of sweet earth.

9.2 Excavation

9.2.1 Measurement

Quantities of excavation shall be, circulated / measured from the pre-work levels of leveled and graded ground taken jointly by the Contractor and the Engineer before commencement of the work.

The quantities set out for excavation and its subsequent disposal shall be deemed to be the bulk quantity before excavating and no allowance shall be made for any subsequent variations in bulk or for any extra excavation.

Unless otherwise shown on the Drawings quantities of excavation shall be measured of acceptably completed works on the basis of vertical excavations required in accordance with lines of concrete.

Quantities of excavation for laying service line trenches shall be measured for payment on the basis of vertical excavation faces for the specified width for the trench as shown on the drawings.

Measurement for acceptably completed excavation works shall be made on the basis of number of cubic feet of material excavated for foundation and service trenches as shown on the Drawings or as directed by the Engineer.

9.2.2 Payment

Payment will be made for acceptably measured quantity of excavation on the basis of unit rate per cubic feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item, including but not limiting to back filling.

9.3 Backfill/Fills

9.3.1 Measurement

Measurement for acceptably completed backfill/fill works will be made on the basis of number of cubic feet of compacted back fill / fill in position in accordance with the lines, levels and grade as shown on Drawings or as directed by the Engineer

9.3.2 Payment

Payment will be made for acceptably measured quantity of backfill/fill on the basis of unit rate per cubic feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item.

SECTION – 7 FORM WORK

1. Scope

The work under this section of the Specifications consists of furnishing all plant, labour, equipment, appliances and materials and in performing all operations in any floor and roof and floor and at any height in connection with the supply and installation of formwork for the purpose of shuttering in concreting work, complete in strict accordance with this section of the' specifications and the applicable drawings and subject to the terms and conditions of the Contract. The works include all formwork required at any floor and at any height required for the completion of the work as per drawings/specifications.

2. General

It shall be the responsibility of the Contractor to perform the work by engaging well-trained & experienced staff or by the sub-contractor who shall have enough number of well-trained and experienced staff to coordinate his activities with the other operations. However the Contractor shall be responsible for the quality of work performed by the sub-contractor -as per the requirements of these specifications.

3. Materials

The Contractor shall use the following formwork materials for different purposes as stated below:

3.1 Timber

Form framing, sheathing and shoring

3.2 Plywood

Form sheathing and panels.

3.3 Steel

Heavy forms and false Work Column and joint forms Permanent forms Welding of permanent forms

3.4 Form Ties Anchors and Hangers

For securing formwork against. placing loads and pressures.

3.5 Coatings

To facilitate form removal.

3.6 Steel Joists

For formwork support.

3.7 Steel frame shoring

For formwork support

4. Delivery And Storage

4.1 Delivery

The delivery of formwork materials shall be done in such a manner that damage can be prevented

4.2 Storage

Formwork should be stored, after cleaning and preparing for re-use if used before, in. such a manner that access to all different materials is available.

Material which can be affected by weathering :)hall be stored in appropriate building or under covers and shade.

5. **Workmanship**

5.1 Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances.

Where required details and locations of special forms to be used are set out on the drawings. The Engineer shall refuse any formwork in any part of the building, which has been constructed with a non-approved formwork. The Engineer shall refuse any concreting which will not be perfect or may not conform to the approved model.

5.2 Earth cuts shall not be used as forms for vertical surfaces of reinforced concrete work unless required as such or permitted by the Engineer.

5.3 Mud centering shall not be permitted without the prior approval of the Engineer.

5.4 Formwork shall be of wrought timber steel, plywood, proprietary building boards and such special materials, as may be shown on the drawings or approved by the Engineer, which give the required finish to the surface of concrete. Wooden formwork shall be free from loose knots and shall be well seasoned.

The responsibility of the safe design of the formwork shall be entirely that of the Contractor.

a) No wooden props, bamboo, ballies etc., shall be used as supports to beams or roofs and floors. Only steel pipe scaffoldings (tubular) to be used for all works.

b) No wooden formwork shall be allowed to be used in columns, roofs and floors and beams etc. All the form work shall be of steel as approved.

c) Only wooden planks of approved quality and thickness of 2 inches minimum on the sides of beams shall be allowed

d) All the erected formwork shall be inspected and approved in all respects by the Engineer or his representative prior to concreting.

e) Where concrete will be exposed to view, special care shall be taken in the selection of the form material and the construction of the forms, to the end that the concrete will be smooth, uniform in texture, true in line and face and free from honey-combing and other projections. All sides and joints on the forms shall be flush (without lipping) and inconspicuous, wood used for such work shall be thoroughly cleaned before each reuse and shall be free from cracks, splinters, nails, or other defects effecting the appearance of the concrete.

5.5 The formwork shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete, and shall be sufficiently tight to prevent loss of liquid from the concrete. The design and Engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. Where necessary, to maintain the specified tolerances, the formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. The Contractor shall establish and maintain in an undisturbed conditioned until final completion and acceptance of the project, sufficient control points and benchmarks to be used as references for checking upon tolerances.

5.6 Forms for architectural concrete shall be designed to produce the required finish or finishes. Deflection of facing materials between studs as well as deflection of studs and wailers shall be limited to 0.0025 times the span or as otherwise specified. Forms shall be designed to permit easy removal. Prying against the face of the concrete shall not be allowed. Only wooden wedges shall be used

5.7 Where natural plywood-form-finish, grout-cleaned-finish, smooth-rubbed- finish, scrubbed-finish or sand-floated-finish is required, forms shall be smooth (faced with plywood, liner sheets, or pre-fabricated panels) and true to line, in order that the surfaces produced will require little dressing to arrive at true surfaces. -Where any as-cast finish is required, no dressing shall be permitted in the finishing operation.

5.8 Where as-cast surfaces, including natural plywood-form-finish are specified, the panels of material against which concrete is cast shall be orderly in arrangement, with joints between panels planned in approved relation to openings, building corners, and other architectural features.

5.9 Where panels for as-cast surfaces are separated by recessed or otherwise emphasized joints, the structural design of the forms shall provide for locating form ties, where possible, within the joints so that patches of tie holes will not fall within the panel areas.

5.10 Forms shall not be re-used if there is any evidence of surface wear and tear or defect, which would impair the quality of the surface finish. Forms shall be thoroughly cleaned and properly coated with form oil before re-use

5.11 The formwork shall be designed so that the soffits of slabs and sides of beams, columns and walls may be removed first, leaving the forms to the soffits of beams and their supports in position.

5.12 Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Unless otherwise specified in the Contract Documents chamfer strips shall be placed in the corners of forms to produce beveled edges on permanently exposed surfaces. Interior corners on such surfaces and the edges of formed joints will not require beveling unless required by the Contract Documents.

5.13 Positive means such as wedges or jacks for accurate adjustment and for proper removal of shores and struts shall be provided and all

settlement shall be monitored during concrete placing operation. Forms shall be securely braced against lateral deflections.

5.14 Where concreting of thin 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 concrete. Small temporary openings shall also be provided at the bottom of the formwork for columns, walls and deep beams to permit the cleaning out of debris and observation immediately before concrete is deposited.

5.15 Form ties shall be constructed so that the ends or end fasteners can be removed without causing appreciable spelling 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 2 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 3/4 inch. When the formed face of the concrete is not to be permanently exposed to view, form ties may be cut of flush with the formed surfaces. Precaution shall be taken not to rotate form ties. Through bolts may 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 and basement walls.

5.16 At construction joints contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by no less than 1. Inch. The forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint so as to maintain a true surface.

5.17 Wood forms for wall opening shall be constructed to facilitate loosening, if necessary to counteract swelling of the forms.

5.18 Wedges used for final adjustment of the forms prior to concrete placement shall be fastened in position after the final check

5.19 Formwork shall be so anchored to shores or to other supporting surfaces or members that upward or lateral movement of any part of the formwork system during concrete placement will not occur.

5.20 Runways or planks for moving labour and equipment shall be provided with struts or legs and shall be supported directly on the formwork or upon the structural member without resting on the reinforcing steel

5 21 All surfaces of forms and embedded materials shall be cleaned of any accumulated mortar or grout from previous concreting and of all other foreign material before placing fresh concrete.

Forms shall be sufficiently tight to prevent leakage of grout or cement paste. Board forms having joints opened by shrinkage of the wood shall be removed and replaced. Plywood and other wood surfaces not subject to shrinkage shall be sealed against absorption of moisture from the concrete by either.

1. A field applied, approved form oil or sealer, or
2. A factory applied non-absorptive liner .

When forms are coated to prevent bond will concrete, it shall be done

prior to placing of the reinforcing steel. Excess coating material shall not be allowed to stand in puddles in the forms nor allowed to come in contact with the concrete against which fresh concrete will be placed. Care shall be taken that such approved composition is kept out of contact with the reinforcement. Whereas-cast finishes are required, materials, which will impart a stain to the concrete shall not be applied to the form surfaces. Where the finished surface is required to be painted, the material applied to form surfaces shall be compatible with the type of paint to be used.

5.22 For reinforced concrete, in no circumstances shall forms be struck until the concrete attains 75% of ultimate strength.

The strength referred to shall be that of concrete using the same cement and aggregates, with the same proportions, and cured under conditions of temperature and moisture similar to those obtaining in the work. Where possible, the formwork should be left for longer time as it would assist the curing.

In normal circumstances (generally where temperatures are above 20° C and where ordinary cement is used, forms may be struck after expiry of the following periods. Walls, columns and vertica sides of beams.48 hours or as may be decided by the Engineer.

Side of slab (shores of props left under)	6 days
Beams soffits (shores or props left under)	12 days
Removal of shores or props to slabs.	
Spanning up to 12 feet.	10 days.
Spanning over 12 feet	16 days.
Removal of shores or props to beams.	
Spanning up to 18 feet.	18 days
Spanning over 18 feet.	25 days

For rapid hardening cement 3/7 of the above period will be sufficient in all cases except vertical sides of slabs, beams and columns which should be retained for a minimum of 24 hours.

The number of shores or props, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab and beams, as the case may be.

Proper allowance shall be made for the decrease in rate of hardening of concrete in cold weather and the above minimum duration must be increased when the mean daily temperature is below 20° C

5.23 When repair of surface defects or finishing is required at an early age, forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

5.24 Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curing

5.25 Wood forms for wall openings shall be removed as soon as this can be acomplished without damage to the concrete.

5.26 All formwork shall be removed without such shock or vibration as would damage the reinforced concrete. Before the top plank and struts are removed, the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cement in the cold weather.

5.27 When reshoring or repropping is permitted or required, the operations shall be planned in advance and shall be subject to approval. While reshoring is underway no live load shall be permitted on the new construction. In no case during reshoring shall concrete in beam, slab, columns or any other structural member be subjected to combined dead and construction loads in excess of the load permitted by the Engineer for the developed concrete strength at the time of reshoring.

Reshores shall be placed as soon as practicable after stripping operations are complete but in no case later than the end of working day on which stripping occurs.

Reshores shall be tightened to carry their required loads without overstressing the construction. Reshores shall remain in place at least until tests representative of the concrete being supported have reached the strength specified in sub-clause 5.23 hereof.

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

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

5.29 It is generally desirable to give forms for reinforced concrete an upward camber to ensure that the beams or slabs (specially cantilever slabs) do not have a sag when they have taken up their deflection, but this should not be done unless permitted by the Engineer.

5.30 No loads, other than man and light plant required 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.

5.31 Prior to placing concrete, all forms shall be inspected and all debris and extraneous matter removed. The form oil or release agent shall not react with concrete to afect the strength nor shall it give any colour.

6. **Measurement and Payment**

No payment will be made for the works involved within the scope of this section of the specifications unless otherwise specifically stated in the Bills of Quantities or herein

The cost thereof shall be deemed to have been included in the quoted unit rate of relevant items of the Bills of Quantities

SECTION – 8 REINFORCEMENT

1. **Scope**

The work under this section of specifications consists of furnishing, cutting, fabricating, bending and placing steel reinforcement in concrete structures or elsewhere as shown on the drawings or as directed by the Engineer. The scope of this section of specification is covered with detailed specifications as laid down herein.

2. **Applicable Standards**

Latest editions of the following Pakistan, British and ASTM Standards are relevant to these specifications wherever applicable.

<u>British Standard</u>

B.S 4449 Carbon steel bars for the reinforcement of concrete.

B S 4466 Specifications for bending dimensions and scheduling of bars for the reinforcement of concrete.

<u>ACI Standard</u>

ACI315 Details and detailing of concrete reinforcement.

ACI318 Building Code Requirements for Reinforced Concrete and commentary.

<u>ASTM Standard</u>

A 82 Cold - Drawn steel wire for concrete reinforcement.

A 305 Minimum requirement for the deformations of deformed steel bars for concrete reinforcement

A 615 Deformed Billet Steel Bars concrete Reinforcement.

In addition to the above, the latest editions of other Pakistan Standards British standards, American Concrete Institute Standards, American Society for Testing and Materials Standards and other standard as may be specified by the Engineer for Special Material and construction are also relevant

3. **Material**

3.1 Unless otherwise specified, all steel bars for reinforcement of concrete shall be conforming to ASTM A615, Grade 60 deformed hot rolled billet steel bars with minimum yield strength of 60,000 Psi (414Mpa).

3.2 Reinforcement shall be free from all loose or flaky rust and mill scale, or coating, including ice, and any other substance that would reduce or destroy the bond

4. **Compliance With Specifications**

The Contractor shall submit certificates of compliance from the manufacturer stating that the supplied reinforcement conforms to the specifications. In addition, wherever and as directed by the Engineer, conformance of the supplied reinforcing bars with the specifications shall be demonstrated by the Contractor through laboratory tests, in accordance with the relevant standards

5. Delivery & Storage

5.1 Delivery

Steel reinforcement bars shall be kept in bundles firmly secured and tagged. Each bar or bundle of bars shall be identified by marks as per relevant BS standards.

5.2 Storage

The method of storage shall be approved by the Engineer. Reinforcing bars shall, be stored in racks or platforms above the surface of ground and shall be protected against scaling, rusting, oiling, coatings, damage, contamination and structural defects prior to placement in works. Bars of different diameters and grades shall be so labeled and kept separately.

6. Bar Bending Schedules

The Contractor shall prepare bar bending schedules of all the reinforcing steel bars and these bar bending schedules shall be submitted to the Engineer for his approval. The Contractor shall obtain approval of the bar bending schedules before starting actual bar bending works.

The Engineer's approval, however, will not relieve the Contractor of his responsibility in this regard

7. Fabricating, Bending & Placing

7.1 Reinforcement is to be accurately placed as shown in the drawings, and secured against displacement by using 16 guage G.I 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 form work shall be galvanized or shall be made of plastic

7.2 Bars used for concrete reinforcement shall be fabricated in accordance with the dimensions shown in the bar bending schedule approved by the Engineer.

7.3 The cutting tolerance for all bars shall be + 25 mm

7.4 Fabrication tolerances shall be as per ACI-315

7.5 Placing tolerances shall be as per ACI-318 & 317.

7.6 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, the resulting arrangement of bars shall be subject to approval of Engineer

7.7 Vertical bars in columns shall be offset at least one bar diameter at lapped splices. To ensure proper placement, templates shall be furnished for all columns dowels.

7.8 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 Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete.

7.9 No splice of reinforcement shall be made, except as shown on the working drawings.

7.10 Welding of reinforcement shall not be done unless permitted and approved by the Engineer.

7.11 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 where the exposed part is to be built into later concrete.

7.12 No concreting is to be carried out until the reinforcement has been checked and approved by the Engineer.

7.13 All detailing shall be done as per ACI-315, ACI-318 and ACI-350R, as and where required.

7.14 Standard or actual weight whichever is lesser shall be used for calculation of weight.

8. Measurement & Payment

8.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quo+9d unit rate of the respective items of the Bill of Quantities.

8.1.1 Providing and installing chairs, supports, hooks, hangars, spacers, binding wires, corrosion protection and laps not shown on Drawings including wastage and rolling margin.

8.1.2 Testing of mild and deformed steel bars.

8.2 Reinforcing Bars

8.2.1 Measurement

Measurement for acceptably completed works of reinforcement bars shall be made by weight according to bar bending schedules approved by the Engineer.

8.2.2 Payment

Payment will be made for access table measured quantity of reinforcement on the basis of unit rate per metric ton quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

SECTION – 9 PLAIN AND REINFORCED CONCRETE

1. Scope

The work under this section of the specification consists of furnishing all plant, labour, equipment, appliances and materials and in performing all operations in connection with the supply, and installation of plain and reinforced concrete work complete in any floor and at any height as per drawings except where specifically stated in the relevant item of Bill of Quantities, in strict accordance with this section of the specifications and the applicable drawings, and subject to the terms and conditions of the Contract. The scope of this section of specification is covered with detailed specifications as laid down herein

2. General

2.1 Full co-operation shall be given to traces like electrical, mechanical and other services.

2.2 Suitable templates or instructions or both shall be provided for setting out items not placed in the forms. Embedded items and other materials for mechanical and electrical operations shall have been completed, inspected, tested and approved before concrete is placed.

2.3 For special concrete finish and for special methods of construction (e.g. slip forms), 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 concrete finish shall be obtained before work is commenced.

3. Applicable Standards

Latest editions of the following Pakistan, British and ASTM Standards are relevant to these specifications wherever applicable.

3.1 Pakistan Standards

PS 177 PS 232 PS 243	Compaction proctor test.
PS 279	Portland Cement (ordinary & rapid hardening). Natural aggregates for concrete.
PS 280	Abrasion of coarse aggregates by the use of Los Angeles machine
PS 281	Determination of aggregate/crushing value.
PS 282	Organic impurities in sand for concrete aggregates.
PS 283	Material finer than No. 200 B.S. test sieve in aggregates, method of test for Soundness test for aggregates by the use of sodium sulphate or magnesium sulphate. Sampling aggregates for concrete.

PS 284	Sampling aggregates for concrete.
PS 285	Sieve or screen analysis of fine and coarse aggregates. Description and classification of mineral aggregates. Sampling fresh concrete.
PS 286	Sampling fresh concrete.
PS 421	Slump test for concrete.
PS 422 PS 560	Making and curing concrete compression test specimen in the field. Sulphate-resistant Portland cement type "A' and sampling fresh concrete in the laboratory
PS 612	Mixing and sampling fresh concrete in the laboratory.
PS 716	Compacting factor test for concrete.
PS 717	Definitions and terminology of cements.
PS 746 PS 849	Making and curing concrete compression test cubes.

3.2 ASTM (American Society for Testing and Materials)

<u>B 370 C 33 Copper sheet and strip for building construction. Concrete Aggregates.</u>

C40	Organic impurities in sand for concrete.
C87	Effect of organic impurities in fine aggregates on of mortar. Soundness of aggregates. Ready mixed Concrete.
C88	Compressive strength of hydraulic cement mortars.
C94	Material finer than NO.200 (0.075mm) sieve. Light-weight pieces in aggregates.
C109	Concrete and concrete aggregates.
C117	Specific gravity and absorption of coarse aggregate
C123	Specific gravity and absorption of fine aggregate.
C125	Resistance to abrasion of small size coarse aggregates
C127	Sieve or screen analysis of fine and coarse aggregate Clay lumps and friable particles in aggregates
C131	Slump of Portland Cement Concrete.
C136	Aggregate for masonry mortar.
C142	Portland Cement.
C143	Water retention by concrete curning material
C144	Sheet material for curing concrete.
C150	Air content or hydraulic cement mortar.
C156	Density of hydraulic cement.
C171	Time of setting of hydraulic cement by vicat needle.
C185	Air entraining admixtures for concrete.
C188	Potential reactivity of aggregate.
C191	Liquid membrane-forming compounds for curing concrete
C260	Lightweight aggregates for structural concrete.
C289	Lightweight aggregates for concrete masonry.
C309	Lightweight aggregates for insulating concrete.
C330	Chemical admixtures for concrete.
C331	Resistance to abrasion of large size coarse aggregates.
C494	Unit weight of structural lightweight concrete.
C535	Aggregate sampling.
C567	Preformed expansion joint filler for concrete.

D75	Concrete joint sealer (hot poured elastic type).
D994	Preformed expansion joint filler for concrete paving and structural construction.
D1190	
D1751	Preformed sponge rubber and cork expansion joint fillers for concrete paving and structural construction.
D1752	
D1850	Concrete joint sealer (cold application type).
E11	Wire cloth sleeves for testing purposes.
E96	Water vapor transmission of materials in sheet form.
E154	Materials for use as vapor barrier under concrete slabs.
E337	Relative humidity by wet and dry bulk psychomotor.

3.3 ACI (American Concrete Institute)

3.3.1 Recommended practice for selecting proportions for normal and heavy weight concrete.

214 Recommended practice for evaluation of strength test result of concrete

301 Specifications for structural concrete for buildings.

304 Recommended practice for measuring, mixing, transporting and placing concrete.

305 Hot weather concreting

308 Recommended practice for curing concrete.

309 Recommended practice for consolidation of concrete.

318 Building code requirements for reinforced concrete

347 Recommended practice for concrete for work

512 Precast structural concrete in building.

517 Low pressure steam curing.

533 Fabrication, handling and erection of Precast concrete wall panels

3.4 British Standards

BS 12 BS	Portland cement, ordinary and rapid hardening
410	Test Sieves.
BS 812 BS 882	Methods for the sampling and ~~sting of mineral aggregates, sands and fillers.
BS 1305	Coarse and fine aggregates from natural sources
BS 1881	Batch Mixer.
BS 3148	Methods of testing and sampling concrete.
BS 3837	Tests for water for making concrete.
BS 5328	Expanded polystyrene boards
BS 3869	Structural Concrete.
BS 3927	Rigid expanded polyvinyl chloride for thermal insulation.
BS 4027	Phenolic foam materials for thermal insulation and building applications. Sulphate-resisting Portland cement.
BS 8110	Structural use of concrete
CP 114	Structural use of reinforced concrete in buildings

CP 116	Structural use of Precast concrete.
CP 5337	The structural use of concrete for retaining aqueous liquids

In addition, the latest editions of other Pakistan and British Standards, American Concrete Institute Standards, American Society for Testing and Materials Standards and other Standards as may be specified by the Engineer for special Materials and Construction are also relevant.

4. Materials

4.1 Aggregates

4.1.1 The sources of supply of all fine and coarse aggregates shall be subject to the approval of the Engineer.

4.1.2 All fine and coarse aggregates shall be clean and free from clay, loam, silt and other deleterious matter. If required, the Engineer reserves the right to have them washed by the Contractor at no additional expense. 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.

4.1.3 Fine aggregate shall be hard coarse sand, crushed stone or gravel screenings shall conform to requirements of PS 243 and/or BS 882 and/or ASTM C 33. Only fine aggregate of grading zones 1 to 3 (BS 882) shall be used.

4.1.4 Coarse aggregate shall be gravel or crush stone of hard, durable material free laminated structure and conforming PS 243 and/or BS 882 and/or ASTM C 33 graded as follows for use in mass concrete as in foundations:

Total Pressure B.S.Sieve	Percent by weight
3 inc. (76.2mm)	100
1.5 inc. (38.10mm)	95-100
0.75 inc (19.05mm)	30-70
0.38 inc (9.52mm)	10-35
0.19 inc. (4.76mm)	0-5

Coarse aggregate for all cast-in-place concrete other than mass concrete as for foundations shall be graded with the following limits:

Total Passing B.S. Sieve	Percent by weight
1.5 in. (38.10 mm)	100
0.75 in. (19.05 mm)	95-100

4.1.5 Wherever feasible, the nominal maximum size of aggregate for cast- in- place reinforced concrete slabs and other members shall be 3/4 inch. If there are difficulties in placing such a concrete the maximum size may be restricted to 1/2 inch provided the requirements for strength are satisfied. The grading requirements of 1/2 inch or 3/8 inch down aggregate shall be agreed to with the Engineer as per relevant ASTM/BS standards.

4.1.6 The nominal maximum size of the aggregate for Precast concrete shall not be larger than one fifth of the narrowest dimension between sides of forms, or one-third of the depth of slabs or three-fourths of the minimum clear distance between. reinforcing bars or between bars and forms, whichever is least. In Precast columns the nominal maximum size of the aggregate shall be limited as above but shall not be larger than two-thirds of the minimum clear distance between bars.

4.1.7 Coarse aggregates in Precast concrete of normal weight may be of one maximum size for all concrete placed in 1 day when quantities to be placed are too small to permit economical use of more than one mix design.

When a single mix design is so used. the maximum nominal size shall be as required for the most" critical condition of concreting, in accordance with the requirements of clause (4.1.6) above.

4.1.8 Except where it can be shown to the satisfaction of the Engineer that a supply of properly graded aggregate of uniform quality can be maintained over the period of the work, the grading of the aggregates shall be controlled by obtaining the 3/4" maximum nominal size, the different sizes being stocked in separate stock piles and recombined in the correct proportion for each batch at the batching plant. The materials shall be stock-piled for a period before use so as to drain nearly to constant moisture content (as long as site and other conditions permit, preferably for at least a day). The grading of the coarse and fine aggregates shall be tested at least once for every 100 tons supplied, to ensure that the grading is uniform and same as that of the samples used in the preliminary tests.

4.1 9 For use in fire proof concrete, the aggregates shall be fire clay and semi-acidic fine ground. The use of broken fire clay bricks as coarse aggregate and waste of semi-acidic refractory particles as fine aggregate can be allowed.

4.2 Cement

4.2 1 The cement shall be fresh and of approved origin and manufacture. It shall be one of the following as may be specified by the Engineer.

Ordinary or Rapid Hardening Portland cement complying with the requirements of PS 232 or BS 12 or ASTM C 150

Sulphate Resisting Portland/Cement complying with the requirements of PS 612 or BS 4027 or ASTM C 150

4 2.2 Unless otherwise specified, ordinary Portland Cement complying with the requirements of BS 12 shall be used.

4.2.3 For all fair faced concrete it will be necessary to use approved cement with a view to obtain light shade concrete as approved by the Engineer.

4.2.4 The Contractor shall supply to the Engineer at fortnightly intervals, test certificates with the appropriate standard in respect of the samples of cement from the work-site. These

tests shall be carried out in a laboratory approved by the Engineer.

4.2.5 Only one brand of each type of cement shall be used for concrete in any individual member of the structure. Cement shall be used in the sequence of receipt of shipment, unless otherwise directed.

4.2.6 There shall be sufficient cement at site to ensure that each section of work is completed without interruption.

4.2.7 Cement reclaimed from cleaning of bags or from leaky containers shall not be used.

4.2.8 The Contractor shall provide and erect (at his cost) a suitable plain, dry, well ventilated, weatherproof and water proof shed of sufficient capacity to store the cement.

4.2.9 Cement shall be used as soon as possible after delivery and cement which the

4.2 10 Engineer considers has become stale or unsuitable through absorption of moisture' from the atmosphere or otherwise shall be rejected and removed immediately from the site at the Contractor's expense. Any cement in containers damaged so as to allow the contents to spill or permitting access of the atmosphere prior to opening of the container at the time of concrete mixing shall be rejected and removed immediately from the site at the Contractor's expense.

4.2 11 The mixing together of different types of cement will not be permitted.

4.3 **Water**

Only clean water from the city supply, tube well installed at the site or from other sources approved by the Engineer shall be used. The Contractor shall supply sufficient water for all purposes, including mixing the concrete, curing, "d cleaning plant and tools. Where doubt exists as to the suitability of the water, it shall be tested in accordance with BS 3148. Where water can be shown to contain any sugar or an excess of acid, alkali or salt, the Engineer may refuse to permit its use.

In case of doubt, the Engineer may require that concrete mixed with water proposed to be used should not have a compressive strength lower than 90 percent of the strength of concrete mixed with distilled water.

4.4 **Additive**

All additives such as foaming and water proofing agents shall be from a manufacturer approved by the Engineer

Air Entraining Admixtures shall conform to APM C 260 Other Admixtures shall conform to ASTM C494.

5. **Nominal Concrete Mixes**

5.1 **Proportions of Mix**

5.1.1 Cement and aggregates:

Cement, fine aggregate and the coarse aggregate shall be weighed separately. The proportions of cement to fine aggregate and coarse aggregate shall be adjusted so as to provide the concrete of the required crushing strength when tested as set out in Table 1.

5.1.2 The Contractor shall regulate and arrange mixing of the ingredients for the designed mix of the concrete by weight batching. The cost of designing the mix shall be borne by the Contractor.

5.1.3 **Water / Cement ratio:**

The quantity of water used shall be just sufficient to produce dense concrete of adequate strength and workability for its purpose. For all external work and foundations the water/cement ratio should not exceed 0.55 for concrete Class A, B and C.

5.1.4 **Workability:**

The workability shall be controlled by direct measurement of the water content, allowance being made for any water in the fine and coarse aggregates. The concrete shall be just sufficiently workable to be placed and compacted, without difficulty, by the available means.

'Workability' shall be determined by either the slump or compaction factor tests as directed by the Engineer and these shall be performed in accordance with the methods given in PS 422 to PS 177 or ASTM C 143.

The slump or compaction factor for each class of concrete shall be determined during the preliminary Test mixes and the value obtained shall not be modified without the written consent of the Engineer. Unless otherwise permitted or specified, the concrete shall be proportioned and produced to have a slump of 3 inch or less for consolidation by vibration. A tolerance of up to 1 inch above- the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, which ever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated

5.2 **Strength requirements for concrete :-**

5.2.1 Portland cement concrete when aggregates comply with BS 882

5.2.2 Concrete made with Portland cement shall comply with the strength Table 1 columns 4&6 (Works Test).

Table 1: Strength requirements for Portland concrete with aggregates complying with BS. 882.

Class Min Cement per of concrete	Min Cube Crushing of Strength at 28 days (psi) (lb)	Min. water per 110 lb. bag of (gallon)	Class Min Cement per of concrete
1	2	3	4
A	30.00	4350	4.40
B	22.00	3750	5.06
C	18.00	3000	5.28
D	13.00	1550	7.05
E	9.50	1000	7.27

Note Conversion Factors. 1 psi = 006897 MPa 1 gal = 4.54 liter

1 lb = 0.4537 Kg. 1cu.ft. = 0 028 cum.

5.2.3 The strengths given in Table 1 are based on the assumption that average temperature is 20 degree C. Where accurate records of temperature are kept, allowance may be made for change of temperature or the cubes may be tested at the equivalent maturity.

5.2.4 Unless otherwise stated, the types of concrete shall be classified on the basis of compressive strength requirements. The Contractor shall provide Mix design by weight for each class of concrete.

Manufacture 12 test cubes for each 3 mix design batches (6 x 6 x 6) inches in accordance with the Mix design batching by weight and test 3 cubes each at 3,7,14 & 28 days intervals in the presence of Engineer's Representative and submit all relevant data and results of tests for approval of the Engineer The Contractor shall obtain approval from the Engineer in writing for each Mix design before producing the actual concrete for the Works.

No payments for producing the Mix design, manufacture of test cubes and testing shall be paid. The Contractor shall include this cost in the relevant item of concrete.

5.3 Batching

5 3.1 All cement, including cement supplied in bulk, shall be batched by weight. A bag of cement may be taken as weighing 110 lb. with the prior approval of the Engineer

5.3 2 Aggregates shall be batched by weight, due allowance being made for water content. Aggregates may be batched by volume through conversion of weigh batching, only with the prior permission of the Engineer. The apparatus for weight batching may be an integral part of the mixer or a separate unit of a type approved by the Engineer. It shall be accurate within 2% and shall be checked for accuracy at least once a

week.

5.3.3 The quantity of additives i.e. foaming and water proofing agents etc. shall be as prescribed by the manufacturer or as directed by the Engineer.

5.3.4 Where the batching plant is of the type in which cement and aggregates are weighed in the same compartment. the cement shall be introduced into the compartment between two sizes of aggregates

5.3.5 Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period. which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.

5.4 Mixing

The concrete shall be mixed in an approved batch mixer conforming to the requirements of BS 1305. It shall be fitted with the manufacturer's plate stating the rates, capacity and the recommended number of revolutions per minute and shall be operated in accordance therewith. It shall be equipped with a suitable charging mechanism and an accurate water-measuring device The mixer shall be capable of thoroughly combining the aggregates, cement and water into a uniform mass within the specified mixing time and of discharging the concrete without harmful segregation.

5.4.1 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 colour, whichever period is longer. If it is desired to use a mixing period of less than 1-1/2 minutes, the Engineer's approval shall be obtained in writing.

5.4.2 Controls shall be provided to ensure that the batch cannot be discharged until the required mixing time has elapsed. At least three quarters of the required mixing time shall take place after the last of the mixing water has been added.

5.4.3 The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixing blades shall be replaced when they have lost 10 percent of their original height

5.4.4 Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be re tempered, but shall be discarded.

5.5 Transporting:

5.5.1 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 of ingredients. All skip vehicles, or containers used for transporting the concrete shall be thoroughly cleaned.

5.5.2 During hot or cold weather. concrete shall be transported in

deep containers, on account of their lower ratios of surface area to mass, which reduces the rate of loss' of water, by evaporation during hot weather and loss of heat during cold weather.

5.6 Placing

5.6.1 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 by the Engineer.

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.

5.6.2 Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as shown in the Contract Documents or as approved by the Engineer. Placing shall be carried out at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their services unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.

5.6.3 The actual sequence of construction proposed by the Contractor shall be subject to 'the Engineer's a approval before construction starts on any part of the structure, and this sequence shall not be varied without the Engineer's approval.

5.6.4 The concrete after it has been mixed shall be placed as soon as it is practicable. Once the concrete has left the mixed no more water shall be added, although the concrete may be mixed or agitated 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 fully and to an acceptable finish by whatever means available

The time between mixing and placing should be reduced if the mix is richer or the initial workability of the mix is lower than normal, or if a rapid hardening cement or an accelerator is used, or if the work is carried out at a high temperature or exposed to a drying atmosphere.

The Contractor shall ensure that the delay between mixing and placing including consolidation does not exceed 45 minutes under any circumstances. Any concrete which does not satisfy this requirement shall be rejected.

5.6.5 Concrete shall be deposited as nearly as possible in its final position to avoid segregation due to re handling or flowing. In no circumstances may concrete be railed or made to flow

along the forms by the use of vibrators, Concreting shall be carried on as a continuous operation using methods, which shall prevent segregation or loss of ingredients.

5.6.6 The free fall of concrete shall not be allowed to exceed 6 feet. Where it is necessary for the concrete to be lowered more that this depth, it is not to be dropped into its final position, but shall be placed through pipes fed by a hopper. When a pipe is used for placing concrete the lower end shall be kept inside or close to the freshly deposited concrete. The size of the pipe shall be not less than 9 inch in diameter.

5.6.7 'Mass-concrete' shall be placed in layers approximately 18 inch thick. Vibrator heads shall extend into the previously placed layer.

5.6.8 The workmen carrying concrete to the site, and all other workmen moving about on the reinforcement before the concrete is placed, shall move only along runways or planks placed for the purpose and no person shall be allowed to walk on the reinforcement itself.

5.6.9 Prior to the laying of concrete on load bearing masonry walls, bearing plates and at other points, as may be directed by the Engineer, the surface will be brought to a true, hard and smooth level surface using cement sand mortar in the ratio of 1 volume of cement to 3 volumes of sand Two layers of building paper weighing .082 lb./will then be laid flat to separate the concrete from the surface on which it is to be laid.

5.7 Construction Joints

5.7.1 Concreting shall be carried out continuously up to construction joints, the position and arrangement of which shall be predetermined by the Engineer

5.7.2 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 the Engineer 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 a distance equal to twice the width of the secondary beam. Joints in walls and columns shall be at the underside of floors, slabs or beams and at the top of footings or floor slabs. 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

5.7.3 All reinforcing steel shall be continued across joints. Keys and inclined dowels shall be provided as directed by the Engineer. Longitudinal keys at least 1-1/2 inches deep shall be provided in all joints in walls and between walls and slabs or footings

5.7.4 When the work has 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.

5.7.5 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 herein shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

5.7.6 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 similar in proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 1/2 inch thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained initial set.

5.7.7 Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle, and brushed, care being taken to avoid dislodgment 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 6 inch in thickness, and shall be well rammed against old work, particular attention being paid to corners and closed spots. 5.7.8 Stop ends for movement joints or construction joints shall be made by splitting them along the lines of reinforcement passing through them, so that each portion can be positioned and removed separately without disturbance or shock to the 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 the 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.

5.8 Expansion Joints

Expansion joints shall be provided wherever indicated on the Drawings or as directed by the Engineer. In no case shall the reinforcement, corner protection angles, or other embedded' items be permitted to extend continuously through any expansion joint.

All expansion joints shall be carefully placed so as not to be displaced during concreting. The method of placing the expansion joints shall be strictly in accordance with the Drawings and/or as directed by the Engineer All materials for use in the expansion joints shall have prior approval of the Engineer before placing order for supply

5.9 Embedded Items

5.9.1 The material, design and location of water stops in joints shall be as indicated in the Contract Documents. Each piece of pre molded water stop shall be of maximum practicable length in order that the number of end joints will be held to a minimum. Joints at intersections and at ends of pieces shall be made in the manner most appropriate to the material being used. Joints shall develop effective water-tightness fully equal to that of the continuous water stop material, shall permanently develop not less than 50 percent of the mechanical strength of

the parent section and shall permanently retain their flexibility.

5.9.2 Electric conduits and other pipes which are planned to be embedded shall not, with their fittings, displace more than four percent of the area of the cross section of a 'column on which Stress is calculated or which is required for fire protection. Sleeves, conduits, or other pipes passing through floors, walls, or beams shall be of such size or in such location as not to impair unduly the strength of the construction; such sleeves, conduits, or pipes mi1Y be considered as replacing structurally in compression the displaced concrete/ provided that they are not exposed to rusting or other deterioration, are of uncoated or galvanized iron or steel not thinner than standard steel pipe, have a nominal inside. diameter not over 2 inch and are spaced not less than three diameters on centers. Except when plans of conduits and pipes are approved by the Engineer, embedded pipes and conduits other than those merely passing through, shall not be larger in outside diameter than one third the thickness of the slab, wall, or beams in which they are embedded nor so located as to impair unduly the strength of the construction. Sleeve pipes or conduits of any material not harmful to concrete and within the limitations of this section may be embedded in concrete with the approval of the Engineer provided they are not considered to replace the displaced concrete.

5.9.3 All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting. All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

5.9.4 Expansion joint material, water stops and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

SECTION – 10 BRICK MASONRY

1. Scope

The work covered by this section of the specifications consists of furnishing all plant, labour, equipment, appliances, and materials and in performing all the operations in connection with masonry work, complete in strict accordance with the specifications herein and the applicable drawings subject to the terms and conditions of the contract. The work under this section includes the brickwork in foundations, walls and partitions both load bearing and non-load bearing.

2. Materials

2.2.1 Bricks

All bricks shall be sound, of well burnt clay, uniform in shape and size, when struck, the brick should produce ringing sound. The brick shall be free from flows, cracks, and shipped corners, nodules of line, kankar, other blemishes and salt When the brick is soaked in water for one hour, it should not absorb more than one sixth of its own weight. Bricks of only one size shall be used in the works. Bricks from different kilns not having the same size and colour shall not be accepted. The minimum compressive strength of the bricks tested in accordance with B.S. 1257 shall be 1300 psi subject to the condition that average compressive strength of five bricks tested shall not be less than 1500 psi.

2.2.2 Cement

Cement shall be Ordinary Portland Cement as specified in respective section.

2.2.3 Aggregates

Aggregates used shall meet the requirements specified under respective concrete section. All the aggregates dry and properly screened from approved source, shall also be acceptable for block making.

2.2.4 Brick Masonry Units

i) Concrete masonry blocks shall be made on the project site and shall be of the sizes required as per drawings and/or as directed by the Consultants and shall generally conform to the requirements of British Standard 2028, 1364:1968 until and unless specified or otherwise in the specifications.
ii) The brick shall be solid as required and shall be carefully made so that they are true in line and face with square corners and free from all defects. The ends of the bricks, masonry, shall be double grooved or a directed by the Consultants.
iii) The blocks shall be cured by keeping moist continuously for a period of at least ten (10) days and then shall be allowed to dry in shade for least twenty (20) days before used in masonry.
iv) All bricks shall have clean cut straight and true edges, smooth dense faces of uniform appearance without voids,

honeycombs, projections and shall be free from cracks spalls, chips, rugged edges or other defects detrimental to their use.

v) Where bricks are to be plastered or rendered, the bricks surface shall have a coarse texture suitable for bonding the plaster as approved by the Engineer.

vi) All bricks shall be stacked at site in a quantity not exceeding 5,000 bricks in each stack. The stacking shall be done in such a manner as to avoid smearing of the bricks in the lowest part of the stack with clay. Bricks smeared with clay show very poor bond with mortar sand, therefore, any bricks thus affected be rejected out of hand without recourse. When transported to the site the bricks shall not be dumped from the vehicle, the bricks shall be manually unloaded and stacked as aforesaid.

2.2.5 Cement Concrete Block Masonry

Proportion

Cement Mortar shall be composed of one part of Ordinary Portland Cement to 6 (six) parts of all brick masonry walls. Hand mixing, when permitted by the Engineer shall be done on clean hard platform as much as required for immediate use with only just sufficient water, to produce mortar of a proper consistency. If directed by the Engineer, the mixing shall be done by mechanical mixers. Sand shall b of an approved quality and shall pass 100% through 3/16 inch sieve.

2.2 Pre-Cast Concrete

Pre-cast concrete units shall be fair faced, cast to the sizes and dimensions as indicated on the Drawings. The concrete used for pre-cast units shall conform to the specifications laid down for cast in situ reinforced cement concrete unless otherwise required and directed by the Consultant.

The Contractor shall be required to submit a sample of pre-cast unit for the approval of the Engineer, all pre-cast units shall strictly conform to the approved sample.

Pre-casting platform of the size and at the location approved by the Engineer shall be constructed. The concrete in one pre-cast unit shall be placed in one operation, in accordance with the details shown on the Drawings.

The material and design of formwork and the method of pre-casting the units shall be approved by the Engineer. The erection/installation and removal of the pre-cast units from the pre-casting platform shall not be permitted until and unless they are properly cured to the satisfaction of the Engineer.

All pre-cast units shall be smoothly finished to the required lines, grades, angles, etc. Holes, grooves, pockets and hooks shall be provided as shown and/or as directed by the Engineer. The units shall be properly stacked on a platform without causing any cracks and damages. Curing of all the pre-cast units shall be done in accordance with the relevant BS code/approval of the Engineer

2.2.1 Erecting Pre-cast Units

All the pre-cast units shall be transported and erected into position in a manner as approved by the Engineer.

The Contractor shall submit his proposal in this regard and obtain approval from the Engineer in advance.

2.2.2 Lifting Beams

The Contractor shall use lifting beams at his own cost for erecting pre-cast members where the Engineer so directs. Lifting beams shall be supplied and erected by the Contractor, at his own cost, at all points where lifting is necessary for maintaining the plant but is inaccessible to mobile/cranes or, alternatively, covered by overhead traveling cranes. The Contractor, however, is to supply the trolleys and erect them on the lifting beams, and to test operation of installed equipment.

3. Cement Concrete Pavements

For all concrete work relevant specifications of this section shall apply.

3.1 Side Forms and Construction

Side forms shall be of steel or any other suitable material and of a design as approved by the Engineer.

In general, only materials and methods that have proved their acceptability by past performance will be considered. All form shall be constructed so that they can be removed without hammering or prying against the concrete.

Horizontal joints in the forms will not be permitted. Forms shall be thoroughly cleaned and oiled with linseed/mineral oil shall be given two coats of niter-cellulose lacquer each time they are used.

The forms shall be set on a thoroughly compacted base true to line and level and firmly secured in position by appropriate methods. Conformity with the alignment and levels shown on the Drawings shall be checked as and when required by the Engineer. Where necessary corrections shall be made immediately before placing the concrete; where any form has been disturbed it shall be reset and rechecked

Pavements shall be constructed in panels of sizes as shown on the Drawings. The panels shall be laid alternately, the adjoining panels being concreted when the side forms are struck and the jointing materials placed, inspected and approved by the Engineer Each panel is to be concreted in one operation and no interruptions shall be permitted during the operation. The concrete shall be tipped from the trolley slightly in advance of the working place and then shoveled into position. The spreading shall be carried out very carefully. Compaction shall be done by means of vibrators compactors of approved surface vibrators. If a vibrators compactor is used,' if. shall be operated on the concrete and will not be allowed to strike or displace the forms. The spreading and compacting,. of the successive layers shall proceed without interruptions and as quickly as practicable so as to ensure that the slab is ' monolithic throughout its depth.

The wearing surface shall be laid while the base concrete is still wet and screeded to line and level. When the initial set takes place the

surface shall be troweled smooth with a steel trowel to provide a dense closed surface.

All the joints shall be carefully formed as shown on the Drawings or as directed by the Engineer. The joint filler together with performed groove shall provide complete separation of adjacent slabs. The joints shall all be sealed with bitumen as shown on the Drawings and as directed by the Engineer.

3.2 Protection and Curing

General Requirements:

Concrete shall be protected adequately from injurious action by sun, rain, flowing water and mechanical injury, and shall not be allowed to dry form the time it is placed until the expiry of the minimum curing periods specified hereinafter. Water curing shall be accomplished by keeping the surface of the concrete continuously wet by covering with water or with approved water saturated covering. Where wood forms are left in place for curing, they shall be kept sufficiently damp at all times to prevent openings at the joints and drying out of the concrete All portions of the structure shall be kept moist for the full curing periods, specified hereinafter.

When liquid membrane curing compound is used the surface of the concrete shall be protected form traffic or other abrasive action, that may break the membrane, for the full period of curing. The membrane curing compound shall be colorless or light colored and shall be approved by the Engineer and shall comply with ASTM Designation C 309.

Curing Periods:

The curing period shall be at least 10 days, or as directed by the Engineer.

Removal of Forms:

The Contractor shall exercise great care in avoiding damage to joints, arises, dowel bars etc., while removing the forms Under no circumstances will the use of pry bars between the forms and pavement be permitted. Side forms shall not be removed until at least 40 hours have elapsed from the time of completing the concreting of the slab, which they contain In no case shall forms be removed until the concrete has hardened sufficiently to permit removal without damage to the concrete. Concrete work shall be protected from injury resulting from the storage or movement of material during construction.

3.3 Finishing

All unformed surfaces shall be finished with a wood float except as otherwise specified. Visible vertical surfaces shall have all projections and irregularities removed. The entire surface shall be rubbed if required by the Engineer, with a No. 16 carborundum brick, or other abrasive until even, smooth and of uniform appearance, and shall be shed clean. Plastering of surface, application of cement or other coating will not be permitted

All exposed corners shall be chamfered, 1"x 1" (2.5 cms x 2.5 cms) unless otherwise mentioned or shown on the plans or directed by the

Engineer. Concrete surfaces which will be covered with other materials shall be screeded without floating.

3.4 Spreading, finishing and floating of concrete in pavements General Requirements

The striking of, compacting and floating of concrete shall be done by mechanical methods, if approved by the Engineer. Where the Engineer determines that it is impracticable to use mechanical methods, manual methods of spreading, finishing and floating may be used on pavement lines as indicated on the Drawings.

Mechanical Methods

The concrete shall be spread uniformly between the forms, immediately after it is placed, by means of an approved spreading machine. The spreader shall be followed by an approved finishing machine equipped with two oscillating or reciprocating screeds. The spreading machine or the finishing machine shall be equipped with vibrating equipment that will vibrate the concrete for the full paving width. internal vibrators shall be used adjacent to the longitudinal edge of the pavement. These vibrators shall be attached to the rear of the spreading machine or to the finishing machine. Vibrators shall not rest on new pavements or side forms or in contract with any dowel bars and the arrange:-'1ent of power supply to the vibrators shall be such that then the motion of machine is stopped, vibration shall cease. The rate of Vibration shall be not less than 8000 vibrations per minute. The concrete shall be spread to full width before being struck of and compacted so that the sure will conform to the finished grade and cross-section as shown on t plans and at the same time leave sufficient material for the floating operation. The spreading & finishing machine shall move over the pavement as many times and at such intervals as may be required by the Engineer to ensure thorough compaction

Except as otherwise specified, after the pavement has been struck of and compacted, it shall be finished with an approved longitudinal float. The Contractor may use a longitudinal float composed of one or more cutting and smoothing floats suspended from and guided by rigid frame. The frame shall be carried by four or more visible wheels riding on and constantly in contact with the forms.

The contractor may use a longitudinal float which works with a sawing motion, while held in a floating position parallel to the road centre line and passing gradually from one side of the pavement to the other Movements ahead, along the centre line of the road, shall be in successive advances of not more than half the length of the float

Instead of using other type of longitudinal float a single machine, which will afect satisfactory compaction, finishing and floating may be used. This machine may be towed by a spreading machine. This combination. finishing floating machine shall be equipped with screeds and vibrators as hereinafter specified for spreading and finishing machine. Floating shall be. accomplished by means of a non-oscillating float held in a suspended position form the frame.

If any spreading, finishing and floating equipment is not maintained in full working order or if the equipment as used by the Contractor

proves inadequate to obtain the results prescribed, such equipment shall be improved or satisfactory equipment substituted or added at the direction of the Engineer.

Manual Methods

When striking-off and compacting by manual methods is permitted, the concrete shall be leveled and then struck-off to such an elevation that, when properly compacted, the surface will conform to the required grade' and cross-section. The strike board shall be moved forward with a combined longitudinal, and transverse motion, the manipulation being such that neither ends is raised from the side forms during the process. While striking off, a slight excess of concrete shall be kept in front of the cutting edge at all times. Prior to tamping, the concrete along the forms shall be thoroughly spaded or vibrated The entire area of pavement shall be tamped or vibrated a manner that will ensure maximum compaction. The concrete shall be brought to the required grade and shape by the use of a tamper consisting of a heavy plank whose length exceeds the width of the pavement by 1 foot or by the use of a mechanical vibrating unit spanning the full width of the spread. The tamper shall be constructed with properly trussed roads to stiffen it and prevent sag and shall be shod with a heavy strip or metal for a tamping surface. The tamper shall be moved with a combined tamping and longitudinal motion, raising it form side form and dropping it so that the concrete will be thoroughly compacted and rammed into place. A small surplus material is compacted and rammed into front of the tamper or vibrating unit and tamping or vibrating shall continue until the true cross-section is obtained and the mortar flushes slightly to the surface.

On grades in excess of 5 percent where hand methods are permitted, a little strike board shall follow at a speed of 25 ft to 50 ft per hour back of the heavy strike board, and shall be used in the same way, so as to remove waves caused by flow of concrete.

Where hand tamping is permitted, not less than two strike boards or tampers shall be used for production in excess of 350 CU.ft. After the concrete has been compacted, it shall be smoothed with a wooden float where necessary, as directed by the Engineer.

Longitudinal Floating

Manual floats shall be at least 12 ft in length not less than 6 inches in width and shall be properly stiffened to prevent bending or warping. In using the float, it shall be held parallel to centre line of the pavement at all time and shall be moved laterally across the pavement from one side or edge to the other until all high areas are cut down and floated into depressions, leaving a surface that is smooth and true to grade. Batch transverse passage of the longitudinal manual float shall lap the proceeding passage by half.

First Straight Edge Testing

Immediately following final floating the entire area of the pavement shall be tested with a 10-ft. (approx. 3. meters) straight edge. Any depressions found shall be immediately fillet." with fresh concrete which shall be struck off compacted and finished. High areas shall be

worked down and refinished. The straight edge testing and refloating shall continue until the pavement has the required surface contour.

After the first straight edge testing and when most of the water sheet has disappeared from the surface. and just before the concrete becomes non-plastic, the surface shall t.',: dragged with a strip of burlap (coarse canvas) 3 ft. to 10 ft. wide and having a length 4 ft. more than the width of the slab. The burlap shall be dragged along the surface of the pavement in a longitudinal direction. Burlap shall be clean and kept free from coatings of hardened concrete. It shall be moist at the time of use

Second Straight Edge Testing:

After the concrete has hardened sufficiently to permit walking on it, the surface of the pavement shall again be tested with a 1 a-ft. straight edge. 'Any portion of the pavement which shows a variation from the testing edge of more than 1/8 inch shall be corrected by cutting, or shall be removed and replaced at the expense of the Contractor

3.5 **Expansion and Construction Joints**

i) All the expansion and contraction joints shall be carefully formed as shown on the Drawings or as directed by the Engineer. As regards dowel bars and joint assemblies, such stakes, brackets or other devices shall be used, as necessary to keep the entire joint assembly in true vertical and horizontal position. The joint filler together with the preformed groove shall provide complete separation of adjacent slabs. The joints shall all be sealed with the specified non-extruding sealing compound set in a 3/4 inch wide preformed chase as shown on the Drawings. The preformed chase shall be thoroughly cleaned of all dust, debris, stones or other hard material prior to its sealing. The riser of all joints shall be rounded to a radius as shown on the Drawings before the concrete hardens.

ii) The joints sealing compound shall be hot poured bitumen or approved sealing compound for concrete pavements complying with BS-2499 for hot tropical climates and heavy duty industrial site subject to severe exposure. All joints)o be filled with flex cell expansion joint filler, or an approved elastic, compressible, durable and rot-proof equivalent of sufficient rigidity to enable it to be satisfactorily installed in the joint and resist deformation during the passage of the concreting equipment. The filler is to be of the same thickness as the joint Width. Holes to accommodate the dowel bars shall accurately be drilled or punched out. Where shown on the Drawings, dowel bars of required diameter shall be placed at the specified spacing. The bars shall be lubricated with an approved lubricant. One end of the dowel bar at expansion joints shall be provided with a closely fitting sleeve 3 inch long, consisting of bitumen coated plastic or other approved material to permit expansion. A loose plug 1 inch deep of approved compressible filling material shall be inserted into the sleeve as shown on the Drawings at the end of the bar. All the dowel bars shall be mild steel bars of the size shown on the Drawings and shall conform to the requirements as specified in the section 'Concrete.

iii) Contraction joints shall be provided as shown on the Drawings. The assembly and method of constructing the expansi9n joints/contraction joints shall be subject to the approval of the Engineer.

3.6 Consolidation

3.6.1 All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, elimir'3ting all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen. Use of vibrators to transport within forms shall not be allowed. vibrators shall be inserted and withdrawn at points approximately 18 inch apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not excessive so as to cause segregation, generally from 5 to 15 sec. A spare Vibrator shall be kept on the job site during all concrete placing 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

3.6.2 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 effect an improvement in the quality of the concrete to the satisfaction of the Engineer and in ' conformity with the provisions of Clause 5.

3.6.3 Vibrator shall not be allowed to contact the formwork for exposed concrete surfaces

3.6.4 Mechanical vibrators shall be of a type suited in the opinion of the Engineer to the particular conditions.

3.6.5 Over-vibration or vibration of very wet mixes is harmful and should be avoided.

3.7 Curing and Protection

3.7.1 Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures and mechanical injury and shall be maintained with minimum moisture loss at a relative constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval of the Engineer.

3.7.2 For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing: Ponding or continuous sprinkling. Application of absorptive mats fabric kept continuously wet. Application of waterproof sheet materials approved by the Engineer Application of other moisture-

retaining covering as approved. Application of a curing compound conforming to ASTM C 309. The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water sheen, which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proved that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded applications.

3.7.3 Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal the concrete shall be cured until the end of the time prescribed for curing.

3.7 4 Curing in accordance with sub-clause 5.13.1 & 5.13.2 above shall be continued for at least 10 days in the case of all concrete except concrete with rapid-hardening Portland Cement for which the period shall be at least 3 days. Alternatively, if tests are made of cubes kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive. strength has reached 70 percent of the minimum specified works cube strength. If one of the first four curing procedures of sub-clause 5.13.2 is used initially, it may be replaced by one of the other procedures of that sub-clause any time after the concrete is one day old provided the concrete is not permitted to become surface dry during the transition.

3.7.5 When the mean daily outdoor temperature is less than 5 degree C (41 deg. F) temperature of the concrete shall be maintained between 10 and 20 degrees C (50 to 68 deg F) for the required curing period of sub-clause 5.13.4

When necessary, arrangements for heating, covering insulation or housing t/ie. Concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hours unless precautions' are taken to prevent exposure of the concrete to exhaust gasses, which contain carbon dioxide

3 7.6 During hot weather when necessary, provision for wind-brakes, shading for spraying, sprinkling, ponding or wet covering with a light coloured material shall be made in advance of placement. Such protective measures shall be taken as quickly as concrete hardening and finishing operation will allow.

3.7.7 Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 3 deg. C (37 deg. F) in anyone hour or 10 degree C (50 deg. F)in any 24 hour period.

3 7.8 During the curing period, the concrete shall be protected from

damaging mechanical disturbances, such as load stresses, heavy shock and excessive vibrations. All finished concrete surfaces shall be protected from damage by construction equipment, materials or methods by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to over stress the concrete.

3.8 Works In Extreme Weather

3.8.1 Unless adequate protection is provided and approval is obtained from the Engineer, concrete shall not be placed during rain Rainwater shall not be allowed to increase / ease the mixing water nor to damage the surface finish.

3.8.2 When the temperature of the surrounding air is expected to be below 5 deg. C during placing or within 24 hours thereafter, the temperature of the plastic concrete, as placed, shall be no lower than 13 deg. C for sections less than 12 inch in any dimension nor 10 deg. C for any other sections.

When necessary, concrete material should be heated before mixing and carefully protected after placing, in general, heating or mixing water alone to about 60 deg. C may be suficient for this purpose. Dependence should not be placed on salt or other chemicals for the prevention of freezing No frozen material or materials, containing ice shall be used All concrete damaged by frost shall be removed. It is recommended that concrete exposed to the action of freezing weather should have entrained air and the water content of the mix should not exceed 5.5 gallon/bag of cement.

If water or aggregate is heated above 38 deg. C the water shall be combined with the aggregate in the mixer before cement is added.

Cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 38 deg. C.

3.8.3 During hot weather, the temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints and should not exceed 32 deg C. For massive concrete, this temp should not exceed 21 degree C. When the temp. of the concrete exceeds 32 degree C, precautionary measures approved by the Engineer shall be put into effect. When the temperature of the steel is greater than 50 deg C, steel forms and reinforcement shall be sprayed with water just prior to placing the concrete. The ingredients shall be cooled before mixing, or flaked ice or well crushed ice of a size that will melt completely during mixing may be substituted for all part of the mixing water if, due to high temperature, low slump, flash set or cold joints are encountered. Other precautions recommended by ACI Standard 305-72 shall also be adopted.

4. EST of Concrete Quality

4.1 The Contractor shall provide samples of concrete for testing at the Engineer's direction. Proper facilities shall be provided for making and curing the test specimens in accordance with PS 560 and PS 849. A competent person shall be employed by the Contractor whose first duty shall be to supervise all stages in the preparation and placing of the concrete. All Test specimens shall be made and site tests carried out under his direct supervision.

4.2 Preliminary cube tests and works cube test shall be performed in accordance with PS 560 and PS 849 at the discretion of the Engineer. Works transverse tests shall be performed in accordance with sub-clauses 208 c and 610 d of CP 114. The standard of acceptance for preliminary and works tests shall be as given below.

4.3 The usual test for concrete with maximum size of aggregate up to 1-1/2 inch is the 6 inch cube tested in compression. Details of making and curing compression test cubes are given in PS 560, PS 849 and BS 1881 and details of the testing are given in Part 8 of BS 1881

For all grades of concrete, preliminary cube strength test with the mixes and materials to be used shall be performed in accordance with PS 560, PS 849 and BS 1881 before the work is begun and subsequently whenever any change is to be made il1l the materials or in the proportions of materials to be used, or as required by the Engineer. The strengths shall comply with the standard of quality specified in accordance with. Table 1 for preliminary tests. The cost of such testing hall be borne by the Contractor.

4.4 Test sample shall be taken at the mixer or as directed by the Engineer. The test specimens shall be cured in accordance with PS 560, PS 849 and BS 1881 Records shall be kept of all test cubes identifying the mix used the section of work for which the concrete was used and the date poured. !

4.5 Five test cubes are to be tested for compressive strength as specified in BS 1881. These tests shall be carried out at site or in a laboratory approved by the Engineer. Two cubes shall be tested at the age of seven days and three at 28 days and the strengths determined are to comply with the standard of quality specified. The laboratory tests shall be carried out by an independent organization, such as Government Testing Laboratory or such other undertakings approved by the Engineer. The original test reports received from the above authorities should be submitted to the Engineer.

4.6 For all grades of concrete, the appropriate strength requirement shall be considered to be satisfied if none of the strengths of the cubes is below the specified cube strength or if the average strength of the three cubes is hot less than the specified cube strength and the difference between the greatest and the least strength is not more than 20% of the average.

4.7 When the results of works cube tests show that the strength of any concrete is below the minimum specified, the Engineer may give instructions for the whole or part of the work concerned to be

removed and replaced at the expense of the Contractor. The Contractor shall bear the cost of any other part of his, or any other contractor's work, which has to be removed and replaced as a result of the defective concrete. If any concrete is held to have failed, the Engineer may order the proportions of that class of concrete to be changed in order to provide the specified strength.

5. Finishing of Formed Surfaces

5.1 General

5.1.1 After removal of forms, the surfaces of concrete shall be given one or more of the finishes specified below in locations designated by the Contract Documents.

5.1.2 When finishing is required to match a small sample furnished to the Contractor, the sample finish shall be reproduced on an area at least 100 Sq. ft. in an inconspicuous location designated by the Engineer before proceeding with the finish in the specified location.

5.1.3 Allowable deviations from plumb or level and from the alignment profile grades, and dimensions are specified in clause 9. Tolerances for concrete construction and defined as tolerances that are to be distinguished from irregularities in finish as described herein. The finish requirements for concrete surfaces shall be as generally specified in this clause and as indicated on the Drawings. Finishing of concrete surfaces shall be performed or, by workmen who are skilled in concrete finishes. The Contractor shall keep the Engineer advised as to when finishing of concrete will be performed Unless inspection is waived in each -specific case, finishing of concrete shall be performed only in the presence of the Engineer. Concrete surfaces will be tested by the Engineer where necessary to determine whether surface irregularities are within the limits herein after specified. Surface irregularities are classified as abrupt or gradual.

Offsets caused by displaced or misplaced form sheeting or lining or sections, or otherwise defective form lumber will be considered as abrupt irregularities, and will be tested by direct measurements All other irregularities will be considered as gradual irregularities, and will be tested by use of a template, consisting of a straight edge or the equivalent thereof for curved surfaces The length of the template will be 6.5 ft for testing of formed surfaces and 10ft. for testing of unformed surfaces.

5.2 As-cast Finishes

Unless 9therwise specified 9 indicated on the Drawings the classes of finish shall apply as follows:

5.2.1 Rough form finish:

No selected form facing materials Shall be specified for rough form finish surfaces. Tie holes and defects shall be patched Fins exceeding 1/4" in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.

5.2.2 **Fair face finish:**

Fair face finish applies to concrete formed surfaces, the appearance of which is considered by the Engineer to be of special importance, such as surfaces of structures prominently exposed to public inspection. Surfaces of concrete structures requiring fair face finish is shown in the Drawings. Surface irregularities, measured as described in sub-clause 7.2.1, 'Rough form finish', shall not exceed 1/4 inch for gradual irregularities and 1/8 inch for abrupt irregularities, except that abrupt irregularities will not be permitted at construction joints. Abrupt irregularities at construction joints and elsewhere in excess of 1/8 inch and gradual irregularities in excess of 1/4 inch shall be reduced by grinding so as to conform to the specified limits. Abrupt irregularities at construction joints shall be ground on level of 1 to 20 ratio of height to length.

Unless otherwise approved, repair of imperfections in formed concrete shall be completed within 24 hours after removal of forms. The form facing material shall produce a smooth, hard, uniform texture on the concrete. It may be plywood, temperated concrete-form-grade hardboard, metal, plastic paper, or other approved material capable of producing the desired fair face finish The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Material with raised grain, torn surfaces, worn edge, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used. Tie holes and defects shall be patched. All fins shall be completely removed.

5.2.3 **Architectural Finish Concrete:**

Architectural finish concreting formed surfaces as shown on the Drawings IS required by. The Engineer where the architectural appearance of surfaces of structures exposed to public view is of special consideration and importance The Contractor shall use approved special material for formwork and design the forms in conformity with the specified architectural patterns, textures and finishes in order to obtain first class architectural finish on formed concrete surface without any defect, irregularities, blemishes, imperfections and encrustation's

Samples:

Submit to the Engineer a minimum of two units or portions of units of each precast item required. Each pair of samples when accepted will describe the allowable limits between which variations can be acceptable.

Similar samples of in-situ concrete for approval by the Engineer submit two samples, 2 Sq. ft of each type of exposed in-situ concrete. All in-situ samples will remain at the construction site.

Sample approvals of precast & in-situ concrete:

These samples will be reviewed and approved on the basis of colour, dimensional accuracy, and finish of surfaces and general appearance. The same requirements for sample approval will be required for both precast and in-situ concrete exposed surfaces

Forms:

The contractor must maintain the forms unusually tight and braces to prevent movement, mal-alignment and bleeding that will result in sand streaks, honeycomb, fins, stain or unsightly appearance. / .

If wood forms are chosen to be used by the Contractor they shall be constructed of 3/4 inch minimum thickness plywood constructed in a fashion to allow many re-uses with all surfaces sealed with a polyurethane varnish.

Edges, surfaces and corners of forms shall be sealed to prevent loss of any matrix or unequal absorption of water. Corners of wood forms shall be filled with suitable compound and all contact surfaces sealed with a polyurethane varnish.

Re-use of forms shall be subject to approval by the Engineer

Curing:

Curing shall be done in shade (out of direct sunlight) and shall be for a minimum period of 4 days.

Finishing Procedures:

"Finishing procedures for filling air void smooth finished concrete developed by a formed surface"·

While the concrete surface is still damp (not more than three days after removal of forms), apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to provide a bonding coat within any pits or blemishes in the parent concrete; avoid coating large areas of the finished surface. Before slurry has dried or changed colour, apply a dry (almost crumbly) grout comprised of one part cement, of the type and brand of cement used in the original concrete, to one and one-half parts clean masonry sand with f3 fineness modulus of approximately 2.25 and complying with the graduation requirements of the ASTM Specifications C 144. Mix proper amounts of white cement and colouring with the parent mortar to produce a satisfactory colour match with the parent concrete after hardening. Use samples previously prepared.

Apply the finishing grout uniformly with damp (neither dripping wet nor dry) pads of coarse burlap approximately 6 inch square used as a float. Scrub the grout well into ' the pits to provide a dense mortar in all the imperfections to be filled. Allow the mortar to partially harden, from one to two hours, depending upon the weather. Avoid direct hot sunlight. If the air is hot and dry, keep the concrete surface damp during this period using a fine fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the edge of a steel trowel without damaging the grout from the small

pits of holes, cut off all that can be removed with a trowel without delay; next allow the surface to dry thoroughly and rub it vigorously with clean, dry burlap to completely remove any dried grout. No visible film of grout shall remain after this rubbing. Complete the entire cleaning and grouting operation for the grout to dry after it has been cut with the trowel, so it can be wiped off clean with the burlap.

On the day after the repair work, the concrete surfaces should again be wiped off clean with dry burlap to remove any inadvertent dust; leave no built-up surfaces on the parent surfaces. Employ, if possible, a used piece of burlap containing old hardened mortar to act as a mild abrasive. Use of fine abrasive stone if needed to remove any remaining built-up film without breaking through the surface film of the original concrete Such scrubbing should be light and sufficient only to remove excess material without working up a lather of mortar or 'changing the texture of concrete.

Following the final ?19.9ing or stoning operation, provide a thorough wash down with stiff bristle brushes 10 remove all extraneous materials and spray the concrete surface with a fine fog spra, periodically to maintain a continually damp condition for at least three days after application of the pit repair grout.

Rust Stains:

All rust stains are to be removed employing the following procedure:

The rust stain shall be soaked for 10 minutes with a solution of 0.055 lb of sodium citrate in 0.33 lb. water "(brushing the solution at short intervals is satisfactory). Then the surface is sprinkled with crystals of sodium hydrosulfite and covered with a paste of Fuller's Earth and water. On a vertical surface, the paste is applied with a trowel, with the crystals first sprinkled on the paste so they will be in direct contact with the stain The paste is allowed to dry for 10 minutes then scraped off and the treatment repeated if necessary.

Repairing of Formed Surfaces:

It is the intention of Specification to require form mixture of concrete and workmanship so that concrete surfaces, when exposed, will require no patching. Any concrete which is not formed as required and conforming to approved samples or for any reason is out of alignment or level or shows a defective surface, shall be removed from the job by the Contractor at his expense unless the Engineer grants permission to repair the defective area. Permission to patch any such area shall not be considered a waiver of the Engineer's right to require a complete removal of defective work if the repair does not, in his opinion, satisfactorily restore the quality and appearance of the surface. The Engineer shall be the sale judge of acceptability of appearance.

5.3 Finishes of Unformed Surfaces:

5.3.1 Monolithic Concrete Floor Finish

Where monolithic concrete floor finish is shown on the Drawings, placing shall proceed continuously for the full thickness of the course or RCC slab without change in concrete mix. Mixing water shall be the minimum required for proper placing, and will be as specified by the Engineer. After placing, floors, and other surfaces shall be floated with a wood float to a true surface and to elevation as shown on the Drawings. Where indicated on the Drawings, floor surfaces shall be steel trowel finished. Toweling shall be the minimum amount consistent with . maintaining a smooth dense surface, and shall not be done until the mortar has hardened sufficiently, to prevent excess fine material from being worked to the surface, and shall produce a dense uniform surface, free from blemishes and trowel marks.

Gradual surface irregularities shall not exceed 1/16 inch. The addition of water, dry cement, or dry cement mortar, to the surface of the concrete to facilitate finishing will not be permitted.

5.3.2 Equipment Foundations'

Unless otherwise specified, exposed, surfaces of equipment foundations shall be given steel trowel finish to produce a surface similar to the specified concrete floor finish.

6 Repair of Surface Defects

6.1 General

6.1.1 Any concrete failing to meet the specified strength or not formed as shown on drawings, concrete out of alignment, concrete with surfaces beyond required tolerances or with defective surfaces which cannot be properly repaired or patched in the opinion of the Engineer shall be removed at Contractor's cost. The Engineer may reject any defective concrete and order it to be cut out in part or in whole and replaced at the Contractor's expense. All ties and both less and all repairable defective areas shall be patched immediately after form removal.

6.2 Repair of Defective Areas

6.2.1 All honeycombed and other defective concrete shall be removed down to sound concrete. The area to be patched and an area at least 6 inch wide surrounding it shall be dampened to prevent absorption of water from the patching mortar A bonding grout shall be prepared using c. mix of approximately 1 part cement to 1 part fine sand passing NO.25 BS Sieve and shall then be well brushed into the surface

6.2.2 The patching mixture shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume White Portland cement shall be substituted for a part of the gray Portland cement on exposed concrete in order to produce a colour matching the colour of the surrounding concrete, as determined by a trial patch

6.2.3 The quantity handling of mixing water shall be no more than necessary for allowed and placing. The patching mortar shall be mixed in advance and of to stand with frequent manipulation with a trowel, without addition placing water, until it has reached the stiffest consistency that will permit

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

6.2.5 Where as-cast finishes are specified, the quantity of patched area shall be strictly limited. The combined total of patched areas in as cast surfaces shall not exceed 2 sq ft. in each 1000 sq.ft. of as-cast suri'3ce This is in addition to form tie patches, if the project design permits ties to fall within as-cast areas.

6.2.6 Any patches in as-cast architectural concrete shall be indistinguishable from surrounding surfaces. The mix formula for patching mortar shall be determined by trial to obtain a good colour match with the concrete when both patch and concrete are cured and dry. After initial set, surfaces of patches shall be dressed manually to obtain the same texture as surrounding surfaces.

6.2.7 Patches in architectural concrete surfaces shall be cured for 7 days. Patches shall be protected from premature drying to the same extent as the body of the concrete.

6.3 Tie and Bolt Holes

After being cleaned and thoroughly dampened, the tie and bolt holes shall be filled solid with patching mortar. If architectural appearance requires, these holes may be filled partially creating the desired round clear holes pattern on surfaces exposed to view.

6.4 Proprietary Materials

If permitted or required by the Engineer, proprietary compounds for adhesion or as patching ingredients may be used in lieu, of or in addition to the foregoing patching procedures. Such compounds shall be used in accordance with the manufacturer's recommendations with prior approval of the Engineer.

Where tolerances are not stated in the specifications or drawings for any individual structure or feature thereof, maximum permissible deviations from established lines, grades and dimensions shall conform to the following. The Contractor is expected to set and maintain concrete forms so as to ensure complete work within tolerance limits. These allowable tolerances shall not relieve the Contractor of this responsibility for correct fitting of indicated materials These tolerances are not cumulative.

6.5 **Variation from the plumb (or the specified batter for inclined walls.)**

6.5.1 In the lines and surfaces of columns, piers, walls and in arises: In any 10 feet of length or height In any storey or 20 feet length Maximum for the entire length or height. In any bay or 20 feet maximum 1/4 inch Maximum for the entire length or height ½ inch

6.5.2 Variation from the level or from the grades indicated on the drawings.

6.5.3 In floors, ceilings, beams soffits and in arises measured before removal of supporting shores.

In any 10 feet of length	1/4 inch
In any bay or in any 20 feet length	38 inch
Maximum for the entire length	3/4 inch

6.5.4 For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines.

In any bay or 20 feet length	1/4 inch
Maximum for the entire length	1/2 inch

6 6 Variation of the linear building lines from established position in plan and related position of columns, walls and partitions.

In any bay or 20 feet of length Maximum for the entire length 1/2 inch 1 inch

6 7 Variation in the sizes and locations of sleeves, floor openings and wall openings. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs And walls

Minus	¼ inch
Plus	½ inch 9.6 Footing

6.7.1 Variation in dimensions in plan Minus ½ inch

Plus (plus variation applied to concrete only, not to reinforcing bars or dowels). 2 inch

6.7.2 Misplacement or eccentricity

2 percent of the footing width in the direction of misplacement but not more than (applies to concrete only, not to reinforcing bars or dowels). ½ inch 2 inch

6.7.3 Thickness Decrease in thickness 5%

6.7.4 Increase in Specified thickness No limit

6.8 **Variation in Steps**

6.8.1 In a flight of stairs

Rise	+1 / 8 inch-
Tread	+1 / 4 inch-

6.8.2 In consecutive steps

Rise	+1 / 16 inch-

Tread	+1 / 8 inch-

6.9 'Tolerances for Precast concrete construction'

Forms must be true to size and dimensions of concrete members shown on the plans and be so constructed that the dimensions of the finished products will be within the following limits at the time of placement of these units in the structure, unless otherwise noted' on structural-architectural drawings:

6.9.1	Overall dimensions of members	1/16 inch per 10 feet
6.9.2	Cross-sectional dimensions Sections less than 3 inch.	1/16 inch
	Sections over 3 inch and less than 18 inch.	1/8 inch 1/4 inch
	Sections over 18 inch.	1/8 inch
6.9.3	Deviations from straight line in long sections per	1/16 inch 10 feet
	Not more than per	+1/16 inch 10 feet span
	Maximum differential between adjacent units in erected position	1/4 inch

7 Acceptance of Structure

7.1 General

7.1.1 Completed concrete work which meets all applicable requirements will be accepted subject to the other terms of the Contract Documents.

7.1.2 Completed concrete work which fails to meet one or more of the requirements and which has been repaired to bring it into compliance will be accepted subject to the other terms of the Contract Documents.

7 1.3 Completed concrete work which fails to meet one or more of the requirements and which cannot be brought into compliance may be accepted or rejected as provided in these Specifications or in the Contract Documents. In this event, modifications may be required to assure that remaining work complies with the requirements.

7.2 Dimensional Tolerances

7 2 1 Formed surfaces resulting in concrete outlines smaller than permitted by the tolerances of clause 9 shall be considered potentially deficient in strength and subject to the provisions of sub clause

7.2.2 Formed surfaces resulting in concrete outlines larger than permitted by the tolerances of clause 9 may be rejected and the excess material shall be subject to removal. If removal of the excess material is permitted, it shall be accomplished in such a manner as to maintain the strength of the section and

to meet all other applicable requirements of function and appearance. Permission is required if excess material is to be removed in accordance with this clause.10.2.3 Concrete members cast in the wrong location may be rejected if the strength, appearance or function of the structure is adversely affected or if misplaced items interfere with other construction

7.2.3 Inaccurately formed concrete surfaces exceeding the limits of Clause 9 or of Clause 5.6 of Section 'Formwork' and which are exposed to view, may be rejected and shall be repaired or removed and replaced if required.

7.3 Appearance

7.3.1 Architectural concrete with surface defects exceeding the limitations of Sub-clause 5.6 of Clause 5 of the Section, 'Formwork' shall be removed and replaced.

7.3.2 Other concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired only by approved methods.

7.3.3 Concrete not exposed to view is not subject to rejection for defective appearance.

7.3.4

7.4 Strength of Structure

7.4.1 The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements" which control the strength of the structure, including but not necessarily limited to the following conditions. Concrete strength requirements not considered to be satisfied in accordance with Clause 6 hereof.

7.4.2 Reinforcing steel size, quality, strength, position or arrangement at variance with the requirements as listed under specification of 'Reinforcement' or in the Contract Documents Concrete which differs from the required dimensions or location in such a manner as to reduce the strength. Curing less than that specified. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development Mechanical injury, construction fires, accidents of premature removal of formwork likely to result in deficient strength. Poor workmanship likely to result in deficient strength.

Structural analysis and/or additional testing may be required when the strength of the structure IS considered potentially deficient

Core tests may be required when the strength of the concrete in place is considered potentially deficient

7.4.3 If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be required and their result evaluated in accordance with British Standard BS 8110 or ACI Standard 318

7.4.4 Concrete work judged inadequate by structural analysis or by results of a load test shall be reinforced with additional construction if so directed by the Engineer or shall be replaced, at the Contractor's expense.

7.4.5 The Contractor shall pay all costs incurred in providing the additional testing and/or analysis required by this section.

7.4.6 The Employer will pay all costs of additional testing and/or analysis which is made at his request and which is not required by these Specifications, or by the Contract Documents.

8 Testing of Material

a) A site laboratory shall be established by the Contractor for all the required testing of concrete, aggregates and other materials etc. All tests shall preferably be done at site. Only the test which are not possible to be carried out in the site laboratory shall be referred to the laboratory approved by the Engineer. All testing charges thereof shall be borne by the Contractor.
For testing of reinforcement steel bars, the samples shall be referred to the laboratory approved by the Engineer at the cost of the Contractor.

b) Cement shall be tested as prescribed in -STM C -150.

c) Aggregates shall be tested as prescribed in British Standard BS 812 - 882. addition fine aggregate shall be tested for organic impurity in conformance with ASTM Standard CAO.

9 Measurement and Payment

9.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bills of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bills of Quantities

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height except where otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account

9.1.1 Providing, fixing, striking, etc. of formwork.

9.1.2 Providing, placing and fixing of anchor bolts or any other embedded parts.

9.1.3 Providing and installing all type of joints in concrete structure. including expansion joints.

9.2 Plain and Reinforced Concrete

9.2.1 Measurement

Concrete shall be measured as executed but no deduction shall be made for the following· Volume of any steel embedded in the concrete.

Volume occupied by water pipes, conduits etc. not exceeding 10 square inches each in cross-sectional area.

Voids not exceeding 4 square inch in work given in square feet. If any void exceeds 4 square inch, total void shall be deducted.

Voids, which are not to be deducted as specified above, refer only to openings or ,vents which are wholly within the boundaries of measured areas. Openings or vents which are at the boundaries of measured areas shall always be subject to deductions irrespective of size.

Concrete work shall be classified and measured separately as listed under items of Bills of. Quantities. Junction between straight and curved works shall in all cases be deemed to be included with the work in which they occur.

Measurement of walls shall be taken between attached columns piers or pilaster. The thickness of attached columns, piers or pilaster shall be taken as the combined thickness of the wall and the columns, piers or pilaster.

Attached or isolated columns, piers, pilaster, and the like (except where caused by openings) having a length on plan not exceeding four times the thickness shall be classified as columns. Those having a length over four times the thickness and are caused by openings in wall shall be classified as walls.

Columns shall be measured from the top of footing/footing beams or floor surfaces to the underside of beams or slabs as the case maybe. Where the width of beams is less than the width of columns, the extra width at the junction shall be included in the beams.

The depth of the beams shall be measured from bottom of the slab to the bottom of the beams except in case of inverted beams where it shall be measured from top of slab to the top of beam. The cross-section of the beam shall be the actual cross-section below or above the slab. .

Measurement of acceptably completed works of plain and reinforced cement concrete will be made on the basis of number of cubic feet concrete placed and compacted in position within the neat lines of the structure as shown on the Drawings or as directed by the Engineer.

9.2.2 Payment

Payment will be made for the acceptable measured quantity of plain and reinforced cement concrete on the basis of unit rate per cubic feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item.

9.3 M16 Hilti System Dowels

9.3.1 Measurement

Measurement of acceptably completed works of drilling and fixing of anchoring dowels as per M16 Hilti's System HIT-

15.8 All bolts, anchors, ties, pipe sleeves, flushing metal attachments, lintels and the like required to be built into the work shall be correctly inserted and executed as the work proceeds.

15.9 Walls or partitions abutting concrete columns or walls shall be securely anchored and tied with metal anchors or ties at not more than 450mm vertical centres. Wall ties cast in with concrete shall be bent down after the removal of formwork and shall be securely jointed into the mortar beds of walling.

15.10 Care shall be taken during construction of cavity walls so as to avoid the filling up of cavity with mortar. G.1. flashing and weep holes shall be provided where ever specified on the drawings or as per the instructions of the Engineer. Wheep holes will be formed by oiled rods, removed after the mortar is set, at specified locations.

16 Scaffolding

Contractor shall provide safe scaffolding of adequate strength for use of 00rkmen at all levels and heights at his own expense. Scaffolding which is unsafe in the opinion of the Engineer shall not be used until it has been strengthened and made safe for use of workmen. Cost of scaffolding etc., shall be included by the Contractor in the unit rate for masonry items.

Damage to masonry from scaffolding or from any other object shall be repaired by the Contractor at his own cost.

17 Jointing

Jointing is the forming of joints as work proceeds. Joints shall be as follows:

17.1 Exterior exposed joints shall be tightly formed to a weather joint with the point of the trowel.

17.2 Interior exposed joints shall be tightly formed to a concave joint

17.3 Joints which are subsequently covered with plaster or other finish materials shall be struck flush.

18 Tolerances

All block work shall be erected plumb and true to line and level with the maximum variation in any storey height or any length of wall being one mm in one meter. The maximum tolerance in the length, height or width of any single masonry unit shall be! 3mm.

19 Damp Proof Course

Damp-proof course shall be laid on an even mortar bed, free from projections, which may puncture the material. Where the damp-proof course is to be stepped only flexible membrane shall be used.

All damp proof course, unless otherwise specified, shall consist of class 'C' cement concrete 50mm thick, mixed with 2.5 kg. of pudlo per bag of cement or other approved quality water proofing compound as per manufacturers specifications and shall be laid at required levels as per drawings and instructions of the Engineer. The D.P.C shall be tamped consolidated, leveled, edges and corners made to the requirements of concerned drawings including finishing and curing complete.

20 Solid Block Work Around Opening of Hollow Masonry

Around all openings in hollow block masonry, the Contractor shall provide solid block work c:f same thickness as that of hollow block masonry wall and of width as indicated on the Drawings .. Solid block shall be laid around openings in such a manner that these are bonded integrally with hollow block masonry.

21 Reinforced Hollow Block Masonry

Where specified on the Drawings, reinforced hollow block masonry shall be provided. Horizontal and vertical reinforcement shall be cold worked deformed bar. Two bars of No. 8 (8mm) diameter shall be provided at every third horizontal course at 600mm centers, while the vertical reinforcement shall be two bars of No. 12 (12mm) diameter at 800mm centers. Bars shall be anchored and held firmly vertical in respective beams and columns in the manner shown in shop Drawings. The reinforced hollow part of '.he block wall shall be solidly filled with Class 'D' concrete at intervals of one meter maximum height as the laying of block masonry work proceeds. The filled concrete shall be consolidated thoroughly by rodding to avoid formation of voids. Contractor shall submit shop drawings of anchoring and placing of reinforcement in hollow block masonry for approval of the Engineer.

22 Curing and Repairs

22.1 All block masonry shall be water cured and shall be kept wet for at least seven days, by an approved method, which will keep all surfaces to be cured continuously wet. Water used for curing shall meet the requirements of the specifications for water used in the manufacture of blocks.

22.2 If, after the completion of any block masonry, the work is not in alignment or level, or does not, conform to the lines and grades shown on the Drawings •or shows a defective surface, it shall be removed and replaced by the Contractor at his expense unless the Engineer grants permission in writing, to patch or replace the defective area.

23 Masonry Short of Height

In case of different thickness of slab in different areas or rooms or for any other reasons, whatsoever if chiseling of masonry is required, the Contractor shall do so at his own cost. Where for any reason whatsoever, the height of the wall is short of ceiling height the actual height shall be made good with Class 'C' nominal mix concrete. This concrete shall neither be measured nor be paid under item of concrete but will be paid for under the item of wall masonry. Similarly where the lintel heights' are such that the Contractor has to chisel the masonry or provide cast-in-place concrete to make up the height of the course, no payment will be made for chiseling, but where such cast-in-place concrete is provided, payment for the same will be made at the unit rate of masonry.

24 Measurement and Payment

24.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bills of Quantities. The cost thereof shall be deemed to have been included

in the quoted unit rate of the respective items of the Bills of Quantities.

24.1.1 Chiseling of masonry, wherever required

Providing and fixing all joints reinforcing bars dovetail anchors, Cement sand mortar used in laying blocks, curing of masonry works and making of weep holes, Wastage of material etc.

Providing and filling Class 'D' Concrete in the cavity of hollow block masonry.

Providing and laying damp proof courses including damp proof materials and GI sheet flashing within cavity wall.

24.2 Solid Block Masonry

24.2.1 Measurement:

Measurement for acceptably completed works of respective type of solid block masonry will be made' on the basis of number of cubic feet provided and installed in position as shown on the drawings or as directed by the Engineer. Each measurement shall be taken to the nearest W'. All opening$ left in the masonry wall shall be deducted.

24.2.2 Payment:

Payment will be made for acceptable measured quantity of respective type of solid block masonry work on the basis of unit rate per cubic feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item

SECTION – 11 CARPENTRY AND JOINERY

1. Scope

The work covered under this section of Specifications consists of providing all material, labour, plant, equipment, appliances and performing all operations in any floor and at any height. connected with the fabrication and erection of all woodwork, mill work, construction assembly, surface finish treatment and building in of all cabinet type items, supports etc. of wood or metal and incidentals, associated woodwork appurtenances, procuring and applying preservatives, installation of "Finish Hard Ware" in connection with finish woodwork as per details shown on the Drawings or as directed by the Engineer.

2. Materials

2.1 Timber

2.1.1 Hard Wood:

Hard wood shall comprise of Oak, beech, Walnut Mahogany, Teak, Iroko and Sheesham.

2.1.2 Soft Wood:

All soft wood shall consist of pines, spruce, hemlock and douglas fir or cedrous deodar (referred in the document as deodar), wood locally known as 'Partal' to be used in shutter core where specified.

2.1.3 General Characteristics:

All the timber shall be in accordance with the requirements of BSI No: 1186, 'Quality of Timber and Workmanship in Joinery.

The whole of the timber shall be from the heart of sound and fully grown tree, uniform in substance, straight first class quality properly seasoned, free from large or loose dead-knots, open shakes and excessive sapwood. The scantlings of all timbers shall be brig t: sound and square edged. The moisture content of timber shall not be more. than 10 (ten) percent in case of soft wood and 7 (seven) percent in case of hard wood.

2.1.4 Preservation of Wood:

Prior to installation of all finish wood works in their respective positions, preservatives shall be applied to safeguard the wood work against fungus, termite and bores.

The Preservatives shall be of the best available quality as approved by the Engineer. The method of application shall be strictly in accordance with the manufacturer's instructions The treatment and application of all the preservatives shall comply with the requirements of BS-CP 98:1964.

2.1.5 Adhesive:

The adhesives shall conform to the requirements of BSI No. 745 "Animal Glues for Wood" manufactured by M/s Host shall

be considered approved for this Project or as directed and approved by (he Engineer.

2.1.6 **Nails and Screws:**

All nails and screws shall comply with requirements of BSI NO. 1202 and BSI NO. 1210 respectively.

2.1.7 **Ply Wood**

The ply wood shall comply in all respects with BSI No. 1455:1963. All the ply wood shall only be obtained from KDC Board (Pvt.) Limited, Jhelum as approved by the Engineer.. All plywood shall be manufactured with phenol pharamaldihide or any other approved water proof adhesive but not with urea pharamaldihide

Ply wood used for doors, and other similar works shall be to the thickness and size as shown on the Drawings or as directed by the Engineer. The grade shall be first quality and the face and back shall be free from end joints, dead knots, overlaps, patches and other similar defects. The surfaces shall be free, smooth for painting or polishing.

2.1.8 **High Density Fibre (MDF) Board**

Medium density fibre board to be used on the project shall be LASANI of thicknesses as specified in the drawings. Board shall be manufactured with water proof resinous glues and shall be guaranteed by the manufacturer. All boards required for the exterior surfaces of cabinets shall be laminated with farmica in approved colour and texture in factory as specified elsewhere.

3. **Samples**

All samples of the material used for the work under this Section of Specification shall be approved by the Engineer and same type of material shall be used throughout the work. If the Engineer desires to get the material tested, this will be got done by the Contractor at his own cost from a laboratory approved by the Engineer.

4. **Fabrication**

'Unwrought' timber shall be used. Sawing shall be done with sufficient oversize margin to finally meet the requirements of specified sizes and dimensions of the finished work

All framing shall be joined and glued properly as shown n on the Drawings or as directed by the Engineer. All joints shall be secured with sufficient number of nails. The Contractor shall perform all necessary mortising, tenoning, grooving, matching, tangoing, housing, rebating and all operations required for the correct jointing. The Contractor shall also provide all metal plates, screws, nails and other fixing material that may be ordered by the Engineer for the proper execution of the joinery work. Fabrication that develop defects due to bad workmanship or unsound materials not conforming to these specifications and the directions of the Engineer, shall be cut out and replaced at Contractor's own expense before the expiry of the maintenance period.

5. **Protection Of Materials**

All materials and assembled units shall be protected from weather and stored in such a way as to prevent decay, warping and attack by fungus and termites.

6. **Wooden Doors**

6.1 **Materials**

6.1.1 First class Deodar wood as approved by the Engineer shall be used for door frames and door shutters except the core of shutters which shall be partial wood as specified and shown on drawings.

6.1.2 Architraves, beads, lippings shall be of Deodar wood of specified sizes and fixed as per details shown on Drawings

6.2 **Ground, Blocking & Nailing Strips**

6.2.1 Ground, blocking and nailing strips shall be provided as necessary to receive the work included herein and as required for the work of other trades.

Except as otherwise shown or specified, ground blocking and nailing strips shall be secured in place as follows:

6.2.2 To steel--- by means of 3/8" diameter bolts spaced not over 3 feet.

6.2.3 To brick wall ---- by the use of cut nails spaced not more than 1.5 feet apart and driven directly into the block. .

6.2.4 To poured concrete --- by means of 1/4" diameter galvanized expansion bolts spaced not more than 1.5 feet part or by any approved method.

6.3 **Exterior and Interior Door Frames**

All exterior and interior door frames shall be fabricated of wooden sections of first class deodar wood frame as shown on drawings.

All exposed surfaces of frames and architraves/beads shall be painted with synthetic matt finished enamel paint of approved shade as per the instructions of the Engineer.

The door frames shall be secured in place by means of 4 inches screws and matching Rawal plugs and built into the plastered masonry after the same has dried 4 number screws in each jamb and 2 number for upto 3.5 feet width and 3 number for upto 5 feet width of doors in the head shall be used.

6.4 **Door Shutters**

The shutters will be fixed to the frames with approved quality fittings as per hardware schedule.

6.5 Squareness Maximum diagonal difference 1/8" (between length of diagonal measured on face of door from upper right corner to lower left corner and length of diagonal measured from upper left corner to lower right corner).

Doors, shutters shall be fabricate in a workman like manner strictly to the correct sizes and shapes as shown on the Drawings or as directed by the Engineer.

Manufacturer's Qualifications:

The manufacturer of doors herein specified shall have been in business of manufacturing doors of type specified for minimum period of five years. The door shutters shall be built in sections, properly jointed and glued together.

The surfaces shall be prepared for painting or polishing. All door shutters shall be paneled, fabricated from first class deodar wood as shown on drawing . Fitting, Hanging and trimming All the doors shall be fitted, hung and trimmed as Here in after specified and as indicated on the Drawings.

Doors shall have a clearance of 1/8" at sides and top unless otherwise directed by the Engineer and shall have 3/16" clearance at bottom. Doors shall be hung and trimmed with hardware as specified. All the locks shall be installed at the same height and shall be located at height as directed by the Engineer. Where directed by the Engineer margin for carpet shall be incorporated in the door shutter.

6.6 Hardware

Hardware shall be of best quality local make extra heavy duty and first class finished material except door locks and door closures which shall be imported of Japanese origin as per attached hardware schedule. The Contractor shall obtain prior approval from the Engineer for quality, shape, pattern, and brand of all the hardware materials by providing samples and catalogues, etc., and shall provide and fix only the approved hardware materials.

Completed doors shall be sound, rigid and free from defects and warp. All edges shall be aligned and smooth, joints shall be close fitting, hard wood doweled or mortised framed and of a strength to maintain frame and of strength to maintain the structural properties of the member connected. All adjoining faces and edges shall be flush and smooth. Edges shall be rectangular and solid.

6.7 Quality Assurance

6.7.1 Tolerances: Doors shall be fabricated to following tolerances Size. Plus or minus 1/16 in overall dimensions Maximum Warp: 1/8"

6.8 Submittal

6.8.1 Provide manufacturer's literature completely describing products.

6.8.2 Provide shop drawings showing door types, details and locations, referred to the door type and hardware group shown on door and hardware schedules.

6.8.3 Provide certificates stating that doors were constructed with timber of the Species specified having moisture content and meeting equilibrium and relative humidity requirements.

6.8.4 Submit samples of plywood for selection of colour and grain.

6.8.5 Procurement of materials shall be made only after the shop drawings and samples have been approved by the Engineer.

6.9 **Product Delivery, Storage and Handling**

6.9.1 Deliver and store products in waterproof, protective containers with seals unbroken and labels intact until time to use.

6.9.2 Keep products dry, stack products off ground on level platforms, fully protected from weather, including direct sunlight.

6.9.3 Identify type, size and location of each door before delivery in order to permit. installalion at correct location.

6.10 **Installation**

6.10.1 Install doors at correct openings and assure smooth swing and proper closer with frames.

6.10.2 Install finish hardware in accordance with manufacturer directions.

6.10.3 Hardware shall be carefully and securely fitted. Upon handing over the work, hardware shall be demonstrated to operate freely. Keys shall be placed into a respective locks and upon acceptance of the work keys shall be tagged and delivered to the Engineering work at site.

7. **Wooden Railing**

Material for wooden hand railing in stairs shall be superior quality teak wood/ deodar wood & 1/2 inch dia mild steel pipes. It shall be fabricated and installed in accordance with the design shown on the drawings/details and as per the instructions of the Engineer. Sample of railing shall be fabricated & mock up samples installed at locations designated by the Engineer for approval. prior to s

Shop/detail drawing indicating the basic details at various locations including details at turnings shall be submitted by the Contractor for Engineer's approval. Hand railing shall be installed to line level and plumb. The surface of railing in stairs shall be prepared for polishing. The railing shall be polished/painted with clear lacquer and the steel surfaces shall be painted with matt finished enamel paint.

8. **SS & Glass Railing**

Material for hand railing in stairs shall be 3" dia stainless steel pipe handrail, 1" dia stainless steel balustrades, W' thick unbreakable Security glass and clamps including all fixing accessories complete in all respect as shown on the drawings, It shall be fabricated and installed in accordance with the design shown on the drawings/details and as per the instructions of the Engineer. Sample of railing shall be fabricated & mock up samples installed at locations designated by the Engineer for approval, prior to starting work at site. Shop/detail drawing indicating the basic details at various locations inclu9ing details at turnings shall be submitted by the Contractor for Engineer's approval. Hand railing shall be installed to line level and plumb.

9. **Defective Work**

In the event of non-conformance to specification and drawings, the wood works shall be rejected by the Engineer and the Contractor shall remove and replace the rejected work by new work of same specifications.

10. **Surface Preparation**

The surfaces of all wood works shall be prepared in the (manner as directed by the Engineer for polishing or painting.

11. **Mock-Up Sample**

After approval of shop drawings and tests etc., the contract shall submit at his own cost one mock-up sample of each type of wood works complete with all fixing, fixtures accessories prior to the actual fabrication of the bulk.

The samples shall be returned to the Contractor for incorporation in the works after installation of at least 80% of the works.

12. **Measurement & Payment**

12.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities The cost thereof shall be deemed to have been included in the quoted unit rate of the respective/items of the Bills of Quantities.

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height except where otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account.

12 1.1 Glazing where required and all finished hardware fittings in carpentry and joinery works, including locks, kick and push plate, architrave, beading, handles, locking arrangements etc.

12.1.2 Prime coat, painting with synthetic enamel paint/lacquer polish in carpentry and joinery works/hand railing.

12 1.3 Anti termite treatment to wood works and adhesives

12.1.4 SS / Steel balusters. steel base and steel strip for wooden railing.

12.1.5 Deodar wood blocking, shipping & base frame work in cabinets/hand railing.

12.1.6 SS Plate in the door bottom.

12.2 Wooden Door

12.1.1 Measurement

Measurement of acceptably completed works of all types of wooden doors will be made on the basis of net actual area in square feet fabricated and installed in position as shown on the Drawings or as directed by the Engineer. Net area will be

measured in accordance with plastered masonry opening in between jambs and plastered head and bottom of shutter.

12.1.2 Payment

Payment will be made for acceptable measured quantity of all types of wooden doors on the basis of unit rate per square feet quoted in the Bill of Quantities against respective item and shall constitute full compensation for all the works including all hardware & fittings like locks, tower bolts, push plates etc. as per details mentioned in Volume III & IV of Tender & Contract Document related to the item.

SECTION – 12 ALUMINIUM WORKS

1. Scope

The work covered under this section of the specifications consists of providing all material, labour, equipment, performing all operations required for providing and installation of aluminium. doors, windows, ventilators & louvers including all related items such as sealants, gasket, netting, rollers, hinges, latches, fastenings, anchor bolts, door locks, locking devices and glass complete in strict accordance with this section of specifications, the applicable drawings and as scheduled. Any additional information required in this connection and not stated in these specifications, shall be obtained from the Engineer's Representative.

2. Applicable Standards

Latest editions of following ISO and British Standards are relevant to these Specifications wherever applicable.

2.1 ISO (International Organization for Standardization)

1804	Doors Door	Terminology
6442	Leaves	Measurement of defects of general flatness
6443	Door	
	Leaves	Measurement of dimensions and defects of squareness.
6444	Door	
	Leaves	
6613	Windows & Doors	Test of behaviour under humidity variations (successive uniform climales) wind resistance tests Air permeability test.

2.2 BSI (British Standard Institution)

1227 Hinges
4873 Aluminum alloy windows.

3. General

3.1 Door, Windows, ventilators, louvers and other items to be provided shall be aluminium, of profile pattern and design shown on drawings and shop drawings manufactured by reputable manufacturer approved by the Engineer The contractor shall provide manufacture literature completely describing the product instructions for installation and maintenance.

3.2 All the sections used for doors, windows, ventilators & louvers fly screens shall be of best quality aluminium products such as equal and unequal angles, channels, tubes, corrugated strips, mouldings etc., in accordance with International standards conforming to ASTM B 308 & B 221.

3.3 All doors, windows. Ventilators and louvers shall be of type and size indicated on drawings and shall conform to the requirements shown and specified herein.

3.4 Contractor shall arrange tests and analysis if directed by the Engineer of scaled models of each door, window, ventilator and louvers type at the maker's works or any laboratory specified by the Engineer for the material supplied by him to be tested in the presence of the Engineer's Inspector, to whom test certificates, proof sheets, etc. shall be furnished. The models shall be submitted to the Engineer for approval prior to testing. Nevertheless, neither the fact that the materials have been tested in the presence of the inspector nor that the Engineer may have been furnished with test certificates in lieu of sending an inspector to the works shall affect the liberty of the Engineer to reject, after delivery of materials found not in accordance with these specifications.

3.5 The contractor shall submit shop drawings conforming to design concept which shall show full construction details, quantities and locations, fastenings, stiffening members and attachments to adjacent construction and materials. Shop drawings and calculations shall be submitted at the proper time to allow for checking, revisions, and agreement and to permit manufacturer's product delivery and start of site work to suit the building programme. The Contractor shall submit representative samples of finished doors, windows, anchoring mechanism, embedded parts, fastenings, glass panes, accessories and other materials for the Engineer's approval.

After approval of shop drawings and tests etc., the Contractor shall submit at his own cost one mock-up sample of each type of aluminium works complete with glazing, all components assembly method and required fittings and accessories prior to the actual fabrication of the bulk. The samples shall be returned to the Contractor for incorporation in the works after installation of at least 80% of the works.

Fabricate and assemble all work in the shop of the approved manufacturer to reduce field fabrication to a minimum unless otherwise directed by the Engineer.

The glass shall conform to specification laid down under chapter 'Glazing' and shall free from all blemishes, bubbles, distortions and other flaws of any kind and shall be properly cut to size as shown on drawings, so as to fit the grooves in window members.

3.6 The structural shape of the Aluminium members shall be of uniform quality, colour temper, clean, round, commercially straight and free from injurious defects.

3.7 All doors, windows, ventilators and louvers shall be fabricated as a complete unit, fully airtight and watertight, including rubber gasket for glazing, hinges, stays, rollers, latch, locking arrangement, handles, etc anodized in specified colour, inclusive of glass sheet, necessary holes for fixing, door locks, door closures and window locking requirements, all as approved by the engineer.

Contractor shall, provide certificate signed by the manufacturer stating that each lot has been sampled, tested and respected and has met the requirements in accordance with these specifications and the same shall be furnished to the Engineer.

3.8 The shop drawings shall clearly show that there shall be no penetration of rainwater from the exterior to the interior in case of severe wind and rainstorm. This has to be specially ensured in bill section.

4. Material

4.1 Frames/shutters

The frames of aluminium door, windows and ventilator shall be formed from rolled, strip or extruded aluminium. The thickness of sectional members shall be at least 1.6 mm. All outer / frame sections of open able / fixed windows. Ventilators and louvers curtain wall shall be 95 mm minimum in width. The Frames for doors and door/windows curtain wall shall be at least 97 mm in width.

4.2 As shown on the drawings, aluminium frames shall be provided as per international standard approved by the Consultant.

4.3 Fasteners shall be stainless steel of a type selected to prevent galvanic action with the components fastened.

4.4 Gaskets shall be vinyl glazing channel gasket to commercial standard CS-230-60.

4.5 Hardware shall be manufacturer's standard hardware. Flush to match doors, windows, ventilators and louvers finish. Floor mounted concealed type double action/swing imported door closures shall be provided to all doors. Heavy duty in-matching finish stays shall be provided to all open able windows, ventilators and louvers. Stays shall be attached to the window frame so as could be replaced easily.

4.6 Joint sealant shall be approved elastomer.

4.7 All Aluminium sections shall be powder coated in accordance with the standards of Aluminium Association of USA. The anodisation shall be of not less than 70-90 microns. The anodic oxide surface shall be properly sealed

4.8 For powder coated finish aluminium sections to be coated shall be mill finish. The sections shall be firstly degreased with a degreasing chemical to remove all/any stains. The sections will then be given a chromating coating and electro static powder coating in the desired colour with a powder-coating machine. After colour coating the sections will be baked at baking temperature of 220 degree Centigrade for 25 minutes.

4.9 All sliding/open able windows shall be sliding/open able wire/fly screen shutters in window matching finish with wire/fly screen of size so as not to permit the entry of flies and mosquitoes. The wire mesh shall be 30 SWG. 14 mesh (14 x 14 openings per square inch).

5. Design Requirement

The Contractor shall design the installation to meet or excel the following requirements,

5.1 Tolerances

The Contractor shall be responsible for agreeing to all dimensions with the Engineer before proceeding with the manufacture and for making provision to allow for building tolerances required by the Engineer. Contractor shall also take site measurements of the structure completed before manufacturing.

5.2 Thermal & Seismic Movements

The window and glazing assemblies are to be constructed and installed in the openings with sufficient tolerance and, where necessary, to provide for Joints incorporated in couplings, to provide for pansion and 'contraction as will be caused by the local seismic and climatic conditions and temperature changes, winter to summer - day to night without buckling, distortion of joints, or other harmful effects.

6. Workmanship

The Contractor shall be responsible for the protection and installation of all items furnished. All items shall be installed plumb and square and shall be solidly anchored in a good workman like manner in accordance with the manufacturer's instruction and as specified herein. The Contractor shall be responsible for the protection of installed items from damage by other trades. All items shall be left in operating, neat and clean condition, free from dirt, finger marks, etc. The Contractor shall be responsible for final cleaning before the final acceptance.

The glass panes shall firmly be secured in the rebates with the rubber gasket. Ensure that the beads and grooves are clean, dry and unobstructed at the time of glazing. The complete unit shall be airtight and watertight on completion. No doors, windows and ventilator shall be considered complete until and unless the fingerprints and other stains and marks have been removed from the surface of glass and aluminium.

7. Product Delivery and Storage

7 1 Deliver doors, windows, ventilator and louvers in a manner preventing damage to units,

7.2 Applicable Standards

Latest editions of following British Standards are relevant to these Specifications wherever applicable.

Store materials off the ground under cover in a manner preventing deterioration or All embedded parts and anchor bolts shall be delivered to the site carefully and keeping the fabricated shape and configuration. All these parts shall be suitably marked for identification

SECTION – 13 GLAZING

1. Scope

The work under this section of the Specifications consists of furnishing all labour, equipment, tools, appliances, scaffolding and providing in any floor and at any height glass, gaskets, sealants, compound and other materials required for performing all operations in connection with' the installation and setting of all types of glass and glazing complete in every respect in accordance with the Drawings or as directed by the Engineer. The scope of this section of Specifications is covered with detailed Specifications as laid down herein.

2. Applicable Standards

Latest addition of following British Standards are relevant to these specifications where ever applicable:

2.1 BSI (British Standards Institution)

952	Glass for glazing
5051	Security glazing part I & II
CP.152	Glazing

3. General

3.1 Each type of glass shall have the manufacturer's label on each pane, and the labels shall remain on the glass until final cleaning.

3.2 Glazing sealant shall be as recommended by the manufacturer for the particular application.

3.3 Spacer shims distance (pieces) shall be plasticized polyvinyl chloride (PVC). Thickness shall be equal to space shown on drawings between glass and rebates bead or cleat. Depth shall give not less than 1/4" cover of glazing sealant.

3.4 Contractor shall submit samples for each type of glass, minimum 4' x 4' in size with protective edges. Samples of glazing sealant minimum 0.1 liter of specified types shall be submitted.

3.5 Contractor shall submit 1 feet long sample c; each type of glazing gasket.

3.6 Contractor shall also submit printed materials manufacturer's installation instructions for specified glazing gaskets. compounds sealants and accessories including description of required equipment and procedures and precautions to be observed.

4. Delivery Storage and Handling

4.1 Contractor shall deliver materials in manufacturer's original, unopened containers clearly labeled with manufacturer's name and address, material, brand, type, class and rating as applicable.

Contractor shall store the materials in original unopened containers with labels intact/protected from ground contact and from elements which may damage glass

Contractor shall handle the materials in a manner to prevent breakage of glass and damage to surfaces.

Examine each piece of glass and discard and replace glass with edge damage or face imperfection. All glazing shall be wind tight and fully water tight on completion.

Clean glazing channels and other framing members indicated to receive glass. Remove coatings which are not firmly bonded to the substrate, Remove lacquer from metal surfaces wherever elastomeric sealants are to be used. Apply primer and sealer to joint surfaces wherever recommended by the sealant manufacturer and as shown on the drawings.

Trim and clean excess glazing materials from surrounding surfaces immediately after installation and eliminate stains and discolorations.

Cure glazing sealants and compounds in compliance with manufacturer's instructions to obtain high early bond strength internal cohesive strength and surface durability.

While glazing operation is in progress great care shall be taken to avoid breakage or damage to the glass and adjoining glazing. The Contractor shall make good at his own cost, all glass broken by his workmen while cleaning or carrying out other operations. On the completion of the glazing work, all glass that has been set by the Contractor shall, if it becomes loose, within the maintenance period, be refixed at Contractor's expense

No glazing shall be considered complete until and unless paint and other stains have been removed from the surface of the glass ad checked by the Engineer for water tightness.

5. Protection and Cleaning of Glazing

5.1 Remove all smears labels and excess glazing sealant, leave clean inside and outside free from scratches. The Contractor shall be responsible for the protection of installed glass. Before final acceptance, damaged or broken glass shall be removed and replaced with the new glass at no additional expense to the Employer and replaced with new glass at no additional aged or broken glass shall be removed.

5.2 All glass surfaces shall be washed clean both inside and outside within two weeks prior to final acceptance by the Consultant.

6. Measurement snd Payment

No payment shall be made for the works involved within the scope of this section specifications unless otherwise specifically stated in the Bill of Quantities or herein. The cost there of shall be deemed to be included in the quoted unit rate of the relevant item of the Bill of Quantities.

SECTION – 14 BITUMEN COATING

1. **Scope**

The work under this section of the Specifications consists of furnishing all plant, labor, equipment, appliances and materials and in performing all operations related to water proof treatment to foundations and basement structures complete in strict accordance with this section· of the specifications and the applicable drawings and subject to the terms and conditions of the Contract.

2. **Submittal**

2.1 Samples of all materials proposed for use under this section. shall be submitted to the Engineer for approval.

3. **Materials**

3.1 Bitumen 10/20 grade.

4. **Delivery Storage and Handling**

Materials shall be protected from damage during loading shipment delivery and storage Non staining materials shall be used for blocking and packing

5. **Preparatory Work**

5.1 All surfaces to be treated shall be dust free and dry. Application of finishes shall not start unless the preparatory work has been inspected and approved by' the Engineer.

6. **Bitumen Coating/Painting In Foundation Sub-Structures, Under Floors**

a) **Bitumen Painting:**

All surfaces to he bitumen painted shall be thoroughly cleaned of any accretion, dust, dirt etc. by scraping, wire brushing or as directed by the Engineer. The surface shall be primed with a coat or asphalt oil used at the rate of not less than 1.08 gallon /10 square meter. Two coats of hot bitumen paint shall be applied at the rate of 1.0 kg/ Sq m. each coat. The first coat shall be allowed to dry for about 6 hours before applying the second coat. During operation of painting great care shall be taken to avoid air bubbles. The manufacturers shall be taken to avoid air bubbles The manufacturer's instructions and Engineer's directions shall be followed.

7. **Measurement and Payment**

7.1 **General**

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bills of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bills of Quantities

7.1.1 All preparatory work, scrapping, scratching, cleaning, cant strips, gravel strips, etc.

7.1.2 Coats of bitumen.

7.2 Bitumen Painting/Coating

7.2.1 Measurement

Measurement of acceptably completed works of bitumen painting/coating will be made on the basis of net actual area in square foot as shown on the Drawings or as directed by the Engineer.

7.2.2 Payment

Payment will be made for acceptable measured quantity of bitumen painting/coating on the basis of unit rate per square foot quoted in the Bills of Quantities. The unit rate shall include all cost of surface preparation and shall constitute full compensation for all the works related to the item.

SECTION – 15 CEMENT PLASTER

1. Scope

The work under this section of the Specifications consists of furnishing all plant, labour, equipment, appliances, and materials and in performing all operations in any floor and at any height connection with providing and installation of cement plaster, and specified external rendering complete in strict accordance with this section of the Specifications and the applicable drawings and subject to the terms and conditions of the contract.

2. General

2.1 Except as may be otherwise shown on surfaces specified, all plaster work, both internal and external shall be ordinary Portland Cement plaster of the required thickness as shown on the drawings.

2.2 Plastering shall not commence until all electric conduits, drainage and sanitary pipes, inlets to tanks, brackets, clamps, doors and window frames and all sort$ of inserts and embedded items are fixed in position. It shall be the responsibility of the Contractor to make sure that all such work is carried out by other contractors before starting of plaster work. Chiseling and repairing of cement plaster shall not be permitted without the approval of the Engineer.

2.3 Sample of materials shall be submitted to the Engineer for his approval prior to use in the works.

3. Material

3.1 Cement for plaster shall be Ordinary Portland Cement (B.S 12 or P.S 232) or Sulphate resisting cement (B.S 4027 or P.S. 612) as specified 'and shall conform to requirements specified in the section "Plain and Reinforced Concrete".

3.2 Sand for plaster shall coy with the requirements of BS 1199, BS 1200 or the draft Pakistan Standard "Sand for Plaster" as directed by the Engineer.

3.3 Water for plaster shall conform to requirements specified in the section for "plain and reinforced concrete".

3.4 All materials and workmanship for plaster, not explained in these Specifications, Shall comply with the requirements of relevant BS CP 211 and CP 221 as directed by the Engineer.

4. Proportioning and Mixing

4.1 Measurement of materials by volume shall be by containers of known capacity to maintain consistent proportions. No lumpy or caked material shall be used. Mixing equipment boxes and tools shall be clean. Materials shall be proportioned as specified on the Drawings, in the Bill of Quantities or as directed by the Engineer. Mixing shall be continuous until all ingredients are evenly distributed and thoroughly mixed.

4.2 Only limited water shall be added for proper workability and such quantity of ortar shall be prepared which can be consumed in thirty minutes after preparation. Preparation of mortar in bulk quantity for use

during the entire day or for any other time more than that stipulated above is expressly prohibited. Retempering shall not be permitted and all mortar which has begun to stiffen shall be discarded.

4.3 Plaster ingredients shall be thoroughly mixed either by hand on a clean cement concrete platform or by a mechanical mixer, as directed by the Engineer.

5. Preparation of Surface to be Plastered

5.1 Concrete surface to be plastered shall be cleaned to remove all grease, form oil and other surface impurities, which will otherwise adversely affect the adhesion of plaster to the surface concerned. The surface of all-concrete ceilings, beams and columns shall be lightly hacked by approved means to give the required key for plastering.

5.2 All masonry surfaces to be plastered shall be cleaned to remove all matter, which will otherwise adversely affect the adhesion of plaster to the surface concerned. The surface shall be washed with clean water and kept damp for 24 hours before further treatment. The surface thus prepared shall be treated uniformly with cement and sand slurry. The slurry to be used shall be one part cement to one part sand by volume with water added to make a stiff creamy mix. The slurry shall be applied with a stiff brush on surface, which has previously been well wetted. The surface so treated shall be left to cure for 3 days.

6. Application of Plaster

6.1 The plaster of thickness less than the specified thickness shall be rejected. If the plaster is to be more than 1/2" thick, it shall be done in two coats. The surface of first coat shall be made rough before the second coat is applied. The plaster shall not have wavy surface and shall be perfectly in plumb. The edges and corners shall represent a straight line. The plaster shall be kept wet continuously for at least ten (10) days. No extra payment shall be allowed for jambs, junctions, corners, edges, round surfaces or for more than one layer of plaster required due to any unevenness in the work done by the Contractor. The plasterwork is to cover all conduits, pipes etc fixed in the walls and ceiling. Wherever specified, metal lath shall be nailed firmly before plastering is commenced. The plaster surface shall be tested frequently with a 10 feet straight edge and plumb bob.

6.2 Plaster containing cracks, blisters, pits, dis coloration or any, defects shall not be acceptable. Any such plaster or loose plaster shall be removed & replaced with plaster in conformity with these specifications and as additionally directed by the Engineer. Contractor shall cut out and patch all defective work at his own cost. All damaged plaster shall be patched as directed by the Engineer. Patching plaster shall match appearance of and shall be finished level with adjoining plaster.

7. Metal Lath

Metal lathing shall be fabricated from sheet steel and shall be of uniform quality and free from flaws broken strands, cracks and corrosive pitting, shall be rectangular and true to shape and shall comply with BS-1369.

All lathing shall be galvanized. Where plastering material depends entirely on the lathing for its key, these shall be not less than two complete mesh openings per 1-1/8"in one direction and the width of the aperture shall not be less than 3/16".

Sheets shall not be less than 1.6 kg/sq.m when fabricated, using 0.7 mm thick steel sheet. Where used on smooth surfaces to form a key it sh~11 be not less than 1.2 kg/sq.mm when fabricated, using 0.5 mm thick steel sheet. Tying wire shall be 1.2 mm diameter galvanized annealed iron wire

Sheets shall be welded to angle iron frame as shown on drawings. 8.

8. Angle and Beads

Angle beads, stop beads, depth gauge beads, edging profiles, plaster dividing profiles, interior angle profiles, plaster borders and the like shall all be manufactured from sheet steel and galvanized after fabrication, all beads shall be perforated at edges to ensure good adhesion of the plaster work. Thickness and dimensions shall suit particular locations and plaster thickness.

All angle beads, stop beads, depth gauge beads and the like are to be ffixed in accordance with the manufacturer's instructions, at all corners, stops, joints, etc as per directions of Engineer In charge.

9. Internal / External Plaster

9.1 Where specified in the Drawings external surface shall have an average 20mm thick. plaster finish, consisting of a base coat of 1:4 cement sand mortar in Grey cement and the finish coat of smooth plaster as shown on the Drawings and as directed by the Engineer.

9.2 Where specified in the Drawings all internal plaster shall have an average 12mm thick consisting of base coat of 1 :3!1:4 cement sand mortar in grey cement and finish coat of smooth plaster as shown on the Drawings and as directed by the Engineer.

9.3 Stucco Plaster

Wherever specified in the drawings external stucco plaster shall consist 'of 1 :2, one part white cement & 2 parts approved shade of marble chips zero size mixed with approved pigment to achieve desired shade. Wherever shown on drawings, groves shall be provided with aluminum U/Y channels. The contractor shall prepare mockup samples of stucco plaster for the approval of Engineer. The plaster shall be applied with machines and the final rough surface/texture/shade shall be as per the approved sample, direction and approval of the Engineer-In charge.

10. Cleaning and Protection

10.1 Rubbish and debris shall be removed as necessary to make way for work of other trades and as directed by the Engineer. As each room or space is completed all rubbish, debris, scaffolding and tools should be removed to leave the room clean.

10.2 Prior to plastering all aluminum windows, finished metals should be covered by sheet of plastic or tarpaulin to protect it from damage.

10.3 Protect finished plaster from injury by any source. Contractor shall also protect walls, floors and work of other trades from Plastic materials.

11. Tolerances

Surfaces of plaster work shall be finished with a true plane to correct line and level with all angle and corners to a right angle unless otherwise specified and with walls and reveals plumb and square.

Maximum permitted tolerances shall not exceed 1/8" in 6 feet variation from plumb or level in any exposed line or surface and 1/16" variation between planes of abutting edges or ends.

12. Measurement and Payment

12.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective item of the Bill of Quantities

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height.otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account.

12.1.1 Metal lath over reinforced concrete and masonry joint

12.1.2 Joints, junctions, corners, beads, drip course edge, roundings, and aluminum UN channels in groves. Etc.

12.1.3 More than one layer due to any unevenness in the finished works and base coat plaster in stucco plaster including marble chips/colour pigments.

12.1.4 Cutting & patching of all defective works.

12.1.5 Surface preparation, cleaning and protection as specified.

12 1.6 Marble chips & pigments in stucco plaster.

12.1.7 Roughning of first coat of plaster before application of 2nd coat incase where overall required plaster thickness exceeds 1/2 inch

12.2 Plain Plaster/Stucco plaster Measurement

Deductions shall not be made for ends of joints, beam posts, etc., and openings not exceeding 5 square feet each and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings non for finishing the plaster around ends of joints, beams posts, etc

In case of opening of area exceeding 5 square, feet each, deduction shall be made for the openings and also no addition shall be made for reveals jambs, soffits, sills, etc., of these openings.

Measurement of acceptably completed works of plaster will be made on the basis of number of square feet of the surface area plaster as shown on the Drawings, or as directed by the Engineer.

SECTION – 16 MARBLE

1. Scope

The work under this section of specifications, consists of providing all material, labour, plant, equipment, appliances in any floor and at any height and performing all operations required for providing and installing marble natural stone slab for toilet counters, where shown on the drawings, complete in strict accordance with this section of the specification and the applicable Drawings.

2. Submittals

The Contractor shall submit manufacturer's specifications and other product data for each type of marble stone and fixtures required, including instructions for handling, storage, installation and protection.

Shop Drawings shall be submitted showing sizes, dimensions, sections and profiles of slab, arrangement and provisions for jointing, anchoring, fastening and supports and other necessary fixing details. Indicate locations, layouts and pattern arrangements for each stone type and colour.

Submit three ranges samples 300mm x 300mm in size of each type of stone showing colour, grade, finishing and texture for approval of the Engineer.

3. Delivery, Storage and Handling

Materials shall be protected from damage during loading, shipment, delivery and storage. Non staining materials for blocking and packing shall be used. Stack marble at site in accordance with manufacturer's recommendations and as required to prevent staining,. scratching, etching or breakage.

4. Materials

4.1 General

Marble shall be compact, dense, metamorphic rock of lime stone origin obtained from quarries within Pakistan. It shall have a specific gravity of 2.7 and hardness number on Moh's scale shall range from 3 to 4.

Obtain each marble stone type from a single quarry and ensure consistent colour range and texture throughout the work. All pieces shall be of uniform thickness and truly square in shape.

Provide marble slabs/sills and tiles of specified sizes in floors, stair tread & risers and counter tops as shown on drawings.

Provide marble slabs/ sills and tiles of type, colour and finish for each area as directed by the Consultant/Engineer.

Provide stone of specified thickness. Saw cut the back surfaces that are meant to be concealed in finished work.

Provide irregular shaped units, staircase units and skirting base units to the profiles of required shapes & sizes and polished exposed surfaces wherever specified.

4.2 Marble Stone Type

All marble stone types are to be selected and approved by the Engineer for quality, colour and texture.

Marble: Marble of approved type and colour of local origin, first class quality and high class finish acceptable to the Engineer.

4.3 Beds and Backings

Where applicable, standard cementious screed and mortar beds and backings, mixed and proportioned by volume shall be as follows: -

Grey ordinary Portland	: 1 part
Cement Sand Water	: 3 parts
	: Clean, fresh and free from deleterious substances

4.4 Adhesives, Grouts and Sealants

Proprietary adhesives, joint grouts and sealants of approved type as required and recommended by the manufacturer for specific application shall be used. The colour of the joint grout and the sealants shall match with the colour of stone

5. Execution

5.1 Flooring, Skirting/dado and Stair

Apply cement slurry coat over surfaces of concrete substrate immediately prior to placing setting bed. Limit area of application to avoid premature drying out. Install setting bed of required thickness and set stone units before initial set occurs. Apply a thin layer of cement paste to bottom of each unit. Set tamps and level units immediately. Set units in required pattern with uniform joint widths.

Point joints as soon as possible after initial set. Force grout into joints, strike flush and tool slightly concave.

Remove mortar and grout from surfaces well still moist and as the work progresses.

Do not permit traffic on finished surface during setting and for a minimum of 24 hours after final pointing of joints.

5.2 Marble Toilet Counters

Marble toilet counter tops of the specified size shall be installed in areas shown on Drawings with M.s. angle framing and fixing accessories in accordance with approved shop drawing. Joints shall be cement grouted with matching colour or with matching colour sealant.

5.3 Repair and Cleaning

Remove and replace stone units which are broken, chipped, stained or otherwise damaged. Where directed, remove and replace units which do not match adjoining stonework or are not in line and level as shown on Drawings. Provide new matching units, install and point joints to

eliminate evidence of replacement. Repoint defective and unsatisfactory joints to provide neat, uniform appearance.

6. **Product Delivery, Storage and Handling**

6.1 Material shall be delivered in original; unopened, protective packaging, with manufacturer's labels indicating brand name, pattern, size, thickness and fire rating.

6.2 Material shall be stored in original protective packaging to prevent soiling, physical damage or wetting.

6.3 Cartons shall be stored in the installation area, opened at each end to stabilize moisture content and temperature, for 48 hours prior to installation.

7. **Job Site Conditions**

7.1 Work which will be concealed by false ceilings shall be completed, tested, inspected and accepted before ceiling work is started.

7.2 False ceiling installation shall not begin until the area has been closed in, and temperature and humidity approximate occupancy conditions. Wet work shall be cured and dry before ceiling work is started.

7.3 Surface which will support the ceilings, and those to which the ceiling abut, shall be inspected and accepted for completeness and adequacy to receive the ceilings before the work begins.

8. **Installation and Workmanship**

False ceiling suspension system and panels shall be installed in accordance with the requirements of BSI-CP.290 and with the manufacturer's recommendations as approved by the Engineer.

8.1 **Suspension System**

The hangers as specified shall be evenly disposed as per drawings, details and place and position as indicated. The suspension system should be installed by . making holes direction in the roof and shall be made good as directed by the Engineer. Their lengths clear of roofing slab shall be as per shop drawing details.

The framing of the specified section and run at spacing as per shop drawings. The jointing of runners to hangers shall be as per approved shop drawing details The extra framing if required shall be provided for light receptacles as per approved shop drawing details.

Wall hangers shall be positively and rigidly connected to the structure and to cross runners.

8.2 **False Ceiling tiles.**

Tiles shall be installed in the grid system after completion of installation of the suspension of lighting and air conditioning fixtures.

Forming ceiling panels shall be laid out in pattern including border of uniform width around all sides of each ceiling area. The pattern shall be as per shop drawings approved by the Engineer.

All panels shall be furnished and installed in an approved manner and as per approved types, sizes and surface design.

9. Fixtures

Light fixtures shall be installed as per approved pattern and supported in accordance with manufacturer's recommendations.

10. Finishing

After installation, dirty, soiled or discoloured surfaces shall be cleaned and left free from defects and ready to receive any painted finish if required.

The panels which are damaged or improperly installed shall be removed and replaced' by the Contractor at his cost.

11. Measurement and Payment

11.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height except where otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account.

Aluminum approved suspension system including main channels, main tee/cross tee bars, wall moulding and edge trims, hanger strips and accessories hold down clips, Aluminum tiles / strips etc. complete for aluminum tile / strips ceiling.

11.2 False Ceiling

11.2.1 Measurement

Measurement of acceptably completed works of respective types of false ceiling will be made on the basis of net actual area in square feet of false ceiling provided and installed in position as shown on the Drawings or as directed by the Consultant/Engineer.

11.2.2 Payment

Payment will be made for acceptable measured quantity of respective type of false ceiling on the basis of unit rate per square feet quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

The aggregate shall be stored on properly constructed paving or as directed by the Engineer.

There shall be a physical partition between the stockpiles of coarse and fine aggregate. If required aggregates shall be washed and screened to the satisfaction of the Engineer. Sieve analysis of all the aggregates to be used in the works shall be carried out as and when required by the Engineer. All aggregate shall be subject to the approval of the Engineer.

Any aggregates not found to be of the specified/approved standard shall be rejected by the Engineer and all such rejected material shall be removed from site with-out delay.

Floors, sub-base or base constructed with rejected aggregates shall be dismantled and rebuilt at the expense of the Contractor.

2.4 Stone Ballast

Stone ballast to be used as soling shall comprise of strong, hard, durable stone of approved size. The stone shall be obtained from approved quarry and shall be sound, free from laminations and weak cleavages and shall conform to specifications of "Stone Soling".

2.5 Water

Water used for mixing concrete, curing or any other operation of the works specified herein shall be fresh, clean and free from organic or inorganic matters in solutions or in suspension. Only water of the approved quality shall be used for all constructional purposes:

2.6 Ceramic/Porcelain tiles

Ceramic tiles shall be imported, premium quality, plain white/ coloured or printed. Porcelain tiles shall be imported Italian or Spanish or Granitto The tiles shall be of sizes as specified on the drawings and shall conform. to BS 1281 as per samples.

2.7 Cleaning Compound

The compound used for all cleaning of terrazzo shall be an approved neutral chemical cleaner free from acid and alkali or any other material that will affect the colour or otherwise damage the terrazzo and shall not affect the conductivity of terrazzo floors.

2.8 PVC Vinyl Tiles

PVC vinyl tiles shall be imported best quality of size 300mm X 300mm Colour and shade shall be as per sample to be submitted by the Contractor and approved by the Engineer.

2.9 Division Strips

Division strips shall be of marble as approved by the Engineer. Standard division strips for floor finishes shall be not less than 5mm (3/16") in thickness and shall not be less than 1-3/4" in depth.

2.10 Marble Chips

Marble chips shall have an abrasive hardness of not less than 16, as determined by the test of wear resistance in National Bureau of Standards Reports MBS 98. Size shall vary from No. zero to 8.

2.11 Preservative Material

Preservative treatment for terrazzo floor shall produce a water-proof 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 discolour the terrazzo nor leave a tacky or sticky finished film on the surface after buffing.

3. Cement Concrete Flooring

The materials for C.C flooring shall be same as already specified under clause 3, "Materials".

3.1 Composition of Concrete

Concrete shall be composed of Portland Cement, sand, coarse, aggregate and water all well mixed and brought to the proper consistency. The Contractor shall mix the ingredients as indicated on the 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.

3.2 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 Engineer reserves the right to increase the mixing time when the charging and mixing operations fail to produce a concrete batch in which the ingredients are uniformly distributed and the consistency is not uniform. The concrete shall be uniform in composition and consistency from batch to batch except when changes in composition or consistency are required. Water shall be added prior to, during and following the mixer charge. Excessive over-mixing requiring addition of water to preserve the required concrete consistency will not be permitted. The concrete ingredients shall be mixed by volumetric measurement in purpose made boxes approved by the Engineer.

3.3 Construction

The base course of the floor shall comprise of stone ballast of 2 inches (approx: 50 mm) mesh size. The base course shall be thoroughly compacted by suitable power rammers to the total consolidated

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 smoothening operations are completed and joints and intersections shall be fitted tight. Strips shall be braced to prevent bulging during the placing of terrazzo.

Unless otherwise shown on the drawings, the divisions in field work of large areas shall not exceed 4 feet x 4 feet and in small areas shall not exceed 2 feet x 2 feet.

Edging strips shall be placed at doorways between terrazzo and other types of flooring and along the edges of all terrazzo bases or borders and adjoining other types of floor finishes or floor covering. The edging strips at doorways shall be placed in line with the step face of doors. All edging strips shall be anchored and grouted solid in the under bed or to the concrete sub-floor and braced to prevent bulging as specified for division strip.

4.4 Laying Terrazzo

4.4.1 The sub-surface shall be swept clean, thoroughly moistened, but not saturated, and slushed with a coating of neat cement grout approximately 1/8" in thickness. The under bed consisting of class 'C' cement concrete screed shall be spread and brought to a level not less than 3/4" below the finished floor level. The dividing strips shall be installed in the green under bed. The terrazzo mix shall be spread, tamped and rolled into a compact mass not less than 3/4" 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.

4.4.2 Seasoning

The completed terrazzo shall be allowed to season for 6 days during which time it shall be kept moist by (1) covering with approximately 1" thickness of sand; or (2) covering with building paper or mats; or (3) sprinkling with water at every 10 hour interval.

4.4.3 Surface

Following the curing period, the terrazzo shall be machine ground to a true, even surface using a No. 24 grit followed by a No. 80 grit or finer abrasive stone. After the first grinding, the floors shall be thoroughly grouted with the same cement and colour 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 pits and thoroughly fill the surface for final grinding.

4.4.4 Finishing

Not less than 72 hours after application, the grouting coat shall be removed by grinding. 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.

4.4.5 Protection

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 Engineer until completion of the work of all other trades.

4.4.6 Cleaning and Coating

Prior to placing the protective covering, the terrazzo floor shall be approved by the Engineer. 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 material shall be applied in accordance with the manufacturer's directions, leaving all terrazzo work in clean condition as approved by the Engineer.

4.4.7 Dado/Skirting

The ingredients of dado/skirting shall be one part of cement and two parts of marble chips varying from Nos. zero to 2. Striking 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 Engineer.

5. Installation of Tile Flooring

When setting out the tiles, care shall be taken to establish the correct elevation for the floor. A gauge rod shall be used, indicating the overall measurement of a given number of tiles with specified joint width to reduce cutting.

After the floor has been machine finished, it should be covered with white, non-staining sand or rags to protect it while other work is being done. After removal, the floor shall be thoroughly scrubbed.

5.1 General

The base shall be prepared by laying cement concrete of specified grade and of thickness as shown on the drawings, or specified in the Bill of Quantities.

The curing period of the setting bed shall be as directed by the Engineer. 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 1/2".

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 made symmetrical with a minimum number of cut tiles as directed by the engineer.

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.

5.2 Ceramic/Porcelain Tiles

The ceramic/porcelain tiles shall be laid to the required lines, levels and grades over a setting bed of cement sand mortar comprising of one part of cement and 4 parts of sand by volume and the joints filled with neat white or grey cement including vertical and horizontal covers. The tile floor shall be kept wet for at least 72 hours and no traffic should be allowed on the tiles during curing period.

6. Measurement and Payment

6.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities.

The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

6.1.1 Loss and wastage of material due to consolidation, erosion and settlement.

6 1.2 All type of joints (expansion, contraction and construction joint etc.).

6.1.3 Class 'C' cement concrete screed base and 1:4 cement sand mortar under floor.

6.1.4 Rough plaster base under skirting / dado.

6.1.5 Finishing/grinding, washing & polishing works of ceramic, concrete, terrazzo tile, terrazzo floors and marble tiles.

6.1.6 Marble strips in terrazzo floors

6.1.7 1 :2 and 1:4 cement sand rough cast plaster.

shall include all cost of cement, sand, mortar and shall constitute full compensation for all the works related to the items.

6.5 Terrazzo Flooring/Skirting

6.5.1 Measurement

Measurement of acceptably completed works of terrazzo flooring/skirting will be made on the basis of net actual area in square feet laid in position as shown on the Drawings or as directed by the Engineer.

6.5.2 Payment

Payment will be made for acceptable measured quantity of terrazzo flooring/skirting on the basis of unit rate per square feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item.

6.6 PVC Vinyl Tile

6.6.1 Measurement

Measurement of acceptably completed works of PVC vinyl tile flooring will be made on the basis of net actual area in square feet laid in position as shown on the Drawings or as directed by the Engineer.

6.6.2 Payment

Payment will be made for acceptable measured quantity of PVC vinyl tile flooring on the basis of unit rate per square feet quoted in the Bills of Quantities and shall constitute full compensation for all the works related to the item.

SECTION – 19 PAINTING

1. Scope

The work under this section of the Specifications consists of furnishing all materials, plant, labour, equipment, appliances and performing all operations in any floor and at any height in connection with surface preparation, mixing, painting concrete works, gates, frames, walls, ceilings and all . such surfaces as shown on the Drawings and/or as directed by the Engineer. The scope of this section of specification is covered with detailed specifications as laid down herein.

2. Applicable Standards

Latest editions of following British Standards are relevant to these specifications wherever applicable.

2.1 BSI (British Standards Institution)

245 Specification for mineral solvents (white spirits and related hydrocarbon solvents) for paints and other purposes.

2521 Lead - based-priming paint for wood work .

2523 Lead based priming paint for iron and steel.

2569 Sprayed metal coatings.

4800 Paint colours for building purposes. Painting of building.CP2

3. Cleaning and preparation of metal surfaces

3.1 Except as otherwise specified, all painting shall be applied in conformity with BS CP 231 "Painting of Building" as applicable to the work.

3 2 The Contractor shall repair at his own 'expense all damaged" or defective areas of shop-painted metal and structural steel work. Metal surfaces against. which concrete is to be placed will be furnished shop-painted and shall be leaned prior to being embedded in concrete.

3.3 Except as otherwise specified all concrete and plastered surfaces are to be painted.

3.4 The Engineer will furnish a schedule of colours for each area and surface. All colours shall be mixed in accordance with the manufacturer's instructions.

3.5 Colours of priming coat (and body coat) where specified. shall be lighter than those of finish coat. The Engineer shall have unlimited choice of colours.

Samples of all colours, and finishes shall be prepared in advance of requirement so as not to delay work and shall be submitted to the Engineer for approval before any work is commenced. Any work done without such approval shall be redone to the Engineer's satisfaction, without additional expense to the

Employer. Samples of each type of paint shall be on separate 12" x 12" x 1/8" tempered hard board panels. Manufacturer's colour chart shall be submitted for colour specifications and selection.

4. Materials

4.1 All materials shall be acceptable proven first grade products and shall meet or exceed the minimum standards of reputable manufacturers as approved by the Engineer.

4.2 Colours shall be pure, non-fading pigments, mildew-proof sun-proof, finely ground in approved medium. Colours used on-plaster and concrete surfaces shall be lime proof. All materials shall be subject to the Engineer's approval.

4.3 All synthetic enamel paints and primers for structural steel works, metal work and wood works will be the best available of its type and shall be approved by the Engineer prior to its procurement.

4.4 Approved quality Weather Shield Weather Coat paint shall be used for painting the exteriors of the structures or other surfaces where specified on the drawings as directed by the Engineer.

4.5 The plastic emulsion paint, vinyl emulsion paint or similar as approved by the Engineer shall be used for interior surfaces.

4.6 All material for Bitumen painting shall consist of Bitumen grade 10/20. It shall be used for foundations or wherever recommended by the Engineer.

4.7 Only paints manufactured by ICI, Berger or approved equivalent shall be used in this Project. All material shall be delivered to site in their original unbroken containers or packages & bear the manufacturer's name, label, brand & formula & will be mixed and applied in accordance with his directions.

5. Delivery Storage And Container Sizes

Paints shall be delivered to the site in sealed containers, which plainly show the type of paint, colour (formula or specifications number) batch number, quantity, date of manufacture, name of manufacturer and instructions for use. Pigmented paints shall be supplied in containers not larger than 20 liters. All materials shall be stored under cover in a clean storage space, which should be accessible at all times to the Engineer. If storage is allowed inside the building, floors shall be kept clean and free from paint spillage

6. Surface Preparation

6.1 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 scrapping, chipping, blasting, wire brushing or other effective means as approved by the Engineer.

6.2 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.

6.3 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.

6.4 All the surfaces to be painted with approved quality paint shall be free from dust, dirt, fungus, lichen, algae etc. Oil paint, varnish and lime wash should always be removed by scraping and washing.

6.5 All surfaces to be bitumen painted shall be thoroughly cleaned of any accretion, dust, dirt etc. by scraping, wire-brushing or as directed by the Engineer. The surface shall be primed with a coat of asphalt oil used at the rate of not less than 0.50 pound per square foot.No work in this section shall be allowed until all surfaces or conditions have been inspected and approved by the Engineer.

7. Application

7 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 workman like 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 Engineer paint shall not be applied when the temperature of the metal or of the surrounding air is below 7 degrees centigrade. 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 segregation 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.

Coats of Weather Shield Weather Coat paint shall be applied in accordance with the manufacturer's instructions or as directed by the Engineer

Only as much material 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

7.2 Where shown on Drawings all exterior 1.1ishes shall be painted with Weather Shield/weather coat paint in approved colours as

per manufacturer's specifications. The number of coats shall be as shown on the drawings or as directed by the Engineer.

7.3 All wooden doors shall be painted with approved synthetic enamel paint as per manufacturer's recommendation and instructions or after approval of the Engineer.

7.4 Plastic emulsion paint vinyl emulsion paint or matt enamel paint of the approved make and shade shall be applied to surfaces as shown on Drawings as per manufacturer's instructions. The numb7er of coat shall be as indicated on the Drawings or as directed by the Engineer.

7.5 Two coats of hot bitumen paint shall be applied to exposed concrete surfaces in contact with earth. The first coat shall be allowed to dry for about six hours before applying the second coat. During the operation of painting great care should be taken to avoid air bubbles. The manufacturers instructions and Engineer's directions shall be complied with.

8. Job Conditions

8.1 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

8.2 Place drop cloths to adequately protect all finished work.

8.3 Remove and replace all items of finish hardware, device plates, accessories, lighting fixtures or other removable items.

8.4 In no case shall any finish hardware or other finished item that is already fitted into place be painted, unless otherwise specified.

9. Quality Assurance

All paint for anyone surface shall be top quality, of one manufacturer and approved by the Engineer. Deep tone accent colours shall be used and the unavailability of final coat colours may be the basis for rejecting materials for anyone surface.

10. Schedule of Measurement Of Paint Area

10.1 Irrespective of prime coats and number of paint coats applied to exposed painting surface area of column, walls, projections, ceilings, false ceilings and other surfaces (Except gates, doors windows and ventilators) shall be measured as per actual paint surface area for single time only and paid in accordance with quoted rate of Bill of Quantities.

11. Measurement And Payment

11.1 General

Except otherwise specified herein or elsewhere in Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of Bill of Quantities.

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height except where otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account.

11.1.1 Preparatory works, including .preparatory materials, scraping, scratching, sand blasting, c1earjng, prime coating, priming, protection of finished works etc.

11.1.2 Polishing works, including preparatory materials, scraping, cleaning, sanding etc/

11.1.3 Painting work on steel & wooden surfaces.

11.1.4 Before application of paint on existing surface the old paint surface shall be removed existing paint filing of cracks, surface preparation and application of primer coat, if any.

11.2 Measurement

11.2.1 Measurement of acceptably completed respective type of painting works will be made on the basis of net actual areas in square feet of the surface painted as shown on the Drawings or as directed by the Engineer.

11.2.2 Payment will be made for acceptable measured quantity of respective type of painting on the basis of unit rate per square feet quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

SECTION – 20 TEXTURED I GRAFFITO WALL COATING

1. Scope

The work under this section of the Specifications consists of furnishing all materials, plant, labour, equipment, appliances and performing all operations in connection with surface preparation, mixing, and application of graffito wall coating as shown on the Drawings and/or as directed by the Engineer. The scope of this section of specifications is covered with detailed specifications as laid down herein.

2. General

2.1 Except as otherwise specified, all painting shall be applied in conformity with BS CP 231 "Painting of Building" as applicable to the work.

2.2 The Engineer will furnish a schedule of colours for each area and surface. All colours shall be mixed in accordance with the manufacturer's instructions.

2.3 Samples of all colours/coating, stains and finishes shall be prepared in advance of requirement so as not to delay work and shall be submitted to the Engineer for approval before any work is commenced. Any work done without such approval shall be redone to the Engineer's satisfaction, without additional expense to the Employer. Samples of each type of . coating shall be on separate 300 x 300 x 3 mm tempered hard based panels. Manufacturer's colour chart shall be submitted for colour specifications.

3. Material

3.1 Material shall be acceptable, proven, top-grade products and shall meet or exceed the minimum standards of reputable manufacturers as approved by the Engineer.

3.2 The material for textured graffito coating shall be variable granular material and shall composed of Acrylic Copolymer Emulsions spherodial quartz various additives, metallic oxides, inerts of different granulemetries colouring agent, antibacterial and antibacterial agents

3.3 All materials shall be delivered to site in their original unbroken containers or packages and bear the manufacturer's name, label, brand and formula and will be mixed and applied in accordance with his directions.

4. Surface Preparation

4.1 All oil, grease, dirt, dust, loose mill scale and any other foreign substance shall be removed from the surface to be coated. Following the solvent cleaning, the surfaces shall be cleaned by scraping, chipping, blasting, wire brushing or other effective means as approved by the Engineer.

In the event the surfaces become otherwise contaminated in the interval between cleaning and costing, recleaning will be done by the Contractor at no additional cost.

No work in this section shall be allowed until all surfaces or conditions have been inspected and approved by the Engineer.

The grafito coating material should be applied with stainless steel trowel and finished with plastic trowel in thickness as per manufacturer's specification. To get straight texture plastic trowel should be moved vertically and the trowel is to be rotated to obtain swirl texture.

5. Measurement And Payment

5.1 General

Except otherwise specified herein or elsewhere in Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bills of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of Bills of Quantities.

5.1.1 Preparatory works, including preparatory materials, scraping, scratching, sand paper rubbing, cleaning, protection of finished works etc.

5.1.2 Providing and applying rough plaster base Corner, pattas, rounding&, arches, borders, grooves etc.

5.2 Measurement

Measurement of acceptably completed works of graffito coating to specified surfaces will be made on the basis of actual area in square foot of the surface coated as shown on the Drawing or as directed by the Engineer.

Payment

Payment will be made for acceptable measured quantity of coating to specified surfaces on the basis of unit rate per square foot quoted in the Bill of Quantities & shall constitute full compensation for all the works related to the item.

Approved Manufacturers

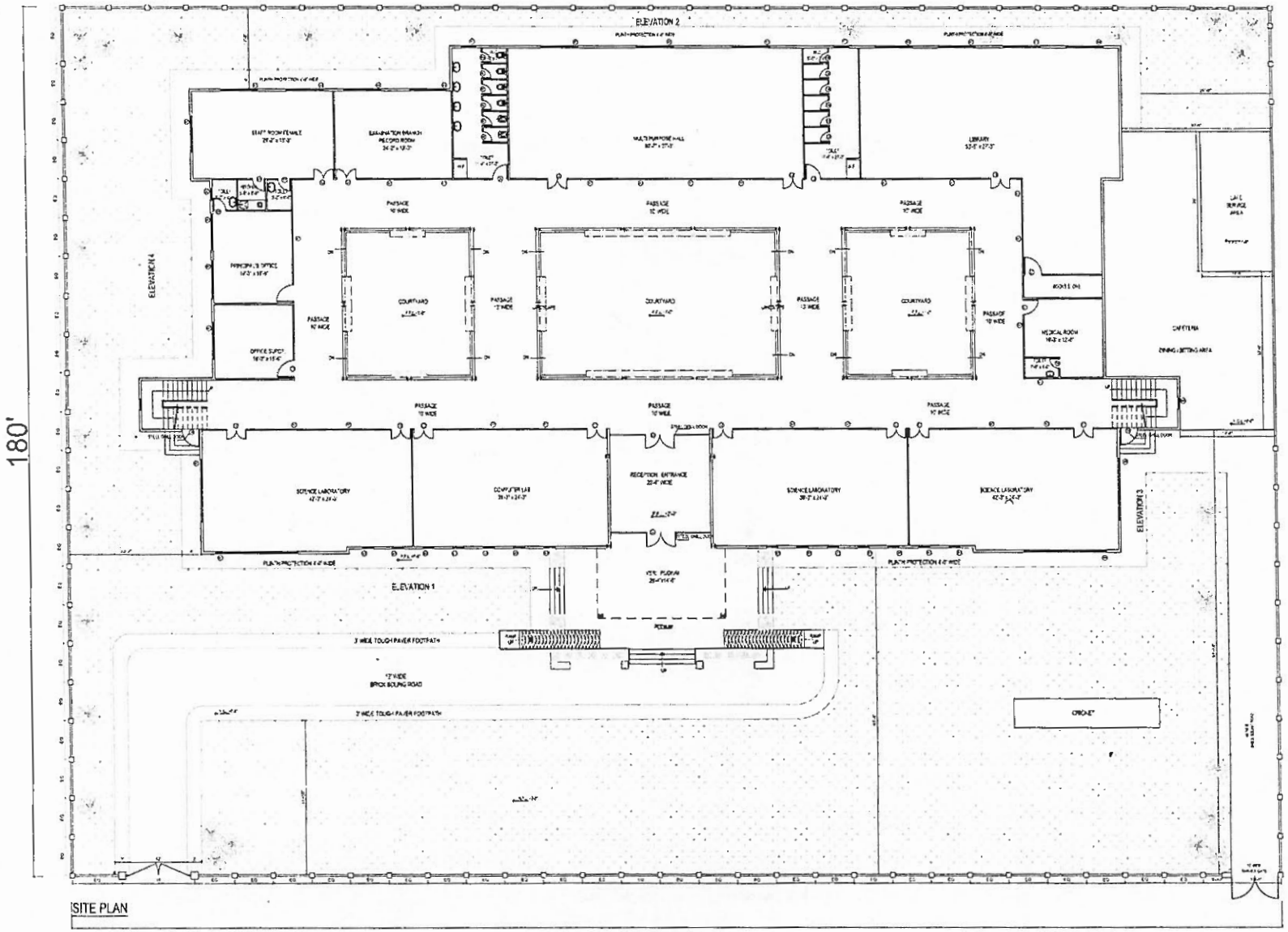
The manifacturer reference provided here below are indicative of minimum quality and specifications required for such materials. Any other manufacturer item having at least the same quality and specifications are acceptabale subject to the approval of the employer / Engineer.

The contractor shall submit literature / catalogue / samples etc. of all the items from each of the specified manufacturer to engineer who shall then decide and appove the sample and the manufacturer. Where the item involves any finishes such as paint, external coating erc. The contractor shall ertect mock-up samples of the specified manufacturers for selection and approval of the engineer.

The responsibility lies with the contractor for establishing the genuineness of any material / product / item for its make and origin as specified below:

Item No.	Description	Sub Sr. No.	Manufacturer(s) / Suppliers(s)
CIVIL WORKS			
1	Bricks, Sand, fair face Brick (Gutka) Crush stone Aggregate Cement	 -	Source as approved by the Engineer Lucky, Thatta, Falcon or equivalent
2	Steel Reinforcement	-	Th contractor must provide a certification from the concerned Steel Mill that the steel reinforcment has been manufactured from Pakistan Steel Mill billet and should conform to the tachnical specifications. Approved brand Amreli, Razzaq and Agha Steel
3	Paints & Varnish	i ii	ICI Dulux / Master Paint Burger Robbialac or approved equivalent
4	Hardware Stays and Handles	i ii	Pistol Sitara or approved equivalent
5	Mirror (Looking glass)	-	Best quality locally available as approved by the engineer
6	Glass for door and windows	-	Best quality locally available as approved by the engineer
7	Aluminum Section	i ii iii	Chawla, Prime Lucky Krudson, Pak Cable or approved equivalent
8	False ceiling & Paneling for doors	i ii	DFB Industries Al-Noor or equivalent
9	Admixture	i ii	Sika Silver streak (Pvt.) Ltd. Or approved equivalent
10	Termite proofing	i ii iii	Mirage Biflex Wonder 25SC or approved equivalent
11	Joining accessories for LG5 expansion Bolt Self Drilling Screws	i ii iii	HILTI FISCHER SPIT Or approved equivalent
PLUMBING WORKS			
1	G.I PIPES	i ii	IIL Steelex
2	Pipes and fitting in polypropylene Random (PPR)	i ii iii	Dadex (Polydex) Jeddah,Pak-Arab Euro Gulf
3	Gate Valves & sluice Valves	i ii iii	Naveed Idrees Toyo
4	UPVC Pipes and fittings	i ii iii	Dadex Euro Gulf Jeddah,Pak-Arab
5	RCC Pipes		As per technical specification and as Approved by the engineer
6	Sanitary Fixtures	i ii iii	ICL Asif ceramic 3-Star Or approved equivalent
7	Sanitary Fitting	i ii ii	Sonex Master Idrees Ir approved equivalent
8	Pumps	ii	PEDROLLO Or approved equivalent

Item No.	Description	Sub Sr. No.	Manufacturer(s) / Suppliers(s)
ELECTRICAL WORKS			
1	Light Fixture		Country of origin to be mentioned with manufacturer name:
		i	Philips
		ii	Cree - USA
		iii	General Electric - UK
		iv	Pierlite
2	Cables and Wires	i	Pakistan Cables
		ii	Fast Cables
		iii	Pioneer Cables
		iv	Newage Cables
		v	Age Cables
3	PVC Conduit accessories	i	PAK Arab
		ii	Jeddah
		iii	Galco
		iv	Dadex
4	Steel Conduit & Accessories	i	IIL
		ii	Or equivalent
5	Fans	i	Pak fans
		ii	GFC fans
		iii	Millat fans
6	MCCB,MCB's	i	Fuji (Japan)
		ii	Marlin Gerlin
		iii	Terraski (Japan)
		iv	ABB
		v	LS
		vi	GE
7	Distribution Boards,Main and Sub-main Panel boards	i	Libra Switchgear
		ii	Seimens, Hussain & Co
		iii	Electrech, ABB
		iv	JEI
		v	Areva (Schneider Electric)
		vi	PEL
8	Switches,Sockets etc	i	MK
		ii	Legrand
		iii	ABB
		iv	Clipsal
9	Back Boxes,Pull Boxes etc	i	Legrand,Electroline
		ii	ABB,Ezzi Engineering
		iii	Clipsal
10	Telephone cables	i	Intex
		ii	cotect
			Or equivalent
11	Telephone Junction Boxes	i	EES
		ii	Tecmens
		ii	Libra
		iv	JEI
		v	Electrech
12	Generator Set	i	Allied Caterpillar,F.G willson
		ii	Perkins
		ii	S.M Jaffer & Co.
		iv	Cummins
13	Transformers	i	Seimens , Transfo power
		ii	PEL
14	Coaxial Cable	I	Pakistan cables
		ii	Universal Cables
		iii	Pioneer Cables
		iv	3 M

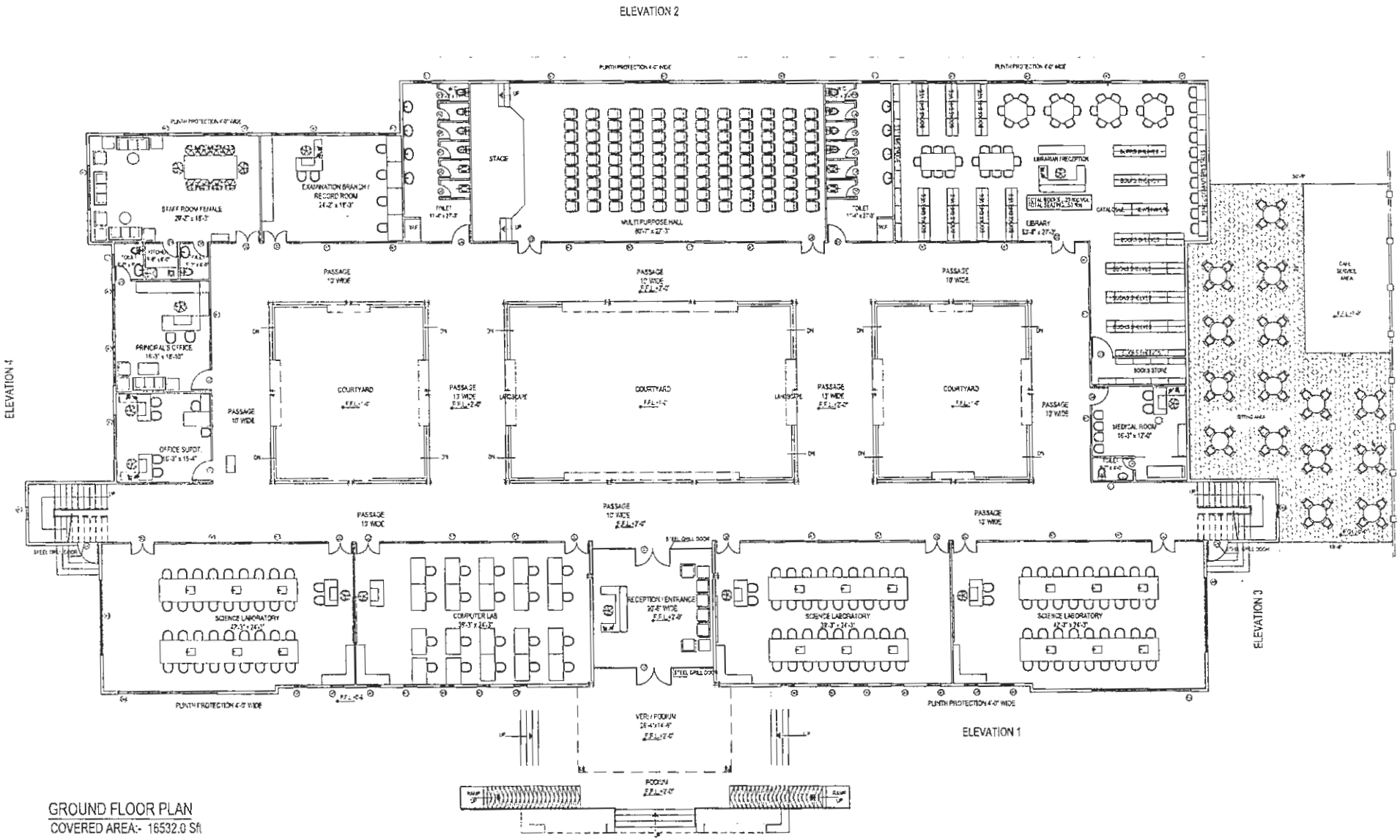


SITE PLAN

STATEMENT OF AREAS:

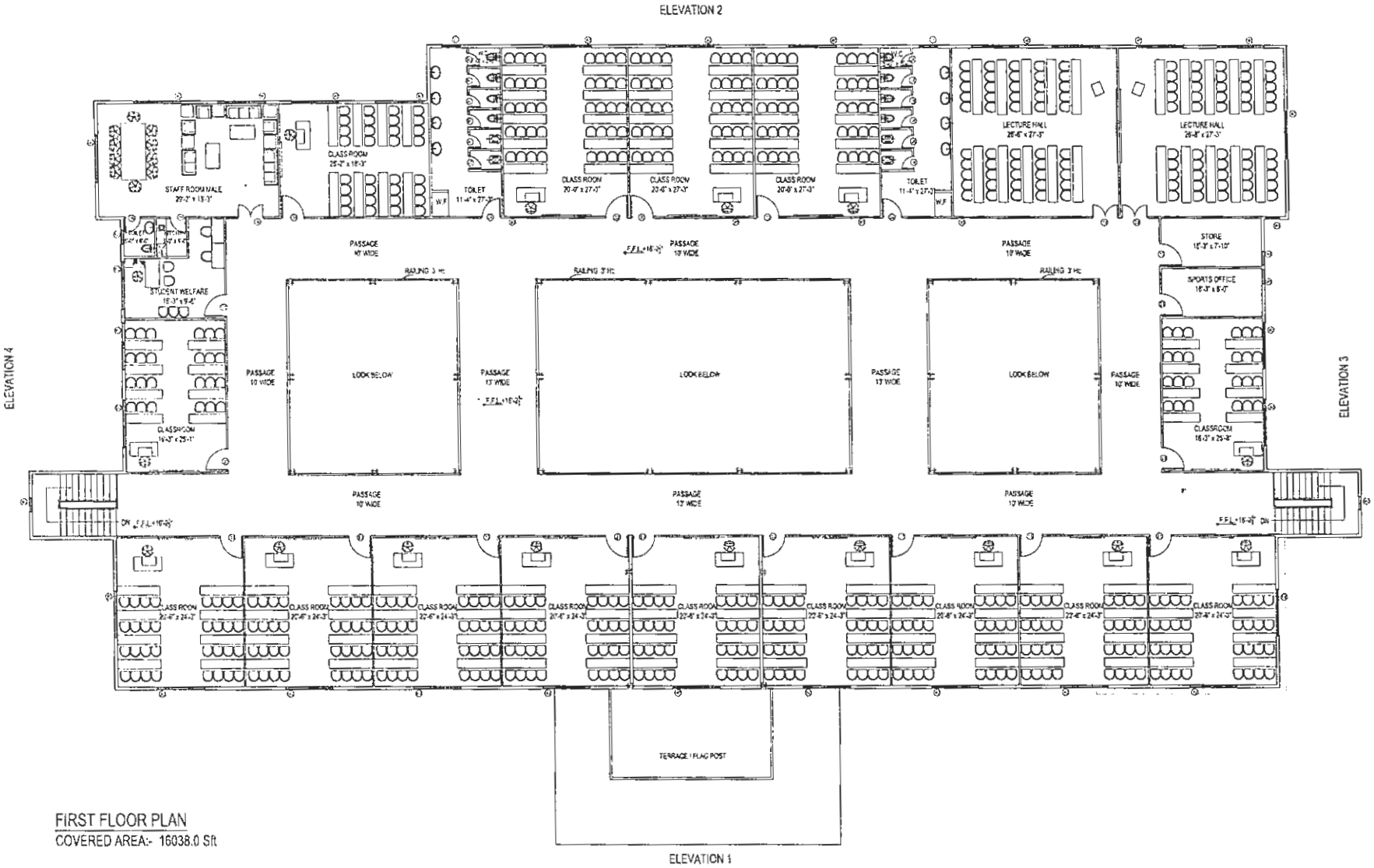
SITE / PLOT	45000.0 Sft.
GROUND FLOOR.	16532.0 Sft.
FIRST FLOOR.	16038.0 Sft.
CAFETERIA	1970.0 Sft.
GUARD ROOM	90.0 Sft.
TOTAL	34630.0 Sft.

COMPREHENSIVE SCHOOL



GROUND FLOOR PLAN
COVERED AREA:- 16532.0 Sft

COMPREHENSIVE SCHOOL



FIRST FLOOR PLAN

COVERED AREA:- 16038.0 Sft

COMPREHENSIVE SCHOOL

S.#	DRAWING NO.	DRAWING DESCRIPTION
01	EL-01	LIST OF DRAWINGS
02	EL-02	LEGENDS, ABBREVIATIONS & GENERAL NOTES
03	EL-03	STANDARD ELECTRICAL DETAILS
04	EL-04	SINGLE LINE DIAGRAM (SHEET-1)
05	EL-05	SINGLE LINE DIAGRAM (SHEET-2)
06	EL-06	ELECTRICAL LAYOUT - SITE PLAN
07	EL-07	LIGHTING LAYOUT - GROUND FLOOR PLAN
08	EL-08	LIGHTING LAYOUT - FIRST FLOOR PLAN
09	EL-09	POWER LAYOUT - GROUND FLOOR PLAN
10	EL-10	POWER LAYOUT - FIRST FLOOR PLAN

COMPREHENSIVE
SCHOOL AT SINDH

LIGHTING FIXTURES SCHEDULE

S No	SYMBOL	DESCRIPTION	LAMP	MOUNTING
1	F1	FLUORESCENT LIGHT FIXTURE WITH M2 LOUVER (IP-20)	4 x 18W T8	RECESSED
2	F2	BATTEN FLUORESCENT LIGHT FIXTURE WITH ACRYLIC DIFFUSER (IP-20)	1 x 36W T8	SURFACE / WALL
3	D1	DOWNLIGHT FIXTURE WITH GLASS COVER (IP-44)	1 x 18W C F L	RECESSED
4	D2	DOWNLIGHT FIXTURE (IP-54)	1 x 18W C F L	SURFACE
5	W1	BULK HEAD LIGHT FIXTURE (IP-54)	1 x 18W C F L	WALL
6		8M HIGH SINGLE ARM LIGHTING POLE (IP 66)	120W LED	POLE

NOTE
COLOUR TEMPERATURE OF ALL LAMPS SHALL BE SUBJECT TO ARCHITECTS APPROVAL

SINGLE LINE SYMBOLS FOR MISC. DEVICES

SYMBOL	DESCRIPTION
M	KILOWATT HOUR METER
V VSS	DIGITAL VOLTMETER / SELECTOR SWITCH
A ASS	DIGITAL AMPERE METER / SELECTOR SWITCH
KWH	KILO WATT HOUR METER
R Y B	PHASE INDICATION LAMPS (R,Y,B)
	SINGLE POLE MINIATURE CIRCUIT BREAKER (MCB)
	MOULDED CASE CIRCUIT BREAKER (MCCB)
	CURRENT TRANSFORMER (CT)
	FUSE
	EARTH PIT WITH EARTH ROD
G	DIESEL GENERATOR SET

ABBREVIATION

WP	WEATHER PROOF
DN	DOWN CONDUIT
UP	UP CONDUIT
CFL	COMPACT FLUORESCENT LAMP
S SOCKET	SWITCHED SOCKET
HDGI	HOT DIP GALVANIZED IRON
M C O S	MANUAL CHANGE OVER SWITCH

LEGEND FOR POWER SYSTEM

SYMBOL	DESCRIPTION
	5A 3 PIN SWITCHED SOCKET OUTLET (LOW / HIGH LEVEL)
	13A 3 PIN FLAT DUPLEX SWITCHED SOCKET OUTLET
	13A 3 PIN FLAT SIMPLEX SWITCHED SOCKET OUTLET AT CEILING FOR PROJECTOR
	15A 3 PIN SWITCHED SOCKET OUTLET
	15A 3 PIN SWITCHED SOCKET OUTLET FOR SPLIT AC
	20A TPN ISOLATOR FOR WATER PUMP
	CEILING FAN 56"Ø
	EXHAUST FAN
	DISTRIBUTION BOARD (DB)
	MAIN DISTRIBUTION BOARD (MDB / SMDB)
	POWER MANHOLE (2'-6" x 2'-6" x 3'-0")
	POWER HAND HOLE (2'-0" x 2'-0" x 3'-0")
	EARTH PIT
	EARTH BAR

SWITCHES

SYMBOL	DESCRIPTION
NS	LIGHTING CONTROL SWITCH (N GANG)
ND	FAN DIMMER (N GANG)

MINIMUM REQUIREMENT OF CONDUIT SIZES SHALL BE AS TABULATED BELOW:

CABLE SIZE	CONDUIT SIZE				
CONDUCTOR SIZE	20mm	25mm	32mm	38mm	50mm
	MAXIMUM No OF CABLES				
2.5 mm²	5	10	-	-	-
4.0 mm²	4	5	-	-	-
6.0 mm²	3	5	-	-	-
10.0 mm²	2	3	5	-	-
16.0 mm²	-	2	4	5	-
25.0 mm²	-	-	3	4	-
35.0 mm²	-	-	2	3	5
50.0 mm²	-	-	-	-	4

CONDUIT AND HOME RUNS

SYMBOL	DESCRIPTION
	CONDUIT CONCEALED IN FLOOR
	CONDUIT CONCEALED IN CEILING (SLAB) OR WALL
R1,Y1 (DB-N, EDB N)	CONDUIT OR CABLE RUN TO DISTRIBUTION BOARD (R1 Y1,B1) INDICATES REFERENCE CIRCUIT (DB-N)- INDICATES DISTRIBUTION BOARD NAME
	CONDUIT OR CABLE RUN TO EQUIPMENT AS INDICATED OR CONTINUED AS INDICATED

GENERAL NOTES

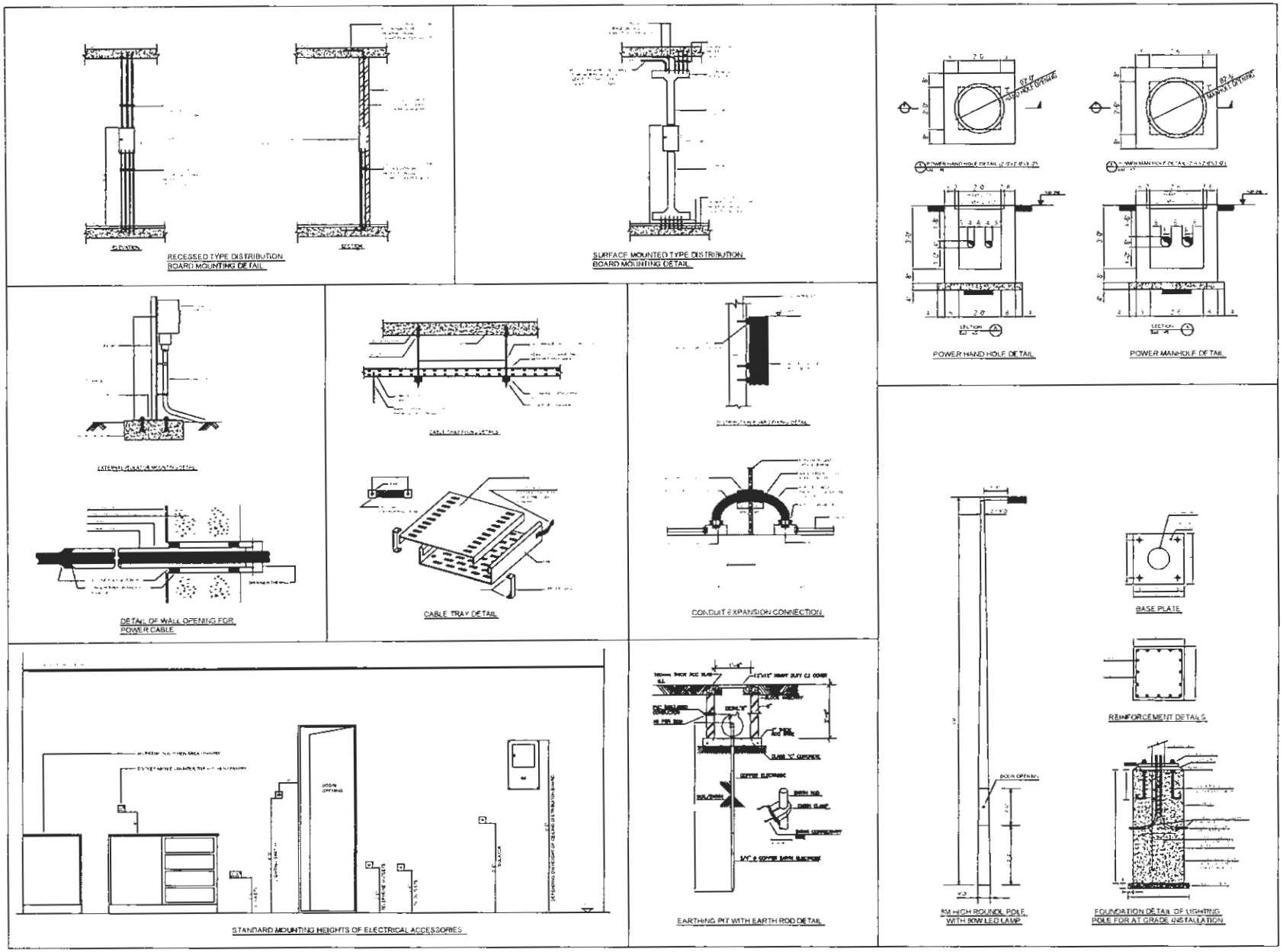
1.1- THE FOLLOWING NOTES SHALL APPLY TO ALL THE ELECTRICAL DRAWINGS UNLESS OTHERWISE INDICATED OR NOTED.
1.2- DO NOT SCALE FROM THE LAYOUT DWGS. WORK ACCORDING TO ARCHITECTURAL AND ELECTRICAL DETAILS. UNLESS OTHERWISE INDICATED.
1.3- THE ELECTRICAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE REST OF THE DRAWINGS PERTAINING TO ARCHITECTURE, STRUCTURE, AIRCONDITIONING, PLUMBING AND AS PER SPECIFICATIONS

2.1- UNLESS OTHERWISE INDICATED ALL CONDUITS SHOWN ON DRAWINGS SHALL BE RIGID NON- METALIC PVC. CONDUITS.
2.2- ALL EXPOSED CONDUITS SHALL BE RIGID GALVANIZED IRON UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2.3- EARTH CONTINUITY SHALL BE IN ACCORDANCE WITH THE IEE REGULATIONS AND AS PER SPECIFICATION
2.4- LIGHTING OUTLETS SHALL BE EXPOSED OR CONCEALED IN ACCORDANCE TO ASSOCIATED CONDUITS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2.5- SHAPE AND DIMENSION OF SYMBOLIZED LIGHT FIXTURES DO NOT NECESSARILY REPRESENT SHAPE AND DIMENSIONS OF ACTUAL FIXTURES INTENDED FOR THIS PURPOSE

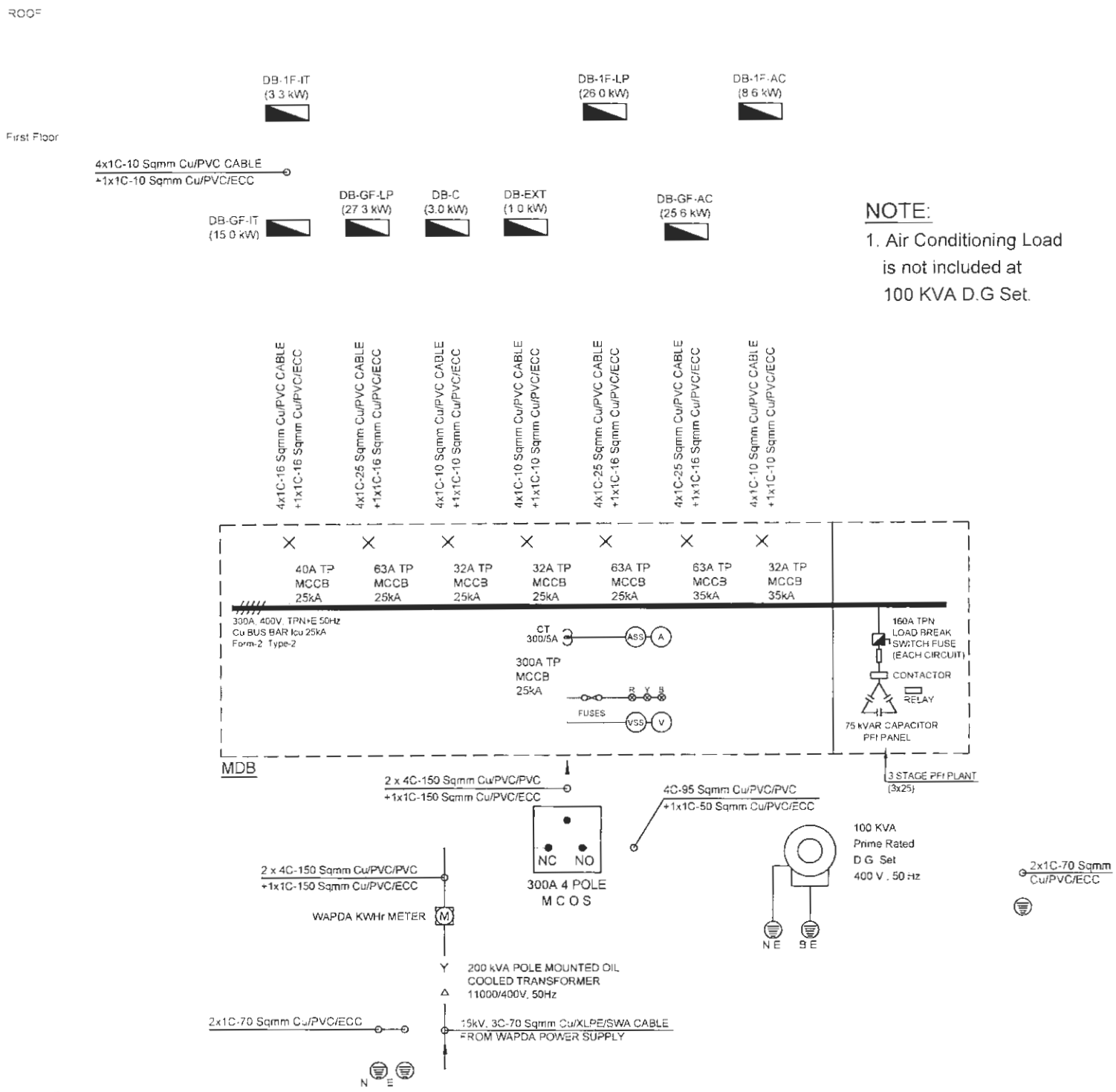
3.1- MOUNTING HEIGHTS OF SOCKET OUTLETS, SWITCHES & DBs SHALL BE AS SHOWN IN ELECTRICAL STANDARD DETAIL DRAWING OR AS DIRECTED BY ENGINEER ON SITE.

4.1- THE MINIMUM CONDUIT SIZE USED SHALL BE Ø 20mm.
4.2- CONTRACTOR SHALL PROVIDE THE REQUIRED CONDUIT SIZE WHEREVER NOT INDICATED FOR THE EASE OF PULLING OF CABLES.
4.3- ALL OPENINGS, SLEEVES AND SHAFTS BETWEEN FLOORS USED FOR POWER & LOW CURRENT CABLES SHALL BE SEALED WITH FIRE RESISTANT MATERIAL OR CHEQUERED PLATE TO THE APPROVAL OF ENGINEER.
4.4- ALL BREAKERS PROTECTING MOTORS SHALL BE MOTOR PROTECTOR TYPE
4.5- CONTRACTOR SHALL PROVIDE EMPTY CONDUITS OF PROPER SIZE FOR CONTROL WIRES SERVING ALL MECHANICAL EQUIPMENT, A/C UNITS ETC. FULLY CO- ORDINATED WITH MECHANICAL SERVICES, REQUIREMENTS.

COMPREHENSIVE SCHOOL AT SINDH



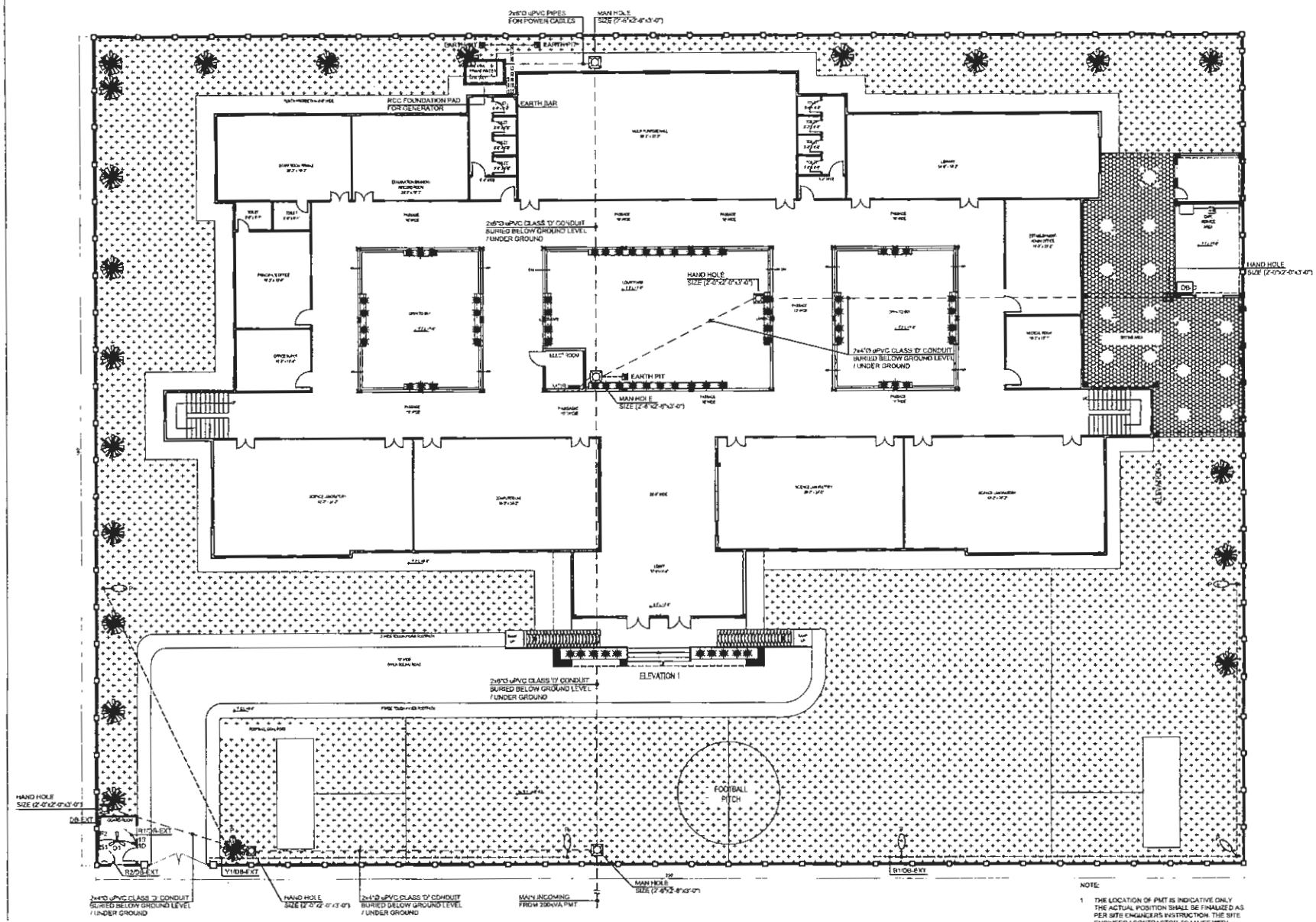
COMPREHENSIVE SCHOOL AT SINDH



NOTE:

1. Air Conditioning Load is not included at 100 KVA D.G Set.

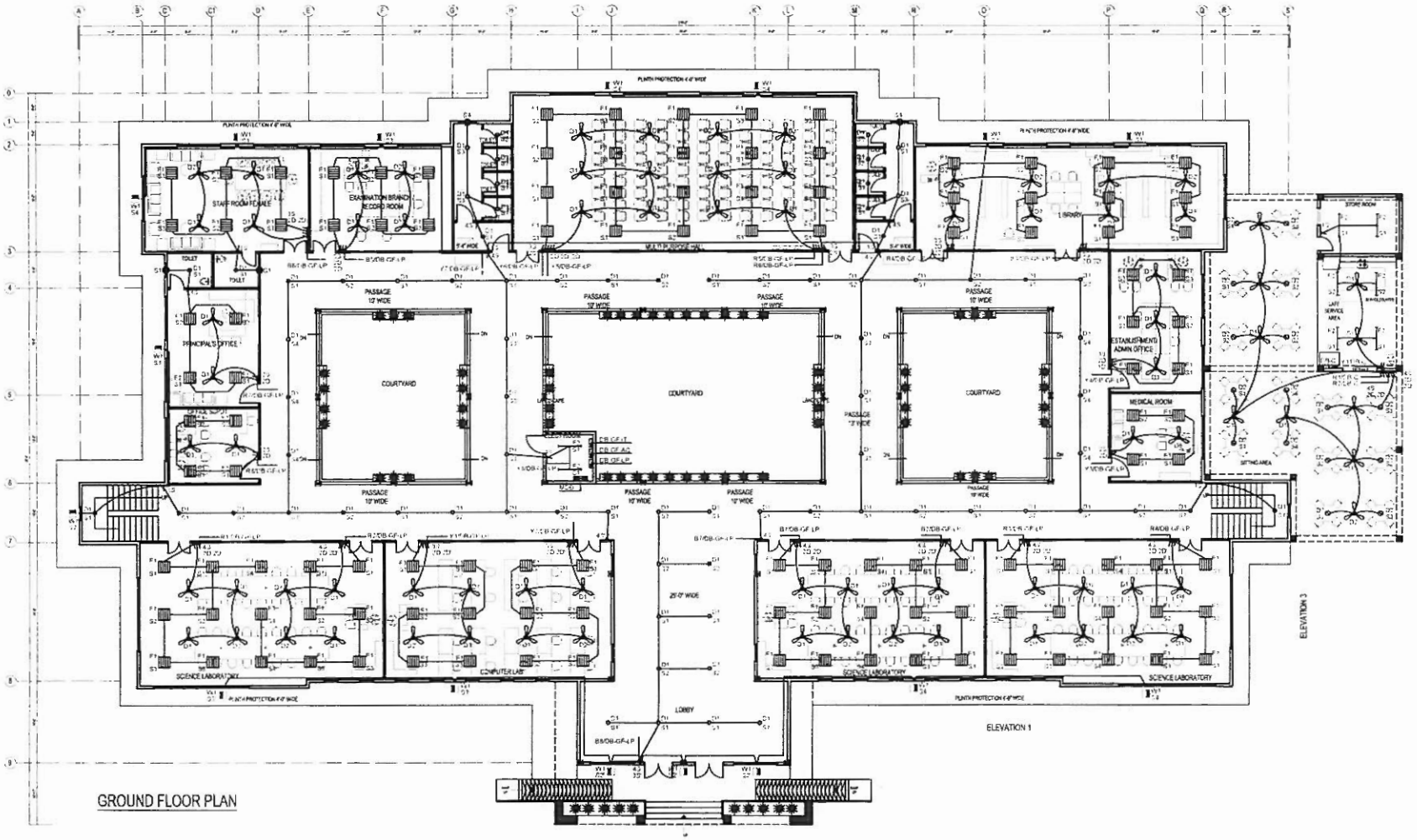
COMPREHENSIVE SCHOOL AT SINDH



NOTE:

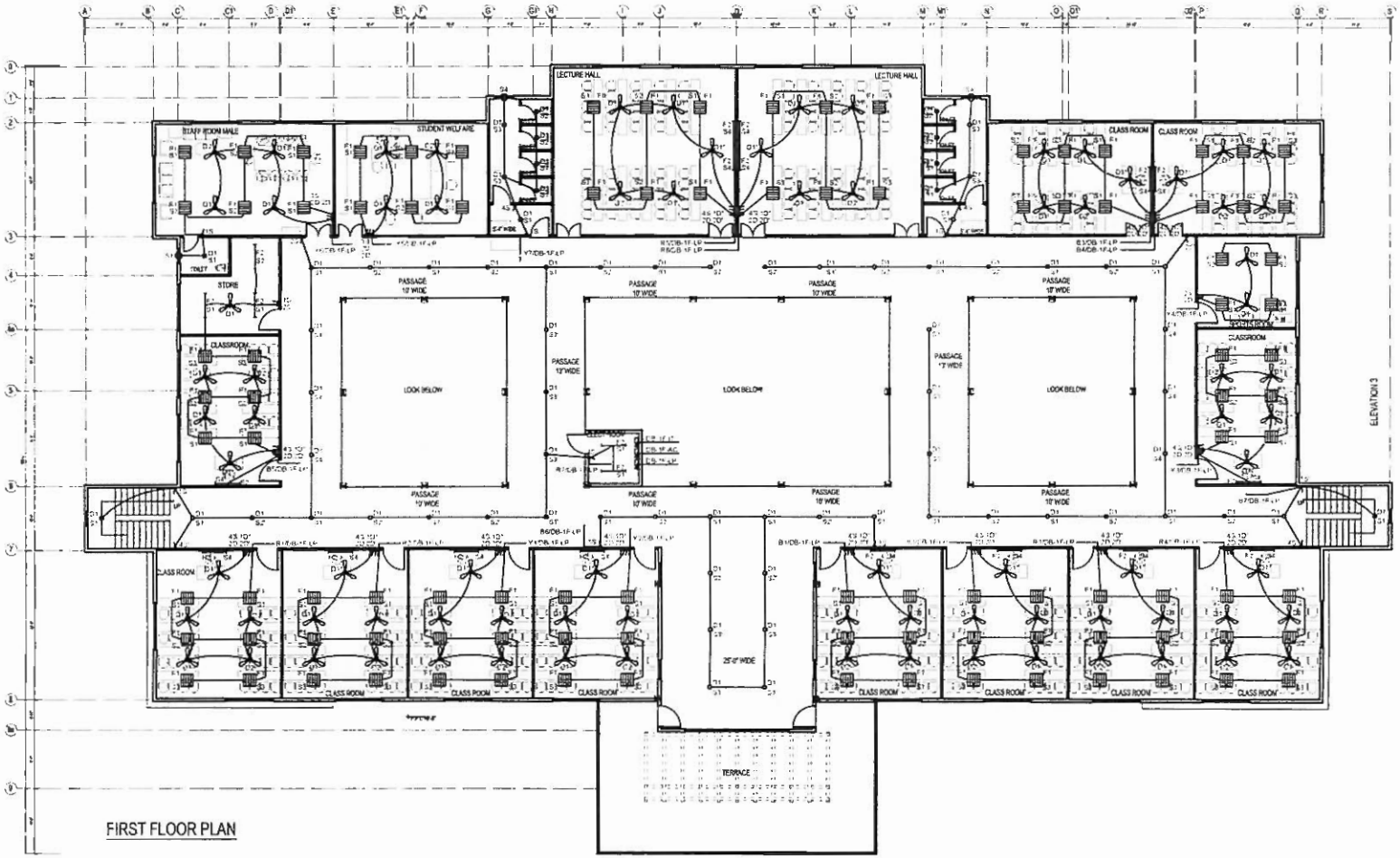
1. THE LOCATION OF PMT IS INDICATIVE ONLY THE ACTUAL POSITION SHALL BE FINALIZED AS PER SITE ENGINEER'S INSTRUCTION. THE SITE ENGINEER / CONTRACTOR TO LIAISE WITH WAPDA NETWORK FOR MAIN INCOMING CABLE

COMPREHENSIVE SCHOOL AT SINDH



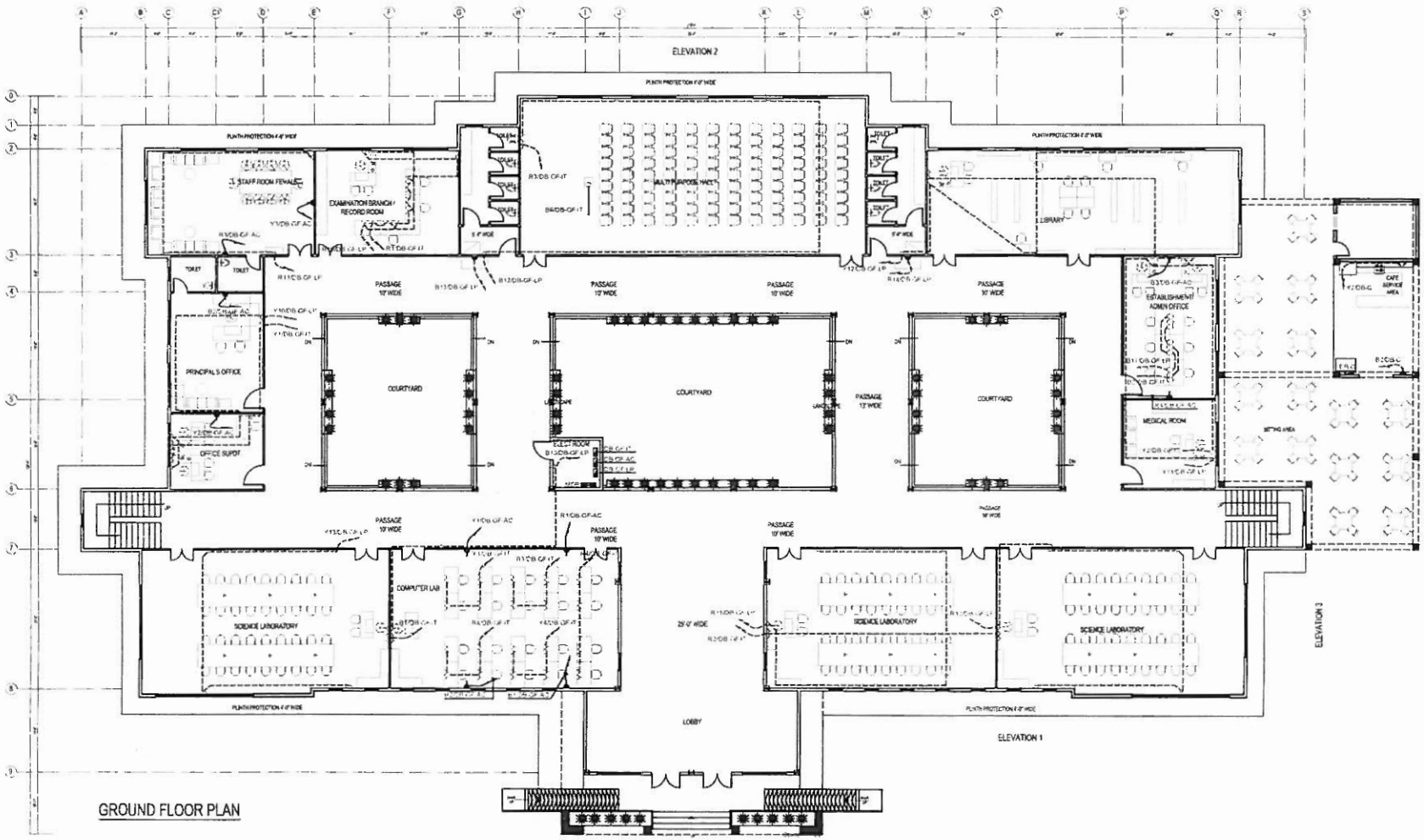
GROUND FLOOR PLAN

COMPREHENSIVE SCHOOL AT SINDH



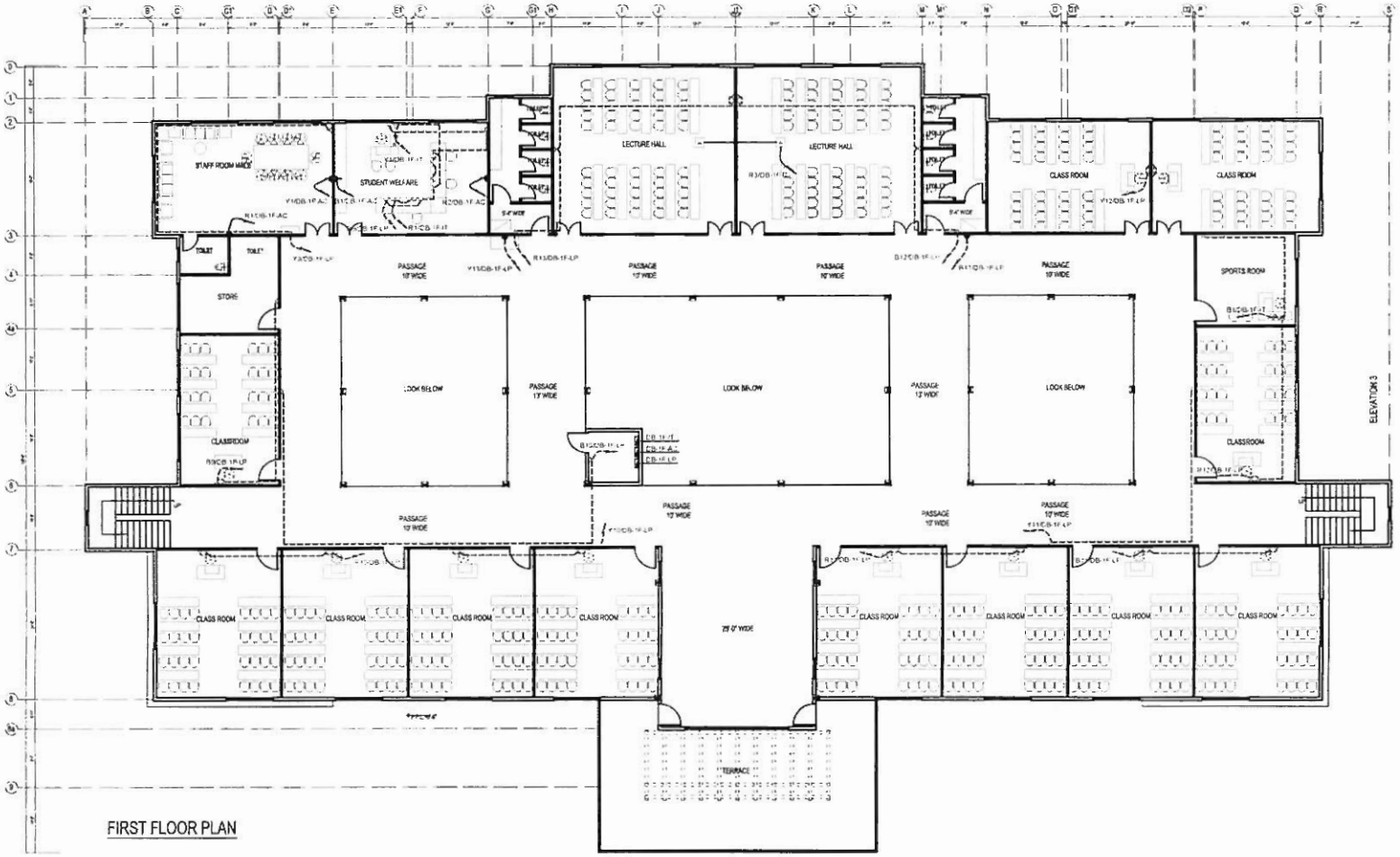
FIRST FLOOR PLAN

COMPREHENSIVE SCHOOL AT SINDH



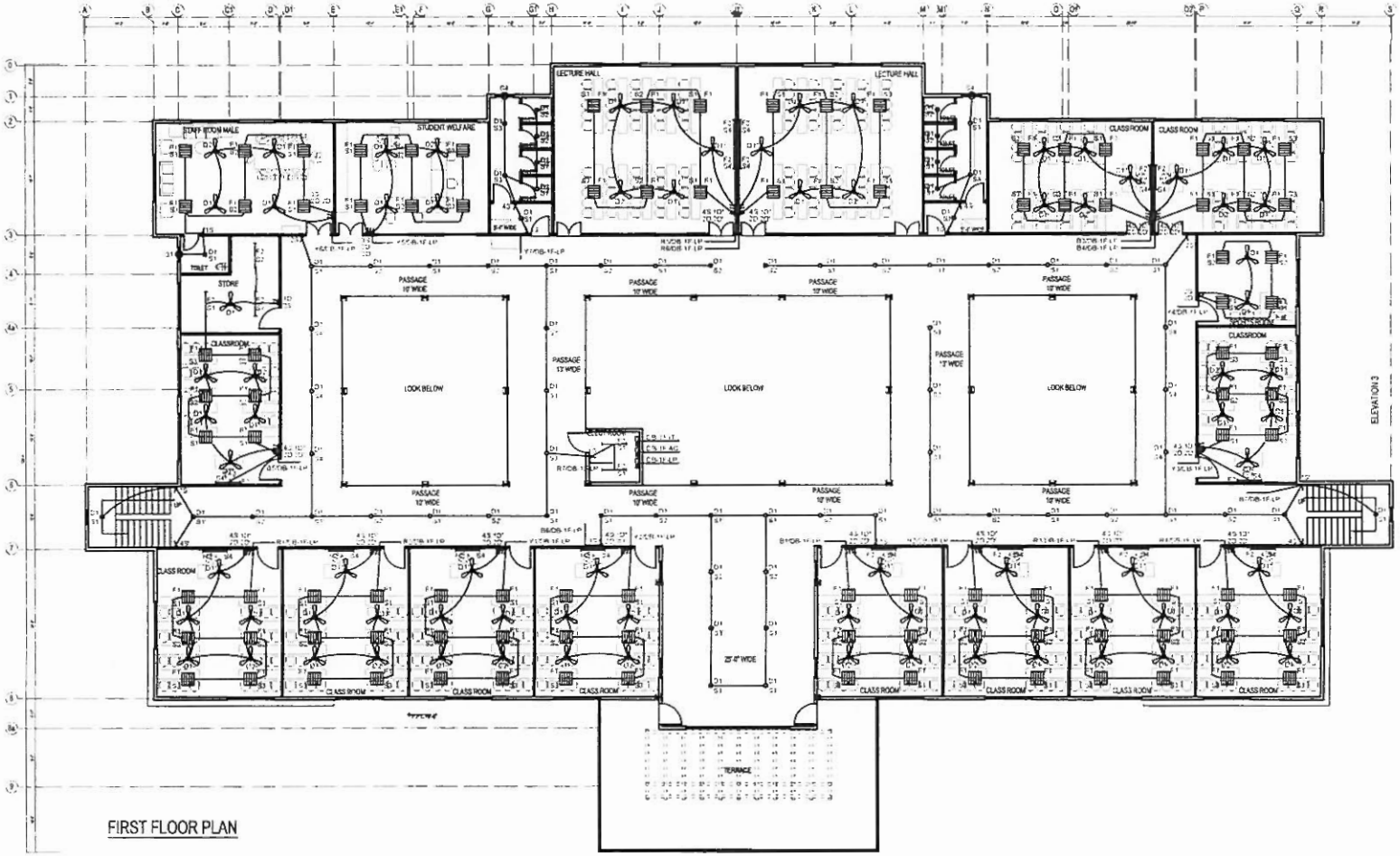
GROUND FLOOR PLAN

COMPREHENSIVE SCHOOL AT SINDH



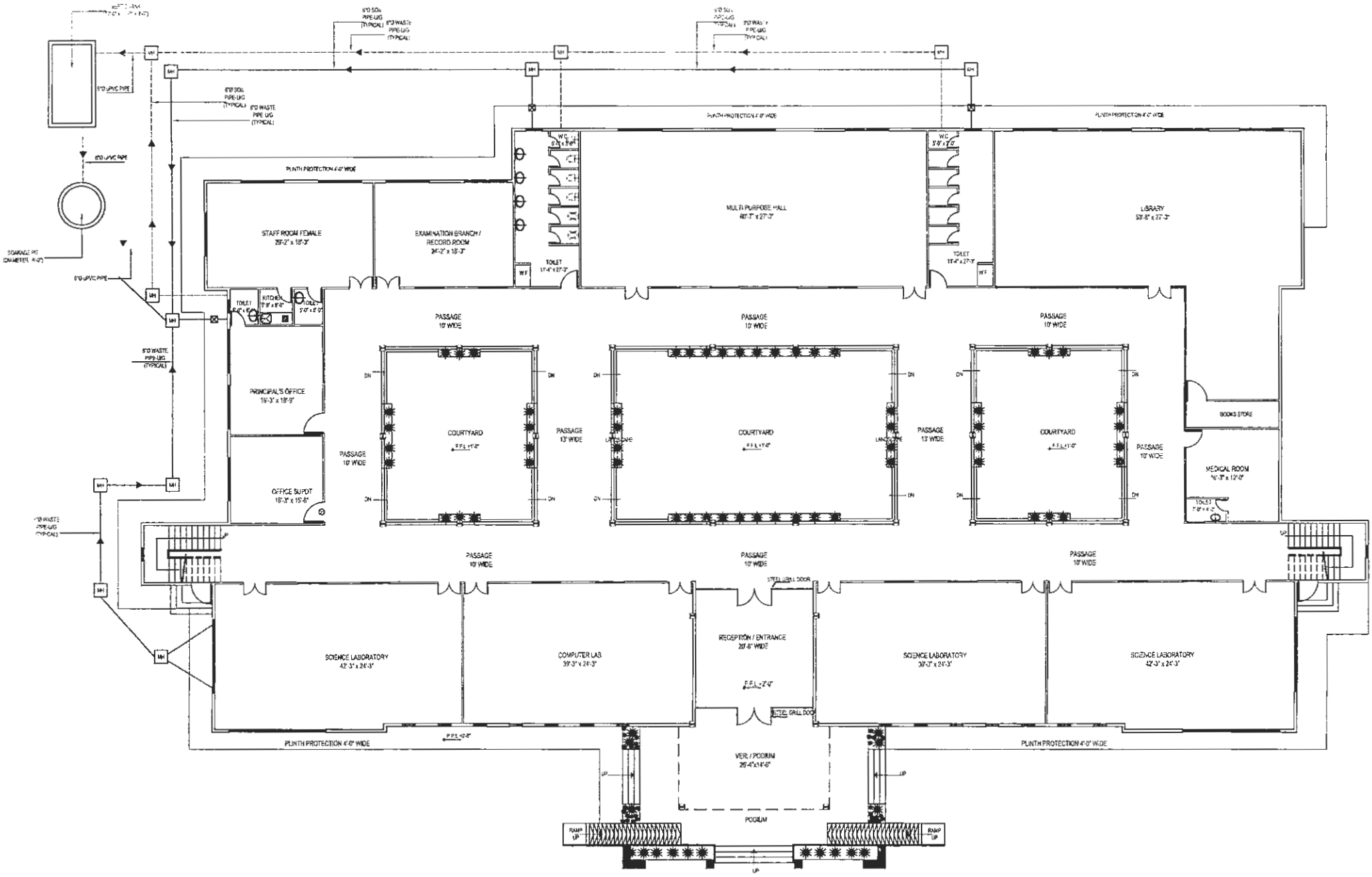
FIRST FLOOR PLAN

COMPREHENSIVE SCHOOL AT SINDH



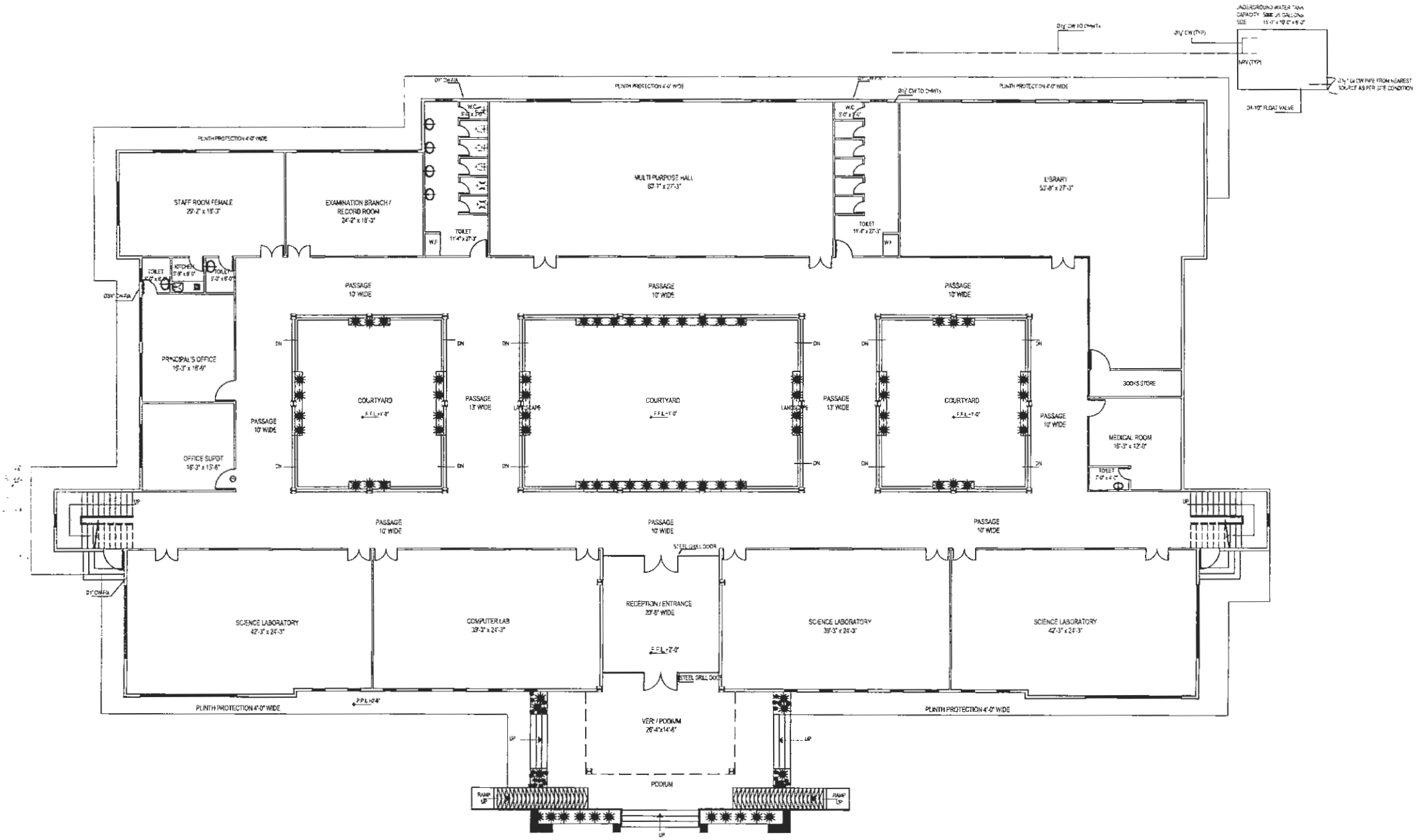
FIRST FLOOR PLAN

COMPREHENSIVE SCHOOL AT SINDH



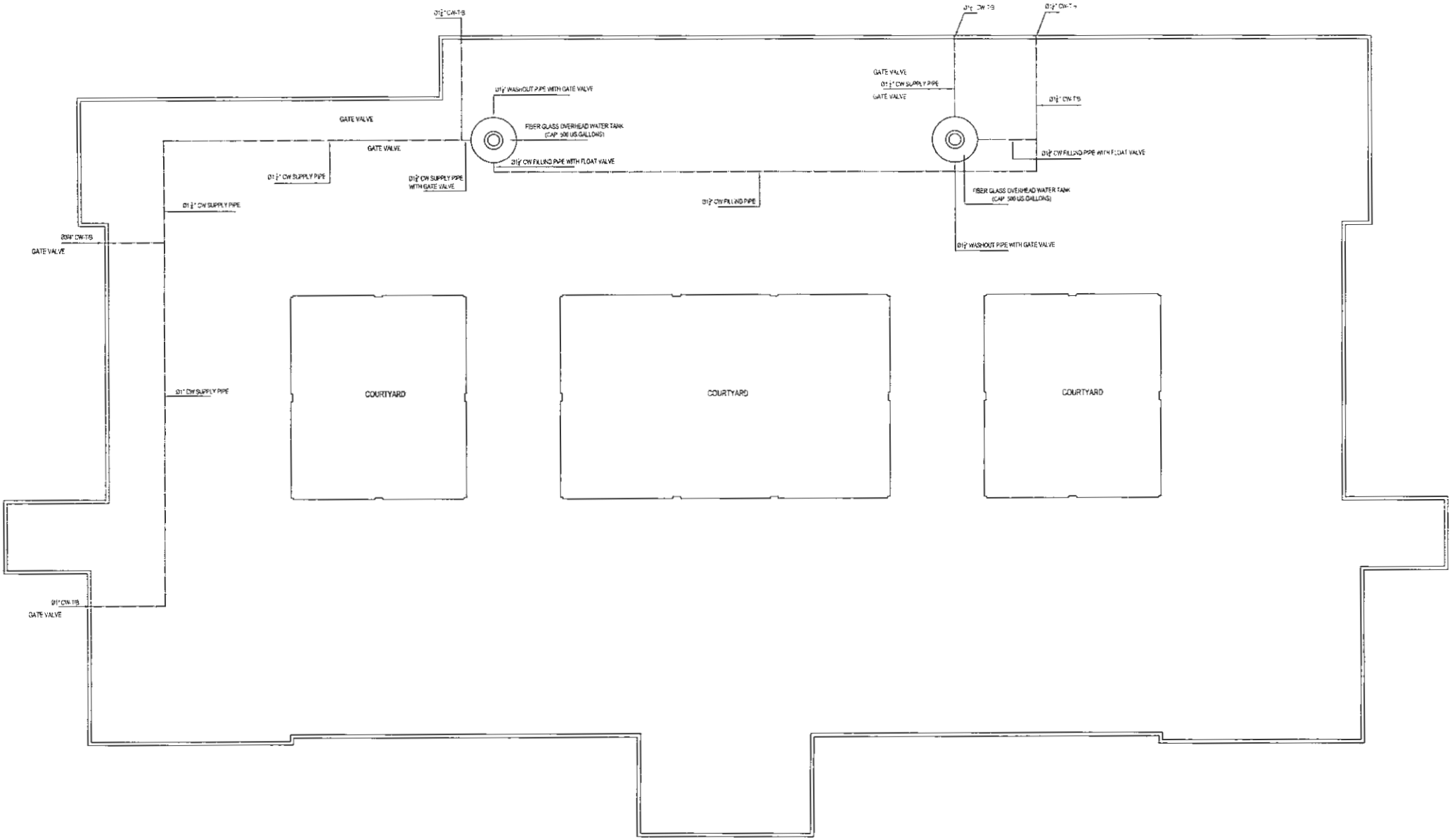
COMPREHENSIVE SCHOOL

Plumbing Drawing - Drainage



COMPREHENSIVE SCHOOL

Plumbing Drawing



COMPREHENSIVE SCHOOL

Plumbing Drawing

GRAND SUMMARY

EA Consulting (Pvt.) Ltd

Establishment of Comprehensive High School in Sindh
Bill of Quantities For 06 Nos School Sites
Package-D
Shaheed Benazirabad, Sanghar, Khairpur
Shahdad Kot, Dadu & Ghotki

Grand Summary

Schedule No.	Description	Amount (Pak Rs.)
1	External Development Works are as follows:	
a)	Septic Tank	
b)	U.G Water Tank	
c)	Boundary Wall	
d)	Soakage Pit	
e)	Brick Soling and Tuff Pavers	
f)	Football Goal Post	
g)	Earth-filling & Green Area	
h)	External Electrification Works	
i)	Miscellaneous Works	
	Sub.Total (a+b+c+d+e+f+g+h+i)	
2	Foundation Works (School Building)	
3	Supply of Plant (Pre-Engineered Cold Formed Steel Structures) including Fixtures and other materials & goods and spare parts (if any)	
4	Installation & Other Services	
5	Design Services	
	Total Amount of Project	

Amount in Words:

BILL OF QUANTITIES

PREAMBLE TO BILL OF QUANTITIES

Investigation, Design, Drawing, Supply, Fixing & Erection / Installation / Fabrication of Pre Engineered Buildings (Light Gauge Cold Formed Galvanized Steel Structures) for COMPREHENSIVE SCHOOL along with Civil , Electrical, Plumbing & Mechanical Works

Package-D (Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki) Sindh.

1. The tenderer are required to fill in all columns for rates and amount, including appendices for item wise price. All priced must be in Pak rupees and shall be inclusive of all taxes and duties.
2. All tenders are inviting to quote strictly as per description of items and specification, Schedule of works. Any alternatives or deviation from specification /BOQ would be subjected to rejection of bid. The cost of imported equipment must include all the duties and taxes.
3. All tenders shall be accompanied by one additional copy of the main proposal and the priced BOQ marked DUPLICATE.
4. All specification drawing and other documents supplied by the Project Manager / Project Engineer for the purpose of bidding shall be returned with the tender bid. Tenderer unable to bid shall also return complete bid documents on the date of the opening of the tender.
5. Electric, Water Supply and other utilities required for construction will be arranged by the Contractor.
6. Contractor shall also be responsible to carry out all the works which deemed to be essential or a pre-requisite for carrying out a particular task; No separate / extra / additional payment will be done for any of this task not mentioned in the B.O.Q. but it is essential to be done to carry out the particular task.
7. Project Manager / Project Engineer can omit or delete any B.O.Q. Item as per site requirement.
8. Contractor is responsible to re-routing the sewer line, electric, water supply lines for proposed construction work as per directives of Engineer In-charge; No Separate / extra / additional payment will be made for re-routing the same.
9. All the current /upcoming taxes will be deducted as per prevailing Government Rules.
10. Contractor is responsible to prepare & forward the progress report on approved format in hard copy & soft copy along-with colored Photographs (2xSets) of the project monthly to the Consultant before 5th of the each month for onward submission to the Client.
11. Contractor will be responsible for the prior submission of the Labour list working against the Contract (if required).
12. All the work shall be carried out strictly in accordance with the drawings and specification, schedule of Works or as instructed by the Project Manager / Project Engineer, where such reference is missing

the standard specification of PEC shall be referred as per Project Manager's / Project Engineer's instruction.

13. Technically and financially qualified Contractor would be required to submit rate analysis of each and every item of bill of quantity within 05 five days of his prior selection for award of work.
14. Technically and financially qualified Contractor would be required to conduct the Topographic Survey of Schools including Contour levels / Invert Levels etc. and submit drawing on AutoCAD Format in Hard Copy & Soft.

Signature:_____

Stamp:

dated:_____

SCHEDULE - 1

EXTERNAL DEVELOPMENT WORKS

a) Septic Tank
b) U.G Tank
c) Boundary Wall
d) Soakage Pit
e) Brick soling and Tuff Pavers
f) Football Goal Post
g) Earth-Filling & Green Area
h) External Electrification Works
i) Miscellaneous Work

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	80	Cu.m		
	PLAIN CEMENT CONCRETE				
2	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	3.00	Cu.m		
	Cast in Situ 1:3:6	3.00	Cu.m		
	REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)				
3	Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. ***(Ratio 1:2:4 strength 20 Mpa)***				
	i) R.C.C Bottom slab	6	Cu.m		
	ii) RCC Wall	12	Cu.m		
	iii) Slab	5	Cu.m		
	REINFORCEMENT				
4	Fabrication of **deformed** steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	2,500	Kg		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
5	**PLASTER** Providing and applying water proof cement sand plaster 1:4 up to 12' height 3/4" thick etc, using PUDLO or any approed water proof agent for water froofing, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	115	Sq.m		
6	**C.I MANHOLE COVER** Providing and fixing C.I Manhole Cover & frame including cost of material etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. C.I cover 600mm x600mm (weight 50 kg Each)	50	Kg		
7	Providing fabricating and fixing of 20mm (3/4") dia G.I ladder/rungs in Septic/U.G water tank as shown in drawing painting with rust proof paint (at any height in any floor) etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	7	Nos		
8	**BITUMEN COATING** Providing and applying industrial bitumen paint **(Coverage 7 Kg / 10 Sqm)** mixed with water component 2 coats on all RCC structural surfaces up to required level etc, complete in all respects as per drawing, standard , specifications and direction of the Engineer.	81	Sq.m		
9	**WATER STOPPER BAR** Providing and fixing PVC ribbed water stops 30mm wide x 12mm thick centrally bubble type including cutting, PVC welded jointing etc, all works to be carried out the satisfaction of the Engineer, complete in all respect as per drawing, specifications and direction of the Engineer.	22	Rm		
10	Providing and fixing of 150 mm dia UPVC pipes and fittings as per BS & ASTM standard for Septic Tank to Soakage Pit including non struct concrete around pipes, silicon mastic filling, jali, cleanout plug, clamps, hanger collars, supports, specials (bend, tees, Y-tee etc) as shown in the drawing, complete in all respect as per drawing, standard , specifications and direction of the Engineer.	12	Rm		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	44	Cu.m		
	PLAIN CEMENT CONCRETE				
2	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	2.00	Cu.m		
	Cast in Situ 1:3:6	1.00	Cu.m		
	STONE SOLLING				
3	Providing and laying dry rammed brick or stone ballast / soling 1-1/2" to 2" gauge from approved quarry including hand packing & filling voids with sprawls & chips, consolidating & compacting with power or hand roller,etc complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer.	3.00	Cu.m		
	REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)				
4	Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. (Ratio 1:2:4 strength 20 Mpa)				
	i) R.C.C Bottom slab	4	Cu.m		
	ii) RCC Wall	8	Cu.m		
	iii) Slab	3	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	REINFORCEMENT				
5	Fabrication of deformed steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	2,500	Kg		
	PLASTER				
6	Providing and applying water proof cement sand plaster 1:4 up to 12' height 3/4" thick etc, using PUDLO or any approed water proof agent for water froofing, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	75	Sq.m		
	C.I MANHOLE COVER				
7	Providing and fixing C.I Manhole Cover & frame including cost of material etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	C.I cover 600mm x600mm (weight 50 kg Each)	50	Kg		
8	Providing fabricating and fixing of 20mm (3/4") dia G.I ladder/rungs in Septic/U.G water tank as shown in drawing painting with rust proof paint (at any height in any floor) etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	14	Nos		
	BITUMEN COATING				
9	Providing and applying industrial bitumen paint **(Coverage 7 Kg / 10 Sqm)** mixed with water component 2 coats on all RCC structural surfaces up to required level etc, complete in all respects as per drawing, standard , specifications and direction of the Engineer.	39	Sq.m		
	WATER STOPPER BAR				
10	Providing and fixing PVC ribbed water stops 30mm wide x 12mm thick centrally bubble type including cutting, PVC welded jointing etc, all works to be carried out the satisfaction of the Engineer, complete in all respect as per drawing, specifications and direction of the Engineer.	22	Rm		
11	Providing & fixing centrifugal pumping set complete with AC supply 5 HP 3 phase AC motor with centrifugal pump having suction & discharge 2" x 1 ½" ” coupled on a common base plate as reqd (Siemens,KSB Grund Fos).	2	Set		
12	Complete Plumbing work for Under Ground Water Tank with all necessary hardwares, accessories, etc, complete in all respect as per drwings, specification and as directed by the engineer incharge.	1	Job		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	210	Cu.m		
	FILLING WITH SANDY/ GHASOO MATERIAL				
2	Supplying and filling sand (sandy / ghasoo material) under floor/foundation and plugging in walls of approved outside sources etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project	195	Cu.m		
	PLAIN CEMENT CONCRETE				
3	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	20	Cu.m		
	Cast in Situ 1:3:6	54	Cu.m		
	REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)				
4	Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. (Ratio 1:2:4 strength 20 Mpa)				
	i) Foundation	32	Cu.m		
	ii) Plinth Beam	27	Cu.m		
	iii) Column (Short & Long)	29	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	REINFORCEMENT				
5	Fabrication of deformed steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	7,000	Kg		
	DAMP PROOF COURSE				
6	Providing,laying and applying 2" thick damp proof course with (cement sand and shingle concrete 1:2:4) including 2 Coats of asphaltic mixture coating and over DPC providing & laying single layer of polythene sheet 0.13mm thick for waterproofing etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	52	Sq.m		
	BRICK MASONRY WORK				
7	Provide and laying pacca brick work in ground floor etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Cement sand mortar Ratio 1:4	60	Cu.m		
	CEMENT PONTING				
8	Provide and applying cement ponting deep struck joint ratio 1:3 on wall etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	840	Sq.m		
	BARBED WIRE FENCING				
9	Providing & fixing barbed wire fencing with 12 gauge-4 points @ 6" apart barbed wire i/c straightening & fixing in angle iron vertical post of size 2"x2"x1/4" embedded in RCC/masonry pillars i/c making cuts/holders @ 12 " including fixing in pillars by chiselling and filling with cement sand mortar,scraping & finishing the surface with and including 2 coats of enamel painting over a coat of primer etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	261	R.m		
	PLASTER				
10	Providing and applying 20mm (3/4") thick cement plaster to external walls, columns, beams, etc. with cement mortar 1:6 ic all corners, recesses, jambs, raking out joints of masonry, scaffolding etc, complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer. (up to any height).	400	Sq.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	WEATHER SHIELD PAINT				
11	Providing and applying preparing the surface and painting with weather coat i/c rubbing the surface with rubbing brick /sand paper, filling the voids with chalk/ plaster of Paris and then painting with weather coat of approved make (1st coat, 2nd & subsequent coat) etc complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer. (At any height)	400	Sq.m		
	M.S GATE				
12	Providing, fabrication, erecting and fitting in position of heavy steel works with (angles,tees,flat iron, round iron and sheet iron for making Main Gate etc.including cutting etc., drilling, riveting, welding handling assembling and fixing in position etc, including preparing surface with priming coat / enamel coating of approved make & colour (1st coat, 2nd & subsequent coat) etc complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer.				
	i) Main Gate	672	Kg		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	26.00	Cu.m		
	PLAIN CEMENT CONCRETE				
2	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	2	Cu.m		
	STONE MASONRY WORK				
3	Providing and Laying Random, rubble masonry (uncoursed), in foundation and plinth with cement sand mortar 1:3 etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Dry masonry cement sand mortar Ratio 1:3	17	Cu.m		
	COURSE GRAVEL IN SOAKAGE PIT				
4	Supplying and stacking at site course gravel of size 1/8"-1/4" (80mm to 160mm) ring i/c screening washing and spreading the same in filter beds to correct level etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	3	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)				
5	Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. (Ratio 1:2:4 strength 20 Mpa)				
	i) R.C.C 1:2:4 in top Slab	1	Cu.m		
	REINFORCEMENT				
6	Fabrication of deformed steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	110	Kg		
	C.I MANHOLE COVER				
7	Providing and fixing C.I Manhole Cover & frame including cost of material etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	C.I cover 600mm x600mm (weight 50 kg Each)	50	Kg		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	75	Cu.m		
	FILLING WITH SANDY/ GHASOO MATERIAL				
2	Supplying and filling sand (sandy / ghasoo material) under floor/foundation and plugging in walls of approved outside sources etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	13	Cu.m		
	PLAIN CEMENT CONCRETE				
3	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	13	Cu.m		
	BRICK MASONRY WORK				
4	Provide and laying pacca brick work in foundation and plinth etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Brick masonry Sub-structure				
	Cement sand mortar Ratio 1:4	11	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
5	Provide and laying pacca brick work in ground floor etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Brick masonry Super-structure				
	Cement sand mortar Ratio 1:4	9	Cu.m		
	EARTH-FILLING (New Earth from Outside Sources)				
6	Filling watering and ramming earth under floors with new earth (excavated from outside) lead up to one chain and lift up to 5 feet. including earth work compaction (soft, ordinary or hard soil) laying in 6" thick layers leveling, dressing and watering for compaction etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	46	Cu.m		
	SAND FILLING				
7	Supplying and filling sand under floor/foundation and plugging in walls of approved outside sources etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	150mm Thick sand filling	46	Cu.m		
	PAVERS ON FOOT PATH				
8	Providing and fixing cement paving blocks flooring having size of 197x197x60mm of city/quddra/cobble shape with natural colours, having strength b/w 7000 psi to 7500 psi including filling the joints with hill sand and laying in specified manner/pattern and design etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	510	Sq.m		
	KERB STONE				
9	Providing and fixing precast edge block 3750 psi industrial made size 6" thick x12" longx12"high including the cost of cartage, excavtion, formwork for haunching, 1450 psi lean concrete, 2250 psi concrete for haunching, 1:4 cement sand mortar etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	180	R.m		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	3	Cu.m		
	PLAIN CEMENT CONCRETE				
2	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Under foundation & where required 1:4:8	1	Cu.m		
	REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)				
3	Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. (**Ratio 1:2:4 strength 20 Mpa)**				
	i) Foundation	1	Cu.m		
	ii) Column	1	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	REINFORCEMENT				
4	Fabrication of deformed steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	141	Kg		
	GOAL POST				
5	Providing, making & fabricating (2.0 Nos) Goal Post with complete comprising 4" dia G.I. pipe including fitting with complete in all respect as per specification & relevant approved drawings, all work to the entire satisfaction of the engneer / project manager.	1	Job		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTH-FILLING (New Earth from Outside Sources)				
1	Filling watering and ramming earth under floors with new earth (excavated from outside) lead up to one chain and lift up to 5 feet. including earth work compaction (soft, ordinary or hard soil) laying in 6" thick layers leveling, dressing and watering for compaction etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	3,100	Cu.m		
2	Providing and laying 150mm thick sweet earth soil(Baloo earth) for grass in lawn including filling watering and ramming as specified etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	280	Cu.m		
3	Spreading cowdung **manure** and mixing the same upto any depth in the prepared bed including breaking clods, dressing fine for grassing, including, disposal of rubbish etc., complete in all respect as per drawing, specification and as directed by the engineer incharge a Plot Area	1,500	Sq.m		
4	Providing and laying grassing (Dacca Grass) in lawn area as specified etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	1,500	Sq.m		
				Total Cost of 01 No	
				Total Cost of 06 Nos Carried to Grand Summary	**6**

Item Ref.	Description	Unit	Quantity	Rate (Pak Rs.)	Amount
1.01	**EXTERNAL LIGHTING**				
1	Providing, installation, testing and commissioning of lighting pole of 8 m High shaft, 4mm thick round conical, hot dipped galvanized (70 to 85 microns as per BS 729) from inside and outside, including base plate anchor bolt, nuts and washer, self inspection door with special keys including excavation and cable connection box as per specification and details shown on the drawings, complete in all respects, with following shaft sizes for light fixture lanterns.				
¡	1 x 0.5m long cross arm for 1 lantern	Nos.	6		
2	Construction of pole foundation block including excavation & backfilling within concrete class "A", reinforcement as per AASHTO M31, lean concrete etc, and as per specifications, as shown on the drawings, foundation constructed above the drain or any location in project, complete in all respects.	Nos.	6		
3	Providing, installation, testing and commissioning of 3 Core 2.5 sq mm PVC / PVC, 300/500 volts grade copper cable in hollow poles (for each light) from cable connection terminal to luminaries.complete in all respect.	Rft.	150		
4	Providing, installation, testing and commissioning of Road light fixture (P2)IP 66 with 1x90W LED on 8m high street pole , complete in all respects.	Nos.	6		
5	Providing, installation, testing and commissioning of Terminal Box IP 65 including 1 No. 3A Circuit Breaker with terminal , complete in all respect.	Nos.	6		
6	Supply, installation, testing & commissioning of wiring from DB EXT. to Push Button,Push Button to Lighting Pole and lighting Pole to lighting Pole with 2x 4 sq.mm. + 1x 4 sq.mm. as ECC single core PVC insulated wires in 25 mm dia. PVC conduit surface / recessed in wall, column, ceiling, including excavation etc., complete with all conduit accessories and as per specification.	Nos.	2		
7	Supply, installation, testing & commissioning of surface wall mounted Batten Fluorescent light fixture with Acrylic Diffuser (IP-20) and 1x36W T8 (F3 Type),complete in all respect.	No.	1		

Item Ref.	Description	Unit	Quantity	Rate (Pak Rs.)	Amount
8	Supply, installation, testing & commissioning of 56" Dia Ceiling Fan with Fan Hook M.S.Box with colour coated,complete in all respect.	No.	1		
9	Supply, installation, testing & commissioning of One gang switch 10A,with back box,complete in all respect.	No.	1		
10	Supply, installation, testing & commissioning of One gang dimmer with switch 10A,with back box,complete in all respect.	No.	1		
11	Supply, installation, testing & commissioning of ON & OFF Push Button,complete in all respect.	No.	1		
12	Supply, installation, testing & commissioning of 13A, 3Pin Unversal switched socket outlet with back box,complete in all respect.	Nos.	2		
13	Supply, Installation, Testing & Commissioning of Circuit Wiring from DB to Switch board including wiring between switch on the same circuit with 2x2.5 sq.mm. + 1x2.5 sq.mm. as ECC single core PVC insulated wires in 20 mm dia. PVC conduit surface / recessed in wall, column, ceiling, etc., complete with all conduit accessories as per specification.	No.	1		
14	Supply, Installation, Testing & Commissioning of Wiring for light point from Switch Board to Point with 3x1.5 sq.mm. wires in 20 mm or appropriate dia PVC conduit, complete in all respect.	No.	1		
15	Supply, Installation, Testing & Commissioning of Wiring for Ceiling fan point from Switch Board to Point with 3x1.5 sq.mm. wires in 20 mm or appropriate dia PVC conduit, complete in all respect.	No.	1		
16	Supply, Installation and Commissioning of Wiring for 3Pin, 10 A Socket Outlet with 2 x 2.5 sq.mm + 1 x 2.5 sq.mm single core PVC insulated wires in 20 mm dia. PVC conduit surface / recessed in wall, column, ceiling, etc., complete with all conduit accessories as per specification.				
i	i DB to Outlet	No.	1		
ii	ii Outlet to Outlet	No.	1		

Item Ref.	Description	Unit	Quantity	Rate (Pak Rs.)	Amount
17	Supply, installation, testing & commissioning of 200 KVA, Pole mounted Transformer. Including all accessories such as Poles, platform, cross arms, insulated copper conductor, dropout fuse switches complete in all respect as per WAPDA specifications.	No.	1		
18	Supply, installation, testing and commissioning of following items for complete earthing system including all connecting accessories as per drawings & specifications complete in all respects.				
i	Earthing pit with 3 meter long 20 mm dia earth copper rod for Transformer directly driven to ground to obtain earth resistance not more than 1 ohm.as per drawing, complete in all respect.	Nos.	2		
19	Supply, installation, testing and commissioning of following size of PVC insulated Cu.Conductor cable as earth continuity conductor (ECC) in 1-1/2" dia upvc conduit, complete in all respect.				
i	70 sq.mm	Rft.	80		
20	Providing, installation, termination and commissioning of 15 KV, 3-core-70 sq.mm. AL.XLPE/SWA/PVC M.V incoming cable for 1No. 200kVA Transformer from nearest source of WAPDA power supply as per site and WAPDA specifications,complete in all respects.	Job.	1		
21	Provisional sum for obtaining11KV power supply to 1No. 200kVA, Transformer, connection coordination with WAPDA with all necessary requirements including meter, circuit breaker / cutouts, necessary power cables and all installation material required for the connection and liosioning with WAPDA for approval of the load, complete in all respect.	Job.	1		
	Total of External Light Work				

Item Ref.	Description	Unit	Quantity	Rate (Pak Rs.)	Amount
22	**DIESEL GENERATOR SET WITH ALLIED ACCESSORIES**				
a)	Supply, Installation, Testing & Commissioning of 100 kVA (Prime Power Rated) 3 phase- 4 wire- 415V Diesel Generator set with Canopy and Electronic Governor, AMF, an advanced LCD Display control panel (Programmable), as per specification. Including transportation up to site and safety store.Exhaust piping, ducting, critical silencer with elbow, also inclusive of Power cable end termination, with the approval of engineer. complete in all respect.	No.	1		
b)	Prepare RCC base for the above Generator (as per recommendation of manufacturer & specification), with the approval of engineer, complete in all respect.	Job.	1		
c)	Getting necessary Approval/ NOC's for Installation of the above Generator from concerned Authorities (Electric Inspector),expenses etc.All official fees/expenses shall be paid by client.	Job.	1		
d)	Supply and Handing Over to Client Representative of Standard Spare Parts as recommended by the manufacturer for the operation of 1000 hours for the Gererator Set. (Itemized list of Spares to be provided as per specification).	Lot	1		
e)	Providing, Installation, Testing & Commissioning of Control Cabling with appropriate sized (multicore) cable as per manufacturer recommendation, between Generator to Manual changeover switch & SMDB including terminations and all mounting accessories etc.,complete in all respects.	Job.	1		
	Total External Light Work + Diesel Generator Set			**Rs.**	
	Total Cost of 06 No. Carried to Grand Summary			**6**	

E.C.H.S in Sindh
Package-D
Shaheed Benazirabad, Sanghar, Khairpur,
Shahdad Kot, Dadu & Ghotki
Bill of Quantities

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types, shown in the drawings under this contract.				
1	Dismantling work of Existing Old R.C.C. building including (sub structure & Super stucture) of Hostel Block Building "B" Complete in all respect and disposal of debris as per instruction of the Engineer incharge.	600	Sq.m		
2	Jungle bushes / tree cutting including disposal from the site as per instruction of Engineer incharge.	4,000	Sq.m		
	Total Cost Carried to Grand Summary				

SCHEDULE – 2

FOUNDATION WORKS

(School Building)

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
	All items under this head to be carried out as per specifications, Drawings, relevant BSI/ASTM Standards, complete in all respect to the entire satisfaction of the Employer, and following Sections of the Technical Specifications. Rates shall be applicable on all types of building/structures shown in the drawings under this contract.				
	EARTHWORK				
1	Excavation in all kinds of soil & rocks etec upto required depth foundation of building, bridges and other structures including dagbelling, dressing, backfilling around structure with (suitable) excavated earth watering, ramming & compacting in 150mm layers and obtain required density, any lead & lift etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	2,405	Cu.m		
	EARTH-FILLING (New Earth from Outside Sources)				
2	Filling watering and ramming earth under floors with new earth (excavated from outside) lead up to one chain and lift up to 5 feet. including earth work compaction (soft, ordinary or hard soil) laying in 6" thick layers leveling, dressing and watering for compaction etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	2,100	Cu.m		
3	**STONE SOLLING**				
	Providing and laying dry rammed brick or stone soling 6" thick from approved quarry including hand packing & filling voids with sprawls & chips, consolidating & compacting with power or hand roller,etc complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer.	782	Cu.m		
4	**ENGINEERED FILL**				
	Providing, spreading and compacting Engineered fill material under floor/ foundation or where required material shall consist of sand, gravel or a sand gravel mixture obtained from the source approved by the Engineer. including breaking clods, leveling, dressing, watering and consolidating by ramming in layers not exceeding 9 inches in depth to full compaction to obtain required density. Complete including all lead & lifts as per instruction of the Engineer etc, complete in all respect as per drawing, specifications and direction of the Engineer.	1,580	Cu.m		
5	**PLAIN CEMENT CONCRETE**				
	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Foudation (1:4:8)	113	Cu.m		
	Cast in Situ (1:3:6)	42	Cu.m		

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
6	**REINFORCED CEMENT CONCRETE (SUB-STRUCTURE)** Reinforced cement concrete work including all labor and material except the cost of steel reinforcement and its labor for bending and binding which will be paid seperately.This rate also includes all kinds of forms moulds lifting shuttering curing rendering and finishing the exposed surface (including screening and washing of shingle).RC work in roof slab,beams,columns rafts. Lintels and other structural members laid in situ or precast laid in position complete in all respects. Ratio (1:2:4) 90 Lbs cement 2 Cft sand 4 Cft shingle 1/8" to 1/4" gauge etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager. **(Ratio 1:2:4 strength 20 Mpa)**				
	i) Footing	380	Cu.m		
	ii) Column	45	Cu.m		
	iii) Plinth Beam	99	Cu.m		
	iv) Ramp Floor	1	Cu.m		
7	**REINFORCEMENT** Fabrication of deformed steel reinforcement bar for reinforced cement concrete including cutting bending, laying in position, making joints and fastenings including cost of binding wire (also includes removal of rust from bars.) including the cost of straightening, cutting, bending, binding, wastage and such overlaps as are not shown in drawing, precast spacer block or m.s chairs etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	49,000	Kg		
8	**PLAIN CEMENT CONCRETE UNDER FLOOR** Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	1:4:8 under Ground Floor	79	Cu.m		
	1:3:6 under Ground Floor (with duracrete fiber)	79	Cu.m		
	1:4:8 under Ramp Floor	1	Cu.m		
9	**TERMITE PROOFING** Providing Anti-termite treatment (Biflex-FMC or equivalent approved) as per manufacturer specifications) by spraying /sprinkling / spreading *Neptach* lar 0.5% Emulsion as an over all pre-construction treatment in slab type construction under the slab and along attach perches or entrances etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	2,110	Sq.m		
	Building Area (Area: 2110 Sq.m)				

Sr.No	Description	Qty	Unit	Rates (Rs.)	Amount (Rs.)
10	**BITUMEN COATING**				
	Providing and applying industrial bitumen paint (Coverage 7 Kg / 10 Sqm) mixed with water component 2 coats on all RCC structural surfaces up to required level etc, complete in all respects as per drawing, standard , specifications and direction of the Engineer.	1,660	Sq.m		
	BRICK MASONRY WORK				
11	Provide and laying pacca brick work in foundation and plinth etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Cement sand mortar Ratio 1:6	3	Cu.m		
	PLINTH PROTECTION WORK				
12	Filling watering and ramming earth under floors with new earth (excavated from outside) lead up to one chain and lift up to 5 feet. including earth work compaction (soft, ordinary or hard soil) laying in 6" thick layers leveling, dressing and watering for compaction etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	135	Cu.m		
13	Providing and laying dry rammed brick or stone soling 6" thick from approved quarry including hand packing & filling voids with sprawls & chips, consolidating & compacting with power or hand roller,etc complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer.	50	Cu.m		
14	Cement concrete plain including placing compacting, finishing and curing, complete (including screening and washing of stone aggregate with erection and removal of centering/shuttering for RCC or plain cement concrete works of Partal wood (2nd class) horizontal & vertical etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.	11.00	Cu.m		
	Under Plinth Protection Floor 1:4:8				
	Plinth Protection Floor 1:2:4	11.00	Cu.m		
15	Provide and laying pacca brick work in foundation and plinth etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.				
	Plinth Protection steps	23	Cu.m		
	PLASTER				
16	Providing and applying 20mm (3/4") thick cement plaster to external walls, columns, beams, etc. with cement mortar 1:6 ic all corners, recesses, jambs, raking out joints of masonry, scaffolding etc, complete in all respects as per standard specification, drawing and entire satisfaction of the Engineer. (up to any height).	160	Sq.m		
				Total Cost of 01 No	
			Total Cost of 06 Nos Carried to Grand Summary	**6**	

SUMMARY 3,4,5

Establishment of Comprehensive High School in Sindh
Bill of Quantities For 06 Nos School Sites
Package-D
Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Summary of Schedule No-3
Supply of Plant (Pre-Engineered Structures) including Fixtures and other materials & goods and spare parts (if any)

Item No.	Description	Unit	Qty	Unit Rate (Pak Rs.)	Total (Pak Rs.)
	Note: *In accordance with Specifications- Schedule of Works & Drawings.*				
1	Supply & fabrication of the following items , on covered area basis for Building :				
a)	Hot rolled Structural Steel and Non-structural light gauge cold formed galvanized steel parts of the Main School building including connections and accessories with provision of additional floor expansion in future. ***Note: Above works are excluding of foundation & sub structure cost)*** .	Sft.	207,780		
b)	Decking Sheet	Sft.	207,780		
c)	Wall Cladding	Sft.	207,780		
d)	Ceiling	Sft.	207,780		
TOTAL Carried to Grand Summary				**Rs**	

Note: 1. Covered area means plinth area of the building including opening, projection for doors, windows and ventilators but excluding void / open to sky area whereas, in case of double story structures plinth area of ground floor will be multiplied with the number of storyes, but only final roof slab projection exceeding 2'-0" will be paid 50% separately on the quoted rate of BOQ.

2. Rates quoted above shall be paid on the basis of covered area of the structure and shall not be measured separately.

3. Cost of all works related to external elevation / facade treatment shall be deemed to be covered in the bid price of buildings and shall not be measured and paid separately.

4. O.H tank(fiber glass food grade material) will be provided as per design requirements on each building and the cost of it shall be deemed to be covered in quoted bid rate and no separate measurement and payment will be made for this item

5. All necessary Internal services (i.e. water supply, sewerage, gas, electrical etc.connections) required to make the building fully functional shall be covered in the bid price of each building and no separate payment shall be made for such works.

EA Consulting
(Pvt.) Ltd

Establishment of Comprehensive High School in Sindh
Bill of Quantities For 06 Nos School Sites
Package-D
Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Summary of Schedule No-4
(Installation, Fabrication & Other Services)

Item No.	Description	Unit	Qty	Unit Rate (Pak Rs.)	Total (Pak Rs.)
	Note: *In accordance with Specifications -Schedule of Works & Drawings for complete execution of following facilities on covered area basis for building:*				
a)	Installation & Errection of Structure	Sft.	207,780		
b)	Electrical Conduiting Complete Package	Sft.	207,780		
c)	Sanitary Conduiting Complete Package	Sft.	207,780		
d)	Installation of Cladding Complete in all respect	Sft.	207,780		
e)	Installation of Decking sheet & False Ceiling complete in all respect	Sft.	207,780		
f)	Foam Concrete & C.C. Complete in all respect	Sft.	207,780		
g)	Tile Work Complete in all respect	Sft.	207,780		
h)	Electrical Fixtures Complete in all respect	Sft.	207,780		
i)	Plumbing Fixtures Complete in all respect	Sft.	207,780		
j)	Doors, Windows, Vent. & S.S. Railing Complete in all respect	Sft.	207,780		
k)	Paint Work / Grafitto Paint Complete in all respect	Sft.	207,780		
TOTAL Carried to Grand Summary				**Rs.**	

Note: 1. Covered area means plinth area of the building including opening, projection for doors, windows and ventilators but excluding void / open to sky area whereas, in case of double story structures plinth area of ground floor will be multiplied with the number of storyes, but only final roof slab projection exceeding 2'-0" will be paid 50% separately on the quoted rate of BOQ.

2. Rates quoted above shall be paid on the basis of covered area of the structure and shall not be measured separately.

3. Cost of all works related to external elevation / facade treatment shall be deemed to be covered in the bid price of buildings and shall not be measured and paid separately.

4. O.H tank(fiber glass food grade material) will be provided as per design requirements on each building and the cost of it shall be deemed to be covered in quoted bid rate and no separate measurement and payment will be made for this item

5. All necessary Internal services (i.e. water supply, sewerage, gas, electrical etc.connections) required to make the building fully functional shall be covered in the bid price of each building and no separate payment shall be made for such works.

Establishment of Comprehensive High School in Sindh
Bill of Quantities For 06 Nos School Sites
Package-D
Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Summary of Schedule No-5
(Design Services)

Item No.	Description	Unit	Qty	Unit Rate (Pak Rs.)	Total (Pak Rs.)
	Note: *In accordance with Specifications - Schedule of Works & Drawings for complete execution of following facilities on covered area basis for building:*				
a)	Topographic Survey	Sft.	207,780		
b)	Soil Investigation	Sft.	207,780		
c)	Foundation Design	Sft.	207,780		
d)	Steel Structure Design	Sft.	207,780		
e)	Electrical Design	Sft.	207,780		
f)	Plumbing Design	Sft.	207,780		
TOTAL Carried to Grand Summary				**Rs.**	

Note: 1. Covered area means plinth area of the building including opening, projection for doors, windows and ventilators but excluding void / open to sky area whereas, in case of double story structures plinth area of ground floor will be multiplied with the number of storyes, but only final roof slab projection exceeding 2'-0" will be paid 50% separately on the quoted rate of BOQ.

2. Payment will be made on submission / approval of design/drawings by Project Manager/ Engineer.

Sr.No	Description of Items (Super-Structure) (All below items covered in Schedule 3,4 & 5)
1	**STEEL STRUCTURE**
1.1	**LIGHT GAUGE STRUCTURAL STEEL** Providing fabricating and fixing light gauge structural steel in walls, joist, bracings, lintels, columns etc. all framing element with C-Section (Manufactured by CNC) with required thickness by structural design calculations of GI Prime Quality Steel G 350 or G550 with coating of Z-180 g/m2 conforming to ASTM A653 or equivalent hot dipped galvanized including galvanized coated screws for the connection of elements and all other part required for the fixing etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
1.2	**HOT ROLLED STRUCTURAL STEEL (If required any)** Providing fabricating and fixing of hot rolled structural steel in specific columns, beams, stairs etc. conforming to ASTM A-36 with required size as per structural design calculation (having maximum yield strength of 36000 Psi) coated with redoxide, including approved connecting detail by the Engineer etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
1.3	**EXPANSION BOLTS** Providing and Fixing of anchors of 12mm x 140mm & M10 x 80 in the foundation for the fixing of structural steel elements including drilling and fixing complete in all respects of approved quality (preferably Hilti / Fischer/Simpson/Index) approved by the Engineer etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
1.4	**SCREWS** Providing and Fixing of 10g/12g-18 x 16mm wafer, dual thread, pin point screw for steel framing connections and 10g/12g-4.8 x 20mm Hex Head Screws of Buildex or equivalent for frame to frame connections etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
1.5	**FLOOR & ROOF DECKING**
a	**FLOOR DECKING** Providing & Fixing of Floor Decking is composed of open web joint of C- Section as per ASTM-653 with 0.6mm Corrugated G.I. Sheet etc, complete in all respect as per specifications & relevant approved drawings, including C.C with Dura Crete fiber and tiles works etc,. all works to the entire satisfaction of the Engineer/Project Manager.
b	**ROOF DECKING** Providing & Fixing of Roof Decking is composed of open web joint of C- Section as per ASTM-653 with 0.6mm Corrugated G.I. Sheet etc, complete in all respect as per specifications & relevant approved drawings, including C.C foam concrete, tiles works & Roof Treatment etc,.all works to the entire satisfaction of the Engineer/Project Manager.
1.6	**STAIRS WITH HAND RAIL** Providing and Fixing of stairs fabricated with LGS/hot rolled Steel with 3-Coats of Paint (if required) with 19mm thick Marble on Steps (China Verona) approved by the engineer, etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
1.7	**S. S. RAILING WORK** Providing, fabricating & fixing in position S.S. (304 grade) railing and balustrade including railing in **passage / corridor (G+1)** consisting of 2" dia S.S. Pipe at top hand rail, over 1-1/2" dia vertical pipe, and 1" dia 3 Nos. horizontal bracing at required spacing as per given drawing, including base plat, hole fast and all hardware's etc, complete in all respect & as per drawing relevant specifications and entire satisfication of the Engineer

Sr.No	Description of Items (Super-Structure) (All below items covered in Schedule 3,4 & 5)
2	**WALL CLADDING & FALSE CEILING**
2.1	**EXTERIOR & INTERIOR WALL CLADDING** Providing and fixing Exterior and Interior wall cladding, non asbestos fiber cement boards (Shera / Prima/Elephant) conforming to ASTM C1186 or 50mm thick nanocrete panel shall be used. The thickness of cladding should not be less than 8mm for both interior and exterior walls & 50mm for nanocrete panel. The vertical and horizontal joints between cladding boards shall be made water tight using jointing compounds shera including all other fixing and finishing detail etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
2.2	**INFILL WALL PANELS** Providing and Filling Foam Concrete/Nanocrete of density 800Kg/m³ to 900Kg/m³ in all wall panels.
2.3	**FALSE CEILING** Providing and fixing pre-painted Gypsum tiles size 600 x 600 x 9mm with G.I. ceiling framing system suspended with bottom chord of joist framing etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
3	**FINISHES**
3.1	**FLOOR TILES**
a.	Providing & laying Porcelain tiles size (400mm x 400mm) make & color of approved by Consultant) patterns and shades, preparation and laying of base coat with 25-50mm CS mortar, over previously laid sub floor including filling of joints with matching color grout, etc., complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
b.	Providing & laying Porcelain **Matt** tiles size (400mm x 400mm) in **passage / corridor (G+1)** make & color of approved by Consultant) patterns and shades, preparation and laying of base coat with 25-50mm CS mortar, over previously laid sub floor including filling of joints with matching color grout, etc., complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
3.2	**SKIRTING** Providing & Laying of approved quality & sizes (as per floor tiles) of porcelain tiles skirting 4" high including chiseling/wall where ever required and cement mortar backing etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
3.3	**BATH TILES** Providing & laying ceramic tiles (size 10" x 13"), walls (up to 5'-0") & floors (Size 10" x 10") of approved shades & patterns (approved by Consultant) in toilets etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
3.4	**PORCELAIN TILE DADO** Providing & applying porcelain tiles on dado thick laid with face of wall cladding with bond approved and including curing at any height in **passage / corridor (G+1)** etc, complete in all respect, as per specifications & relevant drawing and all works to be carried out the specification as direct by engineer. *(upto 4' ft. height)*
3.5	**PAINTS**
a	Providing & applying Matt Finish enamel Paint i.e. (ICI or Berger) on walls i/c applying priming coat, filling, rubbing smoothing with sand paper. Applying three coats of approved shade to walls, columns, coved surfaces in the interior of the building as shown on the drawings including application of primer and preparation of surface to be painted etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
b	Providing & applying weather shield paint i.e. (ICI or Berger) over the external surfaces of building, columns & beams / Projections i/c. filling, rubbing, smoothing with sand paper. Applying three coats of approved shade & colour etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
c	Providing & applying Grafitto texture / paint over the external surfaces of building, columns & beams / Projections i/c. filling, rubbing, smoothing with sand paper. Applying three coats of approved shade & colour etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
d	Providing & applying oil paint i.e. (ICI or Berger) on wood works surfaces of doors, including rubbing, finishing with sand paper of approved shade, including preparation of surface to be painted etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.

Sr.No	Description of Items (Super-Structure) (All below items covered in Schedule 3,4 & 5)
4	**DOORS & WINDOWS**
4.1	**WOODEN DOOR** Providing and fixing in position 38mm thick semi solid flush door with 5mm thick commercial ply single / double shutter with 8mm thick approved quality golden teak wood lipping all around the shutter, 16 SWG galvanized steel sheet frame and molding (width of frame is same as wall thickness) The item includes fixing of door frames in wall opening with five holdfasts filling around frames as well as in pockets with Foam/Nanocrete concrete, complete including wooden beading, handle, lock and tower bolts & door stopper of approved quality etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
4.2	**ALUMINIUM DOORS** Providing and fixing in position Silver/colour anodized aluminium Doors of Delux section 2mm thick manufactured by Lucky, Krudson Pakistan cables or equivalent for Doors section, including the cost of all accessories cutting holes etc., fixing and cost of first class 6 mm thick Imported tinted **(Reflective tinted)** glass, handle, lock, hydrolic door closser & door stopper of approved quality etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
4.3	**ALUMINIUM WINDOWS** Providing and fixing in position Silver/colour anodized aluminium windows of Delux section 2mm thick manufactured by Lucky, Krudson Pakistan cables or equivalent for Sliding/fixed/openable Window section, including the cost of aluminium netting / fly proofing fittings with all accessories cutting holes etc., fixing and cost of first class 6 mm thick Imported tinted **(Reflective tinted)** glass etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
4.4	**ALUMINIUM VENTILATORS** Providing and fixing in position Silver anodized aluminium ventilators as per manufactured by Lucky, Krudson Pakistan cables or equivalent for Sliding/fixed/openable section, 55.5mm x 22.5 mm and Normal thickness including the cost of aluminium netting / fly proofing fittings with all accessories cutting holes etc., fixing and cost of 1st class 6 mm thick Imported tinted **(Reflective tinted)** glass etc, complete in all respect as per specifications & relevant approved drawings, all works to the entire satisfaction of the Engineer/Project Manager.
4.5	**EXPANSION JOINTS** Providing and fixing in expansion joints in floors at any height/elevation MS angle iron 38x38x6mm & Balco ? Chemitech Expansion Joint Section covered with mastic sealant & aluminium cover in floor / walls ad roof with providing 1" to 2" inch thick thermopore sheet / jumbolon sheet complete in all respect as per design / drawings and specification and as per instructions of the Project Manager / Project Engineer / Consultant.
4.6	**MISCELENEOUS** Exterior Elevation complete in all respect as per design, specification and complete in all respect as er design / drawings and specification and as per instructions of the Project Manager ? Project Engineer / Consultant.
4.7	**MS STEEL GRILL** Providing and fixing MS Steel Grill in Windows with 3/8" dia Sq. bar and 1" x 1/8" thick MS Flat patti (approx. 2Kg Per Sft.) including applying one primer coat of red oxide and three coats of dulux (ICI) / Jotun Enamel Paint of approved shade and colour complete in all respect as per design / Drawings and specification and as per instructions of the Projcet Manager ? Projcet Engineer / Consultant.

ELECTRICAL WORKS

(Detail of Schedule - 4)

Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Bill of Quantities

Sr. No.	Description				
	SECTION - A **DISTRIBUTION BOARDS** Supply at site, fabrication, installation, testing and commissioning of Main Distribution Board (MDB) , made of sheet steel 14 SWG, degreased and derusted, with 2 coats of antirust paint, 2 coats of powder coated paint of approved colour, protection classification IP-44, totally enclosed indoor floor mounting cubicle type in free standing design, with hinged door, handle including cost of all auxiliaries, internal wiring, designation lables on MCCBS, grounding bar suitable for system Voltage 415 V, 50 Hz, 3 Phase and neutral bus bars of 99.9% electrolytic copper, including cost of cable terminal blocks wiring from breakers, brass cable glands, all accessories complete in all respects. All incoming and outgoing breakers shall be accessible only by opening the front door having further M.S. sheet cover gaskets shall also be provided where necessary. All MCCBs shall be suitable to operate without any derating at 40°C ambient temperature and shall be of one make only and not mixture of 2 or 3 manufacturers. The sides of MDB shall also have louvers at bottom and top on sides of panel for hot air exhaust, wire mesh etc. The back of the panel shall be lockable door instead of bolted and shall conform to single line diagram				
A-01	**MAIN DISTRIBUTION BOARD** **INCOMING** 01 No.150Amps TP MCCB RC-18kA (Adjustable with UVT) 01 Nos Digital Voltmeter scaled 0-500 Volts of appropriate sizes. 01 Nos. Voltmeter selector switch 03 Nos. Air cooled ring type Current Transformers ratio 150/5 Amps having suitable output and accuracy for Ammeter. 01 Nos. Ammeter selector switch 01 No Digital Ammeter scaled 0-150 Amps of appropriate sizes. 06 Nos. 2 Amp fuses 03 Nos. R-Y-B indication lamps. **OUTGOING** 02- 63 Amps TP MCB Ics=18KA Brass cable glands suitable for 4 core PVC/PVC cu.cond. cable 600/1000 V. grade as per drawings				

Sr. No.	Description				
A-02	**DISTRIBUTION BOARD GROUND FLOOR** **INCOMING** 01-63 Amps TP MCCB Ics=10KA 03 - 2 Amps Protection fuses. 03- R-Y-B indication lamps. **OUTGOING** 15- 10 Amps SP MCB Ics=10 KA 42- 16 Amps SP MCB Ics=10 KA				
A-03	**DISTRIBUTION BOARD FIRST FLOOR** **INCOMING** 01-63 Amps TP MCCB Ics=10KA 03 - 2 Amps Protection fuses. 03- R-Y-B indication lamps. **OUTGOING** 15- 10 Amps SP MCB Ics=10 KA 42- 16 Amps SP MCB Ics=10 KA				
A-04	Supply, Installation, Testing & Commissioning of following 4-Pole Manual Change Over (600V) etc., in 16 SWG sheet metal steel enclosure with neutral and earth terminal strips, complete in all respects.				
1	300A, 4 POLE				
	Collection Page No.1 Page as above				

Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Bill of Quantities

Sr. No.	Description				
	SECTION - B **LIGHT FIXTURES** Supply, installation, testing and commissioning of following fluorescent light fittings, ceiling, recessed,wall mounted made of MS body 22 SWG degreased and derusted with white enamelled non yellowing paint. Complete with internal wiring, Grounding terminal , complete in all respects or as approved by Engineer incharge.				
B-01	Wall mounted Fluorescent Light Fixture Philips TMS Type with M2 Louvre, 1x 18W TL5				
B-02	Surface/Wall mounted Weatherproof external light fixture Bulkhead 1x18W PLC Pierlite Model No. 302015 or equivalent.				
B-03	Mounted Recessed Flurescent light fixture,Philips TBS with M2 Louvre 4x18W TL5 or equivalent.				
B-04	Ceiling mounted Down light fixture ,Philips FBH 145 Lunar,1x18W PLC or equivalent				

Shaheed Benazirabad, Sanghar, Khairpur, Shahdad Kot, Dadu & Ghotki

Bill of Quantities

Sr. No.	Description				
	SECTION - C **MISCELLANEOUS FITTINGS** Supply, installation, testing & commissioning of Ceiling/ Exhaust fan. The ceiling/exhaust fan shall comprise circular fan metallic/ plastic body, metallic fan blades, down rod (if necessary) of suitable dia & length, AC capacitor, internal wiring, terminals all installation & operational accessories as per tender specifications, as per site requirements and as directed by the Engineer.				
C-01	56" dia ceiling fan suitable to give an air displacement of minimum 12000 Cu. ft./ min.				
C-02	12 "dia exhaust fan with plastic body,fan blades and louvers				

Shaheed Benazirabad, Sanghar, Khairpur,
Shahdad Kot, Dadu & Ghotki
Bill of Quantities

Sr. No.	Description				
	SECTION - D				
	WIRING IN CONCEALED CONDUITS				
D-01	**Distribution board to Switch** Wiring of light circuit from Distribution Board to switch,with Three nos. single core 2.5 Sqmm PVC insulated 450/750 volts grade stranded copper conductor cables in concealed PVC conduits (conduits partly shared) including PVC conduit, and conduit accessories etc.				
D-02	**Switch to light point** Wiring from switch to light or fan point with 3 nos. single core 1.5 Sqmm PVC insulated 450/750 Volts grade stranded copper conductor cables in concealed PVC conduit including PVC conduit, Conduit accessories,etc.(conduit partly shared).				
D-03	**light point to light point** Wiring from light pointto light point with 3 nos. single core 1.5 Sqmm PVC insulated 450/750 Volts grade stranded copper conductor cables in concealed PVC conduit including PVC conduit, Conduit accessories,etc.(conduit partly shared).				
D-04	**Distribution board to 5Amps socket** Wiring of circuit from Distribution Board to 05A,230Volts with 3 nos. one core 4 Sqmm PVC insulated 450/750 Volts graded , 2&3 pin switched socket, stranded copper conductor cables in concealed PVC conduit, including conduit accessories, etc(conduit partly shared)				
D-05	**5Amps socket to 5Amps socket** Wiring from 5 Amps, 2&3 pin socket to socket with 3 nos. one core 2.5 Sqmm PVC insulated 450/750 Volts grade solid or stanerd copper conductor cables in concealed PVC conduit including PVC conduit,Conduit accessories, etc complete. (conduit partly shared)				
D-06	**Distribution board to 15Amps socket** Wiring of circuit from distribution board to 15A, 230Volts, 3 pin switched socket outlet with 3 nos. one core 4 Sqmm PVC insulated 450/750 Volts grade stranded copper conductor cables in concealed PVC conduit including PVC conduit, Conduit accessories, etc (conduit partly shared)				
B-05	Supply, Installation and Commissioning of Wiring for 3Pin, 13 A,universal Socket Outlet with 2 x 2.5 sq.mm + 1 x 2.5 sq.mm single core PVC insulated wires in 20 mm dia. PVC conduit surface / recessed in wall, column, ceiling, etc., complete with all conduit accessories as per specification.				
i	DB to Outlet				
ii	Outlet to Outlet				

Sr. No.	Description				
	SECTION-E **LT CABLES** Supply at site, installation, testing and commissioning of PVC insulated non armoured copper conductor cable 600 / 1000 Volt grade (or otherwise mentioned in cable description) in prelaid conduits / trenches to be installed as per routes shown on drawings including cost of all necessary materials, connections, identification tags, cables lugs properly crimped at both ends for the following sizes complete in all respects. Actual length of cables to be installed shall be practically measured at site by the Contractor, duly authenticated by the Engineer before placing the order with the manufacturer, however, approximate length of cables are shown herewith. Payments shall be made as per actual length installed.				
E-01	70 sq mm , 4 core PVC/PVC stranded copper conductor cable				
E-02	16 sq mm , 4 core PVC/PVC stranded copper conductor cable				
	LOW VOLTAGE CABLES AND WIRES Supplying, Laying, Termination and Commissioning of following Copper Conductor Cable in already laid PVC conduit / cable tray / trench as required, as per drawings and specifications.				
(a)	**4 Core - CU/PVC/ PVC Cable (600/1000V)**				
i	4 Core - 150 Sq.mm				
ii	4 Core - 95 Sq.mm				
(b)	**1 Core PVC Cable (600/1000V)**				
iii	1- Core - 25 Sq.mm				
iv	1- Core - 16 Sq.mm				
v	1- Core - 10 Sqmm				
(c)	**4 Core - Flexible CU/PVC/ PVC Cable (600/1000V)**				
i	4 Core - 16 Sq.mm				
(d)	**1 Core PVC Cable As ECC**				
i	1 core -150 Sq.mm (600/1000V)				
ii	1 core -95 Sq.mm (600/1000V)				
iii	1 core -50 Sq.mm (600/1000V)				
iv	1 core -16 Sq.mm (450/750V)				
v	1 core -10 Sq.mm (450/750V)				

Sr. No.	Description				
	SECTION - F **WIRING ACCESSORIES** Suuply at site, installation, testing and commissioning of the following wiring accessories, complete in all respect.				
F-01	10 Amps, 250Volts one way, One gang light control switches including appropriate size concealed back box.				
F-02	10 Amps, 250Volts one way, Two gang light control switches including appropriate size concealed back box.				
F-03	10 Amps, 250Volts one way, Three gang light control switches including appropriate size concealed back box.				
F-04	10 Amps, 250Volts one way, Four gang light control switches including appropriate size concealed back box.				
F-05	10 Amps, 250Volts one way, Five gang light control switches including appropriate size concealed back box.				
F-06	10 Amps, 250Volts one way, Six gang light control switches including appropriate size concealed back box.				
F-07	5 Amps, 250Volts, 2 & 3 pin switched socket unit round pin including appropriate size back box.				
F-08	15 Amps, 250Volts, 3 pin switch socket unit round pin including appropriate size back box.				
F-09	Fan Dimmer with switch/back box with all associated accessories.				
F-10	13A, 3Pin Unversal switched socket outlet				
F-11	13A, 3Pin Flat Simplex switched socket outlet				
F-12	13A, 3Pin Flat Duplex switched socket outlet				

Sr. No.	Description				
	SECTION - G				
	GROUNDING SYSTEM				
G-01	**Grounding Cables**				
	Supply at site, installation, testing and commissioning of PVC insulated non armoured copper conductor cable 450/ 750 Volt grade (or otherwise mentioned in cable description) in prelaid conduits / trenches to be installed as per routes shown on drawings including cost of all necessary materials, connections, identification tags, cables lugs properly crimped at both ends for the following sizes complete in all respects. Actual length of cables to be installed shall be practically measured at site by the Contractor, duly authenticated by the Engineer before placing the order with the manufacturer, however, approximate length of cables are shown herewith. Payments shall be made as per actual length installed.				
1)	35 sqmm, 1 core PVC insulated stranded copper conductor cable				
2)	16 sqmm, 1 core PVC insulated stranded copper conductor cable.				
G-02	**GROUNDING (ROD TYPE)**				
	Earth electrode for genset comprise 25 mm dia, 3 meter long copper deposited steel rod, including appropriate clamp for clamping of the earth continuity conductor. The copper deposited steel rod shall be hammered into the ground to the depth of twelve inches below the ground surface. The earth electrode includes CC inspection chamber with heavy duty cover, excavation, backfilling etc.,as shown on drawing.				
	Carried to Electrical Works Summary				

Sr. No.	Description				
	SECTION - H **CONDUITS AND PIPES** PVC conduits laid under floor for Sub main power cables & earth cables including all conduit accessories. The PVC conduits shall be laid under floor including chiseling and cutting of floor for required dimensions, laying of conduit, backfilling of remaining cavity with CC as specified for floor in that area, making good, complete.				
H-01	3" dia PVC conduit				
H-02	Providing and Construction of Manhole Size 2'-6" x 2'-6" x 3'-0" deep, 6" thick, concrete 1:2:4 ratio with 2'-6" round heavy duty cast iron cover, 100% water proof, complete in all respect. (For Electrical cables).				
H-03	Providing and Construction of Handhole Size 2'-0" x 2'-0" x 3'-0" deep, 6" thick, concrete 1:2:4 ratio with 2'-0" round heavy duty cast iron cover, 100% water proof, complete in all respect. (For Electrical cables).				

PLUMBING WORKS

(Detail of Schedule - 4)

Schedule of Works (Plumbing Work)

ITEM NO.		DESCRIPTION				
		GENERAL NOTE (Applicable to all items) Supply, installation, testing and commissioning of following items of work at site, including all labour, tools, plant, accessories, etc. required for completion of each item as per specifications and as approved by the Engineer.				
		SANITARY FIXTURES AND FITTINGS				
BS-01		Water closet Eastern pattern best quality with integral foot rests, P-trap, t-stop cock,waste pipe,13.5 liters flushing cistern low down, flush pipe etc, fixed to concrete, brick, stone or wood work, in Light colour.				
BS-02		Water closet apparatus European pattern comprising 13.5 liters flushing cistern, seat cover,t-stop cock,waste pipe etc., (Coupled set in Light colour), any approved size fixed to concrete, brick or stone work, complete in all respects.				
BS-03		Wash hand basin of approved make, colour, size(24"X18"), shape & quality including pedestal, bottle trap with union 1-1/4"basin waste, tee-stop cocks,chromium plated chain and rubber plug,C.P. mixer for cold and hot water, jointing and sealing material, painted heavy duty brackets/fixers etc. with all accessories for complete installation.				
BS-04		Stainless steel Laboratory sink,(18"X24") of approved make, colour, size, shape & quality including mixer for cold and hot water, t-stop cocks and all other accessories for complete installation				
BS-05		Supply and fix 5mm thick mirror (24"X18") , including hard board behind it and all other fittings for complete installation as per specifications.				
BS-06		Plastic shelf of approved size and shape, with plugs and screws, fixed to concrete, brick stone or wood work, complete in all respects.				
BS-07		Toilet paper holder (SS) of any shape, pattern and size, complete with plugs, screws etc., fixed to concrete, brick, stone or wood work, complete in all respects.				
BS-08		Soap tray of any shape, pattern and size, complete with plugs, screws etc., fixed to concrete, brick, stone or wood work, complete in all respects .				

Schedule of Works (Plumbing Work)

ITEM NO.		DESCRIPTION				
BS-09		CP towel rail:600mm long, 20mm dia conforming to BS 1010, complete with nuts bolts etc.				
BS-10		Supply and installation of Muslim Shower combined with double bib-cock of approved colour inlcluding all fittings for complete installation.				
BS-11		WC cleaning brush				
		WATER SUPPLY PIPES AND FITTINGS				
BS-13		Supply and installation of PPR PN-20 pipes as per DN 8077-8078 with PN-25 fittings moulded i/c all fittings, making holes in concrete or masonry and then repairing holes, supports and hangers etc. of the following diameters, complete in all respects.				
	(a)	3/4 inch (1/2 inch inner)				
	(b)	1 inch (3/4 inch inner)				
	(c)	1¼ inch (1 inch inner)				
	(d)	2 inch (1 ¼ inch inner)				
		SOIL, WASTE, VENTILATING PIPES & FITTINGS				
BS-14		uPVC class 'B' BSEN 1329-1 Soil, Waste, of the following diameters, including cleanout plug,clamps, hanger collars,supports, imported rubber ring/solvent cement fittings, jointing, cutting, and breaking concrete/masonry etc. and then making it good, cleaning and testing etc.complete in all respects.				
	(a)	6 inches				
	(b)	4 inches				
	(c)	3 inches				
	(d)	2 inches				
BS-15		uPVC Multi Floor Trap (110x75mm),with minimum water seal of 40mm, including strainer; making required number of connections; breaking concrete or masonry work & then making it good; etc. of approved make.				
BS-16		Cowl on vent pipes of the following diameter.				
	(a)	2 inches				
BS-17		Construction of Gully Trap Chamber (12"x12" clear) including supply & fixing of approved make gully trap construction of 4-1/2" thick brick masonry in 1:4 c/s mortar , 3" thick 1:4:8 PCC at bottom, 1:2:4 PCC in benching, (12"x12") CI cover with frame (15 kg), 1/2" thick 1:3 c/s plaster on inner face, etc. complete in all respects as shown on drawings.				

Schedule of Works (Plumbing Work)

ITEM NO.		DESCRIPTION				
		VALVES				
BS-18		Bronze PPR coated Gate valves, conforming to DIN standards,& shall be of 16-bars for working pressure,open & shut indicatiors shall be marked on the handle,the ends may be screwed or flanged,including unions & jointing arrangement with pipe on both ends of valves; nuts, bolts etc. complete in all respects.				
	(a)	3/4 inch				
	(b)	1 inch				
	(c)	1.25 inch				
BS-19		Providing and fixing bronze nor-return/ check valves conforming to BS 5152 (general purpose),service rating of 16bars and check valves shall be of swing type of the following diameters as shown on the drawing and required for installation.				
	(a)	1.25 Inch				
BS-20		Float valves (automatic) of copper alloy,piston type and shall conform to B.S 1212. Float shall be of copper and shall confrom to B.S 1968 including unions & jointing arrangement with pipe on both ends of valves; nuts, bolts etc. complete in all respects .				
	(a)	1.25 inch				
		MANHOLES				
BS-24		Construction of brick masonry manholes including all items and works as shown on drawings, RCC cover Medium duty (weight-45 kg) and C.I. frame complete in all respects as directed by the Engineer of following depths, as defined in specifications and as directed by the Engineer.				
		RAIN WATER DRAIN				
BS-25		Supply, installation, testing and commissioning of Upvc clan "B" as pe BSEN 1329-1 with solvent joint horizontal/vertical plastic body double insulated wall type water tanks of following capacity including all fittings necessary for complete installation.				
	(a)	4 inches				
		FIRE EXTINGUISHER				
BS-26		Wall mounted Dry chemical powder fire extinguisher 6kg capacity stored pressure type as per specifications.				
BS-26		Wall mounted 5kg CO2 fire extinguisher 5kg capacity stored pressure type as per specifications.				

Schedule of Works (Plumbing Work)

ITEM NO.		DESCRIPTION				
		OVER HEAD WATER TANK				
BS-27		Supply, installation, testing and commissioning of Fiber Glass body double insulated water tank of cylindrical shape (Horizontal) (with of following capacity including all fittings necessary for complete installation.				
	(a)	500 US Gallons				
BS-28		1 inch dia Air relief valve on main riser				
		ELECTRIC WATER COOLER				
BS-31		Supply and installation of Electric Water Coller as instructed by the Engineer Incharge.				