STATE BANK OF PAKISTAN

SBP BANKING SERVICES CORPORATION (BANK)

TENDER DOCUMENTS

VOLUME – I

INVITATION TO BID
INSTRUCTIONS TO BIDDERS
BIDDING DATA
FORM OF BID & APPENDICES TO BID
STANDARD FORMS
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TECHNICAL BID

FOR

Retrofitting work of buildings at SBP BSC Quetta

RETROFITTING WORK OF BUILDINGS AT SBP BSC QUETTA

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STATE BANK OF PAKISTAN
SBP BANKING SERVICES CORPORATION
Quetta

Reference No.

INVITATION TO BID

RETROFITTING WORK OF BUILDINGS AT SBP BSC QUETTA

(AS PER PUBLISHED INVITATION TO BID)

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

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INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid

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

1.2 The successful bidder will be expected to complete the Works within the time specified in Appendix-A to Bid.

IB.2 Source of Funds

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

IB.3 Eligible Bidders

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

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

IB.4 One Bid per Bidder

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

IB.5 Cost of Bidding

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

IB.6 Site Visit

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

6.2 The bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidders,

their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

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

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

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

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier than 28 days prior to the deadline for submission of bids.

Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

IB.9 Amendment of Bidding Documents

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

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

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

C. PREPARATION OF BIDS

IB.10 Language of Bid

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

IB.11 Documents Comprising the Bid

11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid and the other the Price Bid, containing the documents listed in Bidding Data Sheet under the heading of IB 11.1 A & B respectively. Both envelopes to be enclosed together in an outer single envelope called the Bid. Each bidder shall furnish all the documents asspecified in Bidding Data Sheet 11.1 A & B.

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

specified therein. Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:

a. In case of a successful bid, the Form of JV Agreement shall be signed so as to be legally binding on all partners within 7 days of the receipt of letter of acceptance failing which the contract and the letter of acceptance shall stand void and redundant.
b. One of the joint venture partners shall be nominated as being in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners;
c. The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of JV Agreement and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;
d. All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para (b) above as well as in the Form of Bid and in the Form of JV Agreement (in case of a successful bid); and
e. A copy of JV agreement shall be submitted before signing of the Contract, stating the conditions under which JV will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. The JV Agreement shall be made part of the contract. No amendments / modifications whatsoever in the jointventure agreement shall be agreed to between the jointventure partners without prior written consent of the Employer.

11.3 The Bidder shall furnish, as part of the Technical Bid, a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated Bidding Forms, in sufficient detail to demonstrate the adequacy of the

Bidders' proposal to meet the work requirements and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

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

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

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder.

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

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

IB.13 Currencies of Bid and Payment

13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. The proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in thecurrency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a

currency or currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid.

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

IB.14 Bid Validity

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

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

IB.15 Bid Security

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

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

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

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

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

15.6 The Bid Security may be forfeited:

a. if the bidder withdraws his bid except as provided in IB 22.1;
b. if the bidder does not accept the correction of his Bid Price pursuant to IB 27.2 hereof; or
c. In the case of successful bidder, if he fails within the specified time limit to:
   i. furnish the required Performance Security
   ii. sign the Contract Agreement; or

Furnish the required JV agreement within 7 days of the receipt of letter of acceptance.

IB.16 Alternate Proposals by Bidder

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

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

IB.17 Pre-Bid Meeting

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

17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than

seven (7) days before the proposed pre-bid meeting.

17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in IB 7.1 hereof, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.

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

IB.18 Format and Signing of Bid

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

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

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

18.4 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in Bidding Data Sheet against IB11 and clearly mark it “ORIGINAL TECHNICAL BID” and “ORIGINAL - PRICE BID”. In addition, the Bidder shall submit two (2) copies of the Bid and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.

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

signed or initialed by the person signing the bid.

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

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

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

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

IB.19 Sealing and Marking of Bids

19.1 Each bidder shall submit his bid as under:

a. ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.
b. The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in IB 19.2 hereof.
c. The technical bid should comprise of documents listed in IB11.1 (A) & the price bid should comprise of documents listed in IB 11.1 (B) which shall be placed in separate envelopes in accordance with IB 11.1.

19.2 The inner and outer envelopes shall:

a. be addressed to the Employer at the address provided in the Bidding Data sheet;
b. bear the name and identification number of the contract as defined in the Bidding Data sheet; and
c. provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data sheet.

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

19.4 If the outer envelope is not sealed and marked asabove, the Employer will assume no responsibility for

the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

20.1 a. Bids must be received by the Employer at the address specified no later than the time and date stipulated in the Bidding Data Sheet.

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

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

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

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

IB.21 Late Bids

21.1 a. Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 willbe returned unopened to such bidder.

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

IB.22 Modification, Substitution and Withdrawal of Bids

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

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

"SUBSTITUTION" or "WITHDRAWAL" as appropriate.

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

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

E. BID OPENING AND EVALUATION FOR SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE

IB.23 Bid Opening

23.1 The Employer will open the Technical Bids in public at the address, date and time specified in the Bidding Data Sheet in the presence of Bidders' designated representatives and anyone who choose to attend.The Price Bids will remain unopened and will be heldin custody of the Employer until the specified time of their opening.

23.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding Withdrawal Notice containsa valid authorization to request the withdrawal and is read out at bid opening.

23.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with IB 23.1.

No envelope shall be substituted unless the corresponding Substitution Notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

23.4 Next, outer envelopes marked “MODIFICATION” shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding Modification Notice contains a valid authorization to request themodification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened,read out, and recorded at the opening. Price Bids, both Original and Modification, will remain unopened in accordance with IB 23.1. The Bidders’ representatives who are present shall be requested to sign the record. The omission of a Bidder’s signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

23.5 Other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

a. the name of the Bidder;
b. whether there is a modification or substitution;
c. the presence of a Bid Security, if required; and
d. Any other details as the Employer may consider appropriate.

No Bid shall be rejected at the opening of Technical Bids except for late bids, in accordance with IB 21.1. Only Technical Bids read out and recorded at bid opening, shall be considered for evaluation.

Preliminary Examination of Technical Bids

23.6 a. The Employer shall first examine qualification and experience Data as per appendix M and N submitted by the Bidder. The technical proposal examination of those bidders only shall be taken in hand who meet the minimum requirement as mentioned in appendix M and N. Only substantially responsive qualification shall be considered for further evaluation.

b. The Employer shall examine the Technical Bid to confirm that all the documents have been provided, and to determine the completeness of each document submitted.

23.7 The Employer shall confirm that all the documents and information have been provided for evaluation of Technical bid as required under these bidding documents.

23.8 At the end of the evaluation of the Technical Bids, the Employer will invite only those bidders who have

submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids.

The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice for the opening of Price Bids.

23.9 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially non-responsive tothe requirements of the Bidding Document and return their Price Bids unopened before inviting others, who are determined as being qualified, to attend the opening of Price Bids.

23.10 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, publically in the presence of Bidders` representatives who choose to attend at the address, date and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

23.11 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

(a) The name of the Bidder;

(b) Whether there is a modification or substitution;

(c) The Bid Prices, including any discounts and alternative offers; and

(d) Any other details as the Employer may consider appropriate.

Only Price Bids and discounts, read out and recorded during the opening of Price Bids shall be consideredfor evaluation. No Bid shall be rejected at the opening of Price Bids.

23.12 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts, the methodology to determine the lowest evaluated price of the contract combinations is that which is most economical to the Employer.

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of bid evaluation report which shall be done at least ten 10 days prior to issue of Letter of Acceptance. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the bid evaluation report. However mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

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

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

IB.26 Examination of Bids and Determination of Responsiveness

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

26.2 A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required Bid Security; (iv) Includes signed Integrity Pact where required as per clause IB.35 and (v) conforms to all the terms, conditions and specifications of the Bidding

Documents, without material deviation or reservation. A material deviation or reservation is one (i) which affect in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; (iii)adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids. Only substantially responsive bid shall be considered for further evaluation.

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

IB.27 Correction of Errors

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

a. where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
b. where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line item total as quoted will govern and the unit rate will be corrected.

27.2 The amount stated in the Letter of Price Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with IB.15.6 (b) hereof.

IB.28 Evaluation and Comparison of Bids

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

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

a. making any correction for errors pursuant to Clause IB.27;
b. excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

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

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

28.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill ofQuantities to demonstrate the internal consistency of those prices with the construction methods andschedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.32be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

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

29.2 The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in bidder's capacities, may require the bidders to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not: Provided that such qualification shall only be laid down after recording reasons in writing. They shall form part of the records of that bid evaluation report.

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

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

IB.31 Notification of Award

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

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

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

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

IB.32 Performance Security

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

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

IB.33 Signing of Contract Agreement

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

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

IB.34 General Performance of the Bidders

34.1 The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/ works. The Employermay 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 (PEC). Upon such reference, PEC in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing ofsuch Bidder and debarring him from participation in future bidding for similar works.

IB.35 Integrity Pact

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

IB.36 Instructions not part of Contract

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

BIDDING DATA

BIDDING DATA

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

Instructions to Bidders

Clause Reference

Clause IB.1 Scope of Bid

Sub Clause 1.1 Name and address of the Employer

The Employer is:

Director Engineering
1st floor SBP Bolton Market Building
State Bank of Pakistan (SBP) Banking Services Corporation (BSC)
Head Office Karachi (HOK), M.A. Jinnah Road, Karachi

(Hereinafter called "The Employer" Which expression shall include the successors, legal representatives and permitted assignees).

The Employer's Representative is:

Divisional Head, Project Management Division (PMD)
Engineering Department
1st floor SBP Bolton Market Building
State Bank of Pakistan (SBP) Banking Services Corporation (BSC)
Head Office Karachi (HOK), M.A. Jinnah Road, Karachi

Name of the Project & Summary of the Works

The name of the Project is:

"Retrofitting work of buildings at SBP BSC Quetta"

The Summary of Works:

The scope of works mainly comprises of dismantling, drilling holes, providing and fixing of steel reinforcement, concreting, plastering, painting and related ancillary works lying within the boundaries and limits as shown on the drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time to time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.

Clause IB.2 Source of Funds

Sub Clause 2.1 The Employer has sufficient funds of its own to cover the Cost of the entire Project for which these Bidding Documents are issued.

Clause IB.4 One Bid per Bidder

Sub Clause 4.1 Delete the text of Sub-Clause 4.1 and substitute with the following:

Each Bidder shall submit only one bid. Joint venture (JV) of the firms is not allowed. A bidder who submits or participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

Clause IB.6 Site Visit

Sub-Clause 6.1 Sub-Clause 6.1 has been amended as under:

The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All cost in this respect shall be at the bidder's own expense. If the Bidder does not visit the siteprior to submitting financial Bid, it is deemed that the Bidder understands the site conditions and price quoted by the Bidder is final.

Clause IB.7 Contents of Bidding Documents

Sub-Clause 7.1 Sub-Clause 7.1 is amended as under:

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

Technical Bid

7.1.1 Volume - I

(i) Instruction to Bidders.
(ii) Bidding Data.
(iii) Letter of Technical Bid & Appendices to Bid (excluding Appendix-D)
(iv) Forms of Bid Security Performance Security, Contract Agreement, Mobilization Advance Bank Guarantee
(v) Part-I - General Conditions of Contract.
(vi) Part-II - Particular Conditions of Contract.
(vii) Bid Security

7.1.2 Volume II:

(i) Volume – II – Special Provisions and Technical Specifications

7.1.3 Volume III:

(i) Volume – III: Bid Drawings

Price Bid

7.1.4 Volume - IV

(i) Letter of Price Bid
(ii) Preamble to Bill of Quantities
(iii) Appendix – D to Bid (Bill of Quantities)

Clause IB.8 Clarification of Bidding Documents

Sub-Clause 8.1 Time limit for clarification

Sub-Clause 8.1 has been amended as under:
Any prospective bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier than 14 days prior to the deadline for submission of bids.

Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents and shall also be uploaded at SBP website along-with tender documents, including a description of the enquiry but without identifying its source.

Clause IB.10 Language of Bid

Sub-Clause 10.1 English.

Clause IB.11 Documents Accompanying the Bid

Sub-Clause 11.1 Sub–Clause 11.1 has been amended as under:

11.1 (A) The Bidder shall submit with its **Technical Bid** the following documents:

Volume – I
(i) Letter of Technical Bid
(ii) Bid Security shall be submitted with the Technical Proposal Envelope
(iii) Written power of attorney authorizing the signatory of the Bid
(iv) Original Bidding Documents (Volume – I)
(v) Duly filled in Schedules to Bid (except Appendix-D to Bid)
(vi) Qualification documents establishing bidders' eligibility as per Appendix-M

Volume II:
(i) Volume – II: Special Provisions and Technical Specifications

Volume III:
(i) Volume – III: Bid Drawings

11.1 (B) The Bidder shall submit with its **Price Bid** the following documents:

Volume – IV
(i) Letter of Price Bid
(ii) Preamble to Bill of Quantities
(iii) Appendix – D to Bid (Bill of Quantities)

Sub-Clause 11.3 The Bidder shall also submit along with the Bid the entire original document issued to him comprising Volume-I to Volume-IV.

Clause IB.12 Bid Prices

Sub-Clause 12.3 Sub–Clause 12.3 has been amended as under:

The Bidder shall obtain all information as to all applicable Taxes and conform to the requirements thereof at his own responsibility andinclude the same in his **quoted Bid Price**.

The quoted Bid Price shall also include the cost of accepting the general risks/ liabilities and obligations set forth or implied in the Contract. No claim at any later stage on this account will be entertained.

All applicable duties, applicable taxes, stamp duty and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder. **State Bank of Pakistan is not to be treated as Government Entity for this purpose therefore 100% applicable taxes etc. will be recovered.**

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

Sub-Clause 12.4 Sub–Clause 12.4 has been amended as under:

The rates and prices quoted by the bidders are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 70 of the Conditions of Contract.

Clause IB.13 Currencies of Bid and Payment

Sub-Clause 13.1 Sub–Clause 13.1 has been amended as under:

The unit rates and the prices shall be quoted by the bidder in Pak Rupees. The payments to the Contractor for the works done shall be made in Pakistani Rupees.

Sub-Clause 13.2 Delete Sub–Clause 13.2.

Clause IB.14 Bid Validity

Sub-Clause 14.1 Period of Bid validity

One hundred eighty two (182) days.

Clause IB.15 Amount of Bid Security

Sub-Clause 15.1 Bid Security shall be of Rs. 1.7 Million.

Sub-Clause 15.2 The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call or Pay Order or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favour of State Bank of Pakistan, Banking Services Corporation valid for a period **two hundred and ten (210) days** from the date of Opening of Bid.

If bidders chose to submit Bank Guarantee as Bid Security, they shall use the Form of Bid Security provided in the Bidding Documents. In case of any discrepancy, other than Amount of Bid Security as per Sub-Clause 15.1, in Bank Guarantee, the bidder shall be advised to provide the revised/amended Bank Guarantee within 10 working days

from the date of issuance of intimation letter/email by the

Employer/Consultant, failing which shall result in non-responsiveness of the bidder and the bid shall be rejected.

The Bid Security (if submitted in the form of Deposit at Call or Pay Order) may be encashed by the Employer upon submission of Bid Security.

Bid Security shall be submitted with the Technical Bid Envelope. Failure shall result in non-responsiveness and the bid shall be returned.

Clause IB.16 Alternate Proposals by Bidder

The text of this sub-clause is deleted and replaced with following.

"Alternate Proposals are not allowed. Bidders offering more than one proposal(s) shall be disqualified and its bid shall be deemed to be non-responsive".

Clause IB.17 Pre-Bid Meeting

As per notice inviting bid which may be either physical or onlinemeeting.

Clause IB.18 Format and Signing of Bid

Sub-Clause 18.4 Number of copies of Bid:

The Sub–Clause 18.4 has been amended as under:

Each bidder shall prepare and submit all documents in original along with the documents as described in Clause IB-11.1 and 19.1 of the Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked "**ORIGINAL**".

Sub-Clause 18.5 The Sub–Clause 18.5 has been amended as under:

The Bid shall be written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder pursuant to Sub-Clause 11.1(a) hereof. All pages of the Bid shall be initialed and stamped by the person or persons signing the Bid. One (1) copy of Power of Attorney must be attached to the Bid submitted to the Employer if this Bid is signed / executed by a person other than the President, Partner or Owner of the Bidder's Company.

Clause IB.19 Sealing and Marking of Bids

Sub-Clause 19.1 The Sub–Clause 19.1 has been amended as under:

Each Bidder shall submit his Bid as under:

(a) **ORIGINAL** Bid comprising Volume-I including Addendum/Corrigendum, Volume-II, Volume-III & Volume-IV sealed in four separate envelopes marked as Volume-I, Volume-II, Volume-III & Volume-IV respectively and put into large envelope named as **ORIGINAL.**

(b) Bid Security shall be put in a separate envelope. The envelope of Bid Security shall be sealed with the envelope of Technical Bid (Volume- I). The envelopes containing the Original Bid and other Bid documents shall be put in a larger envelope, which will be properly sealed and returned by the fixed date and time of Bid submission as specified in the Notice Inviting Bids.

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

PA to Director Engineering,
1st Floor SBP Bolton Market Building M.A Jinnah Road Karachi

(b) Name & identification number of the Contract is as follows:
Name: "Retrofitting Work of Buildings at SBP BSC Quetta"

Identification Number: Not Applicable

Clause IB.20 Deadline for Submission of Bids

Sub-Clause 20.1(a) Time and date of Bid submission and Bid opening shall be as per the data provided in the Notice Inviting Bids.

Clause IB.23 Bid Opening

Sub-Clause 23.1 Venue, time, and date of Bid opening.

As provided in Notice Inviting Bids.

Sub-Clause 23.6 Delete the word "N".

Clause IB.24 Process to be Confidential

Sub-Clause 24.1 In case of grievance, the address of Grievances Committee is:

Chairman Grievance Committee,
Office of the Director Human Resource Management Department,
1st Floor, BSC House State Bank of Pakistan Main Building Complex,
I.I Chundrigar Road, Karachi.

Clause IB.26 Examination of Bids and Determination of Responsiveness

Sub-Clause 26.2 The Sub–Clause 26.2 has been amended as under:

A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by therequired Bid Security; (iv) Includes signed Integrity Pact where required as per clause IB.35 and (v) conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation (vi) determined as qualified. 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; (iii) adoption/rectification whereof would affect unfairly the

competitive position of other bidders presenting substantially responsive bids. Only substantially responsive bid shall be considered for further evaluation.

Clause IB.28 Evaluation and Comparison of Bids

Sub-Clause 28.4 The sub-clause 28.4 is deleted and replaced with following:

"If the rate of any item of the successful bidder is abnormally high i.e. 15% more or higher than the rate of the same items in Engineer's Estimate, the Employer may require the bidder to produce detailed price analyses for any or all such items of Bid of the successful Bidder to demonstrate the internal consistency of those prices. After evaluation of the price analyses by the Employer / Engineer the rate of successful bidder (if required) will be rationalized in following manner and the decision of the Employer / Engineer in this regard shall be final and binding on the successful bidder:

a. The rate or price of individual abnormally high quoted items compared with the Engineer's Estimate would be decreased to the individual item rate of the Engineer's Estimate. The revised BOQ so prepared will be called as Rationalized BOQ duly stamped and signed by the successful bidder which shall be final and binding for interim payment purposes only. Withheld amount(s) of abnormally high quoted items shall be released during finishes stage or at such stage when items identified as below / lower to Engineer's estimate are in progress resulting in making final payments as per original quotes.

b. For calculation of Price Adjustment and Adjustment in US$ rates under Sub-Clause 70.1 during Payments Certification, the original bid rates quoted by the successful bidder would be considered.

Clause IB.29 Award

Sub-Clause 29.1 The sub-clause 29.1 is deleted and replaced with following:

Subject to clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been found Most Advantageous Bid i.e. the bid which has been determined to be substantially responsive to the eligibility criteria and other terms of Bidding Documents and who has offered the lowest evaluated Bid Price.

Clause IB.31 Notification of Award

Sub-Clause 31.2 The sub-clause 31.2 is deleted and replaced with following:

No Negotiation with the bidder having evaluated as most advantageous or any other bidder shall be permitted.

Clause IB.32 Performance Security

Sub-Clause 32.1 Delete the text of Sub–Clause 32.1 and substitute with the following:

The Bidder shall provide Performance Security to the Employer in the prescribed Form annexed to these Bidding / Contract Document. The

said Security shall be furnished to the Employer by the Contractor within 28 days after the receipt of the Letter of Acceptance. ThePerformance Security shall be of an amount equal to 10% of the Contract Price stated in the Letter of Acceptance. The amount in the form of Pay Order, Demand Draft or Deposit at call will be encashedby the Employer upon submission of Performance Security.

Notwithstanding anything contained in the Contract and / or applicable law, Performance Security shall be forfeited if the Contractor fails to perform the Contract.

Sub-Clause 32.2 Delete the text of Sub–Clause 32.2 and substitute with the following:

Failure of the successful bidder to comply with the requirements of Sub-Clause IB. 28.4 or Sub-Clause IB.32.1 or Clauses IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

Clause IB.33 Signing of Contract Agreement

Sub-Clause 33.1 Sub–Clause 33.1 has been amended as under:

The successful Bidder shall submit along with the Performance Security, Contract Agreement as per the Form of Agreement within the time period stipulated in clause IB- 32.1 provided in the Bidding Documents, incorporating all agreements between the parties.

Sub-Clause 33.2 The formal Agreement between the Employer and the successful bidder will be executed within twenty-one (21) days after the receipt / approval / verification of the Contract Agreement and Performance Security and evidence to insurance as per Sub-Clause 32.1 hereof.

Add the following Clauses:

Clause IB.37 Black listing Mechanism

Code of Conduct:

a) It is the Employer's policy that the bidders observe the highest standards of ethics during the procurement and execution of such contracts. Inpursuit of this policy, the Employer follows, inter alia, the instructionscontained in PPR¬2004 which defines:

(i) “coercive practices” which means any impairing or harming or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence the actions of a party to achieve a wrongful gain or to cause a wrongful loss to another party;

(ii) “collusive practices” which means any arrangement between two or more parties to the procurement process designed to stifle open competition for any wrongful gain, and to establish prices at artificial, non-competitive levels;

(iii) “corrupt practices” which means the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence the acts of another party for wrongful gain;

(iv) "fraudulent practices" which means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit orto avoid an obligation; and

(v) "obstructive practices" which means harming or threatening to harm, directly or indirectly, persons to influence their participation in a procurement process, or affect the execution of a contract.

b) Under Rule-19 of PPR-2004, the Employer can inter alia blacklist and debar bidders found to be indulging in corrupt or fraudulent practices mentioned at para a) above. Such matters would be referred to the Blacklisting Committee of the Employer that is empowered to take actions accordingly. Such blacklisting or barring action shall be communicated by the Employer to PPRA and the Bidder in the form of decision containing the grounds for suchaction. :

Nature of Fault	Means of Verification
Corruption	Actual instance verifiable as per law of land and applicable rules and regulations of SBP
Deviation from commitment	If the bidder deviates from its prior commitment or declaration made regarding the bid or proposal submitted by the bidder.
Fraud	Cross verification of documentary undertakings submitted by Bidder
Collusion	Results of Bid analysis resulting in substantive evidence of collusion

Overriding Effect of PPR – 2004

Clause IB.38 Whenever in conflict with these documents the stipulations of PPR-2004 (Public Procurement Rules-2004) shall prevail.

Clause IB.39 Bid Discount
Omitted as PPR Rule 38A.

Clause IB.40 Confidentiality

Sub-Clause IB.40.1 Information relating to evaluation of bids and recommendations concerning to award of the contract shall not be disclosed by the Employer to the bidders or to any other person who is notofficially concerned with the process, until the announcement of the result of evaluation.

Sub-Clause IB.40.2 The Bidder shall not disclose or attempt to make public any information relating to the bidding documents, bidding process and award of the contract to any person or entity without the Employer's prior written consent.

Sub-Clause IB.40.3 In case of any disclosure related to the bidding process and contractual obligations at any stage by any bidder and/or

contractor, the Employer may reject its bid and/or terminate the contract.

FORM OF BID AND APPENDICES TO BID

LTB-1

FORM OF BID

Date: .....

Name of Contract: Retrofitting work of buildings at SBP BSC Quetta

To:

Director
Engineering Department
1st Floor SBP Bolton Market Building
State Bank of Pakistan SBP, BSC
M.A. Jinnah Road, Karachi

We, the undersigned, declare that:

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

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

"Retrofitting work of buildings at SBP BSC Quetta"

c) We understand that all the Appendices attached hereto form part of this Bid. Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of 182 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

d) We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in Appendix-A to Bid.

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

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

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

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

Name.....

In the capacity

of.....

Signed.....

...

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

Date.....

Address……

Appendix-A to Bid

SPECIAL STIPULATIONS
Conditions of Contract

Clause			
1.	Engineer's Authority to issue Variation in emergency	2.1	2% of the Contract Price stated in the Letter of Acceptance
2.	Law applicable	5.1(b)	The law to be applied is the law of Islamic Republic of Pakistan.
3.	Amount of Performance Security	10.1	10% of Contract Price stated in the Letter of Acceptance.
4.	Time for Furnishing Programme	14.1	Within 28 days from the date of receipt of Letter of Acceptance
5.	Minimum amount of Third Party Insurance	23.2	Rupees Five hundred thousand (Rs. 500,000) per occurrence with number of occurrences unlimited.
6.	Time for Commencement	41.1	Within fourteen (14) days from the date of Engineer's Notice to Commence which shall be issued within fourteen (14) days after signing of Contract Agreement.
7.	Time for Completion	43.1	730 days from the date of receipt of Engineer's Notice to Commence.
8.	Amount of Liquidated Damages	47.1	0.1% of Contract Price for each day of delay in completion of the Works subject to a maximum of ten percent (10%) of Contract Price stated in Letter of Acceptance.
9.	Defects Liability Period	49.1	365 days from the effective date of Taking Over Certificate.
10.	Percentage of Retention Money	60.2	5% of the amount of Interim Payment Certificate
11.	Limit of Retention Money	60.2	5% of Contract Price stated in the Letter of Acceptance
12.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	Minimum amount of Interim Payment Certificate shall be Rupees two (02) Millions.
13.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer	60.10	Twenty eight (28) days.
14.	Mobilization Advance (Interest Free)	60.11	Up to 15 % of Contract Price as stated in the Letter of Acceptance.

BB-1
Appendix-B to Bid

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

NOT USED

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BC-1
Appendix-C To Bid

PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT

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

Cost Element	Description	Weightages	Applicable Price
(i)	(ii)	(iii)	(iv)
a.	Fixed Portion	0.42	
b.	Labour *(Labourer (un-skilled) per day, shall be taken as representative of all types of Labour (skilled/unskilled) deployed at site)*	0.30	Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
c.	Cement – in bags *(local 50Kg bag, shall be taken as representative of all types of cement work involved in the project)*	0.03	Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
d.	Steel *(Iron bars (1/2" 40 grade) per tonne, shall be taken as representative of all types of steel/MS work involved in the project)*	0.2	Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
e.	High Speed Diesel (HSD) *(HSD shall be taken as representative of all kind of fuels used in connection with the Contract)*	0.05	Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
	Total	1.000	

Notes:

1) The base date price (or base date index) of any element shall be the price of the element for the month on the day falling 28 days prior to the latest day for submission of bids.
2) The current date price (or current date index) of any element shall be the price of the element for the month falling on the day 28 days prior to the last day of the period to whichthe particular Payment Certificate relates
3) Any fluctuation in the indices or prices of materials other than those given above shall not be subject to adjustment of the Contract Price.
4) The prices for the cost elements shall be used for the City where the Site is located. In- case the Site is not listed in the monthly statistical bulletin, the prices for the nearest City listed in the Bulletin shall be used.

METHODOLOGY USED FOR DETERMINIATION OF WEIGHTAGES OF COST ELEMENTS

A. Weightage of cement has been calculated by estimating the amount of cement bags required for the whole project. Quantity of bags was then multiplied with the rate of one

bag of cement which was subsequently divided the total estimated cost of the project.

B. Similar methodology is used for determination of weightages of steel.

C. Retrofitting work being labor intensive has been given weightage accordingly.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BD-1
Appendix-D to Bid

BILL OF QUNATITIES
(to be filled and signed by the Bidder)

(Separately attached as Volume IV)

BE-1
Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

(to be filled and signed by the Bidder)

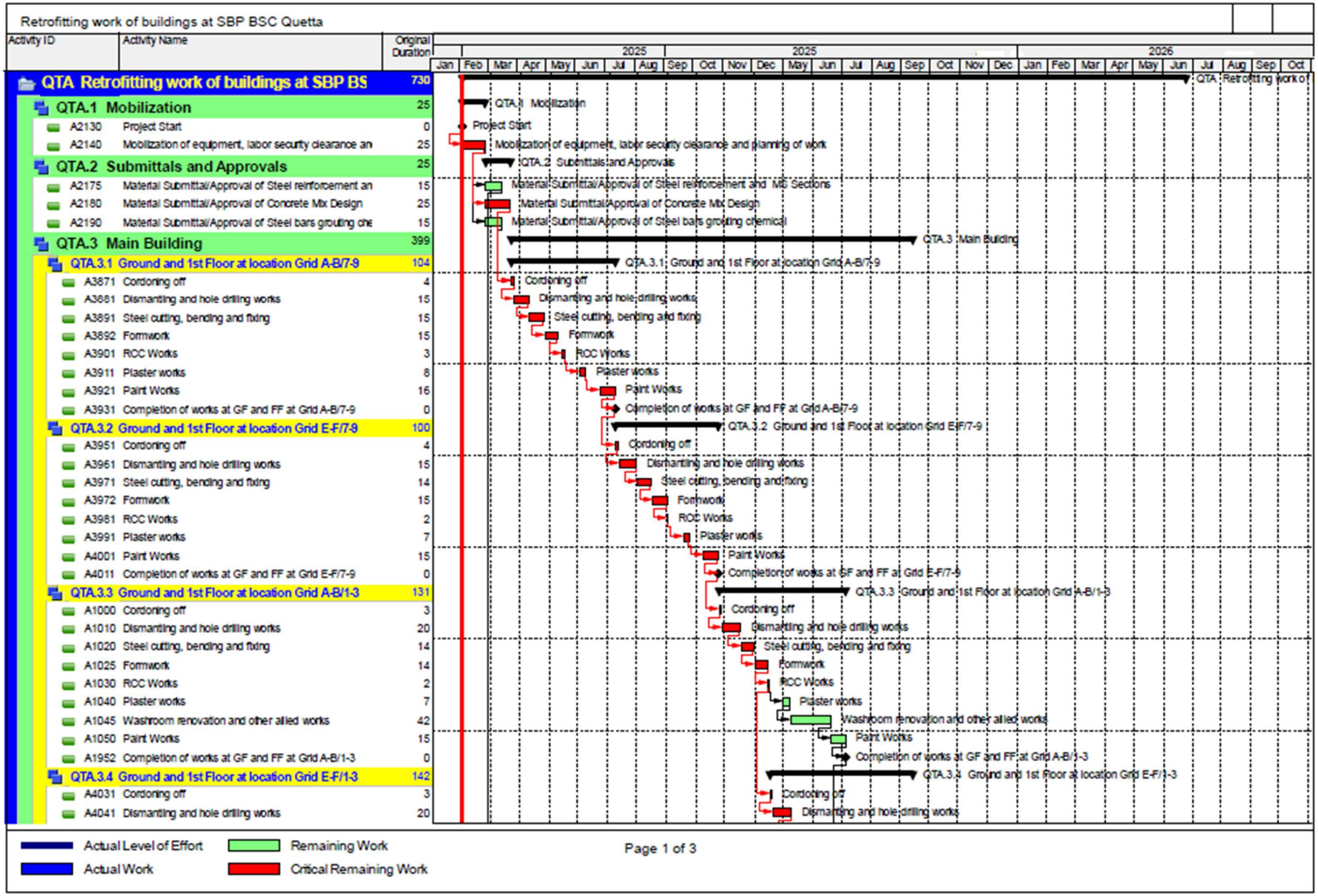
Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to his Bid Construction Schedule in the bar chart (Primavera or MS Excel) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the works and parts of the works may meet Employer's completion targets as set forth in the proposed construction schedule attached hereunder from Page35 to 39.

Attach sheets as required for the specified form of Construction Schedule.

Authorized Signature and official Seal: _____

Name: _____

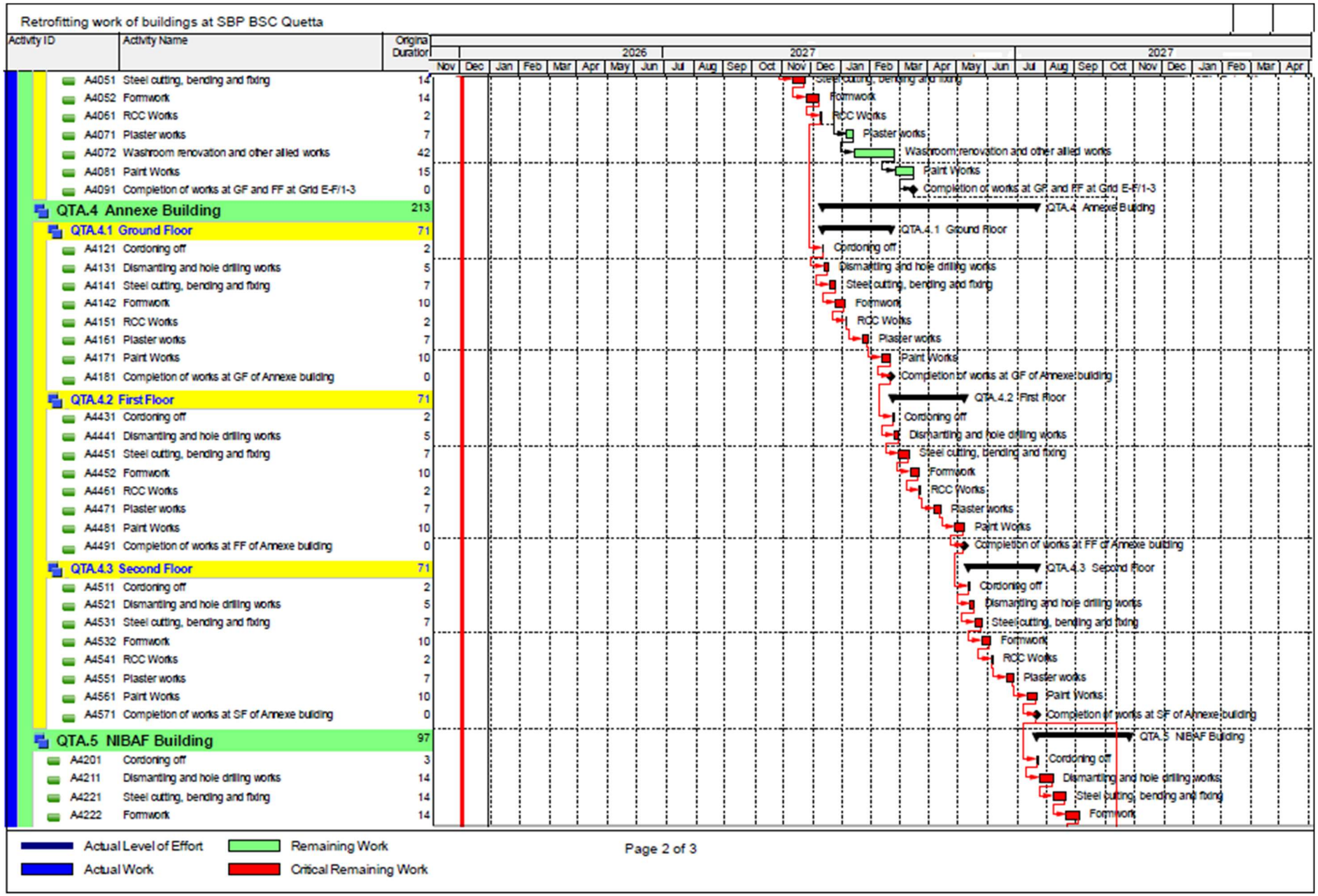
Date: _____



For Contractor
Sign and Seal

For Consultant
Sign and Seal

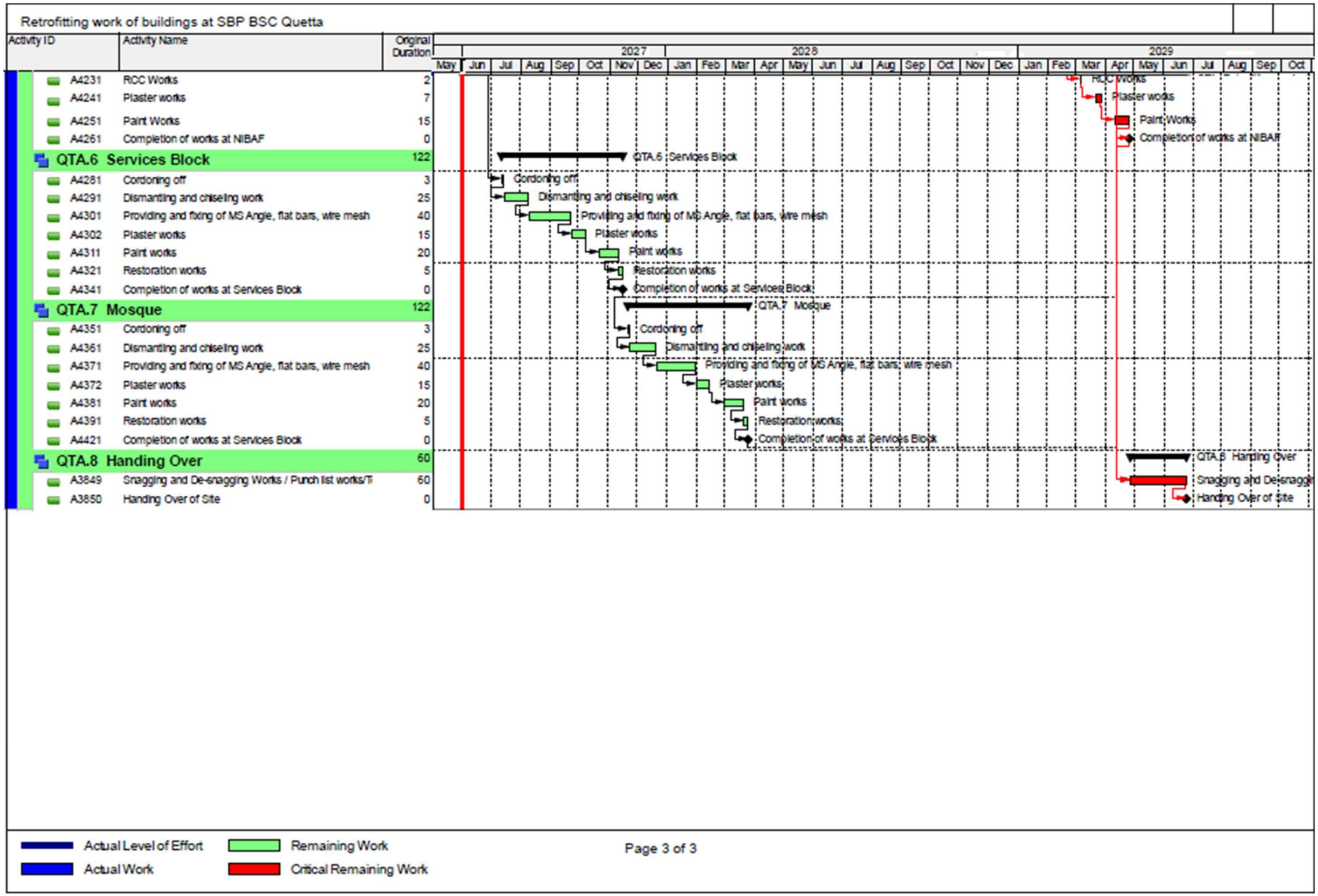
For SBP-BSC
Sign and Seal



For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal



For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

BF-1
Appendix-F to Bid

METHOD OF PERFORMING THE WORK

(to be filled and signed by the Bidder)

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

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

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

3. The method of executing the Works, the procedures for installation of equipment and machinery and transportation of equipment and materials to the site.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

(to be filled and signed by the Bidder)

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

LIST OF MAJOR EQUIPMENT

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

BG-2

Appendix-G to Bid

EQUIPMENT:

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

Sr. No.	Description	Min: Required
1.	Concrete Mixer Machine (Full Cement Bag)	1 No.
2.	Scaffolding	4,000 Rft
3.	Steel Shuttering	2,000 Sft
4.	Concrete Vibrator	2 Nos.
5.	Jack Hammer to break/chip/drill in concrete	02 Nos
6.	Drill Machine to Drill Holes in Concrete	02 Nos

BG-3
Appendix-G to Bid

BIDDER'S MINIMUM MANDATORY REQUIREMENT OF EQUIPMENT FOR RELEASING SECOND PART OF MOBILIZATION ADVANCE

Following are the Minimum mandatory requirement of equipment for releasing second part of mobilization advance as per Clause # 60.11: Particular Conditions of Contract (PCC) – Part II. – All equipment must be in good condition to be decided by the Employer/Engineer)

Sr. No.	Description	Min: Required
1.	Concrete Mixer Machine (Full Cement Bag)	1 No.
2.	Scaffolding	4,000 Rft
3.	Steel Shuttering	2,000 Sft
4.	Concrete Vibrator	2 Nos.
5.	Jack Hammer to break/chip/drill in concrete	02 Nos
6.	Drill Machine to Drill Holes in Concrete	02 Nos

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BH-1
Appendix-H to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

(to be filled and signed by the Bidder)

Establishment of Camp and Housing facility within the premises of SBP BSC Quetta Office is not allowed.
Contractor will be allowed to use the electrical connection and water supply, however, in case of non-availability/shortage in supply, contractor shall arrange for electricity backup and water supply at his own cost.
Storage of material/equipment within the premises of SBP BSC Quetta Office is allowed, however, contractor is responsible for proper stacking, safeguarding and covering of the material.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BI-1
Appendix-I to Bid

LIST OF SUBCONTRACTORS

(to be filled and signed by the Bidder)

The Contractor undertakes that if any part of the Works is subcontracted, the subcontractors shall reliable and competent as per PEC bye laws to perform that part of the work and shall have adequate experience of the similar works. Contractor understands that final selection of subcontractor will be subject to the Employer's approval.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BJ-1
Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of the Works and the Rates in theBill of Quantities.

Note: Only %age of Bid Price is to mentioned.

Months	% of Bid Price
(a)	(b)
Start to 3 months	
4-6 months	
7-9 months	
10-12 months	
13-15 months	
16-18 months	
19-21 months	
22 months till completion	
Total	100 %

Authorized Signature and official Seal: _____

Name: _____

Date: _____

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

BK-1
Appendix-K to Bid

ORGANIZATIONAL CHART FOR THE SUPERVISORY STAFF

(to be signed by the Bidder)

MINIMUM MANDATORY STAFF REQUIREMENT:

The Contractor shall arrange all requisite resources for timely completion of project as per provisions given in the Bidding Documents.

Following is the list of Minimum Mandatory Staff Requirement to be deployed at site by the Contractor as and when required by the Engineer till completion of the Project. In case Contractor fails to deploy any of the following personnel, the Engineer will deduct the amount mentioned at column (E) for the respective personnel. However, the deduction of the amount does not relieve the contractor to deploy the minimum staff at site.

Designation	***Nos.***	***Minimum Qualification***	***Min. Relevant Working Experience***	***Minimum Amount to be deducted per month per person in case the personnel is not deployed at site (Rs.)***
(A)	***(B)***	***(C)***	***(D)***	***(E)***
Site Supervisors (Civil)	02	DAE Civil/ B-Tech	10 years (building constructio n projects)	150,000/-

Authorized Signature and official Seal: _____

Name: _____

Date: _____

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

BL-1
Appendix-L to
Bi

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

Without limiting the generality of the foregoing, [name of Contractor] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation 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/autonomous body, except that which has been expressly declared pursuant hereto.

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

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

Notwithstanding any rights and remedies exercised by GoP/autonomous body in this regard, [name of Contractor] agrees to indemnify GoP/autonomous body for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP/autonomous body 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/autonomous body.

Name of Employer:……

Signature: ……..

[Seal]

Name of Contractor: ……

Signature: ……

[Seal]

BM -1
APPENDIX-M TO BID

QUALIFICATION CRITERIA

Qualification of Bidders shall be evaluated on the basis of mentioned criteria regarding the Bidder's financial soundness, experience record, personnel and equipment capabilities, in addition to fulfillment preliminary Scrutiny requirements.

Information supplied by the Bidders for the qualification must apply to the company/ firm, named on the statement only. The substitution of background information pertinent to qualification will not be considered for another company related to the applicant company through a "Group ownership. The Employer reserves the right to waive minor deviations, if they do not materially affect the capability of the Bidder to perform the Contract.

A. Preliminary Scrutiny:

i. Bid Security as per Clause IB 15 of Bidding Data and Proof of Bid Security as per Clause IB 19.1(c) of Bidding Data.
ii. Valid registration with PEC in Category C-4 or above specialization codes CE-10.
iii. Legal Status of the firm (provide relevant documents) as under

In case of Individual / Sole Proprietor	In case of Associated of Persons (AOP)	In case of (Pvt.) Limited
• Copy of CNIC • Affidavit that firm is individual / Sole proprietor	• Partnership Deed • Any other relevant Document • No. of Partners • Nos. of partners along with CNIC	• Copy of Article of Association / Memorandum • Form 29 • Form A • Nos of Directors along with copy of CNIC

iv. Affidavit on non-judicial stamp paper on the prescribed Form annexed to these Bidding / Contract Documents.

a. That I / We (the bidder) has / have not been blacklisted, declared in-eligible or debarred by any organization / department for corrupt or fraudulent practices, or no failure to perform with SBP BSC in past prepared within the current month of submission of Bids.

b. That I / We (the bidder) has / have obtained all information regarding all applicable Taxes and conform the requirements thereof at bidder's own responsibility and has been included the same in the quoted Bid Price. The quoted Bid Price has also included the cost of accepting the general risks/ liabilities and obligations set forth or implied in the Contract. I / We (the bidder) understand and agree that the Employer will entertain no claim at any later stage on this account.

c. That I / We (the bidder) has / have visited and examined the Site of Works and its surroundings and has obtained all information that which is necessary for preparing the bid and entering into a contract. I / We (the bidder) understand and agree that the Employer will entertain no claim at any later stage on this account.

v. Information on any litigation or arbitration resulting from contracts completed or under execution by the Bidder. In case, the firm has never been involved in litigation, an affidavit to such effect should be provided. If the bidder is involved in litigation / arbitration with State Bank of Pakistan, it shall be held non-responsive.

vi. The Bidder must be on Active Tax Payer's List of Federal Board of Revenue (NTN, GST).

vii. The bidder shall also provide income tax returns of last five years.

viii. The bidder must be registered with concerned Provincial Revenue Board/ Authority. If bidder is not registered or inactive then 100% tax would be deducted from the payments as per applicable laws. State Bank of Pakistan (SBP) is not to be treated as Government Entity for this purpose therefore 100% applicable tax will be recovered.

ix. If the Bidder has worked with State Bank of Pakistan on any project, the Bidder shall provide satisfactory completion certificate issued from the State Bank of Pakistan. Failure to provide the Satisfactory Certificate would cause bidder as non-responsive.

x. Bidder shall be held non-responsive if Bidder's name is found in Schedule-IV (https://nacta.gov.pk/proscribed-persons-2/) and list of organizations/ Splinter Outfits https://nacta.gov.pk/ proscribed-organizations/ notified by National Counter Terrorism Authority NACTA Pakistan.

xi. The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding Rupees ten million

The Bidder failed in Preliminary Scrutiny shall be considered disqualified and its Technical Bid will not be evaluated any further.

B. Detailed Scrutiny:

The detailed qualification evaluation shall be carried out on the basis of the Pass / Fail criteria for the different categories and minimum qualifying requirements are prescribed hereunder:

1. Experience:

Sr. No.	Sub-Category	Passing Criteria
a	Experience as Prime contractor in execution of Building Projects completed during ***last seven (07) years.***	The bidder will qualify the experience criteria if the bidder has completed at least; Two building construction projects, each of minimum cost of Rs. 50.0 Million.

Note:

i. The bidder must provide "Letter of Award" and Taking Over/ Completion Certificate of completed projects of which the experience is being claimed.

ii. Project will not be considered for evaluation for which above letter/ certificate is not provided.

iii. If bidder shows the experience of foreign country, it will provide all the relevant documents dully verified by the Embassy of Pakistan in that country.

iv. Projects executed under Joint Venture (JV) and as Sub Contractor will not be considered.

2. Equipment Capabilities

Sr. No.	Description	Min: Required
1.	Concrete Mixer Machine (Full Cement Bag)	1 No.
2.	Scaffolding	4,000 Rft
3.	Steel Shuttering	2,000 Sft
4.	Concrete Vibrator	2 Nos.
5.	Jack Hammer to break/chip/drill in concrete	02 Nos
6.	Drill Machine to Drill Holes in Concrete	02 Nos

Notes:

Applicant must provide an undertaking to the effect that the aforementioned equipment is available with the firm in good condition of deployment at the project site.

3. Financial Capabilities

Bank statement of four months' period prior to bid opening date OR Bank statement showing Credit Line Facility to be provided to confirm the below evaluation criteria. Following is minimum eligibility criteria:

i.	The minimum amount of unutilized credit line facilities or cash in bank account in any one instance	Rs. 12.0 Million

C) Joint Venture (JV)

Joint Venture is not allowed.

D) Conflict of Interest

The Bidder must not be associated, nor have been associated in the past, with the consultant or any other entity that has prepared the design, specifications, and other prequalification and bidding documents for the project, or was proposed as Engineer for the contract, over the last five years. Any such association may result in disqualification of the Bidder.

E) Other Factors

1) Price Bids of only firms has been post qualified under this procedure shall be opened. A qualified firm may participate only in one bid for the contract. If a firm submits more than one bid all bids including that bidder will be rejected. This rule will not apply in respect of bids which include specialist sub-contractors who are used by more than one bidder.

2) The Employer reserves the right to:

   a) Amend the scope and value of any contract(s) to be bid, in which event the bidder(s) will only bid among those post qualified bidders who meet the requirements of the contract(s) as amended. However, the Employer has to review the disqualified bids who originally do not meet the specified criteria for post - qualification.

   b) Reject or accept any application; and

   c) Cancel the post qualification process and reject all applications.

The Employer shall neither be liable for any such actions nor be under any obligation to inform the Applicant of the grounds for rejection, however, may be debriefed if solicited.

BN-1
Appendix-N to Bid

LIST OF RECOMMENDED MANUFACTURERS

(to be signed by the Bidder)

1. Qualifications of Manufacturers of Equipment and Material

The local and imported equipment offered by the bidder shall be of reputed manufacturers who have at least ten (10) years of proven experience in the design and manufacture of such equipment unless mentioned otherwise, have all testing facilities for testing of equipment strictly in accordance with the laid down standards and specifications and have a local representation in Pakistan with availability of trained technical staff having OEM Certification (where required).

All equipment's/ material must be supplied from Authorized/ Sole Distributors.

2. Brand Names

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

3. List of Manufacturers Recommended and as Offered

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

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

All other items not included in the list hereunder will be approved by the Engineer in accordance to their compliance with the specifications, capacity and/ or performance requirements.

Onus lies with the Contractor for establishing the genuineness of any material/ product.

BO-1
Appendix-O to Bid

SPECIAL PROVISIONS & TECHNICAL SPECIFICATIONS

(to be signed by the Bidder)

(Separately attached as Volume- II)

Authorized Signature and official Seal: _____

Name: _____

Date: _____

BP-1
Appendix-P to Bid

LIST OF DRAWINGS

(to be signed by the Bidder)

(Separately attached as Volume- III)

Authorized Signature and official Seal: _____

Name: _____

Date: _____

STANDARD FORMS

BS-1

FORM OF BID SECURITY
(BANK GUARANTEE / BOND)

Security Executed on _____
(Date)

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

Name of Principal (Bidder) with Address

_____

_____

_____Penal Sum of Security Rupees.

(Rs._____)

Bid Reference No: _____

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

_____

_____

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

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

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

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

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

(3) that in the event of failure of the successful Bidder to execute the proposed Contract Agreement for such work and furnish the required Performance Security, the

entire said sum be paid immediately to the said Employer pursuant to Clause 15.6 of the Instruction to Bidders for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified 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 Contractor in the event of non withdrawal of the said Bid within the time specified for itsvalidity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

BS-2

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

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

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

SURETY (Bank)

WITNESS:

Signature _____

1. _____ Name _____

_____ Title _____

Name, CNIC No. Title& Address

Stamp/Seal: _____

2. _____

_____

Name, CNIC No. Title & Address

PS-1

FORM OF PERFORMANCE SECURITY
(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address: _____

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 _____ for the _____ (Name of Contract)
(Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 49, Defects 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 thisInstrument under its seal on the date indicated above, the name and corporate sealof the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____

Guarantor (Bank)

Witness: Signature

_____

1. _____ Name

_____

_____ Title

_____

Name, CNIC No. Title,& Address

2. _____

_____

Name, CNIC No. Title,& Address Guarantor (Stamp/Seal)

CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of_____, 20__ between_____(hereafter called the "Employer" which expression shall include the successors, legal representatives and permitted assignees) of the one part and_____ of _____ _ (hereafter called the "Contractor" which expression shall include the successors, legal representatives and permitted assignees) of the other part.

WHEREAS the Employer is desirous that certain Works, viz _____should be executed by the Contractor and has accepted a Tender 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 Bid;
   (d) Special Stipulations (Appendix-A to Bid);
   (e) The Particular Conditions of Contract – Part II;
   (f) The General Conditions of Contract– Part I;
   (g) Special Provisions
   (h) The Appendices to Bid (B to N), (excluding Appendix-D to Bid);
   (i) The Drawings;
   (j) The Specifications, Technical Provisions;
   (k) The Priced Bill of Quantities (rationalize and original); (Appendix-D to Bid)
   (l) Performance Security.
   (m) Addenda / Any Other Documents (if any) forming part of Bidding Documents
   (n) Instruction to Bidders and Bidding Data

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 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 the day and year first before written in accordance with the respective laws.

For and on behalf of
Contractor
Signature:_____
Name :- _____
Title :- _____

For and on behalf of
Employer
Signature:_____
Name :- _____
Title :- _____

Signed, Sealed and Delivered in the presence of:

_____

Witness 01
Signature:_____
Name :- _____
Title :- _____
Address :-_____

_____

Witness 02
Signature:

_____
Name :- _____
Title :- _____
Address :- _____

_____

Witness 01
Signature:_____
Name :- _____
Title :- _____
Address :- _____

_____

Witness 02
Signature:

_____
Name :- _____
Title :- _____
Address :- _____

_____

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

MAG-1

MOBILIZATION ADVANCE GUARANTEE

Guarantee No._____Date_____
WHEREAS_____(hereinafter called the "Employer") has entered into a Contract for _____with_____(hereinafter called the "Contractor").

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

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

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

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

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

This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____whichever is earlier.
(Date)
The Guarantor's liability under this Guarantee shall not in any case exceed the sum of Rupees _____(Rs_____).

This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from Interim Payment Certificates of the Contractor provided that the Guarantor agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

GUARANTOR

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

WITNESS

1. _____
(Name, CNIC No. Title & Address)

2. _____ _____
(Name, CNIC No. Title & Address) Guarantor (Stamp/Seal)

UNDERTAKING

On separate non-judicial stamp paper of denomination not less than Rs. 200

I / We (the bidder) do hereby solemnly affirm as under:

d. That I / We have not been blacklisted, declared in-eligible or debarred by any organization / department for corrupt or fraudulent practices, or no failure to perform with SBP BSC in past.

e. That I / We have obtained all information regarding all applicable Taxes and conform the requirements thereof at my / our own responsibility and have included the same in the quoted Bid Price. The quoted Bid Price also includes the cost of accepting the general risks / liabilities and obligations set forth or implied in the Contract. I / We understand and agree that the Employer will entertain no claim at any later stage on this account.

f. That I / We have visited and examined the Site of Works and its surroundings and have obtained all information which is necessary for preparing the bid and entering into a Contract. I / We understand and agree that the Employer will entertain no claim at any later stage on this account.

g. That I / We have never been involved in any litigation / arbitration / Blacklisting case.

D E P O N E N T

A F F I D A V I T

FOR SOLE PROPRIETERSHIP

On Separate non-judicial stamp paper of denomination not less than Rs. 200

I _____S/D/O_____bearing CNIC No. _____ resident of _____ do hereby solemnly affirm and declare that I am the Sole Proprietor of the Firm M/s _____ having its registered office at _____, bearing Pakistan Engineering Council (PEC) registration No._____and as such, I am entirely responsible for all businesses carried out in the name of the Firm.

D E P O N E N T

LC – 1

SECURITY BOND AGAINST RELEASE OF PAYMENT TO BE MADE BY EMPLOYER FOR ESTABLISHMENT OF LETTER OF CREDIT

Bond No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor with address:_____

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

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and clause No._____(hereinafter called as the Payment Terms) 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 terms of the Bidding Documents and the Payment Terms 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 Payment Terms during the original terms of the said Documents and any extensions thereof thatmay 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 whichmodifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of the Payment Terms, 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 defences 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.

LC – 2

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

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name_____
Name, Title & Address

Title _____

2. _____

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

GENERAL CONDITIONS OF CONTRACT

PART-1

GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract (Part-1) are based on the FIDIC "Conditions of Contract for Works of Civil Engineering Construction, Part-I General Conditions" Fourth Edition (1987) Reprinted in 1988 with editorial amendments, Reprinted in 1992 with further amendments, Reprinted 2011. These Conditions of Contract are published by the "FEDERATION OF INTERNATIONALE DES INGENIEURS-CONSEILS" (FIDIC), P.O. Box 86, CH 1000 Lausanne, 12-Chailly, SWITZERLAND.

The prospective Bidders may obtain copy of the above mentioned Conditions of Contract directly from Head Office of FIDIC, on the address indicated above against payment of their usual charges. However, the aforesaid FIDIC Conditions of Contract are availablein the PEC Standard Form of Bidding Documents (Civil Works) which may be purchased from PEC Head office, Islamabad, for ready reference.

PARTICULAR CONDITIONS OF CONTRACT

PART II

PARTICULAR CONDITIONS OF CONTRACT

These Particular Conditions Of Contract - Part II are additions, deletions and amendments to General Conditions of Contract - Part I and shall be taken into consideration in interpreting or construing such clauses. Sub-Clause numbers, if similar as of Part-I, are amendments therein otherwise these are additional Clauses or Sub-Clauses thereto.

Definitions 1.1 (a) (i) The "Employer" means Director Engineering, State Bank of Pakistan BSC, Head Office Karachi and shall mean to include the legal successors and any assignee of such person.

(a) (iv) The "Engineer" means competent person to be nominated later by the Employer, and notified to the Contractor, to act in replacement of the Engineer.

Provided always that except in cases of professional misconduct, the outgoing Engineer to formulate his certifications/ recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

Add the following paragraphs:

(a) (vi) "Employer's Representative" is:

Any competent person appointed in writing by the Employer and shall take effect on delivery of such appointment to the Engineer and the Contractor. The Employer may from time to time delegate to the Employer's Representative any of theduties and authorities vested in the Employer and may at any time revoke such delegation.

Any communication given by the Employer's Representative to the Engineer and the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Employer.

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

(b) (v) Add the following at the end of the paragraph:

The word "Bill of Quantities" is synonymous with "Estimate including Premium".

(vi) Add the following at the end of the paragraph:

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

Add the following paragraph:

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

(e) (i) Delete the text and substitute with the following:

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

(iv) Add the following at the end of Paragraph:

"Price put to Bid" means the Quoted Price for the Works as provided in the Summary of Cost, Appendix-D to Bid.

Engineer's Duties and Authority 2.1 (b) With reference to Sub-Clause 2.1(b), the following provisions shall also apply;

The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses:

i. Consenting to the sub-letting of any part of the Works under Sub-Claus- 4.1 "Subcontracting".
ii. Certifying additional cost determined under Sub- Clause 12.2 "Not Foreseeable Physical Obstructions or Conditions".
iii. Any action under Clause 10 "Performance Security" and Clauses 21, 23, 24 & 25 "Insurance" of sorts.
iv. Any action under Clause 40 "Suspension".
v. Any action under Clause 44 "Extension of Time for Completion."
vi. Any action under Clause 47 "Liquidated Damages for Delay".
vii. Issuance of "Taking Over Certificate" under Clause 48.
viii. Issuing a Variation Order under Clause 51 except:
    a. in an emergency* situation, as stated here below, or
    b. if such variation would increase the Contract Price by less than the amount stated in the Appendix-A to bid.
ix. Fixing rates or prices under Clause 52.
x. Release of Retention Money to the Contractor under Sub- Clause 60.3 "Payment of Retention Money".
xi. Issuance of "Final Payment Certificate" under Sub-Clause 60.8.
xii. Issuance of "Defect Liability Certificate" under Sub-Clause 62.1.
xiii. Any change in the ratios of Contract currency proportions and payments thereof under Clause 72 "Currency and Rate of Exchange".

* (If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities under the Contract,

instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.)

Engineer's Representative

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

Add the following Sub-Clauses 2.7 and 2.8:

Engineer not Liable

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

Replacement of the Engineer

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

Language(s) and Law

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

Priority of Contract Documents

5.2 The Sub-Clause has been amended as under:

The several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

(1) The Contract Agreement;
(2) The Letter of Acceptance;
(3) The completed Form of Bid;
(4) Addenda (if any);
(5) Special Stipulations (Appendix-A to Bid);
(6) The Particular Conditions of Contract – Part II;
(7) The General Conditions of Contract – Part I;
(8) The Specifications – Special Provisions;

(9) The completed Appendices to Bid (B to N), (excluding Appendix-D to Bid);

(10) The Priced Bill of Quantities; (Appendix-D to Bid);
(11) The Drawings;
(12) The Specifications, Technical Provisions;
(13) Any other document forming part of the Contract by reference

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

Add the following Sub-Clauses 6.6 and 6.7:

Shop Drawings 6.6 The Contractor shall submit to the Engineer for review 2 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

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

As-Built Drawings 6.7 At the completion of the Works under the Contract, the Contractor shall furnish to the Engineer 2 copies and one reproducible of all drawings amended to comply with the Works as built. The price of such Drawingsshall be deemed to be included in the Contract Price.

Contractor's General Responsibilities 8.1 Add the following under the sub-clause:

SBP BSC will provide access of Service Provider and Service Provider's employee(s) after verification and clearance by the police or other investigation agency as per SBP BSC Security Protocol, to all concerned parts of the buildings/ Premises where Services are to be provided under the Contract.

Contract Agreement 9.1 The Contract Agreement, Performance Security, Insurance Policies / Bonds and other Bond/Guarantees/Sureties / stamp duty shall be prepared and completed at the cost of the Contractor. The Contractor shall prepare two (2) copies of the Contract Document (including all the volumes / documents listed in the Contract Agreement) along-with copies of all the bonds/Guarantees/Sureties, at his cost and shall submit the same to the Employer.

Performance Security 10.1 Delete the text and substitute with the following:

The Contractor shall obtain and provide to the Employer a Performance Security in the prescribed Form annexed to these Bidding / Contract Documents. The said security shall be furnished to the Employer 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 ten percent (10%) of the Contract Price stated in the Letter of Acceptance. The Performance Security will be furnished as below:

a. Performance Security is required to be submitted in the shape of Pay order/ Demand Draft/ Deposit at call /Bank Guarantee from any Scheduled Bank in Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan.

The amount in the form of Pay Order, Demand Draft or Deposit at call will

be encashed by the Employer upon submission of Performance Security.

Notwithstanding anything contained in the Contract and / or applicable law, Performance Security shall be forfeited if the Contractor fails to perform the Contract.

Period of Validity of Performance Security

10.2 Delete the text and substitute with the following:

The Performance security shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. No claim shall be made against such security after the issue of the Defect Liability Certificate in accordance with Sub-Clause 62.1. One half of the such security in shape of insurance guarantee/ bond shall bereturned to the Contractor within 14 days of the issue of Taking-Over Certificate, while the other half in shape of Pay order/ Demand Draft/ Deposit at call /Bank Guarantee shall be returned to the Contractor within 14 days of the issue of the Defects Liability Certificate. The performance security of equivalent amount shall be valid until the periods mentioned hereinabove

Add the following Sub-Clause 10.4:

Performance Security Binding on Variations and Changes

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

Not Foreseeable Physical Obstructions or Conditions

12.2 Delete the text and substitute with the following:

If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine any extension of time to which the Contractor is entitled under Clause 44, and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.

Programme to be Submitted

14.1 The Sub-Clause has been amended as under:

The Contractor shall prepare and submit the programme of the work acceptable to the Engineers with in twenty eight (28) days from the receiptof Letter of Acceptance for agreement of the Engineer and approval of the Employer. This programme shall be prepared in accordance with the suggested programme of works defined in Appendix–E to Bid and shall identify and highlight those activities which are on the critical path.

The time schedule may be adjusted from time to time but the contractual completion date shall remain un-changed in accordance with the Bid documents unless extensions of time are approved in accordance with the

contract.

The programme should be computerized. Progress reporting by the Contractor should be supported, on a monthly basis with an update analysis of the progress including a statement on items, which are or are to become critical to the progress of the Work, along with the proposal on how the Contractor intends to alleviate the situation. Programme should include complete sequence of activities. Programme to be Primavera/MS Excel based and updated with actual progress continually.

Cash Flow Estimate to be Submitted 14.3 The detailed Cash Flow Estimate shall be submitted within twenty eight (28) days from the date of receipt of Letter of Acceptance.

Add the following Sub-Clause 14.5:

Detailed Programme and Monthly Progress Report 14.5

a. For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed programme for the following:
   1. Execution of Works;
   2. Labour Employment;
   3. Material Procurement;
   4. Schedules for submittals of shop drawings/bar-bending schedule, samples of material/literature for approval; and
   5. Other details as required by the Engineer.

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

Add the following Sub-Clauses 15.2 and 15.3:

Language Ability of Contractor's Representative 15.2 The Contractor's authorised representative shall be fluent in the English language. Alternately an interpreter with ability of English language shall be provided by the Contractor on full time basis.

Contractor's Representative 15.3 The Contractor's authorized representative and his other professional engineers working at site shall register themselves with the Pakistan Engineering Council.

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

Add the following Sub-Clauses 16.3 and 16.4:

Language Ability of Superintending Staff of Contractor 16.3 A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. If the Contractor's superintending staffs is not fluent in English language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

Employment of Local Personnel 16.4 The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour from sources within Pakistan.

Add the following Sub-Clauses 19.3 and 19.4:

Safety Precautions 19.3 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 modificationsthereto as the Engineer may authorise or direct and the Contractor shall take or cause to be taken much further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

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

Lighting Work at Night 19.4 In the event of work being carried out at night, the Contractor shall at hisown cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

Employer's Risks 20.4 The Employer's risks are:

Delete the text and substitute with the following:

a. insofar as they directly affect the execution of the Works in Pakistan:
   i. war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
   ii. rebellion, revolution, insurrection, or military or usurped power, or civil war,
   iii. ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustionof nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
   iv. pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
   v. riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;
b. loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract.
c. loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; and
d. any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:-
   i. could not have reasonably foreseen, or
   ii. could reasonably have foreseen, but against which he could not reasonably have taken at least one of the followingmeasures:-
      a. prevent loss or damage to physical property from occurring by taking appropriate measures, or
      b. insure against.

Insurance of Works and Contractor's Equipment

21.1 The Sub-Clause is amended as under:

Contractor is bound to provide all the below mentioned insurance policies for the persons, works and equipment, etc. on the Contract.

(a) General Requirements

Notwithstanding the responsibilities of the Contractor for indemnities and insurance as described hereunder, the Contractor before commencing work on Site, must discuss fully with the Engineer & Employer the Insurance coverage provided by each under any general policies which are to be applied to this Contract to ensure that there are no contingencies left uncovered and to reduce, as far as practicable, duplication of coverage. Should any areas of possible damage or loss be discovered that are not covered by definition of responsibilities set out in these conditions, the addition or reduction in premiums required to give such insurance coverage will be paid by the Contractor and the policies obtained by the mutual agreement of the Employer and the Contractor.

All payments will be in Pakistan Rupees required to replace the damaged items.

The Contractor shall be responsible for deductibles and losses not covered by insurance.

An insurance loss shall not affect the Employer's or Contractor's rights and obligations under the Contract.

All policies shall state that:

i. the Employer shall receive at least twenty-eight (28) days written notice of intended cancellation or change affecting coverage.
ii. the Contractor is fully protected so as to provide full indemnity to Employer in respect of liability against loss or damage assumed by the Contractor under the Contract.
iii. the inclusion of more than one Insured shall not affect the rights of any other insured.

The Contractor shall be responsible for observance by his Sub Contractor(s) of insurances noted herein. Before each Sub Contractor starts work the Contractor shall give the Employer proof that the Sub contractor(s) are covered by insurance equivalent to that specified herein for the Contractor.

(b) The Contractor shall include the following insurances:

i. Third Party Liability Insurance

Risks insured: bodily injury, death and property damage.

Scope of coverage: contractual liability, tortuous liability, premises and operations liability, Contractor's contingent liability with respect to Sub Contractor's operations.

Minimum limit: as indicated in Appendix-A to Bid (Special Stipulations) per each occurrence.

ii. All Risk Property Insurance

All risks including fire, flood, storm and earthquake.

Scope of coverage: the Works, during the entire duration of the Contract, and all permanent, temporary and consumable materials related to the Works which are in storage, in transit or at site of the Works.

Minimum Limit: the sum of the Contract Price plus fifteen percent (15%). The policy shall state that:

a. if a loss occurs the Contractor, the Employer and the Engineer shall be paid in relation of their share of the loss.
b. (Waiver of subrogation) the Insurer has no subrogation rights against any person, corporation or organization (including directors, officers, employees, servants and agents thereof) which: is an Insured under the policy, or is controlled by, owned by, or associated with an Insured, or is a Sub Contractor on the Works, or has, before a loss occurs, been released from liability by an Insured. "Hold harmless" provisions: The Employer and the Contractor shall be indemnified against all losses.

Employer use or occupancy: If the Employer uses or occupies all or part of the Works during the life of the Policy the Contractor shall ensure that the policycontinues in full force and the Employer shall pay any resulting extra cost of insurance.

Loss Procedure: If a loss occurs the Contractor shall, on behalf of the Employer and himself negotiate the value of the loss with the insurer. Unless directed otherwise by the Engineer, when agreement is reached the Contractor shall repair all damage and the Employer shall pay him, in accordance with the Engineer's certificates, for that part of the repairs which is the Employers responsibility.

If directed by the Engineer, instead of carrying out repairs, the Contractor shall pay to the party suffering theloss that part of the agreed value of the loss which is the Contractor's responsibility.

iii. All Risk Contractor's Plant Insurance
Scope of coverage: all construction machinery plant used by the Contractor for the Works.

Cost of compliance with the requirements of this Sub-Clause and providing all insurance policies shall be borne by the Contractor.

Scope of Cover 21.2

The Sub-Clause is amended as under:

"The insurance in paragraphs (a) and (b) of Sub-Clause 21.1 shall be in the joint names of the Contractor and the Employer and shall cover:

(a) the Employer and the Contractor against all loss or damage from whatsoever cause arising, other than as provided in Sub-Clause 21.4, form the first working day after the Commencement Date until the date of issue of the relevant Taking-Over Certificate in respect ofthe Works or any Section or part thereof as the case may be, and

(b) the Contractor for his liability:

(i) during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liability Periods, and

(ii) for loss or damage occasioned by the Contractor in thecourse of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

(c) It shall be the responsibility of the Contractor to notify the insurer of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the currency of the Contract.

Exclusions 21.4

The Sub-Clause has been amended as under:

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

Evidence and Terms of Insurances 25.1

The Sub-Clause has been amended as under:

The Contractor shall provide evidence to the Employer as soon as practical but in any case prior to the start of the work at site that the insurances required under the Contract have been affected and shall provide the insurance policies to the Employer. When providing such evidence and suchpolicies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the Employer.

The Contractor shall also submit in original the receipts of all the premiums paid by the Contractor in connection with the above insurances.

Add the following Sub-Clause 25.5:

Insurance 25.5

The Contractor shall be obliged to place insurances relating to the Contract including, but not limited to, the insurances referred to in Clauses 21, 23 and

Companies 24 with Insurance Company having AA rating of PACRA / JCR.

Costs of such insurances shall be borne by the Contractor.

Add the following Sub-Clause 31.3:

Co-operation with other Contractors

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

Add the following Sub-Clauses 34.2 to 34.12:

Rates of Wages and Conditions of Labour

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

Employment of Persons in the Service of Others

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

Housing for Labour

34.4 Establishment of Camp and Housing facility within the premises of SBP BSC Quetta Office is not allowed. Contractor shall arrange for housing of its staff at his own cost.

Health and Safety

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

Epidemics

34.6 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.

Supply of Water

34.7 The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer or his representative, adequate supply of drinking and other water for the useof his staff and labour. Quality of drinking water should be in compliancewith WHO standards for drinking water.

Alcoholic Liquor or Drugs

34.8 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 alcoholicliquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labour.

Arms and Ammunition

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

as
aforesaid.

Festivals and Religious Customs	34.10	The Contractor shall in all dealings with his staff and labour have due regard to all recognised festivals, days of rest and religious and other customs.
Disorderly Conduct	34.11	The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.
Compliance by Subcontractors	34.12	The Contractor shall be responsible for compliance by his Subcontractors of the provisions of this Clause.
		Add the following Sub-Clauses 35.2 and 35.3:
Records of Safety and Health	35.2	The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.
Reporting of Accidents	35.3	The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.
		Add the following Sub-Clause 36.6:
Use of Pakistani Materials and Services	36.6	The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services, available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.
Commencement of Works	41.1	The Sub-Clause has been amended as under: The Contractor shall commence the Works on Site within the period named in Appendix – A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.
Restriction on Working Hours	45.1	Add the following under Sub-clause 45.1: Drilling and dismantling work will be carried out exclusively after officeworking hours and/or on holidays only. Execution of work to be carried out by ensuring minimum disruption to the working of bank officials.
Reduction of Liquidated Damages	47.2	Delete the Sub-Clause in its entirety.
Instructions for Variations	51.2	The Sub-Clause has been amended as under: The Contractor shall not make any such variation without an instruction of the Engineer in writing. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

Valuation of Variations

52.1 The Sub-Clause has been amended as under:

All variations referred to in Clause 51 and any additions to the Contract Price which are required to be determined in accordance with Clause 52 (for the purposes of this Clause referred to as "varied work"), shall be valued by the Engineer on the basis of similar items covered in the Bill of Quantities, insofar as such rates or prices apply and where such rates or prices do not directly apply, the value shall be based on the rates or prices deduced there from so far as it is practicable to do so. If the same is not provided in the Bill of Quantities then the valuation will be carried out on the basis of the applicable item rates of MES Schedule of Rates 2021 or latest available with the application of premium as notified by Engineer in Chief's Branch, GHQ, Rawalpindi . If the same is not covered in latest MES Schedule of Rates then the valuation will be carried out on the basis of current market rates for labour, material etc. No escalation on account of material, labour, POL etc. shall be allowed on such items if the valuation is carried out on the basis of MES Schedule of Rates 2021 or latest available with the application of premium as notified by Engineer in Chief's Branch, GHQ, Rawalpindi and on the basis of current market rates. For valuation of currentmarket rates the percentage of overheads, all applicable taxes, duties,levies& profit, etc. to be allowed in such cases for Civil and Plumbing Works excluding Pumps shall be twenty-five percent (25%) and fifteen percent (15%) for Electrical, HVAC, Lifts and Pumps.

In the event of disagreement the Engineer shall within a period not exceeding one-eighth of the completion time subject to a minimum of 56 days from the date of disagreement whichever is later fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued inaccordance with Clause 60.

The approval / finalization of rates of all variations shall not relieve the Contractor of his obligations under the Contract. The Contractor shall neither stop the work nor slow down the progress of the Works in awaiting the approval of rates of all variations.

Power of Engineer to Fix Rates

52.2 The Sub-Clause has been amended as under:

Provided that if the nature or amount of any varied work relative to the nature or amount of the whole of the Works or to any part thereof, is such that, in the opinion of the Engineer, the rate or price contained in theContract for any item of the Works is, by reason of such varied work, rendered inappropriate or inapplicable, then, after due consultation by the Engineer with the Employer and the Contractor, a suitable rate or price shallbe agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such other rate or price as is, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

Provided also that no varied work instructed to be done by the Engineer pursuant to Clause 51 shall be valued under Sub-Clause 52.1 or under this Sub-Clause unless, within 14 days of the date of such instruction and, other than in the case of omitted work, before the commencement of the varied work, notice shall have been given with a copy to the Employer either:

(a) by the Contractor to the Engineer of his intention to claim extra payment or a varied rate or price, or

(b) by the Engineer to the Contractor of his intention to vary a rate or price.

Failure to Comply	53.1 to 53.4	Delete this Clause in its entirety.
Conditions of Hire of Contractor's Equipment	54.5	Add the following paragraph at the end: The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.
Testing of Contractor's Equipment Temporary Works and Materials	54.9	Add the following Sub-Clause 54.9:

a. Definitions

For the purpose of Sub-Clause 54.

i. The expression "Construction Equipment" shall be deemed to exclude vehicles engaged in transporting any labour equipment or materials to or from the site.
ii. The expression "Essential Hired Equipment" shall mean all Constructional Equipment Temporary Works and materials of Temporary Work the withdrawal of which in the event of termination under Sub-Clause 63 hereof might (having regard to the methods of construction employed prior to the termination) endanger the safety or stability of or result in serious disturbanceto the execution of any part of the Works and which are held by the Contractor under any agreement for hire thereof.
iii. The expression "Hired Equipment" shall mean any Constructional Equipment, Temporary Works (other than essential hired equipment) held by the Contractor under any agreement for hire thereof.
iv. The expression "Agreement for Hire" shall be deemed not to include an agreement for hire purchase with an option to purchaseor for conditional sale either of which is herein referred to as an "agreement for the purchase".
v. The expression "Hire Purchase Equipment" shall mean any Constructional Equipment, Temporary Works held by the Contractor under an agreement for hire purchase thereof.
vi. The expression "owner" mean the owner of the equipment of any Hire Purchase Equipment.

b. Vesting of Certain Equipment

All Constructional Equipment, Temporary Works and material owned by the Contractor or by any company in which the Contractor has a controlling interest shall when brought on to the site (or in the case of hire purchase equipment upon becoming the property of the Contractor) shall be and shall be deemed to become the property of theEmployer.

c. Conditions of Hire of Certain Equipment

With a view to securing in the event of termination Sub-Clause 63

hereof the continued availability for the purpose of executing the Works of any essential hired equipment the Contractor shall not bring on to the Site any essential hired equipment unless the agreement for hire thereof contains a provision that the owner will on request in writing made by the Employer within 7 days after the date on which any such termination has become effective and on the Employer undertaking to pay all hire charges in respect thereof on the same terms in all respectsas the same was hired to the contractor save that the Employer shall beentitled to permit the use thereof by any other contractor employed by itfor the purposes of completing the works under the terms of Sub-Clause 63 hereof.

d. Costs for purpose of Sub-Clause 63
In the event of the Employer entering into any agreement for hire of essential hired equipment pursuant to the provisions of Sub-Clause 54.9(c) all sums properly paid by the Employer under the provisions of any such agreement and all expenses incurred by it (including stamp duties) in entering into such agreement shall be deemed for the purpose of Sub-Clause 63 hereof to be part of the cost of completingthe Works.

e. Contractor's Certificate as to Hiring Provisions
The Contractor shall upon request made by the Engineer at any time in relation to any item of essential hired equipment forthwith notify to the Engineer in writing the name and address of the owner and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements of Sub Sub-Clause 54.9(c) hereof. The Contractor shall also upon request as aforesaid give a like notification (but without certificate) in regard to any hire purchase equipment.

f. Hire Purchase Payment by the Employer
The Employer shall in order to avoid seizure by the owner of any hire purchase equipment be entitled to pay to such owner the amount of any overdue installment or other sum payable optionally or otherwise under any Agreement of hire purchase and in the event of his doing so any amount so paid by him shall be debt due from the Contractor to the Employer and may be deducted by the Employer from any moneys due or that may become due to the Contractor under the Contract or may be recovered by the Employer from the Contractor at law.

g. Irrevocability of Certain Equipment etc.

No Constructional Equipment Temporary Works or materials or any part thereof shall be removed from the site without the written consent of the Engineer which consent shall not be unreasonably withheldwhere the same is no longer immediately required for the purposes of completion of the Works but the Employer will permit the Contractor theexclusive use of all such Constructional Equipment, Temporary Works and materials in and for the completion of the Works until the occurrence of any event which gives the Employer the right to expel theContractor from the site and proceed with the completion of the Works.

h. Revesting and Removal of Equipment

Upon the removal with the consent of the Engineer of any such Constructional Equipment, Temporary Works or materials as have been deemed to have become the property of the Employer under Sub- Clause 54.9(b) the property therein shall be deemed to revest in the Contractor and, upon completion of the Works the property in the remainder of such Constructional Equipment, Temporary Works and materials as aforesaid shall subject to the provisions of Sub-Clause 63 be deemed to revest in the Contractor who shall remove the same together with any essential hired equipment or hire purchase equipment. If the Contractor shall fail to remove any Constructional Equipment, Temporary Works or materials as aforesaid or any essential hire equipment or hire purchase equipment within such reasonable time after completion of the Works as may be allowed bythe Engineer then the Employer may:

i. Sell any such Constructional Equipment, Temporary Works and materials as aforesaid, and

ii. Return at the Contractor's expenses to the person firm or company from whom any Essential Hired Equipment or any Hire Purchase Equipment was held by the Contractor such essential hired equipment or hire purchase equipment, and after deducting from any proceeds of sale, the costs, charges and expenses of and in connection with such sale and return as aforesaid shall pay the balance (if any) to the Contractor but to the extent that the proceeds of any sale are insufficient to meet all such cost, charges and expenses the excess shall be a debt due from the Contractor to the Employer and shall be deductible or recoverable by the Employer accordingly as aforesaid.

j. Liability for loss or injury to Equipment
The Employer shall not at any time be liable for the loss of or injury to any of the Constructional equipment, Temporary Works or materials which have been deemed to become the property of the Employer under Sub-Clause 54.9(b) hereof save as mentioned in Sub-Clause 20 hereof.

k. Incorporation of Sub-Clause in Sub-Contracts
The Contractor shall when entering into any sub-contract for the execution of any part of the Works incorporate in such sub-contract (by reference or otherwise) the provisions of this Sub-Clause in relation to Constructional Equipment, Temporary Works and materials. Essential Hired Equipment and Hire Purchase Equipment to be brought on the Site by the sub-contractor.

l. Approval of Materials etc., not implied
The operation of sub Sub-Clause 54.9(b) hereof shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any materials at any time by the Engineer.

The following Sub-Clauses 59.4 & 59.5 are added:

Payments to Nominated Subcontractors

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

Certification of Payments & Nominated Subcontractors

59.5 The sub-clause is amended as under:

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

a. submits reasonable evidence to the Engineer, or
b. i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay theseamounts,
   ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement,

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

60.1 The Sub-Clause is amended as under:

Monthly Statements

a. The Contractor shall on the basis of the joint measurement of work done under Clause 56.1 submit to the Engineer after the end of each month two copies, each signed by the Contractor's representative approved by the Engineer in accordance with the Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself to be entitled up to the end of the month in respect of:

   i. the value of the Permanent Works executed,
   ii. any other items in the Bill of Quantities including those for Contractor's Equipment, Temporary Works, day works and the like,
   iii. the percentage of the invoice value of listed materials, all as stated in the Appendix to Tender, and Plant delivered by the Contractor on the Site for incorporation in the Permanent Works but not incorporated in such Works,
   iv. adjustments under Clause 70, and
   v. any other sum to which the Contractor may be entitled under the Contract or otherwise.

b. Payment against rationalized BOQ

"If the rate of any item of the successful bidder is abnormally high i.e. 15% more or higher than the rate of the same items in Engineer's Estimate, the Employer may require the bidder to produce detailed priceanalyses for any or all such items of Bid of the successful Bidder to demonstrate the internal consistency of those prices. After evaluation of the price analyses by the Employer / Engineer the rate of successful bidder (if required) will be rationalized in following manner and thedecision of the Employer / Engineer in this regard shall be final and

binding on the successful bidder:

c. The rate or price of individual abnormally high quoted items compared with the Engineer's Estimate would be decreased to the individual item rate of the Engineer's Estimate. The revised BOQ so prepared will be called as Rationalized BOQ duly stamped and signed by the successful bidder which shall be final and binding for interim payment purposes only. Withheld amount(s) of abnormally high quoted items shall be released during finishes stage or at such stage when items identified as below / lower to Engineer's estimate are in progress resulting in making final payments as per original quotes.

d. For calculation of Price Adjustment and Adjustment in US$ rates under Sub-Clause 70.1 during Payments Certification, the original bid rates quoted by the successful bidder would be considered.

Monthly Payments 60.2 The Sub-Clause is amended as under:

The Engineer shall, within 14 days of receiving such statement, certify and deliver to the Employer an Interim Payment Certificate stating the amount of payment to the Contractor which the Engineer considers due and payable in respect of such statement, subject:

(a) firstly, to the retention of the amount calculated by applying the Percentage of Retention stated in the Appendix to Tender, to the amount to which the Contractor is entitled under paragraph a. (i, ii, iii and v), b. of Sub-Clause 60.1 until the amount so retained reaches the Limit of Retention Money stated in the Appendix to Tender,

(b) secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer,

(c) Thirdly to the deduction of Advance Income Tax and other applicable taxes in accordance with the applicable laws, and

(d) The Employer may suspend payment of the Interim Payment Certificate in case it is directed by to do so, by Pakistan Customs, FIA and other competent government agencies till the matter is officially cleared by the Government.

Provided that the Engineer shall not be bound to certify any payment under this Sub-Clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender.

Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

Time for Payment 60.10 The Sub-Clause is amended as under:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 28 days after such Interim Payment Certificate has been delivered to the Employer, or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 56 days after such Final Payment Certificate has been delivered to the Employer. In the event of failure of the Employer to make payment within the times stated due to circumstances beyond his control, the Employer shall not pay to the Contractor any interest or compensation of any sort.

Add the following Sub-Clauses 60.11 to 60.13:

Financial Assistance to Contractor

60.11 Financial assistance shall be made available to the Contractor by the Employer as follows:

a. An interest-free Mobilization Advance up to fifteen percent (15%) of the Contract Price stated in the Letter of Acceptance (excluding the cost of Operation and Maintenance) shall be paid by the Employer to the Contractor in two equal parts upon submission by the Contractorof a Mobilization Advance Guarantee for the full amount of the Advance in the specified form, from Scheduled Bank(s) in Pakistan:
    1. First part within twenty-eight (28) days after signing of the Agreement or date of receipt of Engineer's Notice to Commence, whichever is earlier; and
    2. Second part within forty-two (42) days from the date of payment of the first part, subject to the satisfaction of theEngineer as to the state of the following:
        i. delivery at Site of Minimum Mandatory Equipment as per the requirements of Appendix-G to Bid and the deployment of Minimum Mandatory Staff as per the requirements of Appendix-K to Bid;
        ii. having completed at least 2% of the permanent works (to be assessed by the Engineer)

b. This Advance shall be recovered @ 20% of the amount of work done from Interim Payment Certificates (IPC) and shall be fully recovered at least two months before scheduled completion time. The validity of Mobilization Advance Guarantee shall be valid for the Contract Period. Such Guarantee may be progressively reduced to the balance amount of Mobilization Advance indicated in Interim Payment Certificates of the Engineer issued in accordance with this Clause after receipt and verification of the revised guarantee not less than the due amount of mobilization advance.

Withholding of Payment

60.13 a. The Employer at his own or on the recommendations of the Engineer may withhold the whole or part of any payment requested by the Contractor if it is necessary in his opinion to protect himself against losses on account of the following reasons:
    i. Defective work not rectified.
    ii. Non-fulfillment of any due demand and guarantee or renewal of any guarantee or surety.
    iii. Claims if third parties raised against the Employer caused through the fault of the Contractor in connection with the works.

iv. Damage caused by the Contractor or his personnel or any sub contractor, to the Employer, or to a third party on the site.
v. Non-fulfilment of the Contract by the Contractor.
vi. Non-fulfilment of the Contractual Obligation towards submittal of Shop Drawings, Bar Bending Schedules, Samples, erection of Mock-Up samples, As-built drawings, etc.

b. After the reasons of withholding of payments have been eliminated to the satisfaction of the Employer and the Engineer, payments to the Contractor will be undertaken by the Employer without delay.

Default of Contractor 63.1

Delete the Sub-Clause and replace with following:

(a) If the Contractor abandons the Works, delays abnormally, or misses the target dates mentioned in the approved Work Program or refuses or fails to comply with a valid instruction of the Employer, or if Contractor materially or consistently breaches the Contract, the Employer may give a notice under this sub-clause stating the default. If the Contractor has not taken practicable steps to remedy the default or cover up the backlog within fifteen (15) days after receipt of the Employer's notice, the Employermay by serving a second notice within twenty five (25) days, terminate the Contract asking the Contractor to demobilize from the Site leaving behind the Equipment required for completion of the outstanding Works at risk & cost of the Contractor or the Employer may deploy extra resources to cover up the backlog at the risk & cost of the Contractor. The decision of the Director/Head Engineering will be final and conclusive in this regard.

(b) Employer's sole discretion:

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect within 15 days after the Contractor receives the notice.

(c) Insolvency:

If either part is declared (or is likely to be declared) insolvent under any applicable law, the other party may terminate the Contract by serving a notice immediately. The Contractor shall demobilize from the Site leaving behind the Equipment required for completion of the outstanding Works in case of Contractor's insolvency.

(e) Criminal/ Offensive act by the Contractor or his employees:

If the Contractor or any of his employees commits a serious crime within the premises of the Employer which can result in police action under PenalCode Act of Pakistan, the Employer may terminate the Contract by serving a notice to the Contractor and the Contractor shall demobilize from the Siteleaving behind the Equipment required for completion of the outstanding Works at the risk & cost of the Contractor.

(f) Actions in case of failure of the Contractor:

If the Contractor fails to complete the Works even when the amount of Liquidated Damages has reached to the maximum fixed limit or the Contractor abandons or suspends the Works, or commits breach of the terms & conditions of the Contract, the Contractor or any of his employees commits a serious crime within the premises of the Employer which can result in police action under Penal Code Act of Pakistan or in any case in which the contractor shall have rendered himself liable to pay

compensation/liquidated damages, the Director/Head Engineering whose decision shall be final & conclusive, without prejudice to any other right or remedies, shall have power to adopt all or any of the following courses as he may deem best suited to the interest of the Employer;

i. To rescind the Contract (of which the rescission notice in writing to the Contractor under the hand of Director/Head Engineering shall be conclusive evidence) and in which case the retention money and Performance Security of the Contractor shall be forfeited and be absolutely at the disposal of the Bank;

ii. To employ labour paid by the Employer and to supply materials to carry out the Works or any part of the Works, debiting the Contractor with the cost of all labour and the price of the materials (of theamount of which cost and price a certificate of the Director/Head Engineering shall be final & conclusive against the Contractor) and crediting him with the value of the work done in all respects in the same manner and at the same rates as if it had been carried out by the Contractor under the terms of this Contract; the certificate of the Director/Head Engineering as to the value of the work done shall be final and conclusive against the Contractor;

iii. To measure up the works of the Contractor and to take such part thereof as shall be as shall be un-executed out of his hands and give it to another contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original Contractor, if the whole had been executed by him(of the amount of which excess the certificate in writing of the Director/Head Engineering shall be final and conclusive) shall beborne and paid by the original Contractor and may be deducted from any money due to him by the Bank under the Contract or otherwise,or from his retention money or the proceeds of sale thereof or sufficient part thereof;

iv. If any of the above courses being adopted by the Director/Head Engineering, the Contractor shall have no claim to compensation for any loss sustained by him by reasons or his having purchased or procured any materials, or entered in to any engagements or made any advances on account of, or with a view to the execution of the works or the performance of the Contract. And in case the Contract shall be rescinded under the provisions aforesaid, the Contractorshall not be entitled to recover or be paid any sum for any works theretofore actually performed under this Contract unless and until the Director/Head Engineering will have certified in writing the performance of such works and the value payable in respect thereof and he shall be only be entitled to be paid the value so certified.

v. In case of Contractor's failure to perform in line with the agreed terms & conditions laid down in the contract, the Employer may blacklist the Contractor for future opportunities at the Employer as per clause 18.2 and decision of the Director/Head Engineering will be final & conclusive. As per Public Procurement Rule-19, the Contractor will be accorded adequate opportunity of being heard.

Notwithstanding to above, Bank will serve notice to the Contractor for joint measurement of work executed. In case Contractor fails to attend joint measurement, ex parte measurement shall be carried out.

Special Risks	65.2	The Sub-Clause is amended as under: The Special Risks are the risks defined under Sub-Clause 20.4 paragraph a (i) to (v).
Out Break of War	65.6	The Sub-Clause is amended as under: If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and untill the Contract is terminated under the provisions of this Clause, continue to use his best endeavour to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.
Arbitration	67. 3	The Sub-Clause is amended as under: Any dispute in respect of which: (a) the decision, if any, of the Engineer has not become final and binding pursuant to Sub-Clause 67.1, and (b) amicable settlement has not been reached within the period stated in Sub-Clause 67.2, shall be finally settled, under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force. The said arbitrator/s shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Engineer related to the dispute. Neither party shall be limited in the proceedings before such arbitrator/s to the evidence or arguments put before the Engineer for the purpose of obtaining his said decision pursuant to Sub-Clause 67.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator/s on any matter whatsoever relevant to the dispute. Arbitration may be commenced prior to or after completion of the Works, provided that the obligations of the Employer, the Engineer and the Contractor shall not be altered by reason of the arbitration being conducted during the progress of the Works. The place of arbitration shall be Karachi, Pakistan.
Notices to Contractor	68.1	The Sub-Clause is amended as under: All certificates, notices or instructions to be given to the Contractor by the Employer or the Engineer under the terms of the Contract shall be sent by 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. For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

Notice to Employer and Engineer 68.2

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

a) The Employer:

Director Engineering
1st floor SBP Bolton Market Building
State Bank of Pakistan (SBP), Banking Services Corporation (BSC)
Head Office Karachi (HOK), M.A. Jinnah Road, Karachi

b) The Engineer
To be nominated later

Default Of Employer 69.1

The Sub-Clause is amended as under:

In the event of the Employer:
(a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 56 days after the expiry of the time stated in Sub- Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract,

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

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

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

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

Contractor's Entitlement to Suspend Work 69.4

The Sub-Clause is amended as under:

Without prejudice to the Contractor's entitlement to interest under Sub-Clause 60.10 and to terminate under Sub-Clause 69.1, the Contractor may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 56 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, after giving 56 days' prior notice to the Employer, with a copy to the Engineer, suspend work or reduce the rate of work.
If the Contractor suspends work or reduces the rate of work in accordance with the provisions of this Sub-Clause and thereby suffers delay or incurs costs the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 44, and
(b) the amount of such costs, which shall be added to the Contract Price,

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

Increase or Decrease of Cost 70.1

Delete Sub-Clause 70.1 in its entirety, and substitute with the following:

70.1.1 The amounts payable to the Contractor, pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labor, materials, and other inputs to the Works, by applying to such amount the formula prescribed in this Sub-Clause. Price Adjustment under this Sub-Clause shall not be applicable on supply parts of the items listed in Sub-Clause 70.1.2 (a) and Operation & Maintenance Services.

(a) Other Changes in Cost

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

(b) Adjustment Formula

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

$$Pn = A + b\frac{Ln}{Lo} + c\frac{Cn}{Co} + d\frac{Sn}{So} + e\frac{Dn}{Do}$$

Pn is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Paragraph 60.1 a. i., ii. And v., where any variations and daywork are not otherwise subject to adjustment;

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

b, c, d, e are weightages or coefficients representing the estimated proportion of each cost element (Labour, Cement, Steel and High Speed Diesel) in the Works or Sections thereof, net of Provisional Sums and Prime Cost; the sum of A, b, c, d, e shall be one;

Ln, Cn, Sn and Dn are the current cost indices or reference prices of the cost elements for month “n”, determined pursuant to Sub-Clause 70.1(d), applicable to each cost element; and:

(c) Sources of Indices and Weightages

The sources of indices shall be those listed in the Appendix-C to Bid.

(d) Base, Current, and Provisional Indices

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

(e) Adjustment after Completion

If the Contractor fails to complete the Works within the Time for Completion prescribed under Clause 43, adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for

completion, or the current indices or prices, whichever is more favorable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.

(f) Weightages

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

All provisions of Price Adjustment given in "Standard Procedure and Formula for Price Adjustment, Second Edition, May-2022", of Pakistan Engineering Council shall be applicable on this Contract.

Add the following Sub-Clauses 73.1, 73.2, 74.1, 75.1, 76.1, 77.1, 78.1, 79.1, 80.1, 80.2, 80.3, 80.4, 80.5, 80.6, 80.7, 80.8, 81.1 to 81.7:

Payment of Income Tax 73.1 The Contractor, Subcontractors and their employees shall be responsible for payment of all their income tax, super tax and other taxes on income arising out of the Contract and the rates and prices stated in the Contract shall be deemed to cover all such taxes.

Cost inclusive of duties and taxes 73.2 The rates and prices stated in the priced Bill of Quantities shall be deemed to include every element of duty or tax leviable on or in relation to the production, import, purchase, sale, delivery and transportation of materials and to the bringing thereof to the Site and no such duty or tax shall be separately reimbursable.

Integrity Pact 74.1 If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Appendix-L to his Bid, then the Employer shall be entitled to:

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
(b) terminate the Contract; and
(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

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

Termination of Contract for Employer's Convenience 75.1 The Employer shall be entitled to terminate the Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

a. shall proceed as provided in Sub-Clause 65.7 hereof; and
b. shall be paid by the Employer as provided in Sub-Clause 65.8 hereof.

Liability of Contractor

76.1 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 assigns and the labour employed by them.

Joint and Several Liability

77.1 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 fulfillment of theterms 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.

Details to be Confidential

78.1 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 ofthe Employer or the 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 Engineer whose award shall be final.

Precaution for Pollution

79.1 Precautionary measures and facilities shall be provided by the Contractor at his own cost in carrying out the Works including dumping and disposal of spoils, in the manner approved by the Engineer to prevent environmental pollution.

Black Listing Mechanism

80.1 Code of Conduct:

b) It is the Employer's policy that the Contractors observes the highest standards of ethics during the procurement and execution of such contracts. In pursuit of this policy, the Employer follows, inter alia, the instructions contained in PPR¬2004 which defines:

(i) “coercive practices” which means any impairing or harming or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence the actions of a party to achieve a wrongful gain or to cause a wrongful loss to another party;

(ii) “collusive practices” which means any arrangement between two or more parties to the procurement process designed to stifle open competition for any wrongful gain, and to establish prices at artificial, non-competitive levels;

(iii) “corrupt practices” which means the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence the acts of another party for wrongful gain;

(iv) “fraudulent practices” which means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a

financial or other benefit or to avoid an obligation; and

(v) "obstructive practices" which means harming or threatening to harm, directly or indirectly, persons to influence their participation in a procurement process, or affect the execution of a contract.

c) Under Rule-19 of PPR-2004, the Employer can inter alia blacklist and debar the Contractor found to be indulging in practices mentioned at para a) above. Such matters would be referred to the Blacklisting Committee of the Employer that is empowered to take actions accordingly. Such blacklisting or barring action shall be communicated by the Employer to PPRA and the Contractorin the form of decision containing the grounds for such action.

Nature of Fault	Means of Verification
Corruption	Actual instance verifiable as per law of land and applicable rules and regulations of SBP
Deviation from commitment	If the bidder deviates from its prior commitment or declaration made regarding the bid or proposal submitted by the bidder.
Fraud	Cross verification of documentary undertakings submitted by Bidder
Collusion	Results of Bid analysis resulting in substantive evidence of collusion

Warranty 80.2

The Contractor shall provide the Manufacturer's Warranty for Equipment if Supplied under the Contract, which shall cover all imported items against materials, fabrication, workmanship and all other associated deficiencies for a period of 30 months of Shipment. The Contractor shall also warranty the entire installation for a period up to the expiry of Defects Liability Period inclusive of the manufacturer's Terms of Warranty for free replacement of any component, accessories or parts having become defective during the said period.

The Warranty would be in the form given below or as approved, duly executed for all items and shall form an essential part of the Shipping Documents:

"We hereby guarantee that the equipment and machinery, materials, tools and parts supplied by us are produced new in accordance with approved drawings and Contract Specifications and that the materials used whether or not of our manufacture are in accordance with the appropriate Standards (latest editions) and as specified in Contract, and we shallreplace free of cost all defective equipment, machinery, materials, tools, and parts thereof which shall be found defective and not in accordancewith the Contract, provided however, that a period not exceeding 30 months from the date of shipment from our factory of the parts covered by this guarantee/warranty has not elapsed. We shall also replace free of cost every part thereof in use for a period up to the expiry of Defects Liability Period, which would be found defective due to material or faulty workmanship or in any way not in accordance with the Contract Specifications / Documents."

Fire Protection and loss control 80.3

The Contractor shall be aware of necessary precautions & controls concerning cutting, welding, and hot work, fire precautions and ensure

compliance.

The Contractor shall be responsible for the fire watch as necessary and meet the fire prevention / fighting practices.

The Contractor shall, in his work plan, forecast any extra hazardous area or adjacent to the site of the work and provide curtains, shields, or any other specialized equipment to adequately shield flames and sparks from combustibles.

Where the Contractor requires the utilization of flammable liquids, approved devices and containers for transfer or storage of the same shall be used.

The Contractor is responsible for disposal of deleterious substances such as lubrication oil, solvents, diesel fuel etc. which shall be contained in suitable containers and be disposed of away from the site and in no case disposed in sewers or water course(s) or drains.

The Contractor shall provide and maintain adequate fire protection in the form of barrels of water with buckets, fire bucket tanks, fire extinguisher, or other effective means ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of the works.

Gasoline and other flammable liquids shall be stored in and dispensed from safety containers approved by the Engineer and storage shall not be within building.

Torch-cutting and welding operations performed by the Contractor shall have the approval of the Engineer before such work is started and a chemical extinguisher is to be available at the location where such work is in progress.

The Contractor shall follow the instructions and specifications of the Civil Defense Department or any other local department concerned with such activities.

Safety regulations 80.4 1) General;

It is the Contractors responsibility to assure that the safety regulations, are followed at all times and that all his employees at site have a thorough knowledge and understanding of the safety regulations and are complying with all the safety requirements.

The Contractor must comply with all applicable accident prevention regulations and other safety work practices governed under any law of any local or provincial authority of Pakistan.

The Contractor shall comply and enforce compliance by all his sub-contractors with the highest standards of safety and accident prevention in accordance with international standards and in compliance with all applicable laws, ordinances and statutory provisions.

The Employer requires that all the Contractors' workers wear hard hats, safety shoes, and where necessary gloves, and shirts at all times while on site.

All requisite barriers, fences, warning signs, lights and other safety precautions as required for the protection of persons and property on or adjacent to the site shall be provided at the Contractor's cost.

All false work, scaffolding and handrails shall be well constructed and secured at all times. Where overhead work is being carried out, warning signs shall be installed at ground level clearly warning of the overhead work.

All warning signs shall be in two languages, English and Urdu, and shall at all times be maintained in a clean and legible condition, to the satisfaction of the Engineer.

Trash shall be removed at frequent intervals to the satisfaction of the Engineer.

Netting shall be provided at all levels where work is in progress, all around the building.

2) Fire Protection Equipment

The Contractor is responsible to provide the required number of fire extinguishers as well as the necessary hose line for his area of work. The type and size of fire-fighting equipment have to be approved by the Engineer.

i. Welding / burning requires permission from the Engineer

ii. Closing, sealed or locked walls of any fire system requires an impairment lock out notification from the Engineer.

3) Hazardous Area

Before entering any area, the Contractor must familiarize himself of the existing hazards and inquire from the Engineer necessary precautions to be taken for the protection of himself, other workers and equipment.

4) Waste Material Removal and environmental control

If the work requires the removal of any material hazardous to industrial or public / environment, then the Contractor shall remove it in compliance with industrial health and safety regulations.

Labour Conditions 80.5 The Contractor acknowledges that some or all other Contractors or sub- contractors or suppliers or persons working at or delivering to or for the siteor the work being carried out at or near the site may be union or non-union,Labour peace shall be maintained at the site. The Contractor shall carryout the work in a manner which ensures that there are no labour problems,work stoppages, or other labour disputes or disruptions which might affect the Contractors work, any other work at the Site or the Employers operations. The Contractor warrants and confirms that no agreement with its employees or trade unions representing his Employees or between his subcontractors. Suppliers sub-contractors and their employees or labour union representing those Employees will affect the Contractor's performance under the Contract, any other work at the site or the Employers operations. The Contractor acknowledges that the site is considered an open site, not exclusively union or non-union.

Interim Approvals 80.6 The Contractor shall be responsible to get clearance / approvals of agencies for all interim inspections at different stages of the Construction. The government fees / charges will be paid by the Employer as per actual upon submission of requisite documents.

Approval of Building Completion Plans 80.7 The Contractor shall prepare and submit requisite number of sets and obtain approval of Completion Plans from the respective building control authority and get approvals from utilities companies/agencies of the installations. Second part of the Retention Money shall be released after such approvals.

The Contractor Shall Be Liable & Indemnify The Employer 81.1 Contractor shall be exclusively liable for and shall indemnify and hold harmless the Employer, its agents and employees from:

i. Making good all losses arising out of the Contractor's negligence

or breach of the Contract. This may include damage to the paints/ polish works, false ceilings, wooden or metallic works, tiles, marbles, plants, wires, pipes, electrical and mechanical items, fixtures of any kind, antiques, glass items, window blinds, etc. The Employer shall determine the amounts of such losses/ damages and the Contractor hereby expressively waives his all or any right to change or challenge the same. The Contractor shall have to make good all such losses/ damages within time frame specified in the Notice, to the entire satisfaction of the Employer.

ii. Any tax, government duties, insurance contributions and other taxes or social security contributions in respect of Contractor's employee(s) or sub- Contractor together in each case with any interest, fines or penalties thereon.

iii. Any claims of Contractor / service providers current employees or ex-employees, or associates, or their heirs whether against the Contractor, other Contractors working within the same premises or any other person, regarding deals made at personal level by the staff or personal matters or deals carried out as an Employer, in whatsoever form, manner or capacity.

iv. Any Government Permits, Licenses, etc. that may be required for performing the services contemplated under the Contract.

iv. All claims of compensation by an employee of Contractor / Service Provider, his family or legal heirs or any other agency, autonomous body, any NGO or government department, arising from injury, disability, ill health or death of any of his employees during the currency or expiry of this Contract while performing anyservices under this Contract or any claim regarding the medical care or treatment expenses submitted by the employee or ex- employee of the Contractor / Service Provider or their legal heirs.

vi. Save for the willful or deliberate breach of its obligations under the Contract or, as set out above, neither party shall be liable for any consequential or indirect loss or damage.

Contractor's Warranties	81.2		The Contractor undertakes and represents that at all times: i. It has the requisite power and authority to enter into and perform this Agreement; ii. It holds valid license and authority to carry out the Services; iii. It shall execute the services in professional manner through competent, skilled, qualified human resource. iv. Contractor shall not act in a way which is prejudicial to Employer's interests or business; v. The Services shall be fit for the express or implied purposes for which supplied. vi. The Contractor shall follow the instructions to be issued by the Employer when at Employer's premises, all rules and security policies and the Employer may exclude any person from its premises for any actual or anticipated breach of these policies. Any breach by Contractor of this Clause, constitutes a material breach of the Contract and may lead towards Termination of Contract. In addition to Employer's rights under the Contract, the Employer shall be entitled to require Contractor to (a) remedy the breach at its cost; (b) pay for it to be remedied; or / and (c) repay all amounts already paid for the defective Services.
Contractor's Risks	81.3	**i.**	From the Commencement Date of Operation and Maintenance until the expiry, the risks of personal injury, death, and loss of or damage to property of the Employer due to the negligence of the Contractor, his employees, associates, sub-service provider, assigns etc.(including, without limitation, the tiles, cables, wood works, paint/polish, flower pots, plants, fixtures, metallic itemsetc.), all such risks are Contractor's risks. Contractor shall have tomake good all damages/losses to the Employer.
		ii.	The Contractor shall indemnify and keep indemnified the Employer, at all times against any loss, claim, damage, charge occurred to Employer due to negligence or fraud committed by Contractor or his employee. The Contractor may obtain "Contractual Liability Insurance" to cover all claims related to Negligence / Fraud if any, committed by the Contractor. It is further clarified that the Contractor may acquire the required coverage and to facilitate in fulfilling the requirements of the insurance agency. However, the Contractor shall be responsibleto indemnify the Employer within 15 days after receiving all the required supporting documents to support the claim regardless of the payment of the insurance amount paid by the insurance company to the Contractor. Failure of the Contractor to pay the Employer's claim within the afore-said period shall authorize the Employer to deduct the claimed amount from the amount of monthly Service Charges or any other amount payable to the Service Provider or encashment of Performance Security.

Confidentiality	81.4		Except with the consent in writing of the Employer, Contractor shall keep strictly confidential and not make use of any confidential information - supplied by the Employer other than to perform this Contract, and shall impose the same obligations on its employees and other third parties (including sub-service provider). Contractor may disclose confidential information if required to do so by law, court order, rules or regulation provided (to the extent permissible by law) it has notified the Employer in advance and agreed the scope of disclosure with the Employer.
Independent Status of Service Provider	81.5	i.	The parties agree that this contract creates an independent Contractor relationship, not an employment relationship. The Contractor acknowledges and agrees that the Employer will not provide the Contractor or its employees any fringe benefits or for the reimbursement of any expenses, including without limitation any medical or pension payments, and that all taxes are Contractor's responsibility.
		ii.	The Contractor shall be exclusively responsible for paying the salary and other emoluments and providing the benefits to which each of the Contractor's employee(s) is entitled under his/her contract with the Contractor. All claims made by the Contractor's employee (s) shall be dealt with exclusively by the Contractor. None of the Contractor's employee (s) shall be entitled to seek employment with the Employer merely on the ground that he/she had been engaged by the Contractor during the tenure of this Contract or was engaged by the Contractor for the provision of the services to the Employer or was deployed to the Employer.

S T A T E B A N K O F P A K I S T A N

SBP BANKING SERVICES CORPORATION (BANK),
Engineering Department, Head Office Karachi

RETROFITTING WORKS OF S.B.P B.S.C QUETTA OFFICE BUILDINGS

BIDDING DOCUMENTS

VOLUME-II (TECHNICAL SPECIFICATIONS)

April, 2024

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TABLE OF CONTENTS

0 SECTION: GENERAL REQUIREMENTS

0.1 GENERAL DESCRIPTION

0.1.1 Location of Site

The site of the project is located in Quetta, Balochistan.

0.1.2 Work under This Contract

The work under this Contract comprises the retrofitting of existing buildings as specified by the Contract/ necessitated by the project requirements/ instructed by the Engineer.

The Contractor shall be required to plan and execute the works in a manner such that the project is completed within the time specified in the Contract and in conformity with the provisions contained in the documents of Contract. The Contractor shall furnish a detailed construction programme along with a list of plant and equipment with capacities and capabilities for the approval of the Engineer. The Contractor shall also be required to submit a site supervisory/ management chart.

0.1.3 Execution of Work

All Work shall be executed in accordance with the requirements and in a manner set forth in the documents of Contract and in accordance with the instructions of the Engineer or Engineer's Representative. The Contractor shall confine his operations to the areas that are actually designated, for the Works, by the Employer. The Contractor shall be required to supply and maintain his own storage facilities, site office, sanitary facilities, and all temporary connections for electricity, water, sewerage and telephone etc. at his cost, subject to the approval of the Engineer.

0.2 APPLICABLE STANDARDS

Unless specified otherwise in the Contract Documents, all the Work and materials shall conform to the requirements of American Society for Testing Materials (ASTM) Specifications, American Concrete Institute (ACI) and British Standard Specifications (BSS) and as per the Drawings and Specifications.

0.3 TEST LABORATORY AND TESTING

0.3.1 Testing unless specified otherwise in the Contract, 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.

0.3.2 The quality control testing shall be arranged and performed by the Contractor's competent personnel in accordance with a Site Testing and Quality Control Programme/Facility to be established by the Contractor, and approved by the Engineer. The Contractor shall keep complete record of all the quality tests performed including the date and time of testing and submit the same to the Engineer. All quality control and related tests shall be carried out in accordance with applicable standards and codes under the supervision of the Engineer. The Contractor shall establish a laboratory on site which shall have equipment for testing Compressive Strength of concrete, Sieve Analysis and Compaction Test, as per the instructions and to the satisfaction of the Engineer.

0.4 STORAGE AND HANDLING FACILITY

The Employer shall assign the Contractor storage space for the storage of plant, equipment and materials for Contract Works. However the Contractor shall ensure that, on no account shall such temporary installation conflict/interfere with any of the permanent installations, services and any operational function of the Employer. The handling and storage of all plants, equipment and materials at Site shall be the responsibility of the Contractor and at no risk or cost to the Employer.

The Contractor shall protect all materials against corrosion, damage of any kind or deterioration during storage and also during erection on Site. The protection methods shall be to the approval of the Engineer.

0.5 TEMPORARY FACILITIES

The Contractor shall provide, erect/install, maintain, alter as and when necessary and remove on completion except as otherwise directed by the Engineer all temporary facilities and services as described hereinafter and/or in the Contract documents and/or as instructed and approved by the Engineer, all at his own cost and expenses.

0.5.1 Temporary Fencing & Lightning

The Contractor shall provide and maintain at his own cost all temporary lights, guards, fencing and watching to the approval of the Engineer for the safety and protection of the Works.

0.5.2 Temporary Services

a. First Aid

The Contractor shall provide and maintain First Aid Facilities on the Site.

b. Fire Fighting

The Contractor shall provide and maintain adequate firefighting facilities on the Site at his own cost.

0.6 PROJECT RECORD DOCUMENTS

The Contractor will submit shop drawings showing work sequence, work methodology, including location of construction joints, pouring sequences for the approval of Engineer prior to start of work on each stage of the project or at any time if requested by the Engineer.

The Contractor will maintain complete, accurate log of all construction work as it progresses through recording progress on the approved work-plan, progress reports and construction photographs stage wise.

The Contractor will submit weekly and monthly progress reports to the engineer, on approved format with photographs.

On completion of major construction milestones, prepare certified As-built drawing showing work done, dimensions, locations, angles and elevations of construction and site work.

0.7 MEASUREMENTS AND PAYMENT

No separate payment shall be made for the services and performance provided under this section of Specifications.

The Contractor is deemed to have covered the costs of all related supplies and performance in the unit prices of other contract items.

**** END OF SECTION****

1 SECTION: SETTING OUT OF WORKS

1.1 SCOPE OF WORK

The Work covered by this section of Specifications consists of furnishing all labour, materials, necessary equipment, services, miscellaneous and necessary items, required to satisfactorily complete setting out of the Works, as indicated on Drawings, specified herein and subject to the terms and conditions of the Contract.

1.2 SETTING OUT OF WORKS

The Contractor shall set out the Works and shall be responsible for true and perfect levels and setting out of the same and for correctness of the direction, positions, levels, dimensions and alignments of all parts thereof. If any error in this respect shall appear during the progress of the Work, the Contractor shall at his own expense rectify such error to the satisfaction of the Engineer. Any checking by the Engineer shall not relieve the Contractor from his complete unshared responsibility for correct setting out of Works. The Contractor shall construct and maintain accurate bench marks so that the lines and levels can be easily checked by the Engineer.

1.3 MEASUREMENT AND PAYMENT

No separate payment shall be made for setting out of Works. The Contractor shall be deemed to cover the costs for this item of work in the unit price of other Contract items.

**** END OF SECTION****

2 SECTION: PLAIN AND REINFORCED CONCRETE

2.1 SCOPE OF WORK

The Work covered by this section of the Specifications consists of furnishing all plant, labour, equipment, appliances and materials and in performing all operations in connection with plain and/or reinforced concrete work complete in strict accordance with this section of Specifications, applicable Drawings and subject to the terms and conditions of this Contract.

2.2 APPLICABLE STANDARDS

Latest editions of the following Pakistan, British and ASTM ACI Standards are relevant to these specifications wherever applicable.

2.2.1 Pakistan Standards

PS233	Portland Cement (ordinary & rapid hardening)
PS243	Natural aggregates for concrete
PS279	Abrasion of coarse aggregates by the use of Los Angeles machine.
PS280	Determination of aggregates crushing value
PS281	Organic impurities in sand for concrete aggregate.
PS282	Material finer than No. 200 BS test sieve in aggregates, method of test For
PS283	Soundness test for aggregates by the use of sodium sulphate or
PS284	magnesium sulphate.
PS285	Sampling aggregates for concrete
PS286	Sieve or screen analysis of fine and coarse
PS421	Description and classification of mineral aggregates
PS422	Sampling fresh concrete
PS560	Slump test for concrete
	Making and curing concrete compression test specimen in the field.
PS612	Sulphate-resistant Portland cement type 'A' and sampling fresh concrete in the laboratory.
PS716	Mixing
PS717	Compacting factor test for concrete
PS746	Definitions and terminology of cements
PS849	Making and curing concrete compression test cubes.

2.2.2 ASTM (American Society for Testing and Materials)

C33	Standard Test Method for Fine and coarse aggregates
	Organic impurities in sand for concrete.
C39	Standard Test Method for Compressive Strength of Cylindrical Concrete
C40	Specimens
C87	Effect of organic impurities in fine aggregates on strength of mortar.
	Soundness of aggregates.
C88	Ready mixed Concrete.
C91	Cement Standards and Concrete Standards
C94	Compressive strength of hydraulic cement mortars
C 109	Material finer than No. 200 (0.075mm) sieve
C 117	Light weight pieces in aggregates.
C 123	Concrete and concrete aggregates.
C 125	Specific gravity and absorption of coarse aggregate.
C 127	Specific gravity and absorption of fine aggregate.
C 128	Resistance to abrasion of small size coarse aggregate.

C 131	Sieve or screen analysis of fine and coarse aggregate.
C 136	Clay lumps and friable particles in aggregates.
C 142	Slump of Portland Cement Concrete
C 143	
C150	Standard Specification for Portland Cement
C156	Water retention by concrete curing material
C171	Sheet material for curing concrete.
C185	Air content or hydraulic cement mortar.
C188	Density of hydraulic cement.
C191	Time of setting of hydraulic cement by vicat needle
C260	Air entraining admixture for concrete.
C289	Potential reactivity of aggregate.
C309	Liquid membrane forming compounds for curing concrete.
C387	Chemical admixtures for concrete.
C494	Standard Specification for Packaged, Dry, Combined Materials for
C535	Mortar and Concrete
C75	Resistance to abrasion of large size coarse aggregates.
C994	Aggregate sampling.
C1190	Preformed expansion joint filler for concrete.
C1715	Concrete joint sealer (hot poured elastic type).
	Preformed expansion joint filler for concrete paving and structural
D1850	concrete.
E11	Concrete joint sealer (cold application type).
E96	Wire cloth sleeves for testing purposes.
E154	Water vapor transmission of materials in sheet form.
E337	Materials for use as vapor barrier under concrete slabs.
	Relative humidity by wet and dry bulk psychrometer.

2.2.3 ACI (American Concrete Institute)

211	Recommended practice for selecting proportions for normal and heavy weight concrete.
214	Quality control charts
301	Specifications for structural concrete for building.
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
315	Manual of standard practice of detailing reinforcement concrete structure.
318	
347	Building code requirement of reinforced concrete.
	Recommended practice for concrete formwork.

2.2.4 British Standards

BS 12	Specifications for Portland cement, ordinary and rapid hardening
BS 410	Specifications for Test Sieve
BS 812	Specification for aggregates from natural sources for concrete Method of testing concrete
BS 822	Test for water making concrete
BS 1881	Method for determination of Compressive Strength of Concrete Cubes
BS 1348	Rigid expanded polyvinyl chloride for thermal insulation.
BS 3837	Sulphate-resisting Portland cement
BS 4027	Specification for Sulfate-Resisting Portland Cement
CP 8110	

CP 114 BS 4550 BS 8500	Specifications for Design and Construction of Reinforced and Pre-stressed Concrete The Structural Use of Reinforced Concrete in Buildings Methods of Testing Cement Concrete - Complementary British Standard

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.

2.3 GENERAL

2.3.1 Until and unless specified or directed otherwise by the Engineer, all materials and workmanship shall be based on the latest versions of applicable ASTM Standards in force at the time of inviting tenders.

2.3.2 Any defective work in the opinion of the Engineer shall be removed and reconstructed without undue delay to the approval of the Engineer and the Contractor shall bear all additional costs incurred.

2.3.3 Any previous checks by the Engineer shall not in any way relieve the Contractor of his responsibility in respect of quality and accuracy of Work.

2.3.4 Full care shall be taken to install embedded items. Embedded items shall be inspected and checks for reinforcements and other materials and items shall be completed and approved before concrete is placed.

2.3.5 The Contractor shall get the bar bending schedules of reinforcement checked and approved from the Engineer prior to the cutting of reinforcement.

2.3.6 The Contractor shall maintain an accurate record of ambient temperature of Site. Ambient temperature shall be measured using mercury thermometers or other thermometers acceptable to the Engineer.

2.3.7 Throughout the concrete work, the Contractor shall employ full time on the Works suitable number of qualified and experienced Engineers whose sole duties shall be as follows:

- Design of concrete mixes
- Quality control of concrete
- Supervision of mixing, transporting, placing, compacting, finishing, curing and protecting concrete.
- Supervision of sampling and testing.
- Preparation and submission of test certificates and reports.
- Completion and keeping of record.
- Such other duties as the Engineer may direct.

2.3.8 All concrete work including reinforcement etc. shall be carried out in accordance with the applicable requirements of ACI/ASTM/BSS Standards and to the instructions of the Engineer.

2.4 MATERIALS

2.4.1 Cement

a) Ordinary Portland cement shall be grey normal setting cement of approved make and source and of the specified gravity, fineness and chemical composition fully conforming to British Standard Specifications BS-12 and shall be capable of satisfying all tests such as the tensile strength tests contained therein.

b) Sulphate resistant cement where required shall be sulphate resistant Portland cement of the approved make fully conforming to BS-4027 and satisfying the requirements for fineness, chemical composition, strength, setting time and soundness, etc.

c) For all types of cement described in sub-clauses 4.03.1 (a) & (b) above, the cement shall have a tricalcium aluminate (C3A) content by weight not less than 5% and not more than 8%.

d) For all types of cement described in sub-clauses 4.03.1 (a) & (b) above. The initial setting time shall not be less than 45 minutes and final setting time not more than 10 hours.

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

f) Cement shall be delivered in sealed bags and be stored in moisture-protected and well-ventilated sheds and each cement supply shall be stored separately.

g) The Contractor shall provide at his own cost on the Site all necessary sheds which shall be perfectly dry, waterproof and adequately protected against ingress of water for the storing of cement to be delivered to the Work, to ensure adequate supplies being available for the Work.

h) Cement, which is damp or contains lumps which cannot be broken to original fineness by finger pressure will be condemned irrespective of age and must be removed from the Site.

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

j) Cement shall be consumed in the sequence of its arrival at Site unless otherwise directed by the Engineer.

2.4.2 Aggregates

a) All fine and coarse aggregates to be used shall be supplied from approved sources, which shall not be changed without permission in writing from the Engineer. Aggregates shall conform to the requirements of applicable ASTM C33-82.

b) Fine aggregates, shall be from an approved source of supply of a uniform quality conforming to ASTM C-33-82 and shall be clean and sharp and free from clay, earth, vegetable and organic matters, alkaline or acid reactions or other deleterious salts or such harmful matters and impurities.

c) Fine aggregates shall conform to the requirements of the relevant ASTM C- 33-82 Specifications, and shall be graded as follows;

Sieve Number/Size	Percentage (by weight) passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	95 - 100
2.36 mm (No. 8)	80 - 100
1.18 mm (No. 16)	50 - 85
0.6 mm (No. 30)	25 - 60
0.3 mm (No. 50)	10 - 30
0.15 mm (No. 100)	2 - 10

d) Coarse aggregates shall be approved river gravel or hard crushed stone from a source approved by the Engineer and shall be clean, inert, hard, non-porous and free from laminated particles, sand, dust, salt, lime, chalk, clay, organic impurities or other deleterious matter.

e) Coarse aggregate shall also conform to the requirements of Table 2 of ASTM C-33 and shall be graded as follows:-

For Reinforced Concrete (Nominal Size of Graded Aggregates 20.0 mm to 2.36 mm)

Sieve Number/Size	Percentage (by weight) passing
25.0 mm	100
20.0 mm	90 - 100
9.5 mm	20 - 55
4.75 mm (No. 4)	0 - 10
2.36 mm (No .8)	0 - 5

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

g) If required, aggregates shall be washed and screened to the sequence of receipt of supplies unless otherwise directed by the Engineer.

h) All aggregates shall be subjected to the approval of the Engineer. Any aggregates not found to be of the required standard shall be rejected by the Engineer and shall have to be removed from Site without delay. Concrete structures executed with rejected aggregates shall be dismantled and rebuilt at the Contractor's expense.

i) Special fine gravel of 9 mm. size shall be used if called for in the Drawings or as directed by the Engineer.

j) Physical properties of aggregates shall be in accordance with Table 3 of ASTM C33.

2.4.3 Water

Water to be used in the Work shall be potable water and shall be free from all impurities whether suspended or dissolved. Further, the water shall not contain any chemical impurities, salts etc. of any kind. Water shall be tested for its fitness in Works in accordance with AASHTO Method T26-51.

2.4.4 Admixtures

a) Suitable admixtures from BCR, Sika, Fosroc, Betocrete C-16or Master Builders or other approved manufacturers may be used in concrete mixes with the prior approval of the Engineer. The amount of admixtures added to each batch of concrete requires careful control and shall be added in the doses as recommended by the manufacturers and approved by the Engineer. The cost of the admixtures shall be deemed to be included in the rates.

b) For use of an admixture, the information required by the Engineer shall be submitted to him for each admixture for his approval.

c) BASF 700 or approved equivalent concrete retarding agent, may be used if required with the approval of Engineer

2.4.5 Epoxy Mortar

a) Epoxy mortar shall be used as mentioned in drawings or approved equivalent with the approval of Engineer.

b) For use of an epoxy mortar, the information required by the Engineer shall be submitted to him for his approval.

2.5 CLASSIFICATION OF CONCRETE

Classification of concrete to be used in various parts of the Works shall be as indicated on the Drawings and mentioned in the Bill of Quantities. Unless noted otherwise, all blinding concrete shall be of Class E. The concrete of various grades shall be proportioned as set out in Table-1 appended hereto.

Table-1 showing minimum required compressive strengths on 6” x 12” long test cylinders and minimum quantity of cement required per m3 of finished concrete for various mixes and under various conditions is given below:

TABLE – 1

Class of Concrete	Minimum Qty. of Cement Kg/m^3	Work Cylinder Strength		Max. Water-Cement Ratio
		@ 7 days (psi)	@ 28 days (psi)	
D2	540	4200	6000	0.33
D1	400	3500	5000	0.40
D	385	3150	4500	0.42
A3	350	2800	4000	0.45
A2	325	2450	3500	0.47
A1	300	2100	3000	0.50
C	300	1750	2500	0.50
E	275	1400	2000	0.52
F	217	875	1250	0.55
G	159	600	850	-

Non-structural Concrete

Non-structural concrete (NS concrete) shall be used only for non-structural purposes where shown on the Drawing. NS concrete shall be compound of ordinary Portland cement and aggregates complying with this Specification.

The weight of cement mixed with 0.3 cubic meters of combined aggregate shall not be less than 50 kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40 mm nominal.

The concrete shall be mixed by machine or by hand to a uniform colour and consistency before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required.

The concrete shall be compacted by hand towels or rammers or by mechanical vibration.

2.6 PROPORTIONING OF CONCRETE MIXES

All concrete shall be proportioned by weight for design of concrete mixes, unless specifically agreed by the Engineer to proportion them by volume, which permission shall be given only if the arrangements made at Site are satisfactory. The Contractor shall submit to the Engineer proposed mix designs for concrete to be used, based on preliminary laboratory tests to determine proportion of cement, aggregates and water in the concrete conforming to the quality and strength requirements specified herein. Preliminary test results of at least three different mixes of each class of concrete with varied water-cement ratio shall be submitted. The results of 7 days and 28 days cylinder tests shall be used to establish the ratio between 7 days and 28 days strengths of used concrete. The Engineer may make adjustments in the ratio of fine to coarse aggregates in the mix for a certain work. Preliminary design of mixes and testing shall be the responsibility of the Contractor at his own cost. The proportion of voids in between the coarse aggregate shall be controlled and if it exceeds 0.45%, the Contractor without any charge shall increase sand and consequently the cement. If the proportion is less than 0.45%, sand shall be decreased but not the cement.

The detailed data, calculations and test results shall be compiled in a report and the proposed mix be declared by the Contractor. The report shall be submitted to the Engineer in time before commencing the concrete works and all test results shall be to the Engineer's satisfaction.

Lack of approval by Engineer shall not constitute a reason for an extension of time or additional costs.

2.6.1 No Fines Concrete

"No Fines" concrete shall consist of approved aggregate graded between 40mm and 20mm with not more than 5% passing the 20mm sieve.

The mix shall consist of 0.25 cu m of aggregate to 50kg cement. The aggregate is to be damp at the time of mixing and the water/cement ratio is to be strictly controlled to evenly wet the aggregate with grout.

The concrete is to be placed as quickly as possible after mixing and is to be lightly rodded to assist placing. The concrete shall not be vibrated or rammed.

2.6.2 Maximum Allowable Water Content

All concrete specimens shall be made, cured and tested in accordance with ASTM Standard. A curve representing the relation between the water content and the average 28 days compressive strength or earlier strength at which the concrete is to receive its full working load shall be established for a range of values including all the compressive strengths shown on the plans. The curve shall be established by at least four points, each point representing average values for at least four test specimens. The maximum allowable water content for the concrete shall be as determined from this curve and shall correspond to a strength 15% greater than indicated on the plans. However, the water cement ratio shall not exceed the value given in Table-1 above for the class/strength of concrete specified. No substitution shall be made in the materials used in the work without additional tests in accordance herewith to indicate that the quality of the concrete is satisfactory.

2.6.3 Slump Test

The slump for concrete, determined in accordance with ASTM C-143 Test for Concrete, shall be minimum 2” and maximum 4” provided the requisite strength is obtained. Corrective additions to remedy deficiencies in aggregate gradations shall be used only with the written approval of the Engineer. When such additions are permitted, the material shall be measured separately for each batch of concrete.

2.7 BATCHING AND MIXING

Concrete shall be mixed by a mechanical batch type mixing plant with adequate facilities for accurate measurements and control of each material entering the mixer and for changing the proportions to conform to varying conditions of the Work. The mixing plant assembly shall permit ready inspection of operations at all times. The plant and its location shall be subject to approval of the Engineer.

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

2.7.1 Batching Units

Batching units shall be supplied with the following items:-

a) Weighing unit shall be provided for each type of material to indicate the scale load at convenient stages of the weighing operations. Weighing units shall be

checked at times directed by and in the presence of the Engineer and required adjustments shall be made before further use.

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

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

Materials	**Percentage by Weight**
Cement	+1%
Water	+1%
Aggregate smaller than 3/4"	+2%
Aggregate larger than 3/4"	+3%

2.7.2 Mixing Units

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

b) Mixing time shall be measured from the instant water is introduced into the mixer drum containing all solids. All mixing water shall be introduced before one-fourth of the mixing time has elapsed. Mixing time for mixers of one cubic meter or less shall be not less than 2 minutes; for larger than one cubic meter capacity mixers, time shall be increased by 15 seconds for each additional half cubic meter or fraction thereof, which may be varied if the charging and mixing operations fail to result in the required uniformity in composition and consistence within a batch and from batch to batch. If an air-entraining agent is allowed to be used, additional mixing time shall be allowed so as to provide the specified air-content.

c) Unless waived by the Engineer, device such as discharge-lock to lock the discharge mechanism, until the required mixing time has elapsed, shall be provided on each mixer. Mixing shall continue for at least 40 revolutions of mixer drum.

d) No hand mixing under any circumstances even with extra cement shall be permitted. If during concreting, the mixing plant fails, the concrete already poured shall be removed, unless directed otherwise by the Engineer. Mixers, which have been out of use for more than 30 minutes shall be thoroughly cleaned before any further concrete is mixed.

e) The mixing water shall be regularly sampled and tested for salt content and contamination.

2.8 SAMPLES AND TESTING

2.8.1 General

Test cylinders of concrete shall be prepared and stored by the Contractor in accordance with the ASTM C-172, as and when directed by the Engineer. Test cylinders and the concrete materials shall be tested in an approved laboratory and the Contractor shall bear all charges for the same, including such other tests as may be determined by and acceptable to the Engineer.

2.8.2 Water

Water shall be tested in accordance with AASHTO Method of Test T26-51.

2.8.3 Cement

Cement shall be tested as prescribed in BS-12.

2.8.4 Aggregate

Aggregates shall be tested as prescribed in ASTM C-33. In addition, fine aggregates shall be tested for organic impurities in conformity with ASTM C-40.

2.8.5 Reinforcement

Reinforcement bars shall be tested as prescribed in BS 4449, BS-4461 and ASTM A- 615-82(S1) for deformed steel bars and mild steel plain bars. Refer clause 4.10 of this section for specification requirements of reinforcement works.

2.8.6 Testing of Concrete

2.8.6.1 Concrete Compressive Strength Test

a) Works Test Cylinders shall be made of all structural concrete incorporated into the works. Unless otherwise directed by the Engineer, one set of cylinder of any particular mix shall be taken from either :-

- Each 350 Cft or part thereof in columns
- Each 1050 Cft in walls and small foundations
- Each 1750 Cft in slabs, beams and large foundations, or
- each day's production

Whichever is the more frequent

b) Each set of the Works Test Cylinders shall comprise six 6”x12” Cylinders made from a single sample of concrete taken from the point of final deposition of the set concrete under the Engineer's supervision.

c) The sampling, making, curing and testing of Works Test Cylinders shall be carried out in accordance with ASTM C3 & C39. Test results shall be recorded on approved forms and submitted in duplicate to the Engineer immediately following the test.

d) A sample of concrete shall be taken at random on eight separate

occasions during each of the first five days of using that mix. The number of samples per day and the times which they are taken shall be varied at random (thereafter at least one sample shall be taken each day the concrete of that particular mix is made).

e) From each sample six Cylinders shall be made, two for test at seven days, and the other four for test at twenty-eight days.

f) Specimens shall be cured under laboratory conditions except that the Engineer may require curing under field conditions in which case strength of field cured specimens shall not be less than 85% of that of companion laboratory condition cured specimens.

g) All cylinder moulds shall be steel moulds perfectly true, having all internal and meeting faces machined to a smooth surface.

h) If the strength tests of the laboratory cured specimens for any portion of the Work falls below the minimum allowable compressive strength at 28 days required for the class of concrete used in that portion, the Engineer shall have the right to order replacement of the affected work.

i) All test specimens shall bear distinguishing mark showing number, date of casting, quality of concrete and place from where sample was taken. A proper daily record of test specimens made and test results obtained shall be maintained by the Contractor and weekly test results shall be submitted to the Engineer.

2.8.6.2 Testing for Chloride Ion Content

Maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed 0.15% by weight of cement. To determine water soluble chloride ion content, test procedures shall conform to ASTM C 1218.

2.8.7 Concrete Members not complying with Specifications

(i) Where concrete in the Works does not comply with the Specifications, the Engineer may order any or all of the following or any other appropriate action to be taken:

a) The drilling of test cylinders in mass concrete and testing the cylinders to destruction by compression.

b) The carrying out of load tests or other non-destructive tests on concrete structure.

c) The cutting out and replacement of such volume as is considered defective by the Engineer.

d) Strengthening of the structure in accordance with the requirements and as proposed by the Engineer.

(ii) The Contractor shall carry out all such tests, investigations, rehabilitation or

replacement in coordination with and as acceptable to the Engineer at no additional cost to the Employer.

2.9 TRANSPORTING AND PLACING CONCRETE

2.9.1 General

a) Concreting shall be conveyed and deposited as quickly as possible after mixing and shall proceed so that, as far as possible, a complete section of the Work is done in one operation. The concrete may be distributed in barrows, skips, and chutes and by any other method such as pumps, conveyor belts etc. all to the approval of the Engineer.

b) Transportation of concrete shall be in a manner approved by the Engineer and shall be so as to avoid segregation or loss of ingredients of concrete.

c) All foundations and portions of Work to be concreted shall be approved by the Engineer in writing before concrete is poured.

d) All forms and reinforcement shall be completed, cleaned, inspected and approved before pouring of concrete. No concrete is to be deposited till the Engineer has inspected and approved in writing all reinforcement, foundations, forms, details, positioning of all fixtures and materials to be embedded in concrete, control levels and screeds, etc. and is satisfied with the arrangements the Contractor has made to efficiently proceed with the work such as sufficient labour, materials, plants etc. Such an approval will not relieve the Contractor from any of his obligations under this Contract. No concrete shall be deposited without the written permission from the Engineer who shall have no authority to waive off this condition. Any concrete without such written authorization shall be liable to be rejected.

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

f) All concrete shall be thoroughly compacted and consolidated by means of pneumatic or mechanical immersion type vibrators of suitable size having minimum frequency of 8000 RPM. Care shall be taken to avoid segregation due to excessive vibration. The Contractor shall maintain on Site at all times one or more standby vibrators. Tapping or other external vibration of forms shall not be allowed unless so directed by the Engineer. In that case formwork shall be adequate to withstand vibrations. Compaction shall be done until the whole mass assumes a jelly like appearance and consistency with water just appearing on the surface. Concrete shall be sufficiently tamped and consolidated around the steel bars, care shall be taken that the vibrator does not touch steel or formwork, and is worked into all parts of the moulds in order that no voids or cavities are left. Steel shall not be disturbed during operations of concreting. Concrete shall be brought up in even layers not more than 8” thickness and worked against side of forms to give a smooth and uniform surface. No surplus water shall be allowed to come out and lie on the surface of concrete. The concrete must be of such a consistency that when ramming, consolidating and tamping is completed, a thin film of water is just appearing on the surface. In vibrating, care shall be taken to avoid displacing the reinforcement.

g) Hardened concrete, debris and foreign materials shall be removed from interior of forms and from inner surface of mixing and conveying equipment.

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

i) Concrete shall not be dropped freely from a height of more than 10 ½ ft. in columns and 4 ft. elsewhere. In cases where an excessive drop is inevitable, the Contractor shall provide spouts, down pipes, chutes, or side ports to forms with pockets, which will let concrete stop and flow easily into the form without any risk of segregation. The discharge of the spouts, down pipes or chutes shall be controlled so that the concrete may be effectively compacted into horizontal layers not more than 8" thick.

j) Concrete is to be deposited as quickly as possible after mixing and to proceed continuously. Concrete which has attained its initial set or has contained its mixing water for more than 30 minutes shall not be allowed to be placed in the work.

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

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

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

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

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

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

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

r) All exposed surfaces and lines of the concrete work are to be true and fair without cracks, bends, windings and distortions of all kinds, without any extra charges by the Contractor. All concrete work to remain exposed and unplastered is to be fair faced, smooth, pleasing and to the entire satisfaction of the Engineer.

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

2.9.2 Temperature

No concrete shall be mixed or placed while the temperature is above 35 degrees centigrade (°C) on a rising thermometer or above 40 degrees centigrade (°C) on a falling thermometer. The Contractor shall supply an accurate maximum and minimum thermometer and hang it in an approved position in the Works.

The Contractor shall plan the day's concrete in such a manner as to ensure that each bay or panel is completed at a proper construction joint before the temperature rises above the permissible limit.

The Contractor shall allow in his rates for any additional expenses incurred by complying with this Clause in order to complete the works within the "Time for Completion".

2.9.3 Hot Weather Concreting

Hot Weather Concreting Operation should conform to the provisions of ACI Standard 305-72 "Recommended Practice for Hot Weather Concreting". The following precautions should be adopted as necessary to comply with the above limit:-

a. Shading of aggregate stock piles.

b. Insulation of water tanks and pipelines and formwork.

c. Refrigeration of mixing water.

d. Addition of ice to mix to lower temperature.

e. Shading of formwork and reinforcement from the sun and drying winds.

f. Cooling of formwork and reinforcement prior to and ahead of casting of the concrete by mist spraying.

g. Covering and spraying with water of hardening concrete surfaces.

h. Concreting during the cooler part of the day.

2.10 PROTECTION AND CURING

All exposed concrete shall be cured. Curing shall be accomplished by preventing loss of moisture, rapid temperature change and mechanical injury or injury from rain or flowing

water for a period of at least seven (7) days. Curing shall be started as soon as the concrete has hardened sufficiently for the surface not to be marked. Curing shall be done either by covering with sand, hessian, canvas or other approved fabric mats, which shall be kept continuously wet. If required and so directed by the Engineer, formed surface with forms in position shall also be cured by keeping all forms continuously wet. As an alternative, curing of concrete on all exposed surfaces which could not be kept covered, such as sides of the beams, under side of the slabs, may also be done by sealing concrete surface with liquid membrane-forming curing compounds white pigment type conforming to ASTM C-309 or equal so as to arrest loss of moisture from concrete, with the approval of the Engineer. Care shall be taken so as to spray the compound/chemical on all the exposed faces of concrete so that no loss of moisture takes place. The Contractor shall take special care that curing of concrete is satisfactorily carried out and in accordance with methods specified herein and/or as instructed by the Engineer.

Any negligence in this regard may result in total rejection of such concrete works, which in the opinion of the Engineer have not been adequately cured. Period of curing for any concrete shall be 7 days or more as directed by the Engineer. All concrete pours and concrete structures shall be clearly marked with non-washable paints to indicate the date of placing concrete. During hot weather, curing shall be done even at night. It shall be obligatory on the part of the Contractor to obtain a certificate from the Engineer that the curing has been properly done. A suitable format shall be printed and kept on Site to be signed by the Engineer for every part of the Work.

For sections 5 ft. or more thick, the Contractor shall ensure that the temperature differential between the inner and outer surfaces shall not exceed 20°C and shall submit to the Engineer his proposals to control and monitor this.

2.11 CONSTRUCTION JOINTS

Construction joints shall be located as indicated on the Drawings and/or as approved or directed by the Engineer. Prior to construction of any structure, the Contractor shall submit a proposal showing location of construction joints and sequence of construction to suit his concreting programmed for the approval of the Engineer. Joint in columns shall be made at the underside of the deepest beam framing thereto. Beam stems and slabs shall be poured monolithically unless allowed otherwise by the Engineer in writing. Joints not specified or shown on the Drawings if so required and approved by the Engineer, shall be so located as to least impair the strength and appearance of the Work. Except and where indicated on the Drawings, no jointing shall be made in footings or foundations without written approval of the Engineer. Construction joints shall be at right angles to the member and shall be formed against firm stop boards. The stop board shall be removed as soon as possible after placing the concrete but without the risk of movement of the concrete and the concrete surface shall be well brushed with a hard brush and washed off with a spray of water, two to four hours after casting, to expose the aggregate and provide key for the next pour.

In all water retaining structures and other substructure pits and trenches, P.V.C. or any other approved water stops shall be provided at the construction joints in the manner shown on the Drawings and/or approved by the Engineer.

Whenever a section of concrete is left unfinished, for any reasons with the approval of the Engineer, leaving surface which will be hard-set before additional concrete can be joined to it, such dovetails, grooves or other bonds shall be provided as may be necessary to ensure a good bond with the new work, at the cost of the Contractor. Before deposition fresh concrete upon or against any concrete which is already set, the surface of the set concrete shall be roughened with a cutting tool, any laitance removed, thoroughly cleaned from all

foreign matter, well-watered and covered with approved bonding agent and cement grout, and special care shall be taken to ram the fresh concrete thoroughly up and against the set concrete; and, if deemed necessary by the Engineer, the joints shall be reinforced with steel bars or dowels to be all furnished and done by the Contractor without any additional cost.

2.12 CONCRETE FLOOR SLAB FINISHING

Concrete slabs shall be finished as described herein. In preparation for finishing, floor slabs shall be struck off to the required level at or below the elevation or grade of the finished floors as shown on the Drawings. Floors shall be leveled with a tolerance of 1 mm in 1m. Where drains occur, the floor surface shall be pitched to the drains as indicated on the Drawings or as directed by the Engineer.

2.13 MONOLITHIC FINISH

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

2.14 CONCRETE TOPPING

Where indicated on the Drawings, base slab under concrete topping shall receive a screeded finish. After the base slab is thoroughly cured and when directed, concrete topping shall be laid to the thickness as indicated on the Drawings in alternate panels of suitable sizes as directed by the Engineer.

2.15 ANCHOR BOLTS, INSERTS, SLEEVES, CHASSIS, RECESSES, STEEL FRAMES

The Contractor shall provide chases and openings required for other sections of the Works and will cooperate and coordinate with other trades in placing their pipes, ducts, recesses and other built-in items as the Work proceeds, entirely at his own cost and risk.

The Contractor shall furnish and place in position accurately, as shown on the Drawings, all inserts, sleeves, chases, recesses, etc., supplied by the Contractor, subcontractors or other contractors, as directed. Full cooperation and coordination shall be maintained with other contractors, subcontractors in this regard.

2.16 WATERPROOF CONCRETE

Waterproof concrete shall consist of structural concrete as specified herein and with the addition of an approved waterproofing additive. This shall be mixed in accordance with the manufacturer's instructions and as detailed in the Bill of Quantities.

Contractor's attention is drawn to the special care required for casting roof framing, ponds,

swimming pools and all underground structures including basement floor, retaining walls, sumps, pits, etc. These are all designed to BS 8007, British Standard for water retaining structures. The contractor shall ensure that workmanship and curing is up to the required standard. The crack widths in such structures shall not exceed 0.2mm.

The Contractor shall take full responsibility for ensuring that the resulting construction is completely watertight and free from penetration of moisture.

When in the opinion of the Engineer, damp patches and/or leakage of water in the finished work are due to failure of the Contractor to comply with this specification, the affected work shall be made good at the Contractor's expense.

Water-stoppers shall be provided in all construction joints and the type of Water-stoppers will be as specified or to the approval of the Engineer. All Water-stoppers will be joined by welding strictly in accordance with the manufacturer's recommendations and all multiple joints and special intersections shall be manufactured by the supplier.

Before commencement of work, the Contractor shall obtain the Engineer's approval of the methods to be used to support and maintain the Water-stoppers in the correct location while the concrete is placed and also the layout and form of all additional construction joints other than those shown on the drawings. Unless indicated otherwise on the drawings, all construction joints in waterproof concrete shall be formed incorporating Water-stoppers to Engineer's approval.

All service holes cast in shall incorporate sleeves with puddle flanges and temporary openings for services should incorporate Water-stoppers.

Care shall be taken at all times to ensure that Water-stoppers are not perforated or damaged in any way and the concrete shall be carefully placed and compacted around the Water-stoppers to ensure void free impervious concrete.

All kickers or starter plinths to walls (if used) on the periphery of the watertight construction shall be cast monolithically with the base.

The formwork shall comply with this Specification and in addition any bolt or fastening embedded in or passing through the concrete shall be to the approval of the Engineer and not impair the water tightness of the structure. The use of through bolts and sleeves is strictly prohibited.

Special attention shall be given to the elimination of shrinkage or thermal cracking. The size of any bay or slab or wall and sequence of pouring shall be such as to minimize cracking.

Slotted inserts or sockets cast into the structural concrete shall be provided for all fixings including services. The cutting of holes in watertight concrete is strictly prohibited.

The Contractor is completely responsible for making all basements and swimming pools absolutely watertight. If any leakages or moist patches occur, the cost of any repairs, etc. to make the basement and swimming pool fully watertight will be borne by him. The Contractor is to give a ten year guarantee for water tightness, reckoned from the date of completion of roof framing, basement and swimming pool. The form of guarantee is to be to the satisfaction of the Client. Should any leaks or dampness occur during the Guarantee period of ten years, the Contractor shall, at no cost to the Client, immediately re-waterproof

the defective area or areas and make good all damages to surface finishes such as plaster, painting, paneling, tiling, etc. electrical or other installations or other property, caused by leaks or dampness or reimburse the Client for making good such damages.

Water tightness of swimming pools shall be inspected and tested in accordance with BS 8007:1987 and/or ACI-350.

2.17 CLEANING AND REMOVAL OF RUBBISH

On completion of Works herein, the Contractor shall remove all concrete debris, rubbish, shuttering materials, scraps etc., from the vicinity of the structures completed. All areas shall be cleaned to the satisfaction and approval of the Engineer. The rubbish shall be disposed of within or outside the Site premises, free of cost as directed by the Engineer.

2.18 MEASUREMENT AND PAYMENT

a) Concrete works shall be measured and paid for as per theoretical volumes calculated on the basis of the Drawings, or as otherwise approved by the Engineer and paid at per cubic foot at the rates entered in the Bill of Quantities.

   Recesses (e.g. openings in slabs, break-through and the like) with an individual volume of more than 1 sq. ft. or 2 cft shall be deducted.

b) The prices for concrete works shall include all cost for the complete work and are not limited to the cost of formwork, its support, anchoring's, chamfers, construction joints etc., the required scaffolding, false work, temporary works, post-treatment and, if necessary, repair of concrete, all preliminary and routine tests, as well as the required statical checks and drawings for Temporary Works in connection with the concrete works.

c) The cost for special finishing of exposed concrete surfaces such as fair-faced finish etc. shall be included in the unit price applicable to the respective structural member and will not be compensated for separately.

d) The cost of all concrete admixtures and additives shall not be paid for separately and is deemed to be included in the unit rates of respective items of the BOQ.

Joints

a) Expansion Joints

   Expansion joints will be paid per number, according to the Drawings. The prices shall include all costs for the different materials and performances relative to the laying and sealing of the joints.

b) Dummy Joints

   Dummy joints required by the Contractor with the Engineer's consent for the sound execution of the Works will not be paid for separately, but the costs involved are deemed to be covered by the concrete prices applicable to the respective structural member.

c) Construction Joints

   Construction joints will be measured and paid for as below:

The Contractor is deemed to have covered the costs for all related supplies, laying, formation and performances of construction joints included in the respective concrete prices. However, the cost of PVC water stoppers and or swell bars shall be measured and paid for separately per running foot of accepted lengths.

It the approved pouring sequence has not been followed by the contractor. Any increase in quantity of materials (pvc water stoppers, swell bars, rear guards, sealants, SBR etc.) associated with the construction joints and or additional reinforcement required shall be paid for by the Contractor at his own cost.

Tamping of Equipment and Grouting of Recesses

The costs resulting from materials and performances in connection with the tamping of installed items or the grouting of recesses are deemed to be included in the prices for the supply and/or installation of the respective items, and will therefore not be separately compensated for.

**** END OF SECTION****

3 SECTION: REINFORCEMENT STEEL

3.1 SCOPE OF WORK

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

3.2 GENERAL

a) The Contractor shall procure reinforcing steel only from reputable manufacturers/ suppliers duly approved by the Engineer.

b) Verification of the source of supply shall be prepared by the Contractor and submitted to the Engineer along with necessary certificates and test reports.

c) The Contractor shall prepare detailed bar cutting and bending schedules on the basis of the working Drawings and in consideration of BS-4466 and of any requirement resulting from the applied bar bending process.

d) The Contractor shall inform the Engineer of the completion of any reinforcement in time, in order to facilitate its inspection and check of conformity with the working Drawings well before the concreting. Relevant formalities shall be agreed upon between the Contractor and the Engineer at the appropriate time.

e) Reinforcement bar sizes have generally been shown on the Drawings in the form of designated bar numbers.

3.3 MATERIAL

a) Reinforcement shall be deformed reinforcement, except that plain reinforcement bars are permitted for spirals. Reinforcing steel bars (Plain and deformed) shall be from the new billet stock of mild steel and shall conform to the British Standard Specifications mentioned below and as indicated on the Drawings and Bill of Quantities.

   (i) Hot rolled deformed bars conforming to ASTM A-615 / BS 4449

   (ii) Cold worked deformed bars to conforming to BS 4461 (revised 4449-1988)

   (iii) Plain round steel bars to conforming to BS 4449

b) For each consignment, the Contractor shall furnish to the Engineer the manufacturer's mill test certificates to guarantee that the steel supplied meets all the requirements of the relevant specifications and further meets the requirements of specified characteristic strength and minimum tensile strength requirements given as under:-

High Yield Deformed Steel Bars:

i. Specified Characteristic Strength:

up to 16 mm (5/8")	460 N/mm2 (66,700 psi)
over 16 mm (5/8")	425 N/mm2 (61,625 psi)

ii. Tensile Strength:
Minimum Tensile Strength shall be 10% greater than the Specified Characteristic Strength.

iii. Minimum Elongation

up to 16 mm (5/8")	12%
over 16 mm (5/8")	14%

Mild Steel Plain Steel Bars:

(i)	Specified Characteristic Strength	250 N/mm2 (36,000 psi)
(ii)	Tensile Strength: Minimum Tensile Strength shall be at least 15% more than the Specified Characteristic Strength.	
(iii)	Minimum Elongation	22%

a) Bendability

All the bars shall be capable of being bent cold through 180 degree round a pin without cracking on the outside of the bent portion as per ASTM-A615.

b) 18 gauge galvanized wire to BS 4482 shall be used for binding the steel reinforcement.

c) Samples shall be tested for above requirements in an approved laboratory before starting the cutting of bars or when so required by the Engineer; and all cost of such tests shall be borne by the Contractor.

d) All reinforcing steel bars shall be free from loose mill scale, loose rust, oil, grease, dirt or other harmful substances.

Wire Gauze

General

Unless otherwise specified the wire gauze shall be of best quality approved uniformly, woven wire webbing of 12 x 12 meshes to 645 mm square (one Sq. Inch) made from 22 gauge galvanized iron wire. All panels shall be in one piece and no joints shall be allowed.

Fixing

Wire gauze shall be fixed as shown on the drawings or as directed. The gauze shall remain tight to the fill width without any sag.

3.4 STORAGE

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

3.5 REINFORCEMENT CUTTING AND PLACING

All reinforcement steel shall be cut and bent cold in strict accordance with bar bending schedules prepared by the Contractor and approved by the Engineer. The Contractor shall prepare bar bending schedule from approved structural working Drawings and as per instructions of the Engineer. The bending schedules shall be drawn on approved forms and submitted to the Engineer for checking and approval. The steel reinforcement shall be cut and bent to sizes as per Drawings and approved bending schedules. In case, any bars cut, bent or even fixed in position are found incorrect in dimensions, size and shape and are not according to the requirements of the Drawings or instructions of the Engineer, notwithstanding any previous approval of the Engineer, the Contractor shall replace such steel bars, cut, bent or fixed in position, by correct sizes bars at his own cost and no extra payment shall be made to the Contractor on such account. Suitable spacers, chairs as approved by the Engineer shall be used for the purpose of supporting and spacing of bars. In case, any bars are bent or displaced they shall be straightened or replaced prior to pouring. All reinforcement bars within the limit of a day's pour shall be in place and firmly tied with 18 gauge wires. Bars with kinks or bends not shown on the Drawings shall not be used. Reinforcement bars shall not be used for supporting the workmen and concreting work. Separate supporting system shall be used for this purpose.

Concrete cover to all reinforcement bars shall be provided as shown in the Drawings using steel chairs and concrete spacer blocks.

The concrete spacer blocks shall be cast from cement sand mix in a ratio of 1:2 in suitable required sizes. These shall be well cured and dry before use in the Works. The spacers shall meet the specified requirements of water absorption. All spacers shall be properly fixed in their required positions and as directed by the Engineer.

For any structural member which shall receive fair-forced concrete surfaces, special spacers shall be used while do not impair the specified appearance of concrete surfaces.

3.5.1 Laps and Splices

No splicing of bars shall be allowed at positions other than shown on the Drawings. All lap lengths shall be of the minimum sizes as indicated on the Drawings and in accordance with ACI 318-95. Splices of adjacent bars shall be staggered, unless approved otherwise by the Engineer. All reinforcing steel fixed in position shall be inspected by the Engineer and no concrete shall be poured until steel placement has been approved in writing by the Engineer. For inspection purposes, the Contractor shall give to the Engineer reasonable notice before the scheduled pouring time. Clear concrete cover to reinforcement steel shall be as specified or indicated on the Drawings.

3.5.2 Mesh Reinforcement

a) Where indicated mesh shall be of the sizes as shown on the Drawings and conform to BS 4482 or 4449 with mesh sizes to BS 4483 or ASTM A-185 (Welded Steel Wire Fabric for Concrete Reinforcement). Mesh reinforcement when used in slabs shall be supported at proper elevations by standard accessories. In slabs on ground (porous fill), precast concrete spacer blocks may be substituted for chairs.

b) Overlaps in fabric reinforcement shall be a minimum of two meshes, except where otherwise shown on the Drawings, correctly aligned and at least 50% of the wire intersections shall be tied with 18 gauge tying wire. Laps shall be staggered in adjacent rows of sheets.

3.6 MEASUREMENT AND PAYMENT

Reinforcing bars will be measured as per Drawings in consideration of the volumetric weight of 7.85 t/m3, without additions for rolling tolerances, deformations, waste lengths and binding wires and paid per ton at the unit rate entered in the Bill of Quantities.

The prices shall include all costs involved with the supply, transportation, storage and protection, the cutting, bending and placing, inclusive of concrete spacers, supports, stands, tying into position, etc.

Assembly stands, spacers etc., whether designated in the Drawings or not or otherwise demanded by the Engineer will not be measured and paid for separately.

If installed reinforcement must be dismantled under certain circumstances or where additional reinforcing bars are to be provided on Engineer's instruction, the Contractor is not entitled to any compensation, if such additional supplies and/or performances are required and demanded by the Engineer due to the Contractor's faulty execution of the respective work.

**** END OF SECTION****

4 SECTION: FORMWORK

4.1 GENERAL

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

4.2 MAKING FORMS

The formwork for columns, beams, slabs, foundations, pits, lintels, fins, panels, purdees, parapets and all other works whether to be precast or cast-in-situ shall be of steel plates, scaffolding pipes and joints or other approved material and shall be rigidly formed and designed by the Contractor to the shapes and forms as per Drawings in accordance with the best of the existing practices, so as to be able to withstand without displacement, deflection or deformation or movements of any kind, the pressure of the moist concrete and all other loads. No plank timber formwork will be accepted at any location. Only system formwork will be accepted.

4.3 FAIR FACED FINISH

a) Facing Material

The form facing material shall produce a smooth, hard, uniform texture on the concrete. It shall be M.S. steel sheets, plywood, tempered concrete grade hardboard, metal or plastic, or other approved material capable of producing the desired 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 surface, worn edges, 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.

b) Shop Drawings

Shop Drawings shall be submitted by the Contractor for Engineer's approval, showing grooves, joints etc. if indicated on the Drawings or instructed by the Engineer before taking up the job of formwork in hand.

c) Repair

No repair of surfaces designated `fair faced' shall be allowed. Any concrete failing to achieve the desired finish or with defective surfaces shall be removed and replaced at Contractor's expense. The Engineer may reject any defective concrete surface and order it to be cut out in part or in whole and replaced at the Contractor's expenses.

4.4 RIGID WITH ALLOWANCE FOR CAMBER & BULGES

The formwork shall be fabricated and erected in position, perfect in alignment, levels and true to plumb and shape and securely braced so as to enable it to withstand all weights, dead and live, to be endured during placing of concrete and its subsequent hardening till the formwork is struck. It shall be sufficiently rigid as not to lose its shape and shall be made to

compensate for bulging, and deflection to give the finished concrete the required lines, plumb, size and shape.

4.5 EXPOSED SURFACES LEFT UN-PLASTERED

In addition to the provision made elsewhere, for all the concrete work covered in this Contract which are to remain exposed in the finished work and left un-plastered, the formwork shall be smoothly faced by using M.S. steel sheets or lining the shuttering with smooth G.I. sheets or non-absorbent material like Formica sheets or in any manner as approved by the Engineer so as to make a perfectly smooth surface of the finished concrete. Where any surface defects on the exposed concrete surfaces occur and which do not impair the structural performance, being in excess of the designed surfaces and the architectural appearance of the Work in the opinion of the Engineer such defects may be removed by guniting and grinding with carborundum stone or in any other approved manner, at the cost of the Contractor, otherwise the whole or part of the Work shall be removed and made good by the Contractor, at his own cost. For precast concrete members, the forms shall be rigid, exact and smooth.

4.6 MATERIALS AND LABOURS

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

4.7 FORMWORK NOT TO INTERFERE OR INJURE WORK

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

4.8 OPENINGS IN FORMWORK

Wherever concreting is required to be carried out within forms of depth exceeding 6.5 feet, temporary openings in the side of the form shall be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided at bottom of the forms to permit the removal of rubbish etc. but the same shall be suitably closed before pouring.

4.9 OPENING AND OTHER DETAILS

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

4.10 JOINTS IN FORMWORK

All joints in the formwork shall be sufficiently closed to prevent leakage of mortar from concrete for concrete surfaces not to be exposed in the finished work. The joints in the finished work shall be close jointed and perfectly smooth so as not to allow any leakage of the mortar from the concrete and show any appearance of leaking mortar on concrete

surfaces.

4.11 TREATMENT AND INSPECTION OF FORMS

All rubbish particularly chippings, shavings and saw dust shall be removed from the interior of the forms, before placing concrete. Forms shall be coated with approved shuttering oil before reinforcement is placed. Surplus oil on forms and any oil thus applied on reinforcing steel shall be removed. If the forms are not used within 24 hours, a fresh coat of oil shall be given before placing of concrete.

4.12 STRIPPING SHUTTERING

Formwork should not be removed until the concrete has developed sufficiently strength to support all loads placed upon it. The time required before formwork removal depends on the structural function of the member and the rate of strength gain of the concrete. The grade of concrete, type of cement, water/cement ratio, temperature during curing etc. influence the rate of strength gain of concrete.

No struts or timbering which serve the purpose of supporting the shuttering or centering shall be struck and removed without permission from the Engineer in writing and the work of striking and removal after the receipt of such permission shall be conducted under the personal supervision of the competent foremen in the employment of the Contractor and the Contractor even after the permission from the Engineer shall hold himself fully responsible for any consequences whatsoever.

In all cases the Engineer will direct and control the minimum period of time for which the forms, shuttering or centering shall remain in place before being struck; but, for the general guidance of the Contractor, the following are to be considered as the minimum periods for the main classes of Work.

Type of Formwork	**Normal Weather**	**Cold Weather**
Footing Sides	24 hours	36 hours
Vertical sides of Beams, Walls andColumns (unloaded)	24 hours	36 hours
Slab soffits (up to 15 ft span)	10 days	14 days
Slab soffits (> 15 ft span)	14 days	21 days
Beam soffits (up to 15 ft span)	14 days	21 days
Beam soffits (> 15 ft span)	21 days	28 days

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

The formwork parts and connections should be arranged in a way that makes formwork removal easy and simple, prevents damage to concrete and formwork panels so that it can be reused without extensive repair.

The formwork removal procedure should be supervised by the engineer to ensure that quality of hardened concrete in structural member, i.e. it should be free from or has minimum casting defects such as honeycombing, size and shape defects etc. These defects in concrete influence the strength and stability of structure. Thus immediate repair works can be done or the members can be rejected.

The separation of forms should not be done by forcing crowbars against the concrete. It may damage the hardened concrete. This should be achieved by using wooden wedges.

Beam and joist bottoms should remain in place until final removal of all shoring under them are done.

Joist forms should be designed and removed so that the shores may be removed temporarily to permit removal of joist forms but must be replaced at once. The shores and joists will be dismantled beginning from the middle of the member's span, continuing symmetrically up the supports.

The approval from the engineer should be obtained for the sequence and pattern of formwork removal, prior to start of removal.

4.13 INJURY OR DAMAGE

The Contractor shall be responsible for any injury to the Work and any consequential damages caused by or arising from the removal and striking of forms, centering and supports, due to striking too soon. Any advice, permission or approval given by the Engineer relative to the removal and striking of forms, centering and supports shall not relieve the Contractor from the responsibilities herein defined.

4.14 TREATMENT AFTER REMOVAL OF FORMS

Any minor surface honey-combing or other irregularities are to be properly made good immediately upon the removal of the formwork and the surface made good to the satisfaction of the Engineer at the Contractor's own expense. Any small voids shall be neatly repaired with cement mortar consisting of one part of cement to two parts of sand and the whole surface rubbed over with carborundum stone and cement wash to bring the whole to a smooth and pleasing finish and uniform colour.

4.15 TOLERANCES

The structure shall be built to dimensions and levels shown on the Architect's drawings. Deviation from true positions and/or levels will be accepted only if they do not affect the finished dimensions, positions and levels as shown on the Architect's drawings.

Permitted tolerances shall be in accordance with the current issue of BS 5606, Code of Practice for Accuracy in building with up-to-date amendments.

Construction Tolerances of Structural Elements Supporting curtain walls or surfaces affecting curtain wall set out:-

- Maximum deviation vertically from defined position immediately after stripping of formwork +12mm.

- Maximum deviation laterally from defined position immediately after stripping formwork and prior to any pre-stressing (if used) +12mm or building height/4000 whichever is greater. This laterally out of position tolerance includes all local deviations in edge of slab or edge beams as well as overall building tolerance.

NOTE: All structural tolerances given above are for curtain walls (if used) and for all external structural faces of building affecting set out of masonry, windows and other

cladding/finishes.

4.16 EXTERNAL EXPOSED CONCRETE SURFACE

All external exposed concrete surfaces of cast-in-situ or precast units shall be given smooth or pattern finish as shown in the Drawings schedule or as directed by the Engineer.

4.17 MEASUREMENT AND PAYMENT

All costs for formwork must be included in the concrete prices and will not be measured and paid for separately.

**** END OF SECTION****

5 SECTION: STRUCTURAL STEEL WORKS

5.1 SCOPE OF WORK

The work covered by this section consist of general requirement of structural steel work, its fabrication, erection and painting methodology, precautions and other general requirement incidental to structural steel work.

5.2 GENERAL

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

5.3 APPLICABLE STANDARDS

Latest edition of the following standards are relevant to these specifications, wherever applicable:

AISC	Code of standard practice
AISC	Specifications for Architecturally exposed structural steel
ASTM	Specifications for Structural joint using ASTM A325 or A490 bolts.
ASTM	Specifications for Material
AISC	Specifications
SSPC-SP6	Steel structural council-surface preparation specifications
AWS	Specifications for Welding of steel structures
BS 449	Use of structural steel in buildings

5.4 DRAWINGS

5.4.1 Design and Working Drawings

Design and working drawings shall be prepared by the Engineer and shall be supplied to the contractor. These shall contain main dimensions, sizes of members, and typical details of joints. Forces in members may be specified on the drawings to facilitate design/detailing of connections by the Contractor. However if not specified all connections shall be designed to have full strength capacity equal to that of member being connected.

5.4.2 Shop drawings

Shop drawings shall be prepared by the Contractor from the working drawings taking into consideration the the sizes (sections) of members/parts of the structure shall be standard rolled steel sections according to German/British/American or approved standards. The contractor, before, tendering, shall prepare material requirement list, ensure its availability at the time of actual fabrication and in case certain sections are not available, he will select suitable available alternatives subject to the approval of the Engineer.

Workshop drawings shall be prepared by taking into consideration the points enumerated below:

(i) Fabrication in convenient sub-assemblies and each shop assembly to be given an erection mark.

(ii) Milling (machining of bases of supporting plate) for erection without adjustments.

(iii) Provision of basic elements with erection devices.

(iv) In-keeping with the requirements of computed strength of all connections and joints of structures not foreseen in the design and in the working drawings.

(v) Other requirements having an influence on the methodology of fabrication, transportation and erection of steel structures.

(vi) Uniformity of elements and parts of the steel structures should be maintained for mass fabrication.

5.4.3 Contents of Shop Drawings

Shop drawings shall consist of:

a. An erection scheme drawing having the following information:

- Location of erection elements in respect of axes and marks as well as picking points of these elements with respect to each other or with the existing steel or reinforced concrete structures.
- Erection joints showing erection welding thickness and lengths, bolts or rivet diameter and numbers.
- Chart showing list of assembling marks having columns such as mark, description, and quantity, weight of each mark, total weight and remarks with grand total in the end.
- Chart showing list of erection bolts, nuts and washers in tabulated form, showing information such as size, quantity weight and notes and the grand total.
- The mark for shop assemblies of each erection scheme shall have a different index, for example scheme of trusses, purlins etc. shall have marks A1, A2, A3 onwards and another scheme of columns, beams etc. shall have marks B1, B2, B3 and onwards. While marking on the plans, elevation, sections and details, the index shall be omitted.
- Except in special cases, all scheme drawings shall be made in single fairly thick lines.
- Erection scheme shall contain the following notes;
- Erection shall be done using the erection welding and bolts of normal sizes and accuracy according to the joints of the scheme.
- Quality and type of electrode.
- Measures against unscrewing of bolts.
- Erection shall be carried out according to the standard for fabrication and erection of steel structures.
- Painting instructions.
- References to design and working drawings.

b. The working drawings shall contain the following information:

- Each Shop Assembly (Mark) shall be drawn separately showing necessary lines, elevations, sections with reference to axis, center lines, location of holes, cleats, plates, lugs, etc. fully dimensioned with part numbers.
- Bolts, holes sizes and symbols, holes diameter for metric size bolts shall be 2mm larger than bolt diameter and for inch size the same shall be 1/16" larger.
- Welding thickness (general)
- Material quality of steel used.
- Type and quality of electrodes to be used.
- Tests for welding, if any.
- Reference to related erection scheme drawings.
- Reference to design and working drawings.
- Material list.

5.5 MATERIAL

Except otherwise stated in the drawings, the material specifications shall conform to the following. Wherever necessary the contractor may use equivalent alternative material subject to approval of the Engineer.

5.5.1 Structural Steel

Structural steel for structures not requiring welding shall conform to the requirement of ASTM A7 (for bridges and buildings) and ASTM A36.

Structural steel shall conform to the requirement of ASTM A36 or equivalent.

5.5.2 High Strength low Alloy Steel

High strength low alloy steel shall conform to the requirements of ASTM A441 or equivalent.

5.5.3 Sheet Steel

Steel sheet for structures where no welding is required shall conform to the requirements of ASTM A336 (for cold rolled carbon steel sheets commercial quality) or ASTM A415 Standard specifications for cold rolled carbon steel sheets, commercial quality). For structures where welding is required sheet steel shall conform to the requirements of ASTM A425.

5.5.4 HD Grade Steel

HD Grade Steel used with vault area reinforcement shall conform to the requirements of ASTM J93005 (ferritic stainless steel)

5.5.5 Steel Forging

Steel forgings shall conform to the requirements of ASTM A235 (Tentative specifications for carbon steel forgings for general industrial use) class of forging shall be indicated on the drawings.

5.5.6 Steel Casting

Steel casting shall conform to the requirements of ASTM A27 standard.specifications for Mild to Medium strength carbon steel castings for general applications) and ASTM A148 (Standard specification for high strength steel castings for structural purposes). Grade of casting shall be shown on the drawing.

5.5.7 Filler Metal for Welding

Welding electrodes for manual shielded metal arc welding shall conform to the specifications for mild steel covered Arc-welding electrodes, AWS A5.1 latest edition or the specifications for low-alloy steel covered Arc-welding electrodes, AWS A 5.5 latest edition. Equivalent locally manufactured electrodes may also be used subject to the approval of the Engineer.

Welding electrodes shall be E70xx. All welding shall be carried out by qualified welder only using approved and qualified welding procedures.

5.5.8 Bolts, Nuts and Washers

Unless otherwise specified anchor bolts and nuts shall conform to the requirements of ASTM A307 (Standard specification for low alloy carbon steel) externally and internally threaded standard fasteners). Bolts shall be of grade A for general application.

5.5.9 High Strength Bolts

All shop connections, except as noted herein or on the drawings, shall be made with high strength bolts in slip critical connections, or by welding.

High strength carbon steel bolts including nuts and washers shall conform to the requirements of ASTM A325 (Standard specification for high strength bolts for structural steel joints including nuts and plain hardened washers). The dimensions shall conform to the requirements of USASI B18.2965 (square and hexagon bolts and nuts for regular semi-finished hexagon bolts and heavy semi-finished hexagon nuts).

5.5.10 Cast Iron

Cast iron shall conform to the requirement of ASTM A48 (standard specifications for gray iron castings).

5.5.11 Connections

Unless noted otherwise, all connections shall be designed and detailed for forces shown on the drawings or for 100% of the effective capacity of the member. At least two bolts or equivalent welding shall be used for each connection.

5.6 ALLOWABLE STRESSES

Allowable stresses for steel shall be calculated in accordance with AISC specifications for the design, fabrication and erection of structural steel for building.

Allowable stresses for rivets, bolts and threaded parts shall be calculated in accordance with AISC specifications or tabulated allowable loads specified shall be followed.

Allowable stresses for welds shall be calculated in accordance with AISC specification.

5.7 FABRICATION

5.7.1 Straightening Material

All material, before being worked upon, must be straightened within tolerances by ASTM specifications A6. Straightening necessarily shall be done by mechanical means or by the application of a limited amount of localized heat. Temperature of heated areas, as measured by approved methods, shall not exceed 1100 F for A514 steel or 1200 F for other steels.

5.7.2 Cutting

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

5.7.3 Holes Punching Drilling

Holes may be made by drilling or punching. Holes shall be punched where thickness of the material is not greater than the diameter of bolt + 3mm. where the thickness of the material is greater, the holes shall either be drilled or sub-punched and then reamed to size. The die for all sub-punched holes and the drill of all sub-drilled holes shall be at least 2mm smaller than the nominal diameter of bolt. Holes for A 514 steel plates over ½" thick shall be drilled.

5.7.4 Welding

a. **General:** The execution and inspection of welding shall be done in accordance with the provisions of the American welding society code/Specifications for welding in building construction, D1.0.

b. **Automatic Sub-merged Arc Welding:** For all build-up members, i.e. sections fabricated from plates and flat bars or compound rolled sections and plates, where long continuous, welding is to be done, should be executed by Automatic submerged arc welding process in accordance with relevant AWS specifications.

c. Maximum and minimum size and lengths of fillet welds shall be done in accordance with AISC specifications.

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

5.7.5 Tolerances

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

5.7.6 Test Assembly

Fabricated shops assemblies of all components shall be test assembled together after fabrication, prior to painting/galvanizing.

Test assembly work and procedure should be planned during fabrication process. Major fabrication work of locating of gussets etc. marking and drilling of holes for inter connecting joints, spliced connection leveling, placing of bracing, should be done simultaneously with test assembly.

Each test assembly will be inspected by the Engineer's representative and shall be dismantled only after his approval in writing.

5.8 SURFACE PREPARATION/PAINTING/GALVANIZING

5.8.1 Surface Preparation for Painting and Coating:

- After fabrication and test assembly the surface preparation for painting or coating of all components shall be done conforming to SSPC – SP10 (near white metal) by means of sand blasting.
- The sand used for this purpose shall be free from earth, dirt, clay and moisture.
- The size of sand particles, air pressure and size of the hose nozzle shall be correlated to give a proper and acceptable surface.

5.8.2 Painting

Painting of all steel, forged or cast components shall be done in 5-coats as under:

- Surface Preparation:
- Near white metal surface according to SSPC SP-10.
- First and Second Coat:
- Two pack anti corrosive Epoxy primer of 50 microns dry film thickness for each coat.
- Third, Fourth and Fifth; Finishing Coat:
- Two packs Epoxy resin enamel pigmented suitably for resisting highly corrosive and chemical influences and for withstanding abrasion and erosion.
- Each coat shall have 50-micron dry film thickness.
- Paint Selection/application
- Paints of manufacturers of repute shall be selected. The complete 5-coat paint system of any one of the manufacturers shall be used.
- The application of each coat of paint shall be done in accordance with the paint manufacturers recommendations, printed in their authentic printed catalogue.

5.8.3 Engineer's Approval:

The contractor shall submit 2 or more proposals containing the following for Engineer's approval:

1. Manufacturers name along with authentic painted catalogue.
2. Relevant 5-coat paint system with manufacturer trade names.
3. Any other details of relevance.

5.8.4 Steel Work/Surface not to be Painted

i. Steel work to be encased/embedded in concrete or surface in contact with concrete or grout shall not be painted, but shall be given a cement wash after sand blasting.

ii. Machined finished surfaces shall not be printed but shall be coated with rust preventive compound, approved by the Engineer immediately after finishing. Such surfaces shall be also protected with wooden pads or other suitable means for transportation. Unassembled pins, keys, and bolt threads shall be greased and wrapped with moisture resistant paper.

iii. Contact surfaces of connections using high strength bolts in friction type connections shall not be painted. Such surfaces of all components after fabrication shall be cleaned free of paint, grease, burrs slag by means of sand blasting. No coating whatsoever then be applied to such surface.

5.8.5 Zinc Coating (Galvanizing)

Components shall be galvanized after complete fabrication i.e. welding, drilling etc. The process should consist of removal of rust and mill scale by pickling in hydrochloric acid or sulphuric acid followed by water wash and prefluxing with ammonium chloride. The fluxed components should then be passed through a drying oven prior to immersion in a bath of virtually pure molten zinc.

The zinc coating shall be applied in a manner and of a thickness and quality conforming to the requirements of ASTM A123, standard specification for zinc (hot galvanized) coating on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips.

5.9 INSPECTION AND TESTS

Manufacturer's work test certificate for all material used shall be furnished by the Contractor for Engineer's scrutiny and approval.

a. Rolling tolerance of all shapes and profile shall be in accordance with the provisions of the American Society for Testing and Material Designation A.6. These shall be checked by the contractor before being worked upon and shall be rejected if found not within limits.

b. The contractor shall arrange for analysis and test of all material rolled locally at a testing laboratory selected by the Engineer.

c. Nevertheless, neither the fact that the material have been tested nor that the manufacturers work test certificates have been furnished, shall affect the liberty of the Engineer to reject, after delivery, material found not according to these specifications.

5.10 ERECTION

5.10.1 Bracing

The framing of steel skeleton buildings shall be carried up true and plumb within the limits defined in Section 7(h) of the AISC code of standard practice and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected including the equipment and the operation of the same. Such bracing shall be left in place as long as required for safety.

5.10.2 Alignment

No riveting, permanent bolting or welding shall be done at site during erection until as much of the structure as will be stiffened thereby has been properly aligned.

5.10.3 Joints using High Strength Bolts

All structural joints using high strength bolts shall be executed and inspected in accordance with “AISC specification for structural joints” using ASTM A325 or A490 bolts.

5.11 MISCELLANEOUS STEEL WORK

5.11.1 General

The work covered shall include furnishing, fabricating, painting and installing miscellaneous steel work including the following:

a. Steel Stairs
b. Steel Ladders
c. Steel Pipe handrails
d. Steel protection angles
e. Steel doors, windows, gates, ventilators/louvers.
f. Steel fencing.
g. Grating and chequered plate covering.
h. Embedded plate, anchor bolts and other miscellaneous items.

5.11.2 Steel Stairs

General: Structural steel stairs complete with grating treads or chequered plate treads, landings, supporting structures, handrail, supports etc. shall be furnished and installed in accordance with working drawings. All components shall be galvanized to maximum extent practicable as shown on the drawings.

Material: Except otherwise indicated in the working drawings materials shall conform to the requirements of ASTM A36 (Tentative specifications for structural steel).

5.11.3 Steel Ladders

Steel ladder shall be welded assemblies with or without safety cages fabricated in accordance with the drawings. Material and standard of fabrication shall be the same as specified for stairs.

5.11.4 Steel Pipe handrails

Steel pipe handrails consisting of posts, handrail, knee rails and toe rail shall be fabricated in suitable units having two posts or three posts in one unit with erection joints between handrail and knee rails. Handrail of platforms galleries etc. of considerable length may not be shop fabricated as complete units consisting of posts etc. in case of such handrails the posts may be fabricated of the required height having one end with necessary arrangement for fixing to the platform or floor

beams etc. and other end shop prepared to take the top handrail. Top handrail, knee rail and tow rail may be brought at site in stock length. The same may then be cut and welded at site. Locally manufactured pipes, M.S. or G.I may be used for the hand railing. These shall however conform to the requirements of ASTM A53 or shall be of equivalent requirements.

5.11.5 Steel Protection Angles

Steel protection angles required for the protection of concrete work shall be erected true to line and level. Steel angles shall be fixed in position by using anchors.

5.11.6 Steel door, windows, ventilators, louvers and gate frames:

Frames shall be fabricated form locally available hot rolled angle, tee, channel or pipe sections as specified in the drawings. Material shall however conform to ASTM A36.

Shutters:

Shall be made of any of the sections noted above with skin plate of at least 18 S.W.G. as shown in the drawings.

Accessories such as hinges, anchors, bolts, locks and handles shall conform to the requirements shown on the drawings or as directed by the Engineer.

5.11.7 Steel Fencing

Steel fencing shall be made from wire mesh bolted on the steel angles or channel frame as shown on the drawings or as directed by the Engineer.

Surface Preparation and Painting
Surface preparation painting and galvanizing of all miscellaneous steel work shall be done in accordance with clause 10 herein.

5.12 MEASUREMENT AND PAYMENT

5.12.1 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 Bill of Quantities.

a. Bolts, nuts, washers, screw, rivets, heads, fillets, welds and welding rods.
b. Galvanizing and painting.
c. Glass and glazing.
d. All embedded parts unless otherwise specified in the Bill of Quantities
e. Painting
f. Steel grills and fly proof of shutters
g. Locks, handle, hinges, hold fast, stopper etc.

5.12.2 Structural Steel Works and Miscellaneous Steel Work

Measurement

Item of work of structural steel for which the unit rates have been quoted on weight basis and for which detailed workshop drawing have not been made shall be measured net as installed at site as per sketches and instruction of the Engineer. After measurement the theoretical weight shall be calculated from standard tables of section and weight in the manner followed in the preparation of shop drawings.

Items of works of structural steel for which the unit rates have been quoted on weight basis and for which the detailed shop drawings have been prepared, measurement shall be made at site to verify whether the items fabricated, supplied and erected in position are in conformity with the shop drawings. If the same is so verified to the satisfaction of the Engineer the weights given in shop drawing shall form basis of payment of bill. Any deviation found during the verification the same shall be checked from design and specifications point of view and shall be incorporated in the shop drawing and consequently the weights shall be revised.

Payment

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

5.12.3 Steel Embedded Part

Measurement

Measurement of acceptable completed works of steel embedded parts will be made on the basis of weight of steel parts provided and embedded in position as shown on the drawings or as directed by the Engineer.

Payment

Payment shall be made for acceptable measured quantity of steel embedded parts 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 items.

**** END OF SECTION****

6 SECTION: PLASTERING AND RENDERING

6.1 SCOPE OF WORK

The Work covered by this section of the Specifications consists of furnishing all plant, labour, appliances/ equipment and materials for performing all operations in connection with lathing, plastering and rendering, complete in all respect; in strict accordance with this section of the Specifications and the applicable Drawings and subject to the terms and conditions of the Contract.

6.2 APPLICABLE STANDARDS

Latest editions of following Pakistan, British & ASTM standards are relevant to these specifications wherever applicable.

Pakistan Standard

PS 232 Ordinary Portland Cement

ISO (International Organization for Standardization)

R 597 Definitions and terminology of cement.

R 679 Method of testing strength of cements, compressive and flexural strength of plastic mortar (Rilem - Embureau method).

R 680 Chemical analysis of cement& main constituents of Portland cement.

R 681 Chemical analysis of cements-mixer Constituents of Portland cement.

R 682 Chemical analysis of cements - determination of Sulphur as Sulphide.

ASTM (American Society for Testing and Material)

C 144 Aggregate for Masonry mortar

C 631 Bonding compounds for interior plastering

BSI (British Standards Institution)

812 Methods for sampling and testing of mineral aggregates, sands and fillers.

1199 Sands for external renderings internal plastering with lime and Portland cement and floor screeds.

1369 Metal lathing (steel) for plastering.

5262 External rendered finishes.

5492 Internal plastering.

6.3 GENERAL

Except as may be otherwise shown or specified, all interior & exterior plaster shall be cement plaster in specified thickness shown on Drawings & BOQ. Plastered ceilings and walls shall include partitions, piers, columns, beams, ceilings, plastered jambs and other returns, reveals, and backs of recesses and alcoves, and joints and heads of windows and doors, unless otherwise specified or shown on the Drawings. Plaster on walls shall be carried down to dado, skirting and projected bases. Plasterwork shall also include all plasterwork on and under concrete surfaces and masonry. Concrete surfaces to be left exposed and concrete not specified to be left fair faced, as indicated on Drawings.

A 3/8" render coat shall be applied to walls with a slightly roughened surface where wall finishes of applied nature, such as ceramic tiles, marble tiles, granite tiles, textured paint etc., are to be installed over wall surfaces.

Plastering shall not commence until all electric conduits, drainage and sanitary pipes, inlets to tanks, brackets, clamps, doors and window frames and all sorts of inserts and embedded items are fixed in position. It shall be the responsibility of the Contractor to make sure that other contractors carry out all such work before starting of plasterwork. Chiseling and repairing of cement plaster shall not be permitted without the approval of the Engineer.

6.4 MATERIALS

a. Cement for plaster shall be Ordinary Portland Cement (BS 12 or PS 232) or Sulphate Resisting Cement (BS 4027 or P.S. 612) as specified and shall conform to requirements specified in the section "Plain and Reinforced Concrete".

b. Sand for plaster shall comply with the requirements of BS 1199, BS 1200, ASTM C-33 and/or the Pakistan Standard "Sand for Plaster" as directed by the Engineer.

c. Water shall be clean and free from oils, acids, alkalis, salts and organic or other injurious matter and as described in section for "Plain and Reinforced Concrete".

d. 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.

e. External rendered finishes should comply with appropriate clauses of BS 882.

f. Mortar plasticizer shall comply with BS 4887 and shall be used in accordance with the manufacturer's instructions.

g. Pigments to be used shall comply with BS 1104.

h. Galvanized metal angle beads and plaster stops shall be as manufactured by the Expanded Metal Co. Ltd., London or other equal and approved.

6.5 MIXING OF PLASTER

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 or as directed by the Engineer. Mixing shall be continuous until all ingredients are evenly distributed and thoroughly mixed. Only limited water shall be added for proper workability and such quantity of mortar 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. Re-tempering shall not be permitted and all mortar, which has begun to stiffen, shall be discarded.

Except where hand mixing of small batches is approved by the Engineer, mechanical mixers of an approved type shall be used for the mixing of plaster. Frozen, caked, or lumped materials shall not be used. Mechanical mixers, mixing boxes and tools shall be cleaned after mixing each batch and kept free of plaster from previous mixes. Plaster shall be thoroughly mixed with the proper amount of water until uniform in colour and consistency.

Re-tempering will not be permitted, and all plaster which has begun to stiffen shall be

discarded. 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.

Water Proofing Plaster 3/4 inch. (20mm) thick 1:4 cement sand plaster mixed with approved water proofing agent.

Re-tempering will not be permitted, and all plaster which has begun to stiffen shall be discarded.

6.6 PROPORTIONING OF PLASTER ON INTERNAL AND EXTERNAL WALLS

All plaster shall be Portland cement plaster, all coats of which shall be mixed in the following proportions by volume:

- One part cement and 4 parts sand or specified otherwise.
- One part cement and 3 parts sand only for RCC roof slab soffits.

All coats of plaster in water retaining structures shall be waterproofed by the addition of an approved waterproofing additive/admixture from BCR, Sika, Fosroc, Betocrete C-16or Master Builders or approved imported equivalent.

External plaster shall be pigmented plaster in the shades/ colors to the approval of the Engineer.

6.7 PREPARATION OF SURFACES OF PLASTER

a. Surfaces to receive plastering shall be brushed to remove all loose particles, dust, laitence, efflorescence, etc. and any projecting fins on concrete surfaces shall be hacked off.

b. Glossy or greasy surfaces shall also be suitably cleaned and chipped off to remove all traces of mould oil.

c. Where unduly smooth in-situ concrete surfaces are encountered, such surfaces must be hacked properly before applying plaster.

d. Surfaces shall thoroughly be sprayed with water and all free water allowed to disappear before plaster is applied.

e. Irregularities in the surfaces to be plastered shall be filled with cement mortar 24 hours before plastering is commenced.

f. Before plastering is commenced, all junctions between differing materials shall be reinforced. This shall apply where walls join columns and beams particularly where cracks are likely to develop and places directed by the Engineer. The reinforcement of such joints shall consist of a strip of galvanized expanded metal lathe/mesh, at least 6” wide, which shall be plugged, nailed or stapled to the surfaces to be plastered at the intervals not exceeding 12”. The joints in mesh shall be lapped minimum 6”.

g. Metal angle beads shall be fixed with plaster dabs at 24” centers applied to the wall on either side of the arise and the wings of the beads pressed well in.

h. The Plaster stops shall also be fixed in a similar manner or plugged, nailed or stapled to the surfaces to be plastered to the approval of the Engineer.

i. Metal angle beads and plaster stops shall be fixed at places shown on the Drawings or as directed by the Engineer.

j. It shall be responsibility of the Contractor to ensure that all electrical conduits, pipes, concealed or embedded items, ducts, brackets, doors, window and ventilator frames, and all other fixtures on walls, ceilings, columns or required elsewhere have been fixed in position before the plastering is commenced.

k. Cuttings and chasings in the block work shall be repaired as per the instructions of the Engineer at least twenty four hours before the plastering is commenced.

6.8 APPLICATION OF PLASTER

The Contractor shall not start any work till the surfaces are inspected by the Engineer. In case, any plaster work is done without obtaining the consent of the Engineer, the Engineer shall have the right to order removal of all such work and cleaning and preparation of the surfaces to his full satisfaction and the Contractor shall comply with such orders without any delay.

All surfaces to be plastered shall be treated with cement slurry as a base coat for proper bond. Any approved bonding agent may also be used as an alternative to cement slurry.

Plaster to internal and external surfaces shall be applied in the thickness shown on the Drawings or specified elsewhere. In any case, the plaster thickness shall not be less than the specified thickness.

Plaster shall be applied in two (2) coats on masonry and concrete surfaces where thickness is more than 3/4". The thickness of each coat shall not exceed 3/4".

a. In case of 2 coats, the first coat or the under coat shall be full and thick and shall be applied with sufficient force to form good keys. The under coat shall be roughened and cross-scratched upon attaining its initial set to provide a proper bond to the next coat and shall be kept damp with a fog spray.

b. Finish coat shall not be applied until the under coat has seasoned for 2 days. Just before application of the finish coat, the under coat shall again be wetted evenly with a fog spray.

c. Finish coat shall be smooth finished.

d. The finish coat shall be kept moist with a fog spray for at least 2 days and thereafter shall be protected against rapid drying until properly and thoroughly cured.

Plastering shall be executed in a neat workmanlike manner and shall be finished off with a wood or steel float, straight and plumb and shall not have wavy surface. The surface shall be of even texture and entirely free from all marks. The edges and corners shall represent a straight line. All arises shall be rounded to 6 mm radius unless otherwise specified.

Plastering shall neatly be made good around pipes or fittings.

As far as practical, plastering shall not be commenced until all mechanical, electrical and plumbing items, conduits, pipes, fittings and fixtures have been installed in their sequence of operations.

Plaster is to be maintained in moist condition for at least four days after it has developed

enough strength not to be damaged by water.

Plaster stops and angle beads of expanded metal shall be used for protection of arises, edges and plaster ends as shown on the Drawings and as directed by the Engineer.

Plaster containing cracks, blisters, pits, discoloration or any defects shall not be acceptable. Any such defective plaster rejected by the Engineer shall be removed and replaced in conformity with these Specifications by the Contractor at his own cost to the satisfaction and approval of the Engineer.

6.9 SAMPLING OF PLASTER

Samples may be taken by the Engineer at any time from plaster work in place. Areas represented by samples which show over sanding will be rejected.

6.10 PATCHING

Plaster containing cracks, blisters, pits, checks, or discoloration will not be acceptable. Such plaster shall be removed and replaced with plaster conforming to this Specification and approved by the Engineer. Patching shall match with existing work in texture and colour.

6.11 CONCRETE / MASONRY JOINTS

All joints of concrete and block walls shall be specially treated as described here or as shown on Drawings. A 150 mm wide approved expanded metal shall be fixed at the joints and then plaster shall be applied. The expanded metal shall be with a weight of 3.0 lbs./sq. yd.

6.12 CLEANING AND PROTECTION

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 al! Rubbish, debris, scaffolding and tools should be removed to leave the room clean.

Prior to plastering all aluminum windows, finished metals should be covered by sheet of plastic or tarpaulin to protect it from damage.

Protect finished plaster from injury by any source. Contractor shall also protect walls, floors and work of other trades from plaster materials.

6.13 TOLERANCES

The work shall be carried out while maintaining the following tolerances:

- Surfaces of plaster work shall be finished with a true plane to correct line and level unless otherwise specified and with walls and reveals plumb and square.
- Maximum permitted tolerances shall not exceed 1/8 inch. (3mm) in 6ft. (2 meter), but not exceeding 12 mm, maximum over the length of the building.
- Variation from plumb or level in any exposed line or surface and 1/16 inch (1.5 mm)
- Variation between planes of abutting edges or ends 1/16 inch (1.5 mm)
- Maximum permissible Offset at joints is1.5 mm maximum

6.14 MEASUREMENT AND PAYMENT

Plaster shall be measured and paid per square Meter/feet, complete and approved, at the

unit rates entered in the Bill of Quantities, including preparations, junction reinforcements, angle beads, plaster stops, framing and metal furring, metal lathe, chamfered edges, rounding off corners etc. and in the thickness as specified in Bill of Quantities.

**** END OF SECTION****

7 SECTION: FLOOR AND WALL FINISHES

7.1 SCOPE OF WORK

The work under this section of the Specification consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the laying of cement concrete floors and floor finishes including bases, skirting and dado, complete in strict accordance with this section of the specifications and the applicable drawings and in accordance with the terms and conditions of the Contract.

7.2 APPLICABLE STANDARDS

Latest editions of following Pakistan, ISO, British& ASTM standards are relevant to these specifications wherever applicable.

Pakistan Standard

P.S. 232	Ordinary Portland Cement

ISO (International Organization for Standardization

R 680	Chemical analysis of cements Main constituents of Portland Cement.
R 681	Chemical analysis of cements Minor constituents of Portland cement.

ASTM (American Society for Testing and Materials)

C 482	Bond strength of ceramic tile to Portland cement.
C 648	Breaking strength of ceramic tile.
C 650	Resistance of ceramic tile to chemical substances.
C 798	Color permanency of glazed ceramic tile.
E 84	Surface burning characteristics of building materials

BSI (British Standards Institutions)

882	Pt.2 Course and fine aggregates from natural sources.
1199	Sands for external renderings, internal plastering with lime and Portland cement and floor screeds.
1201	Pt.2 Aggregates for granolithic concrete floor finishes.
1281	Glazed ceramic tiles and tile fittings for internal walls.
5442	Classification of adhesives for use in Construction pt-1 Adhesives for use.
203	Tile flooring
204	In-situ Floor Finishes.
209	Pt.1 Care and Maintenance of floor surface, wooden flooring.

7.3 GENERAL

7.3.1 Samples and Approval

a. All applied floor finishes materials such as terrazzo tiles, marble imported or

local, imported Porcelain Tiles and ceramic tiles etc. to be used in the Works shall receive prior approval of the Engineer.

b. Samples of all the materials to be used shall be submitted to the Engineer for his selection and approval before their use in the Works. The Contractor shall strictly follow the instructions of the manufacturers and the floor finishes shall be laid accordingly.

c. Floor finishes shall be laid true to the line and level in approved manner satisfactory to the Engineer.

d. Any work covered under this section of the Specifications not conforming to the requirements of the specified quality and workmanship will not be acceptable and shall be rejected and the Contractor shall be required to remove and replace such work at his own cost as per the instructions of the Engineer.

7.3.2 Floor Screed Beds

a. All floor finishes of an integral nature such as cement concrete flooring, waterproof flooring shall be laid direct on to structural or site reinforced concrete slabs. In these cases, the slabs must first have been fully cured, then hacked, chipped or otherwise roughened to provide a good adhesion key, then brushed, hosed and cleaned thoroughly of all loose concrete, dirt, dust, grease, oil and other impurities. The surfaces shall then be thoroughly wetted for a period of at least a day before the application of the floor finish, and given a thin brush applied cement slurry grout. The floor finishes of integral nature shall then be laid as described in their respective subsections.

b. All floor finishes of an applied nature such as terrazzo tiling, ceramic/marble tiling, etc. shall be laid on a floor screed as described below at 7.03 or as per the instructions of the Engineer. The floor screed shall be laid to a thickness calculated to be the overall nominal floor thickness less the actual thickness of the applied finish.

c. Care is to be taken to relate finished floor levels to specified floor levels. The screed is to be completely flat, level and smooth, with no projections, low or high areas, etc., and finished with a wood float. Where required, the screed shall be laid to falls as shown on Drawings or as directed by the Engineer.

7.4 CEMENT SAND SCREED

7.4.1 Preparation of Base

a. The laitance on the base shall be entirely removed by complete chipping, hacking & exposing the clean coarse aggregate. All loose concrete and dirt should be removed by thorough washing or hosing. The Contractor shall not undertake any finishing work until the surfaces are approved by the Engineer.

b. The base concrete shall be wetted thoroughly for a period of at least a day before the application of floor finishes and any excess water is brushed off before laying the screed.

c. Just before the screed is to be laid, a neat grout should be brushed into the base. The grout should consist of water and cement mixed to the consistency of a thick fluid. An approved bonding agent may be used as an alternative to the

grout. Excess of the grout shall be removed by thorough sweeping just prior to placing the topping material.

7.4.2 Laying of Screed

a. Cement sand screed up to a thickness of 40 mm shall be mixed in the proportions of 1:3 by volume with fine aggregate of approved size and gradation. Screeds over 40 mm thick should be mixed in the proportions of 1: 1 ½ :3 (cement: sand: aggregate) to the approval of the Engineer.

b. Where specified, Aqua guard or an equal approved waterproofing additive shall be mixed in the waterproof cement sand screed in the ratio as per manufacturer's instructions or as directed by the Engineer and shall be finished with a steel float.

c. Where screeds are to receive terrazzo or marble tiles etc. the screeds shall be finished with a slight rough finish to accept the cement paste and tiles. The mortar bed shall be spread and tamped to an even thickness over an area no greater than that, which can be tiled before the mortar reaches its initial set. However, ceramic tiles shall be bedded over a hard set cement sand floor screed laid earlier and well cured.

7.5 TERRAZZO TILES

7.5.1 Description

a. Terrazzo Tiles shall generally comply with the requirements of BS 4131 and shall be as approved by the Engineer.

b. Terrazzo tiling shall be locally manufactured, from an approved manufacturer, specialist in terrazzo tile making. Tiles shall be cast with a cement/sand base, and a pigmented terrazzo topping, cast integral, all in heavy metal moulds under pressure, all to the required sizes and thickness shown on Drawings and to Engineer's detailed approval.

c. Tiles shall be selected by the Engineer from colours and patterns as prepared by the approved manufacturer from samples, the cost of which shall be deemed to be included in the rates. The approved samples shall be retained by the Engineer to form standards against which all deliveries will be judged.

7.5.2 Materials

a. Portland cement conforming to BS 12.

b. White Cement conforming to relevant BS Specification.

c. Sand and aggregates shall comply with requirements of ASTM C-33.

d. Water shall be clean potable drinking water, free from oils, acids, alkalis, salts, and organic or other injurious matter.

e. Marble chips of approved shade, color, size and quality and shall have an abrasive hardness of not less than 16.

f. Marble powder shall be clean and should be of approved quality.

g. Pigments to be used shall comply with BS 1014.

7.5.3 Tile Mixes

a. Tile mixes shall be as under:

- Backing shall consist of Portland cement and fine sand in proportions of 1:5; mixed with a minimum of clean potable water.

- Terrazzo topping shall consist of white Portland cement and granulated marble chips of approved sizes, shade, colour and quality, mixed in proportions dependent on the exact terrazzo selected but average 1:2.

b. The backings shall be placed first into the moulds, then the toppings to a minimum depth of 10 mm; the tiles cast under pressure and filled, ground and polished before delivery to Site. Bottom faces of tiles shall be cast with an approved incised key pattern.

c. All the terrazzo tiles shall be cast to the sizes shown on the Drawings or as approved by the Engineer, perfectly square, with sharp square edges, and consistent in color and texture throughout the Contract for the color/ pattern selected and approved.

d. Curing shall be effected by continuous wetting for a minimum period of 3 days.

7.5.4 Bedding and Finishing

a. Terrazzo Tiles shall be bedded on the wet screeding described above at 7.02.2(b) and 7.03 by applying a thin layer of neat cement paste on to the screed bed and the tiles placed in position and tamped down gently with a wooden mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tiles joints shall be as thin as possible but not more than 2 mm wide and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be saw-cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

b. The surface during laying shall be frequently checked with a straight edge atleast 2m long to obtain a true surface with dead level or slope, as directed.

c. All tile joints shall be grouted up solidly with a grout comprising of white Portland cement and water; all surplus to be cleaned off immediately.

d. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for atleast 48 hours.

e. When cured, the terrazzo tiling shall be machine polished to the approval of the Engineer. Polishing must be evenly and carefully carried out and a perfect

smooth surface produced.

7.6 MARBLE FLOOR TILES

7.6.1 Description

a. The Work included under this subsection shall comprise of providing and fixing marble tiles in floors at locations shown on the Drawings in approved shades and colours. Unless otherwise specified, all marble work shall be in conformity with the latest British Code of Practice for this Work.

b. The marble tiles shall be from approved local source, uniform in color, texture, shade and quality.

c. Generally, marble tiles shall be 12”x12”x 1/2” and 24” x 24” x 3/4" or of size and thickness specified in the Drawings and Bill of Quantities.

7.6.2 Materials

a. Marble

- Marble shall be best quality Boticina marble, compact, dense, metamorphic rock of lime stone origin from quarries in Pakistan or elsewhere. It must be evenly grained with sugar like appearance. The shade and colors shall be to the approval of the Engineer.

- All marble tiles shall be totally free from cracks, defects, fissures etc. and shall have adequate strength to perform as required with good resistance against abrasion and shall have an abrasive strength not less than 20.

b. Portland cement conforming to BS 12.

c. White Cement conforming to relevant BS Specification.

d. Sand and aggregate shall comply with requirements of ASTM Specifications C-33.

e. Water shall be clean potable drinking water, free from oils, acids, alkalis, and salts and organic or other injurious matter.

f. Pigments to be used shall comply with BS 1014.

7.6.3 Samples

a. The Contractor shall provide samples of marble tiles to be used for this item of Work showing the entire range of variation and colour for the selection and approval of the Engineer. The samples shall be in finished sizes and shape, the cost of which shall be deemed to be included in the rates. The approved samples shall be retained by the Engineer to form standards against which deliveries will be judged.

b. The samples supplied shall conform to the ASTM standards stated below for the determination of the following:

Weight % Absorption ASTM C-97-47

Modules of Rupture	ASTM C-99
Compressive Strength	ASTM C-170
Resistance to Abrasion	ASTM C-241-51
Flexural Strength	ASTM C-8880-78

7.6.4 Bedding & Finishing

a. The Contractor shall employ skilled and trained marble workers for doing this job. The Contractor may be allowed to employ an approved specialist subcontractor for this item of Work. All Work shall be of the highest quality in conformance with the Contract requirements and to the approval of the Engineer. Any substandard work shall be rejected and the Contractor shall remove and replace the same at his own cost.

b. The surface over which the marble tiles are required to be fixed shall be clean of all dirt and dust and should be properly hacked so that the mortar sticks well to the surface.

c. The Contractor shall ensure that all the edges of tiles supplied at Site are at right angles to each other, unless other angles are required due to design requirements. The Contractor shall also ensure that all sizes are adequate for the Work as specified.

d. Damaged tiles or tiles with broken edges shall not be acceptable and in no case shall be used in the Work & shall immediately be removed from the Site.

e. Marble tiles shall be bedded on the wet screeding described above by applying a thin layer of neat cement paste on to the screed bed and the tiles placed in position and tamped down gently with a wooden mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tile joints shall be as thin as possible but not more than 2 mm wide and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be saw-cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

f. The surface during laying shall be frequently checked with a straight edge at least 2m long to obtain a true surface with dead level or slope, as directed.

g. All tile joints shall be grouted up solidly with a grout comprising of white Portland cement and water, all surplus to be cleaned off immediately.

h. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for at least 48 hours.

i. When cured, the marble tiling shall be polished with chemical polish to the approval of the Engineer. No wax polish shall be allowed. Polishing must be evenly and carefully carried out and a perfect smooth surface produced.

j. The marble shall be chemical polish finished to a glossy surface that will reflect light to emphasize the color and marking. All finished surfaces shall be of

uniform texture, color and appearance.

7.6.5 Dado

a. Dado in all marble tiled areas are to be in marble to match the floor tiling to the area concerned, unless specified otherwise. The dado shall be produced in an identical manner as for tiling. The dado shall normally be fixed to the walls up to heights shown in the Drawings with top edges arris-rounded or as shown on the Drawings or as approved by the Engineer.

b. The dado tiles shall be fixed to walls on a plastered backing having a slightly rough surface with neat cement paste. The back of each tile shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall with a wooden mallet so that the tile faces are set in one plane. The tiles shall then be grouted and polished with chemical polish as for marble floor tiling.

7.6.6 Marble Tread and Risers

Stair tread and riser slabs shall be provided in local “Boticina” marble or imported marble in approved color and shade and to sizes and profiles as indicated on the Drawings. Treads to be 1” thick in single pieces as shown on Drawings, length to suit stair widths, one long edge arris-rounded and polished, risers shall be ½” thick in single pieces of sizes to suit stair widths; ends polished. Treads and risers shall be bedded in screed as for tiling, of thickness as indicated, all level and square or to profiles shown on Drawings, chemical polished and finished.

7.6.7 Marble Counter Tops

Marble slabs to kitchen counters, toilet counters or others shall be provided to sizes and profiles as indicated on the Drawings. The marble tops shall be provided in configurations to suit the built-in cabinets as per approved shop drawings in approved shade and color, delivered to Site polished and finished to the approval of the Engineer. Marble tops for toilets shall be recessed to provide wash hand basins, where required.

7.7 PORCELAIN FLOOR TILES

7.7.1 Description

The Work included in this subsection shall comprise of providing and fixing in position imported porcelain floor tiles of approved size, color and pattern at locations shown on the Drawings and mentioned in the Bill of Quantities.

7.7.2 Materials

a. Imported non-skid Porcelain Ceramic Floor Tiles shall be from RAK Ceramics, UAE, or equal approved to the approval of the Engineer in the specified size, color and pattern.

b. The tiles shall be bedded with neat cement paste or as recommended by the manufacturer and approved by the Engineer.

c. Joint filler grout shall be from the same manufacture. The grout which shall be non-shrinking, stain resistant, permanent in color, and shall not inhabit fungus

and bacterial growth. It shall be odorless and non-toxic, of smooth consistency for easy preparation and neat, rapid installation, and shall not contain any metallic material or ingredients. The joint floor grout shall be water resistant and shall not washout underwater.

d. Portland cement conforming to BS 12.

e. White Cement conforming to relevant BS standard.

f. Sand & aggregate shall comply with ASTM C33.

g. Water shall be clean potable drinking water, free from oils, acids, alkalis, salts and organic or other impurities and injurious matter.

h. Pigments to be used shall comply with BS 1014.

7.7.3 Samples

The tile samples for the imported porcelain floor tiles shall be furnished from various product ranges of different manufacturers in sizes, patterns and colors for the selection and approval of the Engineer. The approved samples shall be retained by the Engineer to form standards against which deliveries will be judged.

7.7.4 Bedding, Laying & Jointing

a. Porcelain Tiles shall either be bedded on the hard set floor screeding described above at 7.02.2(b) and 7.03 by applying a thin layer of neat cement paste on the screed bed and the tiles placed in position and tamped down gently with a rubber mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tile joints shall be as thin as possible but not more than 2 mm wide, and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

b. The surface during laying shall be frequently checked with a straight edge at least 2m long to obtain a true surface with dead level or slope as directed. Tiles that are out of true plane or placed incorrect shall be removed and reset.

c. All tile joints shall be straight, level and of even width throughout. The tile joints shall be grouted up solidly in matching color with approved tile joint filler and water; all surpluses to be cleaned off immediately.

d. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for at least 48 hours.

e. When cured, the floor shall be washed and cleaned to the approval of the Engineer.

7.7.5 Skirting

a. Skirting in all porcelain ceramic floor tiled areas are to be of porcelain tiles to

match the floor tiling to the area concerned, as specified or shown on Drawings. The skirting shall be provided in an identical manner as for tiling. The skirting shall normally be 4" high with top edges arris-rounded or in the size and shape as shown on the Drawings or as approved by the Engineer.

b. The skirting shall be fixed to walls on a plastered backing having a slightly rough surface with neat cement paste. The back of each skirting tile shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall over rendered backing with a rubber mallet so that the tile faces are set in one plane. The skirting shall then be grouted and finished as for porcelain tiling.

7.7.6 Protection

The completed Works or parts thereof shall be protected by the Contractor against any damage. The Works shall be handed over in perfect condition. If any damage is incurred then the Contractor shall remove and/or replace the same at no additional costs. The Contractor shall exercise all care to protect the works executed by other trades and not covered by his Contract. Any damage to these shall be made good and the works restored at no additional cost.

7.8 MEASUREMENT AND PAYMENT

Floor tiling works covered by this section of Specifications, complete and approved, will be measured and paid for per square meter, at the individual item rates entered in the Bill of Quantities and generally in accordance with the applicable terms and conditions of the Contract.

Skirting, treads and risers shall be measured and paid for per running meter at the individual item rates entered in the Bill of Quantities, as per terms stated above.

***** END OF SECTION*****

8 SECTION: PAINTING

8.1 SCOPE OF WORK

The work under this section of the Specifications consists of furnishing all materials, plant, labor, equipment, appliances and performing all operations in connection with surface preparation, mixing, painting concrete works, gates, grills, 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.

8.2 APPLICABLE STANDARDS

Latest editions of following British Standards are relevant to these specifications wherever applicable.

BSI (British Standards Institution)

BS 245	Specification for mineral solvents (white spirits and related hydrocarbon solvents) for paints and other purposes.
BS 2521	Lead-based priming paint for woodwork.
BS 2522	Lead based priming paint for iron and steel.
BS 2569	Sprayed metal coatings. Paint colors for building purposes
CP 231	Painting of building
CP 3012	Cleaning and preparation of metal surfaces.

8.3 GENERAL

8.3.1 Except as otherwise specified, all painting shall be applied in conformity with BS CP 231 "Painting of Building" as applicable to the work.

8.3.2 The Contractor shall repair at his own/expense all damaged or defective areas of shop-painted metal work and structural steelwork. Metal surfaces against which concrete is to be placed will be furnished shop-painted and shall be cleaned to being embedded in concrete.

8.3.3 Except as otherwise specified, all concrete and plastered surfaces are to be painted.

8.3.4 The Engineer will furnish a schedule of colors for each area and surface. All colors shall be mixed in accordance with the manufacturer's instructions.

8.3.5 Colors of priming coat (and body coat where specified, shall be lighter than those of finish coat. The Engineer shall have unlimited choice of colors.

8.3.6 Samples of all colors 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 1 ft. x 1 ft. x 1/8 inch tempered hard hoard panels. Manufacturer's color chart shall be submitted for color specifications and selection.

8.4 MATERIALS AND EQUIPMENT'S

8.4.1 All materials shall be acceptable, proven, first grade products and shall meet or exceed the minimum standards of approved manufacturers.

8.4.2 Colors shall be pure, non-fading pigments, mildew-proof, sun-proof, finely ground in approved medium. Colors used on plaster and concrete surfaces shall be lime-proof. All materials shall be subject to the Engineer's approval.

8.4.3 Approved quality Distemper paint shall be used for painting where specified on the drawings as directed by the Engineer.

8.4.4 The plastic emulsion/weather shield paint or similar as approved by the Engineer shall be used where specified on the drawing as directed by the Engineer.

8.4.5 Other materials/ equipment's to be used are;

- Cement primer, Turpentine, Putty, Polish paper, Wood primer, Emery polish paper and Water
- Drop cloth and polythene sheets of suitable size & quality shall be used to protect other materials and surfaces.
- The masking material where-ever necessary shall be used in sufficient quantities to avoid falling of paint on unwanted surfaces.
- Grinding / buffing wheels, w ire brush & emery paper.
- Electrical distribution panels switch boards & hand lamps.
- Kerosene, thinners, acetone etc. to remove oil / grease etc.
- Painting brush:
- Good quality brushes with long and flexible bristles free from any paint residue shall be used.
- Neat, clean & painted scaffoldings of good quality.
- Good quality ladders, platforms etc.
- Safety gears to be used by personnel like respirator, face mask, hand gloves, protective clothing etc.

All material 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.

8.5 DELIVERY STORAGE AND CONTAINER SIZES

Paints shall be delivered to the site in sealed containers which plainly show the type of paint, color (formula or specifications number) batch number, quantity, and 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.

8.6 SURFACE PREPARATION

a. 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.

b. All the surfaces to be painted shall be free from dust, dirt, fungus, lichen, algae etc. old paint, varnish and lime wash should always be removed by scraping and washing.

c. All surfaces shall be made smooth, prior to the application of primer by rubbing with Bathy (silicon carbide rubbing brick) and/ or sand paper, filling the voids putty (Zinc/ Chalk/ Plaster of Paris mixture).

d. In the event the surfaces become otherwise contaminated in the interval between cleaning and painting, re-cleaning will be done by the Contractor at no additional cost.

e. No work in this section shall be allowed until all surfaces or conditions have been inspected and approved by the Engineer.

8.7 APPLICATION

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 (Alkali Resistance) 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.

A priming coat shall be applied to the cleaned and smooth surfaces first. Unless otherwise specified in the BOQ or approved by the Engineer, all surfaces shall have at least 3 coats of paint in addition to the priming coat.

Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. Surfaces to be painted that will be inaccessible after installation shall be completely painted prior to installation. Only as 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.

a. Where shown on Drawings all exterior finishes shall be painted with weather resistant paint in approved colors as per manufacturer's specifications.

b. For Interior finishes on concrete, masonry, door, windows, cabinets, grills etc. any of the listed types of paints, i.e.; Whitewash, Oil, Plastic or Matte Emulsion, Cement-based, Enamel, Distemper, Textured, Bituminous, Epoxy, Anti-condensation, Luminous (fluorescent), Latex, Lead, Metallic, Rubber, Aluminum, Silicone, Zinc rich, Anti- corrosive, Fungicidal Paint of the approved make and shade shall be applied to surfaces as shown on Drawings or as specified by the Engineer.

Walls, floors & ceiling and adjacent equipment's and piping shall be satisfactorily protected by drop clothes. Other precautionary measures should be taken during spray / brush painting to ensure at surrounding area /equipment is not affected.

The application should be as per manufacturer's instructions / specifications. Before opening the packed drum, it should be rolled on the floor and after opening the drum paints shall be stirred well so that no material/ pigments remains settled at the bottom. Suitably of the the paint shall be checked as per requirement before opening.

The choice of method of application i.e. by brush or by spray gun will be decided by the Engineer. However, adjacent equipment / structures shall be suitably protected and care shall be taken to prevent intoxication of the surrounding area. The method of paint application depending upon the area shall be jointly discussed and decided with Engineer. Paint thickness (DFT) shall be as per the item scheduled. In case the dry film thickness of finish paint is observed less than the specified values, additional coat shall have to be applied free of charge.

Polishing
After fine sanding by a skilled operator, one coat of clear polish should be rubbed in by hand using a cloth or pad, be allowed to dry and buffed up with worn fine sand paper or steel wool to remove raised grain. A second coat of clear polish should then be applied.

8.8 JOB CONDITIONS

8.8.1 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 decree C. No painting shall be done above 90% relative humidity.

8.8.2 Adequately protect all finished work.

8.8.3 Remove and replace all items of finish hardware, device plates, accessories, lighting fixtures or other removable items.

8.8.4 In no case shall any finish hardware or other finished item that is already fitted into place be painted, unless otherwise specified

8.9 INSPECTION & CHECK :

All the work is subject to the inspection of the Engineer or his authorized representative which shall be carried out in a manner, satisfactory to the Engineer. The contractor shall rectify any short comings pointed out by the said representative. The general inspection requirements are as follows:-

a. No paint shall be applied until the authorized inspection has ascertained that all prepared surfaces are satisfactorily cleaned and are in a condition to ensure the proper receipt of and adhesion of the coating.

b. The contractor shall furnish all gauges, instruments and the necessary measuring equipment's required for inspecting the work, test pieces, samples etc. at site and in the shop. The Engineer's authorized representative is intended to ensure that the material and workmanship are in accordance with this specification, but it will not relieve the contractor for any of his responsibilities for the ultimate workmanship and performances.

8.10 QUALITY ASSURANCE

All paint for any one surface shall be top quality, of one manufacturer of the specified. Deep tone accent colors shall be used and the unavailability of final coat colors may be the basis for rejecting materials for any one surface.

8.11 MEASUREMENT AND PAYMENT

All the painting and finishing on all surfaces, other than timber and steelworks which shall be deemed to be inclusive of painting and finishing in their own items of works, shall be measured per square Meter/ft in accordance with standard method of measurement and paid for at the unit rates entered in the Bill of Quantities and in accordance with the terms and conditions of this Contract.

Where separate quantities are not shown in the Bill of Quantities, these shall be deemed to have been included in the rate of the relevant items to be finished and painted and no separate payment shall be made for painting/finishing works of such items.

***** END OF SECTION *****

9 SECTION: DEMOLITION OF EXISTING STRUCTURE/RCC WORK

9.1 SCOPE OF WORK

This Section specifies the labor, materials, equipment, and incidentals required for the demolition, relocation, and/or disposal of all structures, walks, concrete slabs, retaining walls, trees and bushes, and including foundation, walls, columns, floors, piers, partitions, boundary walls, stoops and any other structures to the level of the demolition grade; to be removed as shown on the Drawings, as directed by the Engineer in charge in writing due to any defect/ damage/ reconstruction and as specified herein.

Site clearance will consist of the removal, disposal of demolition material; filling of all excavations to the existing ground elevation; and the grading and smoothing of the site.

9.2 METHOD

The Contractor shall examine the various Drawings, visit the site, determine the extent of the Work, the extent of work affected therein, and all conditions under which he is required to perform the various operations.

All demolition work will be done under the inspection of Engineer in charge. Contractor shall notify the Engineer in charge in writing prior to beginning any demolition work.

When the work of demolition is substantially complete, the Contractor shall again notify the Engineer in charge that the work will be ready for final inspection.

Before commencing demolition work, all structure relocation, bypassing, capping, and/or modifications necessary will be completed. Actual work will not begin until the Engineer in charge has inspected and approved the prerequisite work and authorized commencement of the demolition work.

Demolition operations shall be conducted in such a way as to to minimize damage by falling debris or other causes to adjacent buildings, structures, roadways, other facilities, and persons. Interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain, shall be provided by the contractor, if needed, or if directed by the engineer in charge, at his own cost.

The Contractor shall be responsible for all damage to private or public property as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all work performed until completion and final acceptance.

Arrangements shall be made with the Police Department to prohibit parking of vehicles in the near vicinity of the actual demolition.

In order to prevent the blowing of dust and dirt, the Contractor will be required to wet down and keep wet the structures before and during wrecking operations, all rubbish and debris stockpiled on the site, and all rubbish or debris is being loaded for disposal. All obstructions shall be adequately barricaded and lighted at night.

The Contractor shall comply with applicable laws and ordinances governing the disposal of materials, debris, rubbish and trash off or on the project area; and shall commit no trespass on any private property in the disposal of the materials without permission of the property

owners involved.

No explosives shall be used at any time during the demolition. No burning of combustible material will be allowed.

The Contractor shall fill and compact all voids left by the removal of pipe, structures, etc. with materials described herein to a grade that will provide for positive drainage of the disturbed area to drain run-off in direction consistent with the surrounding area. The Contractor shall provide all fill materials to the site as needed. Compaction of fill shall match the compaction of adjacent undisturbed material.

Once the demolition is started, it shall be continued until completed

Contractor shall notify utility companies or local authorities furnishing gas, water, electrical, telephone, or sewer service to remove any equipment in the structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition.

9.3 DISPOSAL OF MATERIAL

All salvageable or useable material or equipment and other products of the demolition, to be retained by the Engineer, as indicated in writing by the engineer in charge, shall be moved to a designated area by Contractor for later use. The Contractor shall promptly remove all other materials from the site as instructed.

All material, equipment, rubble, debris, and other products of the demolition not retained by the Engineer shall become the property of the Contractor for his disposal, off-site, in accordance with all applicable laws and ordinances at the Contractor's expense. The sale of salvageable materials by the Contractor shall only be conducted off-site

The proper transport and disposal of all material shall remain the responsibility of the Contractor. On-site storage of items is prohibited.

9.4 MEASUREMENT & PAYMENT

Measurement for payment for demolition work will be done in similar units in which these items were paid, if constructed. No additional payment will be made for pumping or other difficulties encountered due to water.

The rate shall include cost of all such operations mentioned above including necessary labour, materials, transport, scaffolding, stacking the serviceable materials, disposing the unserviceable materials within the lead specified, all as directed by the Engineer-in-charge.

***** END OF SECTION *****

S T A T E B A N K O F P A K I S T A N

SBP BANKING SERVICES CORPORATION (BANK),
Engineering Department, Head Office Karachi

RETROFITTING WORKS OF S.B.P B.S.C QUETTA OFFICE BUILDINGS

BIDDING DOCUMENTS

VOLUME-II (TECHNICAL SPECIFICATIONS)

April, 2024

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TABLE OF CONTENTS

0 SECTION: GENERAL REQUIREMENTS

0.1 GENERAL DESCRIPTION

0.1.1 Location of Site

The site of the project is located in Quetta, Balochistan.

0.1.2 Work under This Contract

The work under this Contract comprises the retrofitting of existing buildings as specified by the Contract/ necessitated by the project requirements/ instructed by the Engineer.

The Contractor shall be required to plan and execute the works in a manner such that the project is completed within the time specified in the Contract and in conformity with the provisions contained in the documents of Contract. The Contractor shall furnish a detailed construction programme along with a list of plant and equipment with capacities and capabilities for the approval of the Engineer. The Contractor shall also be required to submit a site supervisory/ management chart.

0.1.3 Execution of Work

All Work shall be executed in accordance with the requirements and in a manner set forth in the documents of Contract and in accordance with the instructions of the Engineer or Engineer's Representative. The Contractor shall confine his operations to the areas that are actually designated, for the Works, by the Employer. The Contractor shall be required to supply and maintain his own storage facilities, site office, sanitary facilities, and all temporary connections for electricity, water, sewerage and telephone etc. at his cost, subject to the approval of the Engineer.

0.2 APPLICABLE STANDARDS

Unless specified otherwise in the Contract Documents, all the Work and materials shall conform to the requirements of American Society for Testing Materials (ASTM) Specifications, American Concrete Institute (ACI) and British Standard Specifications (BSS) and as per the Drawings and Specifications.

0.3 TEST LABORATORY AND TESTING

0.3.1 Testing unless specified otherwise in the Contract, 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.

0.3.2 The quality control testing shall be arranged and performed by the Contractor's competent personnel in accordance with a Site Testing and Quality Control Programme/Facility to be established by the Contractor, and approved by the Engineer. The Contractor shall keep complete record of all the quality tests performed including the date and time of testing and submit the same to the Engineer. All quality control and related tests shall be carried out in accordance with applicable standards and codes under the supervision of the Engineer. The Contractor shall establish a laboratory on site which shall have equipment for testing Compressive Strength of concrete, Sieve Analysis and Compaction Test, as per the instructions and to the satisfaction of the Engineer.

0.4 STORAGE AND HANDLING FACILITY

The Employer shall assign the Contractor storage space for the storage of plant, equipment and materials for Contract Works. However the Contractor shall ensure that, on no account shall such temporary installation conflict/interfere with any of the permanent installations, services and any operational function of the Employer. The handling and storage of all plants, equipment and materials at Site shall be the responsibility of the Contractor and at no risk or cost to the Employer.

The Contractor shall protect all materials against corrosion, damage of any kind or deterioration during storage and also during erection on Site. The protection methods shall be to the approval of the Engineer.

0.5 TEMPORARY FACILITIES

The Contractor shall provide, erect/install, maintain, alter as and when necessary and remove on completion except as otherwise directed by the Engineer all temporary facilities and services as described hereinafter and/or in the Contract documents and/or as instructed and approved by the Engineer, all at his own cost and expenses.

0.5.1 Temporary Fencing & Lightning

The Contractor shall provide and maintain at his own cost all temporary lights, guards, fencing and watching to the approval of the Engineer for the safety and protection of the Works.

0.5.2 Temporary Services

a. First Aid

The Contractor shall provide and maintain First Aid Facilities on the Site.

b. Fire Fighting

The Contractor shall provide and maintain adequate firefighting facilities on the Site at his own cost.

0.6 PROJECT RECORD DOCUMENTS

The Contractor will submit shop drawings showing work sequence, work methodology, including location of construction joints, pouring sequences for the approval of Engineer prior to start of work on each stage of the project or at any time if requested by the Engineer.

The Contractor will maintain complete, accurate log of all construction work as it progresses through recording progress on the approved work-plan, progress reports and construction photographs stage wise.

The Contractor will submit weekly and monthly progress reports to the engineer, on approved format with photographs.

On completion of major construction milestones, prepare certified As-built drawing showing work done, dimensions, locations, angles and elevations of construction and site work.

0.7 MEASUREMENTS AND PAYMENT

No separate payment shall be made for the services and performance provided under this section of Specifications.

The Contractor is deemed to have covered the costs of all related supplies and performance in the unit prices of other contract items.

**** END OF SECTION****

1 SECTION: SETTING OUT OF WORKS

1.1 SCOPE OF WORK

The Work covered by this section of Specifications consists of furnishing all labour, materials, necessary equipment, services, miscellaneous and necessary items, required to satisfactorily complete setting out of the Works, as indicated on Drawings, specified herein and subject to the terms and conditions of the Contract.

1.2 SETTING OUT OF WORKS

The Contractor shall set out the Works and shall be responsible for true and perfect levels and setting out of the same and for correctness of the direction, positions, levels, dimensions and alignments of all parts thereof. If any error in this respect shall appear during the progress of the Work, the Contractor shall at his own expense rectify such error to the satisfaction of the Engineer. Any checking by the Engineer shall not relieve the Contractor from his complete unshared responsibility for correct setting out of Works. The Contractor shall construct and maintain accurate bench marks so that the lines and levels can be easily checked by the Engineer.

1.3 MEASUREMENT AND PAYMENT

No separate payment shall be made for setting out of Works. The Contractor shall be deemed to cover the costs for this item of work in the unit price of other Contract items.

**** END OF SECTION****

2 SECTION: PLAIN AND REINFORCED CONCRETE

2.1 SCOPE OF WORK

The Work covered by this section of the Specifications consists of furnishing all plant, labour, equipment, appliances and materials and in performing all operations in connection with plain and/or reinforced concrete work complete in strict accordance with this section of Specifications, applicable Drawings and subject to the terms and conditions of this Contract.

2.2 APPLICABLE STANDARDS

Latest editions of the following Pakistan, British and ASTM ACI Standards are relevant to these specifications wherever applicable.

2.2.1 Pakistan Standards

PS233	Portland Cement (ordinary & rapid hardening)
PS243	Natural aggregates for concrete
PS279	Abrasion of coarse aggregates by the use of Los Angeles machine.
PS280	Determination of aggregates crushing value
PS281	Organic impurities in sand for concrete aggregate.
PS282	Material finer than No. 200 BS test sieve in aggregates, method of test For
PS283	Soundness test for aggregates by the use of sodium sulphate or
PS284	magnesium sulphate.
PS285	Sampling aggregates for concrete
PS286	Sieve or screen analysis of fine and coarse
PS421	Description and classification of mineral aggregates
PS422	Sampling fresh concrete
PS560	Slump test for concrete
	Making and curing concrete compression test specimen in the field.
PS612	Sulphate-resistant Portland cement type 'A' and sampling fresh concrete in the laboratory.
PS716	Mixing
PS717	Compacting factor test for concrete
PS746	Definitions and terminology of cements
PS849	Making and curing concrete compression test cubes.

2.2.2 ASTM (American Society for Testing and Materials)

C33	Standard Test Method for Fine and coarse aggregates
	Organic impurities in sand for concrete.
C39	Standard Test Method for Compressive Strength of Cylindrical Concrete
C40	Specimens
C87	Effect of organic impurities in fine aggregates on strength of mortar.
	Soundness of aggregates.
C88	Ready mixed Concrete.
C91	Cement Standards and Concrete Standards
C94	Compressive strength of hydraulic cement mortars
C 109	Material finer than No. 200 (0.075mm) sieve
C 117	Light weight pieces in aggregates.
C 123	Concrete and concrete aggregates.
C 125	Specific gravity and absorption of coarse aggregate.
C 127	Specific gravity and absorption of fine aggregate.
C 128	Resistance to abrasion of small size coarse aggregate.

C 131	Sieve or screen analysis of fine and coarse aggregate.
C 136	Clay lumps and friable particles in aggregates.
C 142	Slump of Portland Cement Concrete
C 143	
C150	Standard Specification for Portland Cement
C156	Water retention by concrete curing material
C171	Sheet material for curing concrete.
C185	Air content or hydraulic cement mortar.
C188	Density of hydraulic cement.
C191	Time of setting of hydraulic cement by vicat needle
C260	Air entraining admixture for concrete.
C289	Potential reactivity of aggregate.
C309	Liquid membrane forming compounds for curing concrete.
C387	Chemical admixtures for concrete.
C494	Standard Specification for Packaged, Dry, Combined Materials for
C535	Mortar and Concrete
C75	Resistance to abrasion of large size coarse aggregates.
C994	Aggregate sampling.
C1190	Preformed expansion joint filler for concrete.
C1715	Concrete joint sealer (hot poured elastic type).
	Preformed expansion joint filler for concrete paving and structural
D1850	concrete.
E11	Concrete joint sealer (cold application type).
E96	Wire cloth sleeves for testing purposes.
E154	Water vapor transmission of materials in sheet form.
E337	Materials for use as vapor barrier under concrete slabs.
	Relative humidity by wet and dry bulk psychrometer.

2.2.3 ACI (American Concrete Institute)

211	Recommended practice for selecting proportions for normal and heavy weight concrete.
214	Quality control charts
301	Specifications for structural concrete for building.
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
315	Manual of standard practice of detailing reinforcement concrete structure.
318	
347	Building code requirement of reinforced concrete.
	Recommended practice for concrete formwork.

2.2.4 British Standards

BS 12	Specifications for Portland cement, ordinary and rapid hardening
BS 410	Specifications for Test Sieve
BS 812	Specification for aggregates from natural sources for concrete Method of testing concrete
BS 822	Test for water making concrete
BS 1881	Method for determination of Compressive Strength of Concrete Cubes
BS 1348	Rigid expanded polyvinyl chloride for thermal insulation.
BS 3837	Sulphate-resisting Portland cement
BS 4027	Specification for Sulfate-Resisting Portland Cement
CP 8110	

CP 114 BS 4550 BS 8500	Specifications for Design and Construction of Reinforced and Pre-stressed Concrete The Structural Use of Reinforced Concrete in Buildings Methods of Testing Cement Concrete - Complementary British Standard

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.

2.3 GENERAL

2.3.1 Until and unless specified or directed otherwise by the Engineer, all materials and workmanship shall be based on the latest versions of applicable ASTM Standards in force at the time of inviting tenders.

2.3.2 Any defective work in the opinion of the Engineer shall be removed and reconstructed without undue delay to the approval of the Engineer and the Contractor shall bear all additional costs incurred.

2.3.3 Any previous checks by the Engineer shall not in any way relieve the Contractor of his responsibility in respect of quality and accuracy of Work.

2.3.4 Full care shall be taken to install embedded items. Embedded items shall be inspected and checks for reinforcements and other materials and items shall be completed and approved before concrete is placed.

2.3.5 The Contractor shall get the bar bending schedules of reinforcement checked and approved from the Engineer prior to the cutting of reinforcement.

2.3.6 The Contractor shall maintain an accurate record of ambient temperature of Site. Ambient temperature shall be measured using mercury thermometers or other thermometers acceptable to the Engineer.

2.3.7 Throughout the concrete work, the Contractor shall employ full time on the Works suitable number of qualified and experienced Engineers whose sole duties shall be as follows:

- Design of concrete mixes
- Quality control of concrete
- Supervision of mixing, transporting, placing, compacting, finishing, curing and protecting concrete.
- Supervision of sampling and testing.
- Preparation and submission of test certificates and reports.
- Completion and keeping of record.
- Such other duties as the Engineer may direct.

2.3.8 All concrete work including reinforcement etc. shall be carried out in accordance with the applicable requirements of ACI/ASTM/BSS Standards and to the instructions of the Engineer.

2.4 MATERIALS

2.4.1 Cement

a) Ordinary Portland cement shall be grey normal setting cement of approved make and source and of the specified gravity, fineness and chemical composition fully conforming to British Standard Specifications BS-12 and shall be capable of satisfying all tests such as the tensile strength tests contained therein.

b) Sulphate resistant cement where required shall be sulphate resistant Portland cement of the approved make fully conforming to BS-4027 and satisfying the requirements for fineness, chemical composition, strength, setting time and soundness, etc.

c) For all types of cement described in sub-clauses 4.03.1 (a) & (b) above, the cement shall have a tricalcium aluminate (C3A) content by weight not less than 5% and not more than 8%.

d) For all types of cement described in sub-clauses 4.03.1 (a) & (b) above. The initial setting time shall not be less than 45 minutes and final setting time not more than 10 hours.

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

f) Cement shall be delivered in sealed bags and be stored in moisture-protected and well-ventilated sheds and each cement supply shall be stored separately.

g) The Contractor shall provide at his own cost on the Site all necessary sheds which shall be perfectly dry, waterproof and adequately protected against ingress of water for the storing of cement to be delivered to the Work, to ensure adequate supplies being available for the Work.

h) Cement, which is damp or contains lumps which cannot be broken to original fineness by finger pressure will be condemned irrespective of age and must be removed from the Site.

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

j) Cement shall be consumed in the sequence of its arrival at Site unless otherwise directed by the Engineer.

2.4.2 Aggregates

a) All fine and coarse aggregates to be used shall be supplied from approved sources, which shall not be changed without permission in writing from the Engineer. Aggregates shall conform to the requirements of applicable ASTM C33-82.

b) Fine aggregates, shall be from an approved source of supply of a uniform quality conforming to ASTM C-33-82 and shall be clean and sharp and free from clay, earth, vegetable and organic matters, alkaline or acid reactions or other deleterious salts or such harmful matters and impurities.

c) Fine aggregates shall conform to the requirements of the relevant ASTM C- 33-82 Specifications, and shall be graded as follows;

Sieve Number/Size	Percentage (by weight) passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	95 - 100
2.36 mm (No. 8)	80 - 100
1.18 mm (No. 16)	50 - 85
0.6 mm (No. 30)	25 - 60
0.3 mm (No. 50)	10 - 30
0.15 mm (No. 100)	2 - 10

d) Coarse aggregates shall be approved river gravel or hard crushed stone from a source approved by the Engineer and shall be clean, inert, hard, non-porous and free from laminated particles, sand, dust, salt, lime, chalk, clay, organic impurities or other deleterious matter.

e) Coarse aggregate shall also conform to the requirements of Table 2 of ASTM C-33 and shall be graded as follows:-

For Reinforced Concrete (Nominal Size of Graded Aggregates 20.0 mm to 2.36 mm)

Sieve Number/Size	Percentage (by weight) passing
25.0 mm	100
20.0 mm	90 - 100
9.5 mm	20 - 55
4.75 mm (No. 4)	0 - 10
2.36 mm (No .8)	0 - 5

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

g) If required, aggregates shall be washed and screened to the sequence of receipt of supplies unless otherwise directed by the Engineer.

h) All aggregates shall be subjected to the approval of the Engineer. Any aggregates not found to be of the required standard shall be rejected by the Engineer and shall have to be removed from Site without delay. Concrete structures executed with rejected aggregates shall be dismantled and rebuilt at the Contractor's expense.

i) Special fine gravel of 9 mm. size shall be used if called for in the Drawings or as directed by the Engineer.

j) Physical properties of aggregates shall be in accordance with Table 3 of ASTM C33.

2.4.3 Water

Water to be used in the Work shall be potable water and shall be free from all impurities whether suspended or dissolved. Further, the water shall not contain any chemical impurities, salts etc. of any kind. Water shall be tested for its fitness in Works in accordance with AASHTO Method T26-51.

2.4.4 Admixtures

a) Suitable admixtures from BCR, Sika, Fosroc, Betocrete C-16or Master Builders or other approved manufacturers may be used in concrete mixes with the prior approval of the Engineer. The amount of admixtures added to each batch of concrete requires careful control and shall be added in the doses as recommended by the manufacturers and approved by the Engineer. The cost of the admixtures shall be deemed to be included in the rates.

b) For use of an admixture, the information required by the Engineer shall be submitted to him for each admixture for his approval.

c) BASF 700 or approved equivalent concrete retarding agent, may be used if required with the approval of Engineer

2.4.5 Epoxy Mortar

a) Epoxy mortar shall be used as mentioned in drawings or approved equivalent with the approval of Engineer.

b) For use of an epoxy mortar, the information required by the Engineer shall be submitted to him for his approval.

2.5 CLASSIFICATION OF CONCRETE

Classification of concrete to be used in various parts of the Works shall be as indicated on the Drawings and mentioned in the Bill of Quantities. Unless noted otherwise, all blinding concrete shall be of Class E. The concrete of various grades shall be proportioned as set out in Table-1 appended hereto.

Table-1 showing minimum required compressive strengths on 6” x 12” long test cylinders and minimum quantity of cement required per m3 of finished concrete for various mixes and under various conditions is given below:

TABLE – 1

Class of Concrete	Minimum Qty. of Cement Kg/m^3	Work Cylinder Strength		Max. Water-Cement Ratio
		@ 7 days (psi)	@ 28 days (psi)	
D2	540	4200	6000	0.33
D1	400	3500	5000	0.40
D	385	3150	4500	0.42
A3	350	2800	4000	0.45
A2	325	2450	3500	0.47
A1	300	2100	3000	0.50
C	300	1750	2500	0.50
E	275	1400	2000	0.52
F	217	875	1250	0.55
G	159	600	850	-

Non-structural Concrete

Non-structural concrete (NS concrete) shall be used only for non-structural purposes where shown on the Drawing. NS concrete shall be compound of ordinary Portland cement and aggregates complying with this Specification.

The weight of cement mixed with 0.3 cubic meters of combined aggregate shall not be less than 50 kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40 mm nominal.

The concrete shall be mixed by machine or by hand to a uniform colour and consistency before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required.

The concrete shall be compacted by hand towels or rammers or by mechanical vibration.

2.6 PROPORTIONING OF CONCRETE MIXES

All concrete shall be proportioned by weight for design of concrete mixes, unless specifically agreed by the Engineer to proportion them by volume, which permission shall be given only if the arrangements made at Site are satisfactory. The Contractor shall submit to the Engineer proposed mix designs for concrete to be used, based on preliminary laboratory tests to determine proportion of cement, aggregates and water in the concrete conforming to the quality and strength requirements specified herein. Preliminary test results of at least three different mixes of each class of concrete with varied water-cement ratio shall be submitted. The results of 7 days and 28 days cylinder tests shall be used to establish the ratio between 7 days and 28 days strengths of used concrete. The Engineer may make adjustments in the ratio of fine to coarse aggregates in the mix for a certain work. Preliminary design of mixes and testing shall be the responsibility of the Contractor at his own cost. The proportion of voids in between the coarse aggregate shall be controlled and if it exceeds 0.45%, the Contractor without any charge shall increase sand and consequently the cement. If the proportion is less than 0.45%, sand shall be decreased but not the cement.

The detailed data, calculations and test results shall be compiled in a report and the proposed mix be declared by the Contractor. The report shall be submitted to the Engineer in time before commencing the concrete works and all test results shall be to the Engineer's satisfaction.

Lack of approval by Engineer shall not constitute a reason for an extension of time or additional costs.

2.6.1 No Fines Concrete

"No Fines" concrete shall consist of approved aggregate graded between 40mm and 20mm with not more than 5% passing the 20mm sieve.

The mix shall consist of 0.25 cu m of aggregate to 50kg cement. The aggregate is to be damp at the time of mixing and the water/cement ratio is to be strictly controlled to evenly wet the aggregate with grout.

The concrete is to be placed as quickly as possible after mixing and is to be lightly rodded to assist placing. The concrete shall not be vibrated or rammed.

2.6.2 Maximum Allowable Water Content

All concrete specimens shall be made, cured and tested in accordance with ASTM Standard. A curve representing the relation between the water content and the average 28 days compressive strength or earlier strength at which the concrete is to receive its full working load shall be established for a range of values including all the compressive strengths shown on the plans. The curve shall be established by at least four points, each point representing average values for at least four test specimens. The maximum allowable water content for the concrete shall be as determined from this curve and shall correspond to a strength 15% greater than indicated on the plans. However, the water cement ratio shall not exceed the value given in Table-1 above for the class/strength of concrete specified. No substitution shall be made in the materials used in the work without additional tests in accordance herewith to indicate that the quality of the concrete is satisfactory.

2.6.3 Slump Test

The slump for concrete, determined in accordance with ASTM C-143 Test for Concrete, shall be minimum 2” and maximum 4” provided the requisite strength is obtained. Corrective additions to remedy deficiencies in aggregate gradations shall be used only with the written approval of the Engineer. When such additions are permitted, the material shall be measured separately for each batch of concrete.

2.7 BATCHING AND MIXING

Concrete shall be mixed by a mechanical batch type mixing plant with adequate facilities for accurate measurements and control of each material entering the mixer and for changing the proportions to conform to varying conditions of the Work. The mixing plant assembly shall permit ready inspection of operations at all times. The plant and its location shall be subject to approval of the Engineer.

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

2.7.1 Batching Units

Batching units shall be supplied with the following items:-

a) Weighing unit shall be provided for each type of material to indicate the scale load at convenient stages of the weighing operations. Weighing units shall be

checked at times directed by and in the presence of the Engineer and required adjustments shall be made before further use.

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

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

Materials	**Percentage by Weight**
Cement	+1%
Water	+1%
Aggregate smaller than 3/4"	+2%
Aggregate larger than 3/4"	+3%

2.7.2 Mixing Units

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

b) Mixing time shall be measured from the instant water is introduced into the mixer drum containing all solids. All mixing water shall be introduced before one-fourth of the mixing time has elapsed. Mixing time for mixers of one cubic meter or less shall be not less than 2 minutes; for larger than one cubic meter capacity mixers, time shall be increased by 15 seconds for each additional half cubic meter or fraction thereof, which may be varied if the charging and mixing operations fail to result in the required uniformity in composition and consistence within a batch and from batch to batch. If an air-entraining agent is allowed to be used, additional mixing time shall be allowed so as to provide the specified air-content.

c) Unless waived by the Engineer, device such as discharge-lock to lock the discharge mechanism, until the required mixing time has elapsed, shall be provided on each mixer. Mixing shall continue for at least 40 revolutions of mixer drum.

d) No hand mixing under any circumstances even with extra cement shall be permitted. If during concreting, the mixing plant fails, the concrete already poured shall be removed, unless directed otherwise by the Engineer. Mixers, which have been out of use for more than 30 minutes shall be thoroughly cleaned before any further concrete is mixed.

e) The mixing water shall be regularly sampled and tested for salt content and contamination.

2.8 SAMPLES AND TESTING

2.8.1 General

Test cylinders of concrete shall be prepared and stored by the Contractor in accordance with the ASTM C-172, as and when directed by the Engineer. Test cylinders and the concrete materials shall be tested in an approved laboratory and the Contractor shall bear all charges for the same, including such other tests as may be determined by and acceptable to the Engineer.

2.8.2 Water

Water shall be tested in accordance with AASHTO Method of Test T26-51.

2.8.3 Cement

Cement shall be tested as prescribed in BS-12.

2.8.4 Aggregate

Aggregates shall be tested as prescribed in ASTM C-33. In addition, fine aggregates shall be tested for organic impurities in conformity with ASTM C-40.

2.8.5 Reinforcement

Reinforcement bars shall be tested as prescribed in BS 4449, BS-4461 and ASTM A- 615-82(S1) for deformed steel bars and mild steel plain bars. Refer clause 4.10 of this section for specification requirements of reinforcement works.

2.8.6 Testing of Concrete

2.8.6.1 Concrete Compressive Strength Test

a) Works Test Cylinders shall be made of all structural concrete incorporated into the works. Unless otherwise directed by the Engineer, one set of cylinder of any particular mix shall be taken from either :-

- Each 350 Cft or part thereof in columns
- Each 1050 Cft in walls and small foundations
- Each 1750 Cft in slabs, beams and large foundations, or
- each day's production

Whichever is the more frequent

b) Each set of the Works Test Cylinders shall comprise six 6”x12” Cylinders made from a single sample of concrete taken from the point of final deposition of the set concrete under the Engineer's supervision.

c) The sampling, making, curing and testing of Works Test Cylinders shall be carried out in accordance with ASTM C3 & C39. Test results shall be recorded on approved forms and submitted in duplicate to the Engineer immediately following the test.

d) A sample of concrete shall be taken at random on eight separate

occasions during each of the first five days of using that mix. The number of samples per day and the times which they are taken shall be varied at random (thereafter at least one sample shall be taken each day the concrete of that particular mix is made).

e) From each sample six Cylinders shall be made, two for test at seven days, and the other four for test at twenty-eight days.

f) Specimens shall be cured under laboratory conditions except that the Engineer may require curing under field conditions in which case strength of field cured specimens shall not be less than 85% of that of companion laboratory condition cured specimens.

g) All cylinder moulds shall be steel moulds perfectly true, having all internal and meeting faces machined to a smooth surface.

h) If the strength tests of the laboratory cured specimens for any portion of the Work falls below the minimum allowable compressive strength at 28 days required for the class of concrete used in that portion, the Engineer shall have the right to order replacement of the affected work.

i) All test specimens shall bear distinguishing mark showing number, date of casting, quality of concrete and place from where sample was taken. A proper daily record of test specimens made and test results obtained shall be maintained by the Contractor and weekly test results shall be submitted to the Engineer.

2.8.6.2 Testing for Chloride Ion Content

Maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed 0.15% by weight of cement. To determine water soluble chloride ion content, test procedures shall conform to ASTM C 1218.

2.8.7 Concrete Members not complying with Specifications

(i) Where concrete in the Works does not comply with the Specifications, the Engineer may order any or all of the following or any other appropriate action to be taken:

a) The drilling of test cylinders in mass concrete and testing the cylinders to destruction by compression.

b) The carrying out of load tests or other non-destructive tests on concrete structure.

c) The cutting out and replacement of such volume as is considered defective by the Engineer.

d) Strengthening of the structure in accordance with the requirements and as proposed by the Engineer.

(ii) The Contractor shall carry out all such tests, investigations, rehabilitation or

replacement in coordination with and as acceptable to the Engineer at no additional cost to the Employer.

2.9 TRANSPORTING AND PLACING CONCRETE

2.9.1 General

a) Concreting shall be conveyed and deposited as quickly as possible after mixing and shall proceed so that, as far as possible, a complete section of the Work is done in one operation. The concrete may be distributed in barrows, skips, and chutes and by any other method such as pumps, conveyor belts etc. all to the approval of the Engineer.

b) Transportation of concrete shall be in a manner approved by the Engineer and shall be so as to avoid segregation or loss of ingredients of concrete.

c) All foundations and portions of Work to be concreted shall be approved by the Engineer in writing before concrete is poured.

d) All forms and reinforcement shall be completed, cleaned, inspected and approved before pouring of concrete. No concrete is to be deposited till the Engineer has inspected and approved in writing all reinforcement, foundations, forms, details, positioning of all fixtures and materials to be embedded in concrete, control levels and screeds, etc. and is satisfied with the arrangements the Contractor has made to efficiently proceed with the work such as sufficient labour, materials, plants etc. Such an approval will not relieve the Contractor from any of his obligations under this Contract. No concrete shall be deposited without the written permission from the Engineer who shall have no authority to waive off this condition. Any concrete without such written authorization shall be liable to be rejected.

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

f) All concrete shall be thoroughly compacted and consolidated by means of pneumatic or mechanical immersion type vibrators of suitable size having minimum frequency of 8000 RPM. Care shall be taken to avoid segregation due to excessive vibration. The Contractor shall maintain on Site at all times one or more standby vibrators. Tapping or other external vibration of forms shall not be allowed unless so directed by the Engineer. In that case formwork shall be adequate to withstand vibrations. Compaction shall be done until the whole mass assumes a jelly like appearance and consistency with water just appearing on the surface. Concrete shall be sufficiently tamped and consolidated around the steel bars, care shall be taken that the vibrator does not touch steel or formwork, and is worked into all parts of the moulds in order that no voids or cavities are left. Steel shall not be disturbed during operations of concreting. Concrete shall be brought up in even layers not more than 8” thickness and worked against side of forms to give a smooth and uniform surface. No surplus water shall be allowed to come out and lie on the surface of concrete. The concrete must be of such a consistency that when ramming, consolidating and tamping is completed, a thin film of water is just appearing on the surface. In vibrating, care shall be taken to avoid displacing the reinforcement.

g) Hardened concrete, debris and foreign materials shall be removed from interior of forms and from inner surface of mixing and conveying equipment.

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

i) Concrete shall not be dropped freely from a height of more than 10 ½ ft. in columns and 4 ft. elsewhere. In cases where an excessive drop is inevitable, the Contractor shall provide spouts, down pipes, chutes, or side ports to forms with pockets, which will let concrete stop and flow easily into the form without any risk of segregation. The discharge of the spouts, down pipes or chutes shall be controlled so that the concrete may be effectively compacted into horizontal layers not more than 8" thick.

j) Concrete is to be deposited as quickly as possible after mixing and to proceed continuously. Concrete which has attained its initial set or has contained its mixing water for more than 30 minutes shall not be allowed to be placed in the work.

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

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

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

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

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

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

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

r) All exposed surfaces and lines of the concrete work are to be true and fair without cracks, bends, windings and distortions of all kinds, without any extra charges by the Contractor. All concrete work to remain exposed and unplastered is to be fair faced, smooth, pleasing and to the entire satisfaction of the Engineer.

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

2.9.2 Temperature

No concrete shall be mixed or placed while the temperature is above 35 degrees centigrade (°C) on a rising thermometer or above 40 degrees centigrade (°C) on a falling thermometer. The Contractor shall supply an accurate maximum and minimum thermometer and hang it in an approved position in the Works.

The Contractor shall plan the day's concrete in such a manner as to ensure that each bay or panel is completed at a proper construction joint before the temperature rises above the permissible limit.

The Contractor shall allow in his rates for any additional expenses incurred by complying with this Clause in order to complete the works within the "Time for Completion".

2.9.3 Hot Weather Concreting

Hot Weather Concreting Operation should conform to the provisions of ACI Standard 305-72 "Recommended Practice for Hot Weather Concreting". The following precautions should be adopted as necessary to comply with the above limit:-

a. Shading of aggregate stock piles.

b. Insulation of water tanks and pipelines and formwork.

c. Refrigeration of mixing water.

d. Addition of ice to mix to lower temperature.

e. Shading of formwork and reinforcement from the sun and drying winds.

f. Cooling of formwork and reinforcement prior to and ahead of casting of the concrete by mist spraying.

g. Covering and spraying with water of hardening concrete surfaces.

h. Concreting during the cooler part of the day.

2.10 PROTECTION AND CURING

All exposed concrete shall be cured. Curing shall be accomplished by preventing loss of moisture, rapid temperature change and mechanical injury or injury from rain or flowing

water for a period of at least seven (7) days. Curing shall be started as soon as the concrete has hardened sufficiently for the surface not to be marked. Curing shall be done either by covering with sand, hessian, canvas or other approved fabric mats, which shall be kept continuously wet. If required and so directed by the Engineer, formed surface with forms in position shall also be cured by keeping all forms continuously wet. As an alternative, curing of concrete on all exposed surfaces which could not be kept covered, such as sides of the beams, under side of the slabs, may also be done by sealing concrete surface with liquid membrane-forming curing compounds white pigment type conforming to ASTM C-309 or equal so as to arrest loss of moisture from concrete, with the approval of the Engineer. Care shall be taken so as to spray the compound/chemical on all the exposed faces of concrete so that no loss of moisture takes place. The Contractor shall take special care that curing of concrete is satisfactorily carried out and in accordance with methods specified herein and/or as instructed by the Engineer.

Any negligence in this regard may result in total rejection of such concrete works, which in the opinion of the Engineer have not been adequately cured. Period of curing for any concrete shall be 7 days or more as directed by the Engineer. All concrete pours and concrete structures shall be clearly marked with non-washable paints to indicate the date of placing concrete. During hot weather, curing shall be done even at night. It shall be obligatory on the part of the Contractor to obtain a certificate from the Engineer that the curing has been properly done. A suitable format shall be printed and kept on Site to be signed by the Engineer for every part of the Work.

For sections 5 ft. or more thick, the Contractor shall ensure that the temperature differential between the inner and outer surfaces shall not exceed 20°C and shall submit to the Engineer his proposals to control and monitor this.

2.11 CONSTRUCTION JOINTS

Construction joints shall be located as indicated on the Drawings and/or as approved or directed by the Engineer. Prior to construction of any structure, the Contractor shall submit a proposal showing location of construction joints and sequence of construction to suit his concreting programmed for the approval of the Engineer. Joint in columns shall be made at the underside of the deepest beam framing thereto. Beam stems and slabs shall be poured monolithically unless allowed otherwise by the Engineer in writing. Joints not specified or shown on the Drawings if so required and approved by the Engineer, shall be so located as to least impair the strength and appearance of the Work. Except and where indicated on the Drawings, no jointing shall be made in footings or foundations without written approval of the Engineer. Construction joints shall be at right angles to the member and shall be formed against firm stop boards. The stop board shall be removed as soon as possible after placing the concrete but without the risk of movement of the concrete and the concrete surface shall be well brushed with a hard brush and washed off with a spray of water, two to four hours after casting, to expose the aggregate and provide key for the next pour.

In all water retaining structures and other substructure pits and trenches, P.V.C. or any other approved water stops shall be provided at the construction joints in the manner shown on the Drawings and/or approved by the Engineer.

Whenever a section of concrete is left unfinished, for any reasons with the approval of the Engineer, leaving surface which will be hard-set before additional concrete can be joined to it, such dovetails, grooves or other bonds shall be provided as may be necessary to ensure a good bond with the new work, at the cost of the Contractor. Before deposition fresh concrete upon or against any concrete which is already set, the surface of the set concrete shall be roughened with a cutting tool, any laitance removed, thoroughly cleaned from all

foreign matter, well-watered and covered with approved bonding agent and cement grout, and special care shall be taken to ram the fresh concrete thoroughly up and against the set concrete; and, if deemed necessary by the Engineer, the joints shall be reinforced with steel bars or dowels to be all furnished and done by the Contractor without any additional cost.

2.12 CONCRETE FLOOR SLAB FINISHING

Concrete slabs shall be finished as described herein. In preparation for finishing, floor slabs shall be struck off to the required level at or below the elevation or grade of the finished floors as shown on the Drawings. Floors shall be leveled with a tolerance of 1 mm in 1m. Where drains occur, the floor surface shall be pitched to the drains as indicated on the Drawings or as directed by the Engineer.

2.13 MONOLITHIC FINISH

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

2.14 CONCRETE TOPPING

Where indicated on the Drawings, base slab under concrete topping shall receive a screeded finish. After the base slab is thoroughly cured and when directed, concrete topping shall be laid to the thickness as indicated on the Drawings in alternate panels of suitable sizes as directed by the Engineer.

2.15 ANCHOR BOLTS, INSERTS, SLEEVES, CHASSIS, RECESSES, STEEL FRAMES

The Contractor shall provide chases and openings required for other sections of the Works and will cooperate and coordinate with other trades in placing their pipes, ducts, recesses and other built-in items as the Work proceeds, entirely at his own cost and risk.

The Contractor shall furnish and place in position accurately, as shown on the Drawings, all inserts, sleeves, chases, recesses, etc., supplied by the Contractor, subcontractors or other contractors, as directed. Full cooperation and coordination shall be maintained with other contractors, subcontractors in this regard.

2.16 WATERPROOF CONCRETE

Waterproof concrete shall consist of structural concrete as specified herein and with the addition of an approved waterproofing additive. This shall be mixed in accordance with the manufacturer's instructions and as detailed in the Bill of Quantities.

Contractor's attention is drawn to the special care required for casting roof framing, ponds,

swimming pools and all underground structures including basement floor, retaining walls, sumps, pits, etc. These are all designed to BS 8007, British Standard for water retaining structures. The contractor shall ensure that workmanship and curing is up to the required standard. The crack widths in such structures shall not exceed 0.2mm.

The Contractor shall take full responsibility for ensuring that the resulting construction is completely watertight and free from penetration of moisture.

When in the opinion of the Engineer, damp patches and/or leakage of water in the finished work are due to failure of the Contractor to comply with this specification, the affected work shall be made good at the Contractor's expense.

Water-stoppers shall be provided in all construction joints and the type of Water-stoppers will be as specified or to the approval of the Engineer. All Water-stoppers will be joined by welding strictly in accordance with the manufacturer's recommendations and all multiple joints and special intersections shall be manufactured by the supplier.

Before commencement of work, the Contractor shall obtain the Engineer's approval of the methods to be used to support and maintain the Water-stoppers in the correct location while the concrete is placed and also the layout and form of all additional construction joints other than those shown on the drawings. Unless indicated otherwise on the drawings, all construction joints in waterproof concrete shall be formed incorporating Water-stoppers to Engineer's approval.

All service holes cast in shall incorporate sleeves with puddle flanges and temporary openings for services should incorporate Water-stoppers.

Care shall be taken at all times to ensure that Water-stoppers are not perforated or damaged in any way and the concrete shall be carefully placed and compacted around the Water-stoppers to ensure void free impervious concrete.

All kickers or starter plinths to walls (if used) on the periphery of the watertight construction shall be cast monolithically with the base.

The formwork shall comply with this Specification and in addition any bolt or fastening embedded in or passing through the concrete shall be to the approval of the Engineer and not impair the water tightness of the structure. The use of through bolts and sleeves is strictly prohibited.

Special attention shall be given to the elimination of shrinkage or thermal cracking. The size of any bay or slab or wall and sequence of pouring shall be such as to minimize cracking.

Slotted inserts or sockets cast into the structural concrete shall be provided for all fixings including services. The cutting of holes in watertight concrete is strictly prohibited.

The Contractor is completely responsible for making all basements and swimming pools absolutely watertight. If any leakages or moist patches occur, the cost of any repairs, etc. to make the basement and swimming pool fully watertight will be borne by him. The Contractor is to give a ten year guarantee for water tightness, reckoned from the date of completion of roof framing, basement and swimming pool. The form of guarantee is to be to the satisfaction of the Client. Should any leaks or dampness occur during the Guarantee period of ten years, the Contractor shall, at no cost to the Client, immediately re-waterproof

the defective area or areas and make good all damages to surface finishes such as plaster, painting, paneling, tiling, etc. electrical or other installations or other property, caused by leaks or dampness or reimburse the Client for making good such damages.

Water tightness of swimming pools shall be inspected and tested in accordance with BS 8007:1987 and/or ACI-350.

2.17 CLEANING AND REMOVAL OF RUBBISH

On completion of Works herein, the Contractor shall remove all concrete debris, rubbish, shuttering materials, scraps etc., from the vicinity of the structures completed. All areas shall be cleaned to the satisfaction and approval of the Engineer. The rubbish shall be disposed of within or outside the Site premises, free of cost as directed by the Engineer.

2.18 MEASUREMENT AND PAYMENT

a) Concrete works shall be measured and paid for as per theoretical volumes calculated on the basis of the Drawings, or as otherwise approved by the Engineer and paid at per cubic foot at the rates entered in the Bill of Quantities.

   Recesses (e.g. openings in slabs, break-through and the like) with an individual volume of more than 1 sq. ft. or 2 cft shall be deducted.

b) The prices for concrete works shall include all cost for the complete work and are not limited to the cost of formwork, its support, anchoring's, chamfers, construction joints etc., the required scaffolding, false work, temporary works, post-treatment and, if necessary, repair of concrete, all preliminary and routine tests, as well as the required statical checks and drawings for Temporary Works in connection with the concrete works.

c) The cost for special finishing of exposed concrete surfaces such as fair-faced finish etc. shall be included in the unit price applicable to the respective structural member and will not be compensated for separately.

d) The cost of all concrete admixtures and additives shall not be paid for separately and is deemed to be included in the unit rates of respective items of the BOQ.

Joints

a) Expansion Joints

   Expansion joints will be paid per number, according to the Drawings. The prices shall include all costs for the different materials and performances relative to the laying and sealing of the joints.

b) Dummy Joints

   Dummy joints required by the Contractor with the Engineer's consent for the sound execution of the Works will not be paid for separately, but the costs involved are deemed to be covered by the concrete prices applicable to the respective structural member.

c) Construction Joints

   Construction joints will be measured and paid for as below:

The Contractor is deemed to have covered the costs for all related supplies, laying, formation and performances of construction joints included in the respective concrete prices. However, the cost of PVC water stoppers and or swell bars shall be measured and paid for separately per running foot of accepted lengths.

It the approved pouring sequence has not been followed by the contractor. Any increase in quantity of materials (pvc water stoppers, swell bars, rear guards, sealants, SBR etc.) associated with the construction joints and or additional reinforcement required shall be paid for by the Contractor at his own cost.

Tamping of Equipment and Grouting of Recesses

The costs resulting from materials and performances in connection with the tamping of installed items or the grouting of recesses are deemed to be included in the prices for the supply and/or installation of the respective items, and will therefore not be separately compensated for.

**** END OF SECTION****

3 SECTION: REINFORCEMENT STEEL

3.1 SCOPE OF WORK

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

3.2 GENERAL

a) The Contractor shall procure reinforcing steel only from reputable manufacturers/ suppliers duly approved by the Engineer.

b) Verification of the source of supply shall be prepared by the Contractor and submitted to the Engineer along with necessary certificates and test reports.

c) The Contractor shall prepare detailed bar cutting and bending schedules on the basis of the working Drawings and in consideration of BS-4466 and of any requirement resulting from the applied bar bending process.

d) The Contractor shall inform the Engineer of the completion of any reinforcement in time, in order to facilitate its inspection and check of conformity with the working Drawings well before the concreting. Relevant formalities shall be agreed upon between the Contractor and the Engineer at the appropriate time.

e) Reinforcement bar sizes have generally been shown on the Drawings in the form of designated bar numbers.

3.3 MATERIAL

a) Reinforcement shall be deformed reinforcement, except that plain reinforcement bars are permitted for spirals. Reinforcing steel bars (Plain and deformed) shall be from the new billet stock of mild steel and shall conform to the British Standard Specifications mentioned below and as indicated on the Drawings and Bill of Quantities.

   (i) Hot rolled deformed bars conforming to ASTM A-615 / BS 4449

   (ii) Cold worked deformed bars to conforming to BS 4461 (revised 4449-1988)

   (iii) Plain round steel bars to conforming to BS 4449

b) For each consignment, the Contractor shall furnish to the Engineer the manufacturer's mill test certificates to guarantee that the steel supplied meets all the requirements of the relevant specifications and further meets the requirements of specified characteristic strength and minimum tensile strength requirements given as under:-

High Yield Deformed Steel Bars:

i. Specified Characteristic Strength:

up to 16 mm (5/8")	460 N/mm2 (66,700 psi)
over 16 mm (5/8")	425 N/mm2 (61,625 psi)

ii. Tensile Strength:
Minimum Tensile Strength shall be 10% greater than the Specified Characteristic Strength.

iii. Minimum Elongation

up to 16 mm (5/8")	12%
over 16 mm (5/8")	14%

Mild Steel Plain Steel Bars:

(i)	Specified Characteristic Strength	250 N/mm2 (36,000 psi)
(ii)	Tensile Strength: Minimum Tensile Strength shall be at least 15% more than the Specified Characteristic Strength.	
(iii)	Minimum Elongation	22%

a) Bendability

All the bars shall be capable of being bent cold through 180 degree round a pin without cracking on the outside of the bent portion as per ASTM-A615.

b) 18 gauge galvanized wire to BS 4482 shall be used for binding the steel reinforcement.

c) Samples shall be tested for above requirements in an approved laboratory before starting the cutting of bars or when so required by the Engineer; and all cost of such tests shall be borne by the Contractor.

d) All reinforcing steel bars shall be free from loose mill scale, loose rust, oil, grease, dirt or other harmful substances.

Wire Gauze

General

Unless otherwise specified the wire gauze shall be of best quality approved uniformly, woven wire webbing of 12 x 12 meshes to 645 mm square (one Sq. Inch) made from 22 gauge galvanized iron wire. All panels shall be in one piece and no joints shall be allowed.

Fixing

Wire gauze shall be fixed as shown on the drawings or as directed. The gauze shall remain tight to the fill width without any sag.

3.4 STORAGE

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

3.5 REINFORCEMENT CUTTING AND PLACING

All reinforcement steel shall be cut and bent cold in strict accordance with bar bending schedules prepared by the Contractor and approved by the Engineer. The Contractor shall prepare bar bending schedule from approved structural working Drawings and as per instructions of the Engineer. The bending schedules shall be drawn on approved forms and submitted to the Engineer for checking and approval. The steel reinforcement shall be cut and bent to sizes as per Drawings and approved bending schedules. In case, any bars cut, bent or even fixed in position are found incorrect in dimensions, size and shape and are not according to the requirements of the Drawings or instructions of the Engineer, notwithstanding any previous approval of the Engineer, the Contractor shall replace such steel bars, cut, bent or fixed in position, by correct sizes bars at his own cost and no extra payment shall be made to the Contractor on such account. Suitable spacers, chairs as approved by the Engineer shall be used for the purpose of supporting and spacing of bars. In case, any bars are bent or displaced they shall be straightened or replaced prior to pouring. All reinforcement bars within the limit of a day's pour shall be in place and firmly tied with 18 gauge wires. Bars with kinks or bends not shown on the Drawings shall not be used. Reinforcement bars shall not be used for supporting the workmen and concreting work. Separate supporting system shall be used for this purpose.

Concrete cover to all reinforcement bars shall be provided as shown in the Drawings using steel chairs and concrete spacer blocks.

The concrete spacer blocks shall be cast from cement sand mix in a ratio of 1:2 in suitable required sizes. These shall be well cured and dry before use in the Works. The spacers shall meet the specified requirements of water absorption. All spacers shall be properly fixed in their required positions and as directed by the Engineer.

For any structural member which shall receive fair-forced concrete surfaces, special spacers shall be used while do not impair the specified appearance of concrete surfaces.

3.5.1 Laps and Splices

No splicing of bars shall be allowed at positions other than shown on the Drawings. All lap lengths shall be of the minimum sizes as indicated on the Drawings and in accordance with ACI 318-95. Splices of adjacent bars shall be staggered, unless approved otherwise by the Engineer. All reinforcing steel fixed in position shall be inspected by the Engineer and no concrete shall be poured until steel placement has been approved in writing by the Engineer. For inspection purposes, the Contractor shall give to the Engineer reasonable notice before the scheduled pouring time. Clear concrete cover to reinforcement steel shall be as specified or indicated on the Drawings.

3.5.2 Mesh Reinforcement

a) Where indicated mesh shall be of the sizes as shown on the Drawings and conform to BS 4482 or 4449 with mesh sizes to BS 4483 or ASTM A-185 (Welded Steel Wire Fabric for Concrete Reinforcement). Mesh reinforcement when used in slabs shall be supported at proper elevations by standard accessories. In slabs on ground (porous fill), precast concrete spacer blocks may be substituted for chairs.

b) Overlaps in fabric reinforcement shall be a minimum of two meshes, except where otherwise shown on the Drawings, correctly aligned and at least 50% of the wire intersections shall be tied with 18 gauge tying wire. Laps shall be staggered in adjacent rows of sheets.

3.6 MEASUREMENT AND PAYMENT

Reinforcing bars will be measured as per Drawings in consideration of the volumetric weight of 7.85 t/m3, without additions for rolling tolerances, deformations, waste lengths and binding wires and paid per ton at the unit rate entered in the Bill of Quantities.

The prices shall include all costs involved with the supply, transportation, storage and protection, the cutting, bending and placing, inclusive of concrete spacers, supports, stands, tying into position, etc.

Assembly stands, spacers etc., whether designated in the Drawings or not or otherwise demanded by the Engineer will not be measured and paid for separately.

If installed reinforcement must be dismantled under certain circumstances or where additional reinforcing bars are to be provided on Engineer's instruction, the Contractor is not entitled to any compensation, if such additional supplies and/or performances are required and demanded by the Engineer due to the Contractor's faulty execution of the respective work.

**** END OF SECTION****

4 SECTION: FORMWORK

4.1 GENERAL

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

4.2 MAKING FORMS

The formwork for columns, beams, slabs, foundations, pits, lintels, fins, panels, purdees, parapets and all other works whether to be precast or cast-in-situ shall be of steel plates, scaffolding pipes and joints or other approved material and shall be rigidly formed and designed by the Contractor to the shapes and forms as per Drawings in accordance with the best of the existing practices, so as to be able to withstand without displacement, deflection or deformation or movements of any kind, the pressure of the moist concrete and all other loads. No plank timber formwork will be accepted at any location. Only system formwork will be accepted.

4.3 FAIR FACED FINISH

a) Facing Material

The form facing material shall produce a smooth, hard, uniform texture on the concrete. It shall be M.S. steel sheets, plywood, tempered concrete grade hardboard, metal or plastic, or other approved material capable of producing the desired 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 surface, worn edges, 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.

b) Shop Drawings

Shop Drawings shall be submitted by the Contractor for Engineer's approval, showing grooves, joints etc. if indicated on the Drawings or instructed by the Engineer before taking up the job of formwork in hand.

c) Repair

No repair of surfaces designated `fair faced' shall be allowed. Any concrete failing to achieve the desired finish or with defective surfaces shall be removed and replaced at Contractor's expense. The Engineer may reject any defective concrete surface and order it to be cut out in part or in whole and replaced at the Contractor's expenses.

4.4 RIGID WITH ALLOWANCE FOR CAMBER & BULGES

The formwork shall be fabricated and erected in position, perfect in alignment, levels and true to plumb and shape and securely braced so as to enable it to withstand all weights, dead and live, to be endured during placing of concrete and its subsequent hardening till the formwork is struck. It shall be sufficiently rigid as not to lose its shape and shall be made to

compensate for bulging, and deflection to give the finished concrete the required lines, plumb, size and shape.

4.5 EXPOSED SURFACES LEFT UN-PLASTERED

In addition to the provision made elsewhere, for all the concrete work covered in this Contract which are to remain exposed in the finished work and left un-plastered, the formwork shall be smoothly faced by using M.S. steel sheets or lining the shuttering with smooth G.I. sheets or non-absorbent material like Formica sheets or in any manner as approved by the Engineer so as to make a perfectly smooth surface of the finished concrete. Where any surface defects on the exposed concrete surfaces occur and which do not impair the structural performance, being in excess of the designed surfaces and the architectural appearance of the Work in the opinion of the Engineer such defects may be removed by guniting and grinding with carborundum stone or in any other approved manner, at the cost of the Contractor, otherwise the whole or part of the Work shall be removed and made good by the Contractor, at his own cost. For precast concrete members, the forms shall be rigid, exact and smooth.

4.6 MATERIALS AND LABOURS

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

4.7 FORMWORK NOT TO INTERFERE OR INJURE WORK

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

4.8 OPENINGS IN FORMWORK

Wherever concreting is required to be carried out within forms of depth exceeding 6.5 feet, temporary openings in the side of the form shall be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided at bottom of the forms to permit the removal of rubbish etc. but the same shall be suitably closed before pouring.

4.9 OPENING AND OTHER DETAILS

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

4.10 JOINTS IN FORMWORK

All joints in the formwork shall be sufficiently closed to prevent leakage of mortar from concrete for concrete surfaces not to be exposed in the finished work. The joints in the finished work shall be close jointed and perfectly smooth so as not to allow any leakage of the mortar from the concrete and show any appearance of leaking mortar on concrete

surfaces.

4.11 TREATMENT AND INSPECTION OF FORMS

All rubbish particularly chippings, shavings and saw dust shall be removed from the interior of the forms, before placing concrete. Forms shall be coated with approved shuttering oil before reinforcement is placed. Surplus oil on forms and any oil thus applied on reinforcing steel shall be removed. If the forms are not used within 24 hours, a fresh coat of oil shall be given before placing of concrete.

4.12 STRIPPING SHUTTERING

Formwork should not be removed until the concrete has developed sufficiently strength to support all loads placed upon it. The time required before formwork removal depends on the structural function of the member and the rate of strength gain of the concrete. The grade of concrete, type of cement, water/cement ratio, temperature during curing etc. influence the rate of strength gain of concrete.

No struts or timbering which serve the purpose of supporting the shuttering or centering shall be struck and removed without permission from the Engineer in writing and the work of striking and removal after the receipt of such permission shall be conducted under the personal supervision of the competent foremen in the employment of the Contractor and the Contractor even after the permission from the Engineer shall hold himself fully responsible for any consequences whatsoever.

In all cases the Engineer will direct and control the minimum period of time for which the forms, shuttering or centering shall remain in place before being struck; but, for the general guidance of the Contractor, the following are to be considered as the minimum periods for the main classes of Work.

Type of Formwork	**Normal Weather**	**Cold Weather**
Footing Sides	24 hours	36 hours
Vertical sides of Beams, Walls andColumns (unloaded)	24 hours	36 hours
Slab soffits (up to 15 ft span)	10 days	14 days
Slab soffits (> 15 ft span)	14 days	21 days
Beam soffits (up to 15 ft span)	14 days	21 days
Beam soffits (> 15 ft span)	21 days	28 days

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

The formwork parts and connections should be arranged in a way that makes formwork removal easy and simple, prevents damage to concrete and formwork panels so that it can be reused without extensive repair.

The formwork removal procedure should be supervised by the engineer to ensure that quality of hardened concrete in structural member, i.e. it should be free from or has minimum casting defects such as honeycombing, size and shape defects etc. These defects in concrete influence the strength and stability of structure. Thus immediate repair works can be done or the members can be rejected.

The separation of forms should not be done by forcing crowbars against the concrete. It may damage the hardened concrete. This should be achieved by using wooden wedges.

Beam and joist bottoms should remain in place until final removal of all shoring under them are done.

Joist forms should be designed and removed so that the shores may be removed temporarily to permit removal of joist forms but must be replaced at once. The shores and joists will be dismantled beginning from the middle of the member's span, continuing symmetrically up the supports.

The approval from the engineer should be obtained for the sequence and pattern of formwork removal, prior to start of removal.

4.13 INJURY OR DAMAGE

The Contractor shall be responsible for any injury to the Work and any consequential damages caused by or arising from the removal and striking of forms, centering and supports, due to striking too soon. Any advice, permission or approval given by the Engineer relative to the removal and striking of forms, centering and supports shall not relieve the Contractor from the responsibilities herein defined.

4.14 TREATMENT AFTER REMOVAL OF FORMS

Any minor surface honey-combing or other irregularities are to be properly made good immediately upon the removal of the formwork and the surface made good to the satisfaction of the Engineer at the Contractor's own expense. Any small voids shall be neatly repaired with cement mortar consisting of one part of cement to two parts of sand and the whole surface rubbed over with carborundum stone and cement wash to bring the whole to a smooth and pleasing finish and uniform colour.

4.15 TOLERANCES

The structure shall be built to dimensions and levels shown on the Architect's drawings. Deviation from true positions and/or levels will be accepted only if they do not affect the finished dimensions, positions and levels as shown on the Architect's drawings.

Permitted tolerances shall be in accordance with the current issue of BS 5606, Code of Practice for Accuracy in building with up-to-date amendments.

Construction Tolerances of Structural Elements Supporting curtain walls or surfaces affecting curtain wall set out:-

- Maximum deviation vertically from defined position immediately after stripping of formwork +12mm.

- Maximum deviation laterally from defined position immediately after stripping formwork and prior to any pre-stressing (if used) +12mm or building height/4000 whichever is greater. This laterally out of position tolerance includes all local deviations in edge of slab or edge beams as well as overall building tolerance.

NOTE: All structural tolerances given above are for curtain walls (if used) and for all external structural faces of building affecting set out of masonry, windows and other

cladding/finishes.

4.16 EXTERNAL EXPOSED CONCRETE SURFACE

All external exposed concrete surfaces of cast-in-situ or precast units shall be given smooth or pattern finish as shown in the Drawings schedule or as directed by the Engineer.

4.17 MEASUREMENT AND PAYMENT

All costs for formwork must be included in the concrete prices and will not be measured and paid for separately.

**** END OF SECTION****

5 SECTION: STRUCTURAL STEEL WORKS

5.1 SCOPE OF WORK

The work covered by this section consist of general requirement of structural steel work, its fabrication, erection and painting methodology, precautions and other general requirement incidental to structural steel work.

5.2 GENERAL

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

5.3 APPLICABLE STANDARDS

Latest edition of the following standards are relevant to these specifications, wherever applicable:

AISC	Code of standard practice
AISC	Specifications for Architecturally exposed structural steel
ASTM	Specifications for Structural joint using ASTM A325 or A490 bolts.
ASTM	Specifications for Material
AISC	Specifications
SSPC-SP6	Steel structural council-surface preparation specifications
AWS	Specifications for Welding of steel structures
BS 449	Use of structural steel in buildings

5.4 DRAWINGS

5.4.1 Design and Working Drawings

Design and working drawings shall be prepared by the Engineer and shall be supplied to the contractor. These shall contain main dimensions, sizes of members, and typical details of joints. Forces in members may be specified on the drawings to facilitate design/detailing of connections by the Contractor. However if not specified all connections shall be designed to have full strength capacity equal to that of member being connected.

5.4.2 Shop drawings

Shop drawings shall be prepared by the Contractor from the working drawings taking into consideration the the sizes (sections) of members/parts of the structure shall be standard rolled steel sections according to German/British/American or approved standards. The contractor, before, tendering, shall prepare material requirement list, ensure its availability at the time of actual fabrication and in case certain sections are not available, he will select suitable available alternatives subject to the approval of the Engineer.

Workshop drawings shall be prepared by taking into consideration the points enumerated below:

(i) Fabrication in convenient sub-assemblies and each shop assembly to be given an erection mark.

(ii) Milling (machining of bases of supporting plate) for erection without adjustments.

(iii) Provision of basic elements with erection devices.

(iv) In-keeping with the requirements of computed strength of all connections and joints of structures not foreseen in the design and in the working drawings.

(v) Other requirements having an influence on the methodology of fabrication, transportation and erection of steel structures.

(vi) Uniformity of elements and parts of the steel structures should be maintained for mass fabrication.

5.4.3 Contents of Shop Drawings

Shop drawings shall consist of:

a. An erection scheme drawing having the following information:

- Location of erection elements in respect of axes and marks as well as picking points of these elements with respect to each other or with the existing steel or reinforced concrete structures.
- Erection joints showing erection welding thickness and lengths, bolts or rivet diameter and numbers.
- Chart showing list of assembling marks having columns such as mark, description, and quantity, weight of each mark, total weight and remarks with grand total in the end.
- Chart showing list of erection bolts, nuts and washers in tabulated form, showing information such as size, quantity weight and notes and the grand total.
- The mark for shop assemblies of each erection scheme shall have a different index, for example scheme of trusses, purlins etc. shall have marks A1, A2, A3 onwards and another scheme of columns, beams etc. shall have marks B1, B2, B3 and onwards. While marking on the plans, elevation, sections and details, the index shall be omitted.
- Except in special cases, all scheme drawings shall be made in single fairly thick lines.
- Erection scheme shall contain the following notes;
- Erection shall be done using the erection welding and bolts of normal sizes and accuracy according to the joints of the scheme.
- Quality and type of electrode.
- Measures against unscrewing of bolts.
- Erection shall be carried out according to the standard for fabrication and erection of steel structures.
- Painting instructions.
- References to design and working drawings.

b. The working drawings shall contain the following information:

- Each Shop Assembly (Mark) shall be drawn separately showing necessary lines, elevations, sections with reference to axis, center lines, location of holes, cleats, plates, lugs, etc. fully dimensioned with part numbers.
- Bolts, holes sizes and symbols, holes diameter for metric size bolts shall be 2mm larger than bolt diameter and for inch size the same shall be 1/16" larger.
- Welding thickness (general)
- Material quality of steel used.
- Type and quality of electrodes to be used.
- Tests for welding, if any.
- Reference to related erection scheme drawings.
- Reference to design and working drawings.
- Material list.

5.5 MATERIAL

Except otherwise stated in the drawings, the material specifications shall conform to the following. Wherever necessary the contractor may use equivalent alternative material subject to approval of the Engineer.

5.5.1 Structural Steel

Structural steel for structures not requiring welding shall conform to the requirement of ASTM A7 (for bridges and buildings) and ASTM A36.

Structural steel shall conform to the requirement of ASTM A36 or equivalent.

5.5.2 High Strength low Alloy Steel

High strength low alloy steel shall conform to the requirements of ASTM A441 or equivalent.

5.5.3 Sheet Steel

Steel sheet for structures where no welding is required shall conform to the requirements of ASTM A336 (for cold rolled carbon steel sheets commercial quality) or ASTM A415 Standard specifications for cold rolled carbon steel sheets, commercial quality). For structures where welding is required sheet steel shall conform to the requirements of ASTM A425.

5.5.4 HD Grade Steel

HD Grade Steel used with vault area reinforcement shall conform to the requirements of ASTM J93005 (ferritic stainless steel)

5.5.5 Steel Forging

Steel forgings shall conform to the requirements of ASTM A235 (Tentative specifications for carbon steel forgings for general industrial use) class of forging shall be indicated on the drawings.

5.5.6 Steel Casting

Steel casting shall conform to the requirements of ASTM A27 standard.specifications for Mild to Medium strength carbon steel castings for general applications) and ASTM A148 (Standard specification for high strength steel castings for structural purposes). Grade of casting shall be shown on the drawing.

5.5.7 Filler Metal for Welding

Welding electrodes for manual shielded metal arc welding shall conform to the specifications for mild steel covered Arc-welding electrodes, AWS A5.1 latest edition or the specifications for low-alloy steel covered Arc-welding electrodes, AWS A 5.5 latest edition. Equivalent locally manufactured electrodes may also be used subject to the approval of the Engineer.

Welding electrodes shall be E70xx. All welding shall be carried out by qualified welder only using approved and qualified welding procedures.

5.5.8 Bolts, Nuts and Washers

Unless otherwise specified anchor bolts and nuts shall conform to the requirements of ASTM A307 (Standard specification for low alloy carbon steel) externally and internally threaded standard fasteners). Bolts shall be of grade A for general application.

5.5.9 High Strength Bolts

All shop connections, except as noted herein or on the drawings, shall be made with high strength bolts in slip critical connections, or by welding.

High strength carbon steel bolts including nuts and washers shall conform to the requirements of ASTM A325 (Standard specification for high strength bolts for structural steel joints including nuts and plain hardened washers). The dimensions shall conform to the requirements of USASI B18.2965 (square and hexagon bolts and nuts for regular semi-finished hexagon bolts and heavy semi-finished hexagon nuts).

5.5.10 Cast Iron

Cast iron shall conform to the requirement of ASTM A48 (standard specifications for gray iron castings).

5.5.11 Connections

Unless noted otherwise, all connections shall be designed and detailed for forces shown on the drawings or for 100% of the effective capacity of the member. At least two bolts or equivalent welding shall be used for each connection.

5.6 ALLOWABLE STRESSES

Allowable stresses for steel shall be calculated in accordance with AISC specifications for the design, fabrication and erection of structural steel for building.

Allowable stresses for rivets, bolts and threaded parts shall be calculated in accordance with AISC specifications or tabulated allowable loads specified shall be followed.

Allowable stresses for welds shall be calculated in accordance with AISC specification.

5.7 FABRICATION

5.7.1 Straightening Material

All material, before being worked upon, must be straightened within tolerances by ASTM specifications A6. Straightening necessarily shall be done by mechanical means or by the application of a limited amount of localized heat. Temperature of heated areas, as measured by approved methods, shall not exceed 1100 F for A514 steel or 1200 F for other steels.

5.7.2 Cutting

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

5.7.3 Holes Punching Drilling

Holes may be made by drilling or punching. Holes shall be punched where thickness of the material is not greater than the diameter of bolt + 3mm. where the thickness of the material is greater, the holes shall either be drilled or sub-punched and then reamed to size. The die for all sub-punched holes and the drill of all sub-drilled holes shall be at least 2mm smaller than the nominal diameter of bolt. Holes for A 514 steel plates over ½" thick shall be drilled.

5.7.4 Welding

a. **General:** The execution and inspection of welding shall be done in accordance with the provisions of the American welding society code/Specifications for welding in building construction, D1.0.

b. **Automatic Sub-merged Arc Welding:** For all build-up members, i.e. sections fabricated from plates and flat bars or compound rolled sections and plates, where long continuous, welding is to be done, should be executed by Automatic submerged arc welding process in accordance with relevant AWS specifications.

c. Maximum and minimum size and lengths of fillet welds shall be done in accordance with AISC specifications.

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

5.7.5 Tolerances

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

5.7.6 Test Assembly

Fabricated shops assemblies of all components shall be test assembled together after fabrication, prior to painting/galvanizing.

Test assembly work and procedure should be planned during fabrication process. Major fabrication work of locating of gussets etc. marking and drilling of holes for inter connecting joints, spliced connection leveling, placing of bracing, should be done simultaneously with test assembly.

Each test assembly will be inspected by the Engineer's representative and shall be dismantled only after his approval in writing.

5.8 SURFACE PREPARATION/PAINTING/GALVANIZING

5.8.1 Surface Preparation for Painting and Coating:

- After fabrication and test assembly the surface preparation for painting or coating of all components shall be done conforming to SSPC – SP10 (near white metal) by means of sand blasting.
- The sand used for this purpose shall be free from earth, dirt, clay and moisture.
- The size of sand particles, air pressure and size of the hose nozzle shall be correlated to give a proper and acceptable surface.

5.8.2 Painting

Painting of all steel, forged or cast components shall be done in 5-coats as under:

- Surface Preparation:
- Near white metal surface according to SSPC SP-10.
- First and Second Coat:
- Two pack anti corrosive Epoxy primer of 50 microns dry film thickness for each coat.
- Third, Fourth and Fifth; Finishing Coat:
- Two packs Epoxy resin enamel pigmented suitably for resisting highly corrosive and chemical influences and for withstanding abrasion and erosion.
- Each coat shall have 50-micron dry film thickness.
- Paint Selection/application
- Paints of manufacturers of repute shall be selected. The complete 5-coat paint system of any one of the manufacturers shall be used.
- The application of each coat of paint shall be done in accordance with the paint manufacturers recommendations, printed in their authentic printed catalogue.

5.8.3 Engineer's Approval:

The contractor shall submit 2 or more proposals containing the following for Engineer's approval:

1. Manufacturers name along with authentic painted catalogue.
2. Relevant 5-coat paint system with manufacturer trade names.
3. Any other details of relevance.

5.8.4 Steel Work/Surface not to be Painted

i. Steel work to be encased/embedded in concrete or surface in contact with concrete or grout shall not be painted, but shall be given a cement wash after sand blasting.

ii. Machined finished surfaces shall not be printed but shall be coated with rust preventive compound, approved by the Engineer immediately after finishing. Such surfaces shall be also protected with wooden pads or other suitable means for transportation. Unassembled pins, keys, and bolt threads shall be greased and wrapped with moisture resistant paper.

iii. Contact surfaces of connections using high strength bolts in friction type connections shall not be painted. Such surfaces of all components after fabrication shall be cleaned free of paint, grease, burrs slag by means of sand blasting. No coating whatsoever then be applied to such surface.

5.8.5 Zinc Coating (Galvanizing)

Components shall be galvanized after complete fabrication i.e. welding, drilling etc. The process should consist of removal of rust and mill scale by pickling in hydrochloric acid or sulphuric acid followed by water wash and prefluxing with ammonium chloride. The fluxed components should then be passed through a drying oven prior to immersion in a bath of virtually pure molten zinc.

The zinc coating shall be applied in a manner and of a thickness and quality conforming to the requirements of ASTM A123, standard specification for zinc (hot galvanized) coating on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips.

5.9 INSPECTION AND TESTS

Manufacturer's work test certificate for all material used shall be furnished by the Contractor for Engineer's scrutiny and approval.

a. Rolling tolerance of all shapes and profile shall be in accordance with the provisions of the American Society for Testing and Material Designation A.6. These shall be checked by the contractor before being worked upon and shall be rejected if found not within limits.

b. The contractor shall arrange for analysis and test of all material rolled locally at a testing laboratory selected by the Engineer.

c. Nevertheless, neither the fact that the material have been tested nor that the manufacturers work test certificates have been furnished, shall affect the liberty of the Engineer to reject, after delivery, material found not according to these specifications.

5.10 ERECTION

5.10.1 Bracing

The framing of steel skeleton buildings shall be carried up true and plumb within the limits defined in Section 7(h) of the AISC code of standard practice and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected including the equipment and the operation of the same. Such bracing shall be left in place as long as required for safety.

5.10.2 Alignment

No riveting, permanent bolting or welding shall be done at site during erection until as much of the structure as will be stiffened thereby has been properly aligned.

5.10.3 Joints using High Strength Bolts

All structural joints using high strength bolts shall be executed and inspected in accordance with “AISC specification for structural joints” using ASTM A325 or A490 bolts.

5.11 MISCELLANEOUS STEEL WORK

5.11.1 General

The work covered shall include furnishing, fabricating, painting and installing miscellaneous steel work including the following:

a. Steel Stairs
b. Steel Ladders
c. Steel Pipe handrails
d. Steel protection angles
e. Steel doors, windows, gates, ventilators/louvers.
f. Steel fencing.
g. Grating and chequered plate covering.
h. Embedded plate, anchor bolts and other miscellaneous items.

5.11.2 Steel Stairs

General: Structural steel stairs complete with grating treads or chequered plate treads, landings, supporting structures, handrail, supports etc. shall be furnished and installed in accordance with working drawings. All components shall be galvanized to maximum extent practicable as shown on the drawings.

Material: Except otherwise indicated in the working drawings materials shall conform to the requirements of ASTM A36 (Tentative specifications for structural steel).

5.11.3 Steel Ladders

Steel ladder shall be welded assemblies with or without safety cages fabricated in accordance with the drawings. Material and standard of fabrication shall be the same as specified for stairs.

5.11.4 Steel Pipe handrails

Steel pipe handrails consisting of posts, handrail, knee rails and toe rail shall be fabricated in suitable units having two posts or three posts in one unit with erection joints between handrail and knee rails. Handrail of platforms galleries etc. of considerable length may not be shop fabricated as complete units consisting of posts etc. in case of such handrails the posts may be fabricated of the required height having one end with necessary arrangement for fixing to the platform or floor

beams etc. and other end shop prepared to take the top handrail. Top handrail, knee rail and tow rail may be brought at site in stock length. The same may then be cut and welded at site. Locally manufactured pipes, M.S. or G.I may be used for the hand railing. These shall however conform to the requirements of ASTM A53 or shall be of equivalent requirements.

5.11.5 Steel Protection Angles

Steel protection angles required for the protection of concrete work shall be erected true to line and level. Steel angles shall be fixed in position by using anchors.

5.11.6 Steel door, windows, ventilators, louvers and gate frames:

Frames shall be fabricated form locally available hot rolled angle, tee, channel or pipe sections as specified in the drawings. Material shall however conform to ASTM A36.

Shutters:

Shall be made of any of the sections noted above with skin plate of at least 18 S.W.G. as shown in the drawings.

Accessories such as hinges, anchors, bolts, locks and handles shall conform to the requirements shown on the drawings or as directed by the Engineer.

5.11.7 Steel Fencing

Steel fencing shall be made from wire mesh bolted on the steel angles or channel frame as shown on the drawings or as directed by the Engineer.

Surface Preparation and Painting
Surface preparation painting and galvanizing of all miscellaneous steel work shall be done in accordance with clause 10 herein.

5.12 MEASUREMENT AND PAYMENT

5.12.1 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 Bill of Quantities.

a. Bolts, nuts, washers, screw, rivets, heads, fillets, welds and welding rods.
b. Galvanizing and painting.
c. Glass and glazing.
d. All embedded parts unless otherwise specified in the Bill of Quantities
e. Painting
f. Steel grills and fly proof of shutters
g. Locks, handle, hinges, hold fast, stopper etc.

5.12.2 Structural Steel Works and Miscellaneous Steel Work

Measurement

Item of work of structural steel for which the unit rates have been quoted on weight basis and for which detailed workshop drawing have not been made shall be measured net as installed at site as per sketches and instruction of the Engineer. After measurement the theoretical weight shall be calculated from standard tables of section and weight in the manner followed in the preparation of shop drawings.

Items of works of structural steel for which the unit rates have been quoted on weight basis and for which the detailed shop drawings have been prepared, measurement shall be made at site to verify whether the items fabricated, supplied and erected in position are in conformity with the shop drawings. If the same is so verified to the satisfaction of the Engineer the weights given in shop drawing shall form basis of payment of bill. Any deviation found during the verification the same shall be checked from design and specifications point of view and shall be incorporated in the shop drawing and consequently the weights shall be revised.

Payment

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

5.12.3 Steel Embedded Part

Measurement

Measurement of acceptable completed works of steel embedded parts will be made on the basis of weight of steel parts provided and embedded in position as shown on the drawings or as directed by the Engineer.

Payment

Payment shall be made for acceptable measured quantity of steel embedded parts 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 items.

**** END OF SECTION****

6 SECTION: PLASTERING AND RENDERING

6.1 SCOPE OF WORK

The Work covered by this section of the Specifications consists of furnishing all plant, labour, appliances/ equipment and materials for performing all operations in connection with lathing, plastering and rendering, complete in all respect; in strict accordance with this section of the Specifications and the applicable Drawings and subject to the terms and conditions of the Contract.

6.2 APPLICABLE STANDARDS

Latest editions of following Pakistan, British & ASTM standards are relevant to these specifications wherever applicable.

Pakistan Standard

PS 232 Ordinary Portland Cement

ISO (International Organization for Standardization)

R 597 Definitions and terminology of cement.

R 679 Method of testing strength of cements, compressive and flexural strength of plastic mortar (Rilem - Embureau method).

R 680 Chemical analysis of cement& main constituents of Portland cement.

R 681 Chemical analysis of cements-mixer Constituents of Portland cement.

R 682 Chemical analysis of cements - determination of Sulphur as Sulphide.

ASTM (American Society for Testing and Material)

C 144 Aggregate for Masonry mortar

C 631 Bonding compounds for interior plastering

BSI (British Standards Institution)

812 Methods for sampling and testing of mineral aggregates, sands and fillers.

1199 Sands for external renderings internal plastering with lime and Portland cement and floor screeds.

1369 Metal lathing (steel) for plastering.

5262 External rendered finishes.

5492 Internal plastering.

6.3 GENERAL

Except as may be otherwise shown or specified, all interior & exterior plaster shall be cement plaster in specified thickness shown on Drawings & BOQ. Plastered ceilings and walls shall include partitions, piers, columns, beams, ceilings, plastered jambs and other returns, reveals, and backs of recesses and alcoves, and joints and heads of windows and doors, unless otherwise specified or shown on the Drawings. Plaster on walls shall be carried down to dado, skirting and projected bases. Plasterwork shall also include all plasterwork on and under concrete surfaces and masonry. Concrete surfaces to be left exposed and concrete not specified to be left fair faced, as indicated on Drawings.

A 3/8" render coat shall be applied to walls with a slightly roughened surface where wall finishes of applied nature, such as ceramic tiles, marble tiles, granite tiles, textured paint etc., are to be installed over wall surfaces.

Plastering shall not commence until all electric conduits, drainage and sanitary pipes, inlets to tanks, brackets, clamps, doors and window frames and all sorts of inserts and embedded items are fixed in position. It shall be the responsibility of the Contractor to make sure that other contractors carry out all such work before starting of plasterwork. Chiseling and repairing of cement plaster shall not be permitted without the approval of the Engineer.

6.4 MATERIALS

a. Cement for plaster shall be Ordinary Portland Cement (BS 12 or PS 232) or Sulphate Resisting Cement (BS 4027 or P.S. 612) as specified and shall conform to requirements specified in the section "Plain and Reinforced Concrete".

b. Sand for plaster shall comply with the requirements of BS 1199, BS 1200, ASTM C-33 and/or the Pakistan Standard "Sand for Plaster" as directed by the Engineer.

c. Water shall be clean and free from oils, acids, alkalis, salts and organic or other injurious matter and as described in section for "Plain and Reinforced Concrete".

d. 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.

e. External rendered finishes should comply with appropriate clauses of BS 882.

f. Mortar plasticizer shall comply with BS 4887 and shall be used in accordance with the manufacturer's instructions.

g. Pigments to be used shall comply with BS 1104.

h. Galvanized metal angle beads and plaster stops shall be as manufactured by the Expanded Metal Co. Ltd., London or other equal and approved.

6.5 MIXING OF PLASTER

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 or as directed by the Engineer. Mixing shall be continuous until all ingredients are evenly distributed and thoroughly mixed. Only limited water shall be added for proper workability and such quantity of mortar 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. Re-tempering shall not be permitted and all mortar, which has begun to stiffen, shall be discarded.

Except where hand mixing of small batches is approved by the Engineer, mechanical mixers of an approved type shall be used for the mixing of plaster. Frozen, caked, or lumped materials shall not be used. Mechanical mixers, mixing boxes and tools shall be cleaned after mixing each batch and kept free of plaster from previous mixes. Plaster shall be thoroughly mixed with the proper amount of water until uniform in colour and consistency.

Re-tempering will not be permitted, and all plaster which has begun to stiffen shall be

discarded. 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.

Water Proofing Plaster 3/4 inch. (20mm) thick 1:4 cement sand plaster mixed with approved water proofing agent.

Re-tempering will not be permitted, and all plaster which has begun to stiffen shall be discarded.

6.6 PROPORTIONING OF PLASTER ON INTERNAL AND EXTERNAL WALLS

All plaster shall be Portland cement plaster, all coats of which shall be mixed in the following proportions by volume:

- One part cement and 4 parts sand or specified otherwise.
- One part cement and 3 parts sand only for RCC roof slab soffits.

All coats of plaster in water retaining structures shall be waterproofed by the addition of an approved waterproofing additive/admixture from BCR, Sika, Fosroc, Betocrete C-16or Master Builders or approved imported equivalent.

External plaster shall be pigmented plaster in the shades/ colors to the approval of the Engineer.

6.7 PREPARATION OF SURFACES OF PLASTER

a. Surfaces to receive plastering shall be brushed to remove all loose particles, dust, laitence, efflorescence, etc. and any projecting fins on concrete surfaces shall be hacked off.

b. Glossy or greasy surfaces shall also be suitably cleaned and chipped off to remove all traces of mould oil.

c. Where unduly smooth in-situ concrete surfaces are encountered, such surfaces must be hacked properly before applying plaster.

d. Surfaces shall thoroughly be sprayed with water and all free water allowed to disappear before plaster is applied.

e. Irregularities in the surfaces to be plastered shall be filled with cement mortar 24 hours before plastering is commenced.

f. Before plastering is commenced, all junctions between differing materials shall be reinforced. This shall apply where walls join columns and beams particularly where cracks are likely to develop and places directed by the Engineer. The reinforcement of such joints shall consist of a strip of galvanized expanded metal lathe/mesh, at least 6” wide, which shall be plugged, nailed or stapled to the surfaces to be plastered at the intervals not exceeding 12”. The joints in mesh shall be lapped minimum 6”.

g. Metal angle beads shall be fixed with plaster dabs at 24” centers applied to the wall on either side of the arise and the wings of the beads pressed well in.

h. The Plaster stops shall also be fixed in a similar manner or plugged, nailed or stapled to the surfaces to be plastered to the approval of the Engineer.

i. Metal angle beads and plaster stops shall be fixed at places shown on the Drawings or as directed by the Engineer.

j. It shall be responsibility of the Contractor to ensure that all electrical conduits, pipes, concealed or embedded items, ducts, brackets, doors, window and ventilator frames, and all other fixtures on walls, ceilings, columns or required elsewhere have been fixed in position before the plastering is commenced.

k. Cuttings and chasings in the block work shall be repaired as per the instructions of the Engineer at least twenty four hours before the plastering is commenced.

6.8 APPLICATION OF PLASTER

The Contractor shall not start any work till the surfaces are inspected by the Engineer. In case, any plaster work is done without obtaining the consent of the Engineer, the Engineer shall have the right to order removal of all such work and cleaning and preparation of the surfaces to his full satisfaction and the Contractor shall comply with such orders without any delay.

All surfaces to be plastered shall be treated with cement slurry as a base coat for proper bond. Any approved bonding agent may also be used as an alternative to cement slurry.

Plaster to internal and external surfaces shall be applied in the thickness shown on the Drawings or specified elsewhere. In any case, the plaster thickness shall not be less than the specified thickness.

Plaster shall be applied in two (2) coats on masonry and concrete surfaces where thickness is more than 3/4". The thickness of each coat shall not exceed 3/4".

a. In case of 2 coats, the first coat or the under coat shall be full and thick and shall be applied with sufficient force to form good keys. The under coat shall be roughened and cross-scratched upon attaining its initial set to provide a proper bond to the next coat and shall be kept damp with a fog spray.

b. Finish coat shall not be applied until the under coat has seasoned for 2 days. Just before application of the finish coat, the under coat shall again be wetted evenly with a fog spray.

c. Finish coat shall be smooth finished.

d. The finish coat shall be kept moist with a fog spray for at least 2 days and thereafter shall be protected against rapid drying until properly and thoroughly cured.

Plastering shall be executed in a neat workmanlike manner and shall be finished off with a wood or steel float, straight and plumb and shall not have wavy surface. The surface shall be of even texture and entirely free from all marks. The edges and corners shall represent a straight line. All arises shall be rounded to 6 mm radius unless otherwise specified.

Plastering shall neatly be made good around pipes or fittings.

As far as practical, plastering shall not be commenced until all mechanical, electrical and plumbing items, conduits, pipes, fittings and fixtures have been installed in their sequence of operations.

Plaster is to be maintained in moist condition for at least four days after it has developed

enough strength not to be damaged by water.

Plaster stops and angle beads of expanded metal shall be used for protection of arises, edges and plaster ends as shown on the Drawings and as directed by the Engineer.

Plaster containing cracks, blisters, pits, discoloration or any defects shall not be acceptable. Any such defective plaster rejected by the Engineer shall be removed and replaced in conformity with these Specifications by the Contractor at his own cost to the satisfaction and approval of the Engineer.

6.9 SAMPLING OF PLASTER

Samples may be taken by the Engineer at any time from plaster work in place. Areas represented by samples which show over sanding will be rejected.

6.10 PATCHING

Plaster containing cracks, blisters, pits, checks, or discoloration will not be acceptable. Such plaster shall be removed and replaced with plaster conforming to this Specification and approved by the Engineer. Patching shall match with existing work in texture and colour.

6.11 CONCRETE / MASONRY JOINTS

All joints of concrete and block walls shall be specially treated as described here or as shown on Drawings. A 150 mm wide approved expanded metal shall be fixed at the joints and then plaster shall be applied. The expanded metal shall be with a weight of 3.0 lbs./sq. yd.

6.12 CLEANING AND PROTECTION

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 al! Rubbish, debris, scaffolding and tools should be removed to leave the room clean.

Prior to plastering all aluminum windows, finished metals should be covered by sheet of plastic or tarpaulin to protect it from damage.

Protect finished plaster from injury by any source. Contractor shall also protect walls, floors and work of other trades from plaster materials.

6.13 TOLERANCES

The work shall be carried out while maintaining the following tolerances:

- Surfaces of plaster work shall be finished with a true plane to correct line and level unless otherwise specified and with walls and reveals plumb and square.
- Maximum permitted tolerances shall not exceed 1/8 inch. (3mm) in 6ft. (2 meter), but not exceeding 12 mm, maximum over the length of the building.
- Variation from plumb or level in any exposed line or surface and 1/16 inch (1.5 mm)
- Variation between planes of abutting edges or ends 1/16 inch (1.5 mm)
- Maximum permissible Offset at joints is1.5 mm maximum

6.14 MEASUREMENT AND PAYMENT

Plaster shall be measured and paid per square Meter/feet, complete and approved, at the

unit rates entered in the Bill of Quantities, including preparations, junction reinforcements, angle beads, plaster stops, framing and metal furring, metal lathe, chamfered edges, rounding off corners etc. and in the thickness as specified in Bill of Quantities.

**** END OF SECTION****

7 SECTION: FLOOR AND WALL FINISHES

7.1 SCOPE OF WORK

The work under this section of the Specification consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the laying of cement concrete floors and floor finishes including bases, skirting and dado, complete in strict accordance with this section of the specifications and the applicable drawings and in accordance with the terms and conditions of the Contract.

7.2 APPLICABLE STANDARDS

Latest editions of following Pakistan, ISO, British& ASTM standards are relevant to these specifications wherever applicable.

Pakistan Standard

P.S. 232	Ordinary Portland Cement

ISO (International Organization for Standardization

R 680	Chemical analysis of cements Main constituents of Portland Cement.
R 681	Chemical analysis of cements Minor constituents of Portland cement.

ASTM (American Society for Testing and Materials)

C 482	Bond strength of ceramic tile to Portland cement.
C 648	Breaking strength of ceramic tile.
C 650	Resistance of ceramic tile to chemical substances.
C 798	Color permanency of glazed ceramic tile.
E 84	Surface burning characteristics of building materials

BSI (British Standards Institutions)

882	Pt.2 Course and fine aggregates from natural sources.
1199	Sands for external renderings, internal plastering with lime and Portland cement and floor screeds.
1201	Pt.2 Aggregates for granolithic concrete floor finishes.
1281	Glazed ceramic tiles and tile fittings for internal walls.
5442	Classification of adhesives for use in Construction pt-1 Adhesives for use.
203	Tile flooring
204	In-situ Floor Finishes.
209	Pt.1 Care and Maintenance of floor surface, wooden flooring.

7.3 GENERAL

7.3.1 Samples and Approval

a. All applied floor finishes materials such as terrazzo tiles, marble imported or

local, imported Porcelain Tiles and ceramic tiles etc. to be used in the Works shall receive prior approval of the Engineer.

b. Samples of all the materials to be used shall be submitted to the Engineer for his selection and approval before their use in the Works. The Contractor shall strictly follow the instructions of the manufacturers and the floor finishes shall be laid accordingly.

c. Floor finishes shall be laid true to the line and level in approved manner satisfactory to the Engineer.

d. Any work covered under this section of the Specifications not conforming to the requirements of the specified quality and workmanship will not be acceptable and shall be rejected and the Contractor shall be required to remove and replace such work at his own cost as per the instructions of the Engineer.

7.3.2 Floor Screed Beds

a. All floor finishes of an integral nature such as cement concrete flooring, waterproof flooring shall be laid direct on to structural or site reinforced concrete slabs. In these cases, the slabs must first have been fully cured, then hacked, chipped or otherwise roughened to provide a good adhesion key, then brushed, hosed and cleaned thoroughly of all loose concrete, dirt, dust, grease, oil and other impurities. The surfaces shall then be thoroughly wetted for a period of at least a day before the application of the floor finish, and given a thin brush applied cement slurry grout. The floor finishes of integral nature shall then be laid as described in their respective subsections.

b. All floor finishes of an applied nature such as terrazzo tiling, ceramic/marble tiling, etc. shall be laid on a floor screed as described below at 7.03 or as per the instructions of the Engineer. The floor screed shall be laid to a thickness calculated to be the overall nominal floor thickness less the actual thickness of the applied finish.

c. Care is to be taken to relate finished floor levels to specified floor levels. The screed is to be completely flat, level and smooth, with no projections, low or high areas, etc., and finished with a wood float. Where required, the screed shall be laid to falls as shown on Drawings or as directed by the Engineer.

7.4 CEMENT SAND SCREED

7.4.1 Preparation of Base

a. The laitance on the base shall be entirely removed by complete chipping, hacking & exposing the clean coarse aggregate. All loose concrete and dirt should be removed by thorough washing or hosing. The Contractor shall not undertake any finishing work until the surfaces are approved by the Engineer.

b. The base concrete shall be wetted thoroughly for a period of at least a day before the application of floor finishes and any excess water is brushed off before laying the screed.

c. Just before the screed is to be laid, a neat grout should be brushed into the base. The grout should consist of water and cement mixed to the consistency of a thick fluid. An approved bonding agent may be used as an alternative to the

grout. Excess of the grout shall be removed by thorough sweeping just prior to placing the topping material.

7.4.2 Laying of Screed

a. Cement sand screed up to a thickness of 40 mm shall be mixed in the proportions of 1:3 by volume with fine aggregate of approved size and gradation. Screeds over 40 mm thick should be mixed in the proportions of 1: 1 ½ :3 (cement: sand: aggregate) to the approval of the Engineer.

b. Where specified, Aqua guard or an equal approved waterproofing additive shall be mixed in the waterproof cement sand screed in the ratio as per manufacturer's instructions or as directed by the Engineer and shall be finished with a steel float.

c. Where screeds are to receive terrazzo or marble tiles etc. the screeds shall be finished with a slight rough finish to accept the cement paste and tiles. The mortar bed shall be spread and tamped to an even thickness over an area no greater than that, which can be tiled before the mortar reaches its initial set. However, ceramic tiles shall be bedded over a hard set cement sand floor screed laid earlier and well cured.

7.5 TERRAZZO TILES

7.5.1 Description

a. Terrazzo Tiles shall generally comply with the requirements of BS 4131 and shall be as approved by the Engineer.

b. Terrazzo tiling shall be locally manufactured, from an approved manufacturer, specialist in terrazzo tile making. Tiles shall be cast with a cement/sand base, and a pigmented terrazzo topping, cast integral, all in heavy metal moulds under pressure, all to the required sizes and thickness shown on Drawings and to Engineer's detailed approval.

c. Tiles shall be selected by the Engineer from colours and patterns as prepared by the approved manufacturer from samples, the cost of which shall be deemed to be included in the rates. The approved samples shall be retained by the Engineer to form standards against which all deliveries will be judged.

7.5.2 Materials

a. Portland cement conforming to BS 12.

b. White Cement conforming to relevant BS Specification.

c. Sand and aggregates shall comply with requirements of ASTM C-33.

d. Water shall be clean potable drinking water, free from oils, acids, alkalis, salts, and organic or other injurious matter.

e. Marble chips of approved shade, color, size and quality and shall have an abrasive hardness of not less than 16.

f. Marble powder shall be clean and should be of approved quality.

g. Pigments to be used shall comply with BS 1014.

7.5.3 Tile Mixes

a. Tile mixes shall be as under:

- Backing shall consist of Portland cement and fine sand in proportions of 1:5; mixed with a minimum of clean potable water.

- Terrazzo topping shall consist of white Portland cement and granulated marble chips of approved sizes, shade, colour and quality, mixed in proportions dependent on the exact terrazzo selected but average 1:2.

b. The backings shall be placed first into the moulds, then the toppings to a minimum depth of 10 mm; the tiles cast under pressure and filled, ground and polished before delivery to Site. Bottom faces of tiles shall be cast with an approved incised key pattern.

c. All the terrazzo tiles shall be cast to the sizes shown on the Drawings or as approved by the Engineer, perfectly square, with sharp square edges, and consistent in color and texture throughout the Contract for the color/ pattern selected and approved.

d. Curing shall be effected by continuous wetting for a minimum period of 3 days.

7.5.4 Bedding and Finishing

a. Terrazzo Tiles shall be bedded on the wet screeding described above at 7.02.2(b) and 7.03 by applying a thin layer of neat cement paste on to the screed bed and the tiles placed in position and tamped down gently with a wooden mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tiles joints shall be as thin as possible but not more than 2 mm wide and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be saw-cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

b. The surface during laying shall be frequently checked with a straight edge atleast 2m long to obtain a true surface with dead level or slope, as directed.

c. All tile joints shall be grouted up solidly with a grout comprising of white Portland cement and water; all surplus to be cleaned off immediately.

d. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for atleast 48 hours.

e. When cured, the terrazzo tiling shall be machine polished to the approval of the Engineer. Polishing must be evenly and carefully carried out and a perfect

smooth surface produced.

7.6 MARBLE FLOOR TILES

7.6.1 Description

a. The Work included under this subsection shall comprise of providing and fixing marble tiles in floors at locations shown on the Drawings in approved shades and colours. Unless otherwise specified, all marble work shall be in conformity with the latest British Code of Practice for this Work.

b. The marble tiles shall be from approved local source, uniform in color, texture, shade and quality.

c. Generally, marble tiles shall be 12”x12”x 1/2” and 24” x 24” x 3/4" or of size and thickness specified in the Drawings and Bill of Quantities.

7.6.2 Materials

a. Marble

- Marble shall be best quality Boticina marble, compact, dense, metamorphic rock of lime stone origin from quarries in Pakistan or elsewhere. It must be evenly grained with sugar like appearance. The shade and colors shall be to the approval of the Engineer.

- All marble tiles shall be totally free from cracks, defects, fissures etc. and shall have adequate strength to perform as required with good resistance against abrasion and shall have an abrasive strength not less than 20.

b. Portland cement conforming to BS 12.

c. White Cement conforming to relevant BS Specification.

d. Sand and aggregate shall comply with requirements of ASTM Specifications C-33.

e. Water shall be clean potable drinking water, free from oils, acids, alkalis, and salts and organic or other injurious matter.

f. Pigments to be used shall comply with BS 1014.

7.6.3 Samples

a. The Contractor shall provide samples of marble tiles to be used for this item of Work showing the entire range of variation and colour for the selection and approval of the Engineer. The samples shall be in finished sizes and shape, the cost of which shall be deemed to be included in the rates. The approved samples shall be retained by the Engineer to form standards against which deliveries will be judged.

b. The samples supplied shall conform to the ASTM standards stated below for the determination of the following:

Weight % Absorption ASTM C-97-47

Modules of Rupture	ASTM C-99
Compressive Strength	ASTM C-170
Resistance to Abrasion	ASTM C-241-51
Flexural Strength	ASTM C-8880-78

7.6.4 Bedding & Finishing

a. The Contractor shall employ skilled and trained marble workers for doing this job. The Contractor may be allowed to employ an approved specialist subcontractor for this item of Work. All Work shall be of the highest quality in conformance with the Contract requirements and to the approval of the Engineer. Any substandard work shall be rejected and the Contractor shall remove and replace the same at his own cost.

b. The surface over which the marble tiles are required to be fixed shall be clean of all dirt and dust and should be properly hacked so that the mortar sticks well to the surface.

c. The Contractor shall ensure that all the edges of tiles supplied at Site are at right angles to each other, unless other angles are required due to design requirements. The Contractor shall also ensure that all sizes are adequate for the Work as specified.

d. Damaged tiles or tiles with broken edges shall not be acceptable and in no case shall be used in the Work & shall immediately be removed from the Site.

e. Marble tiles shall be bedded on the wet screeding described above by applying a thin layer of neat cement paste on to the screed bed and the tiles placed in position and tamped down gently with a wooden mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tile joints shall be as thin as possible but not more than 2 mm wide and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be saw-cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

f. The surface during laying shall be frequently checked with a straight edge at least 2m long to obtain a true surface with dead level or slope, as directed.

g. All tile joints shall be grouted up solidly with a grout comprising of white Portland cement and water, all surplus to be cleaned off immediately.

h. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for at least 48 hours.

i. When cured, the marble tiling shall be polished with chemical polish to the approval of the Engineer. No wax polish shall be allowed. Polishing must be evenly and carefully carried out and a perfect smooth surface produced.

j. The marble shall be chemical polish finished to a glossy surface that will reflect light to emphasize the color and marking. All finished surfaces shall be of

uniform texture, color and appearance.

7.6.5 Dado

a. Dado in all marble tiled areas are to be in marble to match the floor tiling to the area concerned, unless specified otherwise. The dado shall be produced in an identical manner as for tiling. The dado shall normally be fixed to the walls up to heights shown in the Drawings with top edges arris-rounded or as shown on the Drawings or as approved by the Engineer.

b. The dado tiles shall be fixed to walls on a plastered backing having a slightly rough surface with neat cement paste. The back of each tile shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall with a wooden mallet so that the tile faces are set in one plane. The tiles shall then be grouted and polished with chemical polish as for marble floor tiling.

7.6.6 Marble Tread and Risers

Stair tread and riser slabs shall be provided in local “Boticina” marble or imported marble in approved color and shade and to sizes and profiles as indicated on the Drawings. Treads to be 1” thick in single pieces as shown on Drawings, length to suit stair widths, one long edge arris-rounded and polished, risers shall be ½” thick in single pieces of sizes to suit stair widths; ends polished. Treads and risers shall be bedded in screed as for tiling, of thickness as indicated, all level and square or to profiles shown on Drawings, chemical polished and finished.

7.6.7 Marble Counter Tops

Marble slabs to kitchen counters, toilet counters or others shall be provided to sizes and profiles as indicated on the Drawings. The marble tops shall be provided in configurations to suit the built-in cabinets as per approved shop drawings in approved shade and color, delivered to Site polished and finished to the approval of the Engineer. Marble tops for toilets shall be recessed to provide wash hand basins, where required.

7.7 PORCELAIN FLOOR TILES

7.7.1 Description

The Work included in this subsection shall comprise of providing and fixing in position imported porcelain floor tiles of approved size, color and pattern at locations shown on the Drawings and mentioned in the Bill of Quantities.

7.7.2 Materials

a. Imported non-skid Porcelain Ceramic Floor Tiles shall be from RAK Ceramics, UAE, or equal approved to the approval of the Engineer in the specified size, color and pattern.

b. The tiles shall be bedded with neat cement paste or as recommended by the manufacturer and approved by the Engineer.

c. Joint filler grout shall be from the same manufacture. The grout which shall be non-shrinking, stain resistant, permanent in color, and shall not inhabit fungus

and bacterial growth. It shall be odorless and non-toxic, of smooth consistency for easy preparation and neat, rapid installation, and shall not contain any metallic material or ingredients. The joint floor grout shall be water resistant and shall not washout underwater.

d. Portland cement conforming to BS 12.

e. White Cement conforming to relevant BS standard.

f. Sand & aggregate shall comply with ASTM C33.

g. Water shall be clean potable drinking water, free from oils, acids, alkalis, salts and organic or other impurities and injurious matter.

h. Pigments to be used shall comply with BS 1014.

7.7.3 Samples

The tile samples for the imported porcelain floor tiles shall be furnished from various product ranges of different manufacturers in sizes, patterns and colors for the selection and approval of the Engineer. The approved samples shall be retained by the Engineer to form standards against which deliveries will be judged.

7.7.4 Bedding, Laying & Jointing

a. Porcelain Tiles shall either be bedded on the hard set floor screeding described above at 7.02.2(b) and 7.03 by applying a thin layer of neat cement paste on the screed bed and the tiles placed in position and tamped down gently with a rubber mallet to be level with other tiles. The tiles shall be laid in the manner so that they align perfectly to the specified lines and levels and are square. The tile joints shall be as thin as possible but not more than 2 mm wide, and shall be regular and perfectly straight, and setting out shall be carried to ensure a minimum of cut tiles. Any tiles requiring to be cut shall be cut by approved tools. Tiles pattern shall be square to the spaces floored, and any patterning by tile jointing, alternating colors, etc. is to be carried out as indicated on the Drawings and as approved by the Engineer.

b. The surface during laying shall be frequently checked with a straight edge at least 2m long to obtain a true surface with dead level or slope as directed. Tiles that are out of true plane or placed incorrect shall be removed and reset.

c. All tile joints shall be straight, level and of even width throughout. The tile joints shall be grouted up solidly in matching color with approved tile joint filler and water; all surpluses to be cleaned off immediately.

d. Once bedded, curing shall be carried out by covering in hessian and continuous wetting for a minimum period of 3 days and the floor kept clear of traffic for at least 48 hours.

e. When cured, the floor shall be washed and cleaned to the approval of the Engineer.

7.7.5 Skirting

a. Skirting in all porcelain ceramic floor tiled areas are to be of porcelain tiles to

match the floor tiling to the area concerned, as specified or shown on Drawings. The skirting shall be provided in an identical manner as for tiling. The skirting shall normally be 4" high with top edges arris-rounded or in the size and shape as shown on the Drawings or as approved by the Engineer.

b. The skirting shall be fixed to walls on a plastered backing having a slightly rough surface with neat cement paste. The back of each skirting tile shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall over rendered backing with a rubber mallet so that the tile faces are set in one plane. The skirting shall then be grouted and finished as for porcelain tiling.

7.7.6 Protection

The completed Works or parts thereof shall be protected by the Contractor against any damage. The Works shall be handed over in perfect condition. If any damage is incurred then the Contractor shall remove and/or replace the same at no additional costs. The Contractor shall exercise all care to protect the works executed by other trades and not covered by his Contract. Any damage to these shall be made good and the works restored at no additional cost.

7.8 MEASUREMENT AND PAYMENT

Floor tiling works covered by this section of Specifications, complete and approved, will be measured and paid for per square meter, at the individual item rates entered in the Bill of Quantities and generally in accordance with the applicable terms and conditions of the Contract.

Skirting, treads and risers shall be measured and paid for per running meter at the individual item rates entered in the Bill of Quantities, as per terms stated above.

***** END OF SECTION*****

8 SECTION: PAINTING

8.1 SCOPE OF WORK

The work under this section of the Specifications consists of furnishing all materials, plant, labor, equipment, appliances and performing all operations in connection with surface preparation, mixing, painting concrete works, gates, grills, 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.

8.2 APPLICABLE STANDARDS

Latest editions of following British Standards are relevant to these specifications wherever applicable.

BSI (British Standards Institution)

BS 245	Specification for mineral solvents (white spirits and related hydrocarbon solvents) for paints and other purposes.
BS 2521	Lead-based priming paint for woodwork.
BS 2522	Lead based priming paint for iron and steel.
BS 2569	Sprayed metal coatings. Paint colors for building purposes
CP 231	Painting of building
CP 3012	Cleaning and preparation of metal surfaces.

8.3 GENERAL

8.3.1 Except as otherwise specified, all painting shall be applied in conformity with BS CP 231 "Painting of Building" as applicable to the work.

8.3.2 The Contractor shall repair at his own/expense all damaged or defective areas of shop-painted metal work and structural steelwork. Metal surfaces against which concrete is to be placed will be furnished shop-painted and shall be cleaned to being embedded in concrete.

8.3.3 Except as otherwise specified, all concrete and plastered surfaces are to be painted.

8.3.4 The Engineer will furnish a schedule of colors for each area and surface. All colors shall be mixed in accordance with the manufacturer's instructions.

8.3.5 Colors of priming coat (and body coat where specified, shall be lighter than those of finish coat. The Engineer shall have unlimited choice of colors.

8.3.6 Samples of all colors 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 1 ft. x 1 ft. x 1/8 inch tempered hard hoard panels. Manufacturer's color chart shall be submitted for color specifications and selection.

8.4 MATERIALS AND EQUIPMENT'S

8.4.1 All materials shall be acceptable, proven, first grade products and shall meet or exceed the minimum standards of approved manufacturers.

8.4.2 Colors shall be pure, non-fading pigments, mildew-proof, sun-proof, finely ground in approved medium. Colors used on plaster and concrete surfaces shall be lime-proof. All materials shall be subject to the Engineer's approval.

8.4.3 Approved quality Distemper paint shall be used for painting where specified on the drawings as directed by the Engineer.

8.4.4 The plastic emulsion/weather shield paint or similar as approved by the Engineer shall be used where specified on the drawing as directed by the Engineer.

8.4.5 Other materials/ equipment's to be used are;

- Cement primer, Turpentine, Putty, Polish paper, Wood primer, Emery polish paper and Water
- Drop cloth and polythene sheets of suitable size & quality shall be used to protect other materials and surfaces.
- The masking material where-ever necessary shall be used in sufficient quantities to avoid falling of paint on unwanted surfaces.
- Grinding / buffing wheels, w ire brush & emery paper.
- Electrical distribution panels switch boards & hand lamps.
- Kerosene, thinners, acetone etc. to remove oil / grease etc.
- Painting brush:
- Good quality brushes with long and flexible bristles free from any paint residue shall be used.
- Neat, clean & painted scaffoldings of good quality.
- Good quality ladders, platforms etc.
- Safety gears to be used by personnel like respirator, face mask, hand gloves, protective clothing etc.

All material 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.

8.5 DELIVERY STORAGE AND CONTAINER SIZES

Paints shall be delivered to the site in sealed containers which plainly show the type of paint, color (formula or specifications number) batch number, quantity, and 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.

8.6 SURFACE PREPARATION

a. 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.

b. All the surfaces to be painted shall be free from dust, dirt, fungus, lichen, algae etc. old paint, varnish and lime wash should always be removed by scraping and washing.

c. All surfaces shall be made smooth, prior to the application of primer by rubbing with Bathy (silicon carbide rubbing brick) and/ or sand paper, filling the voids putty (Zinc/ Chalk/ Plaster of Paris mixture).

d. In the event the surfaces become otherwise contaminated in the interval between cleaning and painting, re-cleaning will be done by the Contractor at no additional cost.

e. No work in this section shall be allowed until all surfaces or conditions have been inspected and approved by the Engineer.

8.7 APPLICATION

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 (Alkali Resistance) 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.

A priming coat shall be applied to the cleaned and smooth surfaces first. Unless otherwise specified in the BOQ or approved by the Engineer, all surfaces shall have at least 3 coats of paint in addition to the priming coat.

Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. Surfaces to be painted that will be inaccessible after installation shall be completely painted prior to installation. Only as 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.

a. Where shown on Drawings all exterior finishes shall be painted with weather resistant paint in approved colors as per manufacturer's specifications.

b. For Interior finishes on concrete, masonry, door, windows, cabinets, grills etc. any of the listed types of paints, i.e.; Whitewash, Oil, Plastic or Matte Emulsion, Cement-based, Enamel, Distemper, Textured, Bituminous, Epoxy, Anti-condensation, Luminous (fluorescent), Latex, Lead, Metallic, Rubber, Aluminum, Silicone, Zinc rich, Anti- corrosive, Fungicidal Paint of the approved make and shade shall be applied to surfaces as shown on Drawings or as specified by the Engineer.

Walls, floors & ceiling and adjacent equipment's and piping shall be satisfactorily protected by drop clothes. Other precautionary measures should be taken during spray / brush painting to ensure at surrounding area /equipment is not affected.

The application should be as per manufacturer's instructions / specifications. Before opening the packed drum, it should be rolled on the floor and after opening the drum paints shall be stirred well so that no material/ pigments remains settled at the bottom. Suitably of the the paint shall be checked as per requirement before opening.

The choice of method of application i.e. by brush or by spray gun will be decided by the Engineer. However, adjacent equipment / structures shall be suitably protected and care shall be taken to prevent intoxication of the surrounding area. The method of paint application depending upon the area shall be jointly discussed and decided with Engineer. Paint thickness (DFT) shall be as per the item scheduled. In case the dry film thickness of finish paint is observed less than the specified values, additional coat shall have to be applied free of charge.

Polishing
After fine sanding by a skilled operator, one coat of clear polish should be rubbed in by hand using a cloth or pad, be allowed to dry and buffed up with worn fine sand paper or steel wool to remove raised grain. A second coat of clear polish should then be applied.

8.8 JOB CONDITIONS

8.8.1 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 decree C. No painting shall be done above 90% relative humidity.

8.8.2 Adequately protect all finished work.

8.8.3 Remove and replace all items of finish hardware, device plates, accessories, lighting fixtures or other removable items.

8.8.4 In no case shall any finish hardware or other finished item that is already fitted into place be painted, unless otherwise specified

8.9 INSPECTION & CHECK :

All the work is subject to the inspection of the Engineer or his authorized representative which shall be carried out in a manner, satisfactory to the Engineer. The contractor shall rectify any short comings pointed out by the said representative. The general inspection requirements are as follows:-

a. No paint shall be applied until the authorized inspection has ascertained that all prepared surfaces are satisfactorily cleaned and are in a condition to ensure the proper receipt of and adhesion of the coating.

b. The contractor shall furnish all gauges, instruments and the necessary measuring equipment's required for inspecting the work, test pieces, samples etc. at site and in the shop. The Engineer's authorized representative is intended to ensure that the material and workmanship are in accordance with this specification, but it will not relieve the contractor for any of his responsibilities for the ultimate workmanship and performances.

8.10 QUALITY ASSURANCE

All paint for any one surface shall be top quality, of one manufacturer of the specified. Deep tone accent colors shall be used and the unavailability of final coat colors may be the basis for rejecting materials for any one surface.

8.11 MEASUREMENT AND PAYMENT

All the painting and finishing on all surfaces, other than timber and steelworks which shall be deemed to be inclusive of painting and finishing in their own items of works, shall be measured per square Meter/ft in accordance with standard method of measurement and paid for at the unit rates entered in the Bill of Quantities and in accordance with the terms and conditions of this Contract.

Where separate quantities are not shown in the Bill of Quantities, these shall be deemed to have been included in the rate of the relevant items to be finished and painted and no separate payment shall be made for painting/finishing works of such items.

***** END OF SECTION *****

9 SECTION: DEMOLITION OF EXISTING STRUCTURE/RCC WORK

9.1 SCOPE OF WORK

This Section specifies the labor, materials, equipment, and incidentals required for the demolition, relocation, and/or disposal of all structures, walks, concrete slabs, retaining walls, trees and bushes, and including foundation, walls, columns, floors, piers, partitions, boundary walls, stoops and any other structures to the level of the demolition grade; to be removed as shown on the Drawings, as directed by the Engineer in charge in writing due to any defect/ damage/ reconstruction and as specified herein.

Site clearance will consist of the removal, disposal of demolition material; filling of all excavations to the existing ground elevation; and the grading and smoothing of the site.

9.2 METHOD

The Contractor shall examine the various Drawings, visit the site, determine the extent of the Work, the extent of work affected therein, and all conditions under which he is required to perform the various operations.

All demolition work will be done under the inspection of Engineer in charge. Contractor shall notify the Engineer in charge in writing prior to beginning any demolition work.

When the work of demolition is substantially complete, the Contractor shall again notify the Engineer in charge that the work will be ready for final inspection.

Before commencing demolition work, all structure relocation, bypassing, capping, and/or modifications necessary will be completed. Actual work will not begin until the Engineer in charge has inspected and approved the prerequisite work and authorized commencement of the demolition work.

Demolition operations shall be conducted in such a way as to to minimize damage by falling debris or other causes to adjacent buildings, structures, roadways, other facilities, and persons. Interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain, shall be provided by the contractor, if needed, or if directed by the engineer in charge, at his own cost.

The Contractor shall be responsible for all damage to private or public property as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all work performed until completion and final acceptance.

Arrangements shall be made with the Police Department to prohibit parking of vehicles in the near vicinity of the actual demolition.

In order to prevent the blowing of dust and dirt, the Contractor will be required to wet down and keep wet the structures before and during wrecking operations, all rubbish and debris stockpiled on the site, and all rubbish or debris is being loaded for disposal. All obstructions shall be adequately barricaded and lighted at night.

The Contractor shall comply with applicable laws and ordinances governing the disposal of materials, debris, rubbish and trash off or on the project area; and shall commit no trespass on any private property in the disposal of the materials without permission of the property

owners involved.

No explosives shall be used at any time during the demolition. No burning of combustible material will be allowed.

The Contractor shall fill and compact all voids left by the removal of pipe, structures, etc. with materials described herein to a grade that will provide for positive drainage of the disturbed area to drain run-off in direction consistent with the surrounding area. The Contractor shall provide all fill materials to the site as needed. Compaction of fill shall match the compaction of adjacent undisturbed material.

Once the demolition is started, it shall be continued until completed

Contractor shall notify utility companies or local authorities furnishing gas, water, electrical, telephone, or sewer service to remove any equipment in the structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition.

9.3 DISPOSAL OF MATERIAL

All salvageable or useable material or equipment and other products of the demolition, to be retained by the Engineer, as indicated in writing by the engineer in charge, shall be moved to a designated area by Contractor for later use. The Contractor shall promptly remove all other materials from the site as instructed.

All material, equipment, rubble, debris, and other products of the demolition not retained by the Engineer shall become the property of the Contractor for his disposal, off-site, in accordance with all applicable laws and ordinances at the Contractor's expense. The sale of salvageable materials by the Contractor shall only be conducted off-site

The proper transport and disposal of all material shall remain the responsibility of the Contractor. On-site storage of items is prohibited.

9.4 MEASUREMENT & PAYMENT

Measurement for payment for demolition work will be done in similar units in which these items were paid, if constructed. No additional payment will be made for pumping or other difficulties encountered due to water.

The rate shall include cost of all such operations mentioned above including necessary labour, materials, transport, scaffolding, stacking the serviceable materials, disposing the unserviceable materials within the lead specified, all as directed by the Engineer-in-charge.

***** END OF SECTION *****

S T A T E B A N K O F P A K I S T A N

SBP BANKING SERVICES CORPORATION (BANK)

QUETTA

TENDER DOCUMENTS

Volume - IV

Financial Bid

PRICE BID

For

Retrofitting Work of Buildings at SBP BSC Quetta

April 2024

LPB-1

LETTER OF PRICE BID

Name of Contract: **Retrofitting Work of Buildings at SBP BSC Quetta**

To:

Director
Engineering Department
State Bank of Pakistan SBP, BSC
1st Floor SBP Bolton Market Building
M.A. Jinnah Road, Karachi

We, the undersigned, declare that:

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

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

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

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

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

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

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

Name .....

In the capacity of .....

Signed .....

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

Date .....

Address……

For Contractor Sign and Seal	For Consultant Sign and Seal	For SBP-BSC Sign and Seal

Financial Bid/ Schedule of Prices

RETROFITTING WORK OF BUILDINGS AT SBP BSC QUETTA

1. PREAMBLE

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

ii. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix in accordance with provisions of the Contract.

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

iv. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor will have failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

v. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works.

vi. General directions and description of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the priced Bill of Quantities

vii. The prices and rates to be quoted in the Bill of Quantities are to be the full inclusive value of the works described under specified items including all cost of expenses which may be required in and for the construction of the works described and implied in all the documents referred to on which the tender is based.

viii. Rates quoted should be inclusive of all applicable taxes, duties, levies etc.

ix. Unit rate is to be entered against each item in the Bill of Quantities whether quantities are entered or not. Items against which no price or rate is quoted in the Bill of Quantities shall be deemed to have been covered by rates or prices quoted in the other BOQ item.

x. Sub-total/Total amounts shall also be referred in words.

xi. Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, and the line total will be corrected accordingly.

xii. Each cutting should be signed by the authorized person.

xiii. The brand names have been provided in order to establish a standard of performance and reliability. However, it does not indicate a preference for a particular brand. The bidder may propose other brands, which can be accepted subject to necessary tests to establish equivalency at bidder's cost.

2. BILL OF QUANTITIES:

Item No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
Civil Works					
1	Dismantling masonry wall in cement mortar foundation, basement, plinth and any floor including stacking salvaged material (serviceable) and disposing of surplus material away from the office premises outside municipal limits, complete in all respects, as per site conditions and as directed by engineer In-charge.	Cft	2,662		
2	Dismantling tile from any height & floor including cement sand layer and PCC underneath, including stacking salvaged material (serviceable) and disposing of surplus material as directed by engineer In-charge.	Sft	2,523		
3	Removing, Repairing, re-fixing of wooden panel i/c replacement of wooden strips, nail etc. complete in all respects, as per site conditions and as directed by engineer In-charge.	Sft	534		
4	Removing, Repair, re-fixing of cabinet i/c replacement of wooden strips, sheet, hinges where required, complete in all respects, as per site conditions and as directed by engineer In-charge.	Sft	119		
5	Removing, Repair, re-fixing of Wooden doors i/c replacement of wooden strips, sheet, hinges where required, complete in all respects, as per site conditions and as directed by engineer In-charge.	Nos	10		
6	Providing and laying glazed/semi-glazed ceramic tiles (local) tiles (of approved colour/ shade/ texture) upto 4 Sft size on floors & on walls, in any floor, laid with dry bond (stile bond) over a base of avg. 1" thick cement mortar including jointing to tiles with joint filler of approved quality as per direction of the Engineer In-charge.	Sft	2,193		
7	Providing & Fixing porcelain tiles of M/s Master or approved equivalent 3/8" thick on floors & on walls upto 4 sft size, color jointed white cement with matching pigment & laid over 1:2 cement sand mortar avg. 1" thick i/c finishing, as per approved by the Engineer In-charge.	Sft	1,042		
8	Taking out existing door shutter, incl. frames as required, all complete as per the direction of the Engineer-in-charge.	Each	13		
9	Taking out existing plumbing fixture as required, stacking usable material at site and disposal of unserviceable material away from the office premises outside municipal limits, complete in all respects, as per site conditions and as directed by engineer In-charge.	Job	13		

Item No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
10	Chipping of concrete cover surface from slabs, beams, columns, floor etc. with manual Chisel and/ or bystandard power driven percussion type or of approved make including tapering of all edges, making square shoulders of cavities including cleaning the exposed concrete surface and reinforcement with wire brushes etc. and disposalof debris for all lead and lifts all complete as per direction of Engineer-In-Charge	Sft	3,518		
11	Provision of rebar anchors in existing RCC structural members by drilling suitable holes of manufacturer recommended dia & depth using power driven machine, cleaning of holes, filling of holes by manufacturer's applicator using approved epoxy resin/mortar of Hilti, Sika or other approved equivalent manufacturer, including fixing the steel bars in position but excluding the cost of reinforcement, complete in all respect as per site conditions and as per direction of Engineer-In-charge. Contractor must seek prior approval of epoxy mortar (Epoxy mortar and application procedure to comply with the provision of ACI code for seismic retrofitting)				
11a	For 3/8" Dia rebar	Per Hole	12,628		
11b	For 1" Dia rebar	Per Hole	704		
12	Providing and laying deformed steel (minimum yield point 60,000 psi) compliant to ASTM A-615 reinforcement bars with & including the cost of straightening, cutting, bending, binding, placing in position in all kinds of RCC work in foundation, walls, columns & slabs including fixing of spacers, at any floor of building and as per direction of engineer in charge. (Rebar weight (incl. laps) approved in Bar Bending Schedule shall only be paid)	Kg	17,885		
13	Providing and laying Reinforced concrete having 28 days 4000 Psi cylindrical strength in roof, slabs, walls, landings, plinth beams, rafts and bands, etc. as specified requiring steel shuttering, admixtures for workability, cold weather concrete (if required), SBR based bonding agent on construction joints, internal external vibrators complete, curing etc as per ACI standards & per instructions of engineer in charge. Reinforcement to be measured and paid separately. Contractor shall seek approval of concrete mix design and shall arrange for testing of concrete cylinders from every batch as per ASTM standards.	Cft	6,456		

14	Providing and applying curing compound of Sika, Aquafin or any other approved equivalent applied @ 55Ft²/L or as per manufacturer recommendations, after removal of formwork for concrete works. Complete in all respects and as directed by Engineer In-charge.	Sft	40,000		
15	Providing , fabricating fixing angle Iron 5" x 5" x 1/2" on diaphragm connections slab & walls with 1/2" dia anchor bolts @ 12" c/c on area specified on drawings including cutting, bending, drilling and red oxide painting complete in all respect as per drawings, specifications and instructions of Engineer In-charge.	Kg	8,194		
16	Providing and fixing 300 x 10mm thick MS plate on diaphragm connections beam & walls with 1/2" dia anchor bolts @ 12" c/c on area specified on drawings including cutting, bending, drilling and red oxide painting complete in all respect as per drawings, specifications and instructions of Engineer In-charge.	Kg	9,875		
17	Providing and fixing 50mm x 6mm thick MS plate walls with 1/2" dia anchor bolts @ 4' c/c on area specified on drawings including cutting, bending, drilling and red oxide painting complete in all respects as per drawings, specifications and instructions of Engineer In-charge.	Kg	15,950		
18	Providing and fixing 6mm dia & 150mm c/c wire mesh etc., complete in any floor as per drawings, specifications & site requirements or as directed by Engineer in-charge.	Kg	5,647		
19	Providing, mixing & applying avg 1" (25mm) thick 1:4 cement sand plaster in Double layer on walls and columns mixed with approved quality bonding agent(SBR) @ 3 liters per cement bag or as recommended by manufacturer, smooth finished with steel trowel as per proper lines & levels to the entire satisfaction of Engineer in charge , using clean sand of approved quality, including the cost of providing & fixing 16SWG expanded metal lath on joints of masonry & concrete or where required including cost of curing, scaffolding etc. complete in all respect as per directions of Engineer In-charge.	Sft	30,506		
20	Providing & applying 03 coats of best quality plastic emulsion paint of ICI Dulux or equivalent make over walls & ceiling including surface preparation with approved quality wall putty and one coat of primer of ICI Dulux or other approved equivalent make, sand papering where required, complete in all respects as per site requirements and as directed by the Engineer In-Charge.	Sft	33,080		

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

21	Distempering with poly vinyl distemper of approved make and shade in two coats over and including the cost of one priming coat of lime wash including sand papering, dusting, and filling the holes, cracks and inequalities, if any, at any height in any floor etc. complete and as per instructions of Engineer In-charge.	Sft	6,965		
22	Providing & applying 03 coats of weather resistant paint of ICI Dulux or other approved equivalent make over external walls, including surface preparation with approved quality wall putty and one coat of primer of ICI Dulux or other approved equivalent make, sand papering where required, complete in all respects as per site requirements and as directed by the Engineer In-Charge.	Sft	15,564		
23	Providing & fixing ¾" thick laser cut pre-polished grade-A, Pearl Blue or any other approved type granite tiles of about 30cm x 60cm size, over floor as per the sample available with the Bank, including grouting with matching colour pigment, cost of spacers, cement buttering etc. complete in all respects as per site requirements and as directed by the Engineer In-charge.	Sft	510		
24	Removal & Re-fixing of Dry partition including staking at appropriate location within Bank premises & disposal of unserviceable material away from Bank outside Municipal limits as per site requirements and instructions of Engineer In-charge.	Sft	765		
25	Providing & fixing in position one piece commode of 3-Star, Master or approved equivalent make, with S-trap & heavy duty plastic type hydraulic seat cover, approved quality CP T-stop cock of Master/Sonex or approved equivalent, CP connection pipe of approved quality & make, complete in all respects as per site requirements and as directed by the Engineer In-Charge.	Nos	04		
26	Providing & fixing of plastic body flush tank of 3-Star, Master, Faisal, Durr or other approved equivalent make, including the cost approved quality CP T-stop cock of Master/Sonex or approved equivalent, CP connection pipe, including connection with the WC/ commode, complete in all respects as per site requirements and as directed by the Engineer In-Charge.	Nos	04		

27	Providing & fixing squatting pan (W.C) of about 16" x 21" size by 3-Star, Master, Faisal, Durrr or other approved equivalent make, including the cost of uPVC P-trap, concealed flushing pipe (1.5" dia. uPVC Sche.40), providing and applying sealant Max Track of Sika, CHEMAFLEX of ICPL or other approved equivalent make around flush pipe at joint with WC, and around WC neck before placing the WC in position, etc. complete in all respects as per site Providing & fixing of plastic body flush tank of Master, Durr, ,faisal or other approved equivalent make, including the costapproved quality CP T-stop cock of Master/Sonex or approved equivalent, CP connection pipe, including connection with the WC/ commode, complete in all respects as per site requirements and as directed by the Engineer In-Charge	Nos	05		
28	Providing & fixing in position false ceiling comprising of 600 mm x 600mm size 7mm thick Gypsum Board sheets of DFB or other approved equivalent make with PVC film pasted at front and aluminum foil pasted at back side, with approved quality powder coated suspension system of CKM or other approved equivalent make, with 14SWG GI wires at every junction of the main Tee runner and lateral Tee sections, hanging with the RCC slab with the help of approved quality rawl bolts/fixing anchors (3" long) provided @ approximately 4ft both ways including cutting of sheets, etc. where required, making of holes for fixtures, complete in all respects as per site requirements and as directed by the Engineer in-charge.	Sft	510		
29	Cordoning off of work site with green cloth/white Ply sheet scaffolding etc of Bank Building other operational functional areas and removing the same after completion of required works as per site requirements and Instruction of Engineer in Charge	Sft	1,255		
30	Providing & laying Sch.40 uPVC pipe of Dadex, AGM (Jeddah) or approved make & quality for waste water, including the cost of required uPVC specials/ sockets & solutions, etc. complete in all respects as per site requirements and as directed by the Engineer In-charge.	Rft	515		
31	Providing & fixing in position, uPVC floor trap for floor drains of Dadex, AGM (Jeddah) or approved equivalent make, with heavy duty stainless steel jali set of 6" x 6" size, complete in all respects as per site requirements and as directed by the Engineer In-charge.	Nos	20		

32	Providing, laying/fixing as per required slopes and levels & testing of medium grade GI pipe of 1/2" dia., of IIL or other approved equivalent make conforming to ASTM-A53/BS1387 or EN 39, including the cost of cutting where required, making of threads and jointing with approved quality GI sockets/elbows/bends etc., providing & wrapping of approved quality bitumastic/PVC tape over the entire outer face of the pipe after applying a flood coat of hot bitumen, providing & applying approved quality Teflon tape and sealant at joints, complete in all respects as per site requirements and as directed by the Engineer In-Charge.	Rft	515		
33	Providing & fixing in position, solid core flush doors comprising of (5 x (2.5ft x 7ft)) & (2x(3ftx 7ft)) door panels of 1.5" thickness, with partal wood infill & 1.5" x 1/2" size deodar wood lipping and approved quality Formica pasted on both sides, polishing of lipping with matt finish coca brown enamel paint, door frame made from 16SWG GI pressed sheet, painted with approved quality & colour paint of ICI, Berger or approved equivalent make, minimum 06 hold fasts made from 1" wide MS flat patti of 10 SWG grouted in Brick work, including filling of cement-sand slurry 1:4 behind the door frame, at least 4" size brass handles of approved quality on inner & outer side, four 6" long stainless steel hinges with brass bushes, approved quality stainless steel 6" size horizontal sliding bolt/L-drop on inner side, complete in all respects as shown in drawings, as per site requirements and as directed by the Engineer In-charge.	Sft	210		
34	Providing and fixing in position, pre-cast RCC lintels 9" deep & 6" wide with 3 steel bars of 1/2" diameter at bottom and 2 steel bars of 1/2" diameter at top and 3/8" diameter rings @ 6" c/c, all steel bars of tor steel, concrete ratio not leaner than 1:2:4 by volume, including cost of transportation/carriage, loading / unloading, lifting & handling of pre-cast units, labour and other charges complete in all respect as per site requirements, as per drawings and as directed by the Engineer In-Charge	Rft	55		
35	Providing and fixing half pedestal washbasin of porta approved equivalent including the cost of stainless steel screws, approved quality bottle trap, connection pipes, waste pipes ,T cock etc. complete in all respects as per site requirements and as directed by the Engineer In-charge.	Nos	05		
36	Dismantling and re-fixing of Vanities & disposal of unserviceable material away from Bank Premises outside Municipal limits complete in all respects as directed by Engineer In-charge.	Nos	03		
37	Mirror removal/re-fixing complete in all respects as directed by Engineer In-charge.	Nos	03		

38	Providing and torch applying 4mm thick layer of plastomeric waterproofing membrane of Roofgrip (Elastogrip RL-400) manufactured from bitumen, modified with elastomers SBS (Styrene Butadiene Styrene) or other approved equivalent, with heat resistant and waterproofing properties, in accordance with the directions of the manufacturer/supplier including the cost of approved primer (Primer Grip or other approved equivalent) applied @ about 4-6m2/liter or as recommended by the manufacturer, all required overlaps of minimum 3" width, providing & laying about 200 micron thick polythene sheet over the membrane, etc. complete in all respects as per site requirements and as directed by the Engineer In-Charge.(The contractor shall have to submit samples along with technical data sheets of materials for approval by the Engineer In-charge before application at site.)	Sft	510		
39	Providing, mixing, laying, vibrating and curing of Plain Cement Concrete screed in floor not leaner than 1:2:4 ratio, in panels each of about 200SFt area in layers of about 5" thickness on average using MS pipe 1"x3" frame area as advised by engineer in charge, with about 1" wide gap between the adjacent panels, laid according to proper slopes & levels, the levels will be achieved by complete leveling and providing bench marks (thiya) on complete slab, same slope will lead the water towards the down spouts and drains, including the cost of providing & mixing of about 19mm long mono filament poly propylene fiber of Sika, ICPL, Pagel or other approved equivalent make @ 150 grams per bag of cement, the PCC will be made using concrete mixer machine, complete in all respects as per site requirements and as directed by the Engineer In-charge.	Cft	255		
40	Leveling/repairing of slab surface with about ¾" average thick layer of slurry comprising of Cement + Sand (in 1:4 ratio) using latex based concrete bonding agent from Sika, Fospak or other approved manufacturer @ 3 liters per bag of cement or as per the directions of the manufacturer/ supplier, and mono filament fiber (PPA) of approved make & quality mixed@ 150 grams per bag of cement, with smooth trowel finished top surface, curing with damp jute cloth, complete in all respects as per site requirements and as directed by the Engineer In-charge	Sft	510		

41	Making of holes upto 6" dia in RCC slab/wall through diamond core cutter for disposal of sewerage lines of washrooms using skilled labor, equipment and materials for core cutting to facilitate sewerage disposal in the washroom areas. The contractor to ensure that the core cuts are of the specified diameter and properly installed sealed with two component epoxy d fittings to connect the core cuts with the existing sewerage system.	Nos	10		
42	Providing and installation of complete set of Washrooms accessories by Dur, Faisal, Master or other approved equivalent which include, towel rail, soap dish, coat hanger, brush holder etc and any other item damaged during execution of retrofitting works, complete in all respects, as directed by Engineer in charge.	Nos	05		
43	Providing and pasting of approved quality wall paper complete in all respects as directed by Engineer In-charge.	Sft	120		
44	Removal of existing MS Windows & re-fixing in reverse direction i.e. openable from outside including repair of jambs, replacement of broken glass during process with match glass of other windows as per site conditions & instructions of Engineer in charge.	Sft	655		
45	Providing & Laying Block Masonry with1:2:4 Blocks set in 1:4 cement sand mortar including scaffolding, site preparation, disposal of debris etc complete in all respect in straight or curved walls of any height & thickness as per drawings, specifications, site requirements and instructions of Engineer In-charge.	Cft	505		
Electrical Works					
46	**Supply and Installation** of 13 Amp Multi Switch Socket sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level with necessary fitting, fixing material. **Supply and termination** of 2 x 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	42		

47	**Supply and installation** of 02 Gang switch sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing material. **Supply and termination** of 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	20		
48	**Supply and installation** of 04 Gang switch sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing material. **Supply and termination** of 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	20		

49	**Supply and installation** of 05 Gang switch sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing material. **Supply and termination** of 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	10		
50	**Supply and installation** of 06 Gang switch sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing material. **Supply and termination** of 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	25		

51	**Dismantling, Restoration, re-fixing, relocation**, and making good of all internet LAN points, including cabling work, UPS electrical boards, and wirings, to be completed comprehensively in accordance with site requirements and under the guidance of the Engineer In-charge. **Supply and termination** of 2.5mm sqr. & 1.5mmsqr. as ECC copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Jobs	40		
52	**Dismantling, Re-fixing, relocation,** and making good of Power DB including cabling work, electrical boards, and wirings, to be completed comprehensively in accordance with site requirements and under the guidance of the Engineer In-charge. **Supply and termination** of power cables with required thimble, lugs, and other accessories as per site requirement. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Job	01		
53	**Dismantling, Re-fixing**, and making good of Switches (variable gangs) including termination work and wiring to be completed comprehensively in accordance with site requirements and under the guidance of the Engineer In-charge. **Supply and termination** of power wires with required thimble, lugs, and other accessories as per site requirement. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Job	03		
54	**Supply and installation** of RJ 11 sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing	Each	04		

Item No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
	material, **Supply and termination** of CAT-6 UTP voice cables as per site requirement with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)				
55	**Supply and installation** of RJ 45 sheets/face plates of make Clipsal, Legrand or equivalent with metallic powder coated back box with fixing material by observing beauty and proper level on wall from floor level. with necessary fitting, fixing material, **Supply and termination** of CAT-6 UTP voice cables as per site requirement with drilling, chipping, wall cutting and repairing as per original, connections complete in all respects as directed by engineer-in-charge. (**Note:** The bidder is strongly recommended to visit the site prior quoting of the price)	Each	04		
HVAC Works					
56	Supply, Installation Testing & Commissioning of Supply/Return Air Ducts (GI) for extension of existing ducts including jointing material, clamps, hanger rods, supports and complete in all respects in accordance with site requirements and under the guidance of the Engineer In-charge. As per existing duct sizes. (**Note**: The bidder is strongly recommended to visit the site prior quoting of the price)	Sft	400		
57	**Dismantling, Re-fixing** and making good of Ceiling Convertible Type (Floor Mounted) Fan Coil Units including extension of supply & return copper piping including all copper fittings elbow, tees, flares, nuts bolts etc. sized 1/2-inch or as per existing with complete access (supply & installation) aeroflex insulation and insulated wrapping tape. The work shall be including replacement of gate valves sized 1/2-inch or as per existing (make kitz or approved equivalent) for both supply return of the unit. The job shall be carried out with proper finishing and quality. The unit shall be restored in operational condition. Complete in all respect as directed by Engineer In-charge (**Note**: The bidder is strongly recommended to visit the site prior quoting of the price. The bidder is advised to place GI sleeves for passing the copper pipes and electrical wiring before the concrete works to avoid any drilling of core cutting. The amount of sleeves should be included in items cost.)	Job	08		

Item No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
58	**Dismantling, Repairing & Re-fixing after Fresh powder coating paint (Shade as per approved sample) of Air Devices i.e. Diffuser, Grills, Vanes etc**. The work should be completed in all respects i.e. repairing of neck, springs, clips etc. where required and repairing in accordance with site requirements and under the guidance of the Engineer In-charge. (**Note**: The bidder is strongly recommended to visit the site prior quoting of the price)	Job	08		
59	Removal & stacking at designated location wall mounted Split ACs capaties ranging from 1-2 TR (both indoor & outdoor units) Supply and installation of 2 x 4mm sqr. & 1.5mmsqr. As ECC for Acs from DB to AC DP Breaker copper/PVC wire as per site requirement (Electrical wiring must be compliant with IEC 60364 or BS 7671 and type tested certification from KEMA/RAWAT/PQSIR) and supply and installation of PVC pipe of 25 mm dia of class C (Electrical PVC pipe must be in compliant with BS 6099-1 or PS 1905-87 standards) Re-fixing after completion of required works including necessary repair & maintenance, epoxy coating of ubends, charging/top-up of Refrigerant (r-22/R-410a/R-32) with other fitting fixtures. Testing & commissioning of Units. complete in all respects as per site requirements and Directions of Engineer In-charge (Note: The bidder is strongly recommended to visit the site prior quoting of the price)	Job	04		
				TOTAL AMOUNT (RS)=	

Total Amount (in words)……..……..

Undertaking by the Bidder:

I_____had visited the site and have fully understood the scope of work & specifications. The above rates are inclusive of all labour charges, Tool & Plants, applicable taxes/ duties, overheads, safety equipment/PPEs/measures etc. I/ we have sufficient resources to carry out above works. All the above Terms & Conditions are acceptable to us. We are not blacklisted by the Bank or any other organization.

For Contractor
Sign and Seal

For Consultant
Sign and Seal

For SBP-BSC
Sign and Seal

Date: **Contractors Signature & Seal**