Issued to M/s: _____

Date : _____

Issued By : _____

KARACHI WATER & SEWERAGE BOARD

PROJECT:

GREATER KARACHI BULK WATER SUPPLY SCHEME, K-IV, PHASE-I, 260 MGD FROM KINJHAR LAKE TO KARACHI

NAME OF WORK:

SUPPLY AND FIXING OF BOUNDARY PILLARS & WALLS FOR K-IV PROJECT

BIDDING DOCUMENT

APRIL 2015

CONSULTANT

OSMANI عثماني

Engineering - Architecture - Planning - Mapping - Technology

OSMANI & COMPANY (PVT.) LTD.

Consulting Engineering - Architects - Planners
Osmani House, 245/2-K, Block-6, PECHS, Karachi
Tel: (92-21) 34536007-08, 34546541-42, Fax: (92-21) 34534691
E-mail: ocl-khi@osmani.com Web: www.osmani.com

SUPPLY AND FIXING OF BOUNDARY PILLARS & WALLS FOR K-IV PROJECT

BIDDING DOCUMENT

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GREATER KARACHI BULK WATER SUPPLY SCHEME K-IV

OFFICE OF THE PROJECT DIRECTOR, K-IV PROJECT

NOTICE INVITING TENDER

1. KARACHI WATER & SEWERAGE BOARD (KW&SB) invites sealed tenders on Item Rate Basis from interested contractors/firms.

Name of Work	Estimated Cost (Rs. Millions)	Bid Security	Tender Fee	Time for completion
Supply and fixing of Boundary Pillars & Walls for K-IV Project	350	2% of Bid Amount	Rs. 2,000/-	12 months

2. Eligibility: PEC Licensed Contractors/ Firms/ JVs / Consortium having relevant experience of similar works with valid PEC License in Category C-3 and above with specialization codes of CE-01 and CE-10.

3. Method of Procurement: National Competitive Bidding (Single Stage Two Envelope Procedure). Sealed Financial Proposal in original and Technical Proposal (one original and one copy) should be delivered at the office of PD K-IV as per given schedule. Each page of Original copies must be signed and stamped by the Bidder.

4. Bidding/Tender Documents:
   (i) Documents will be issue on payment of tender fee (*Non- refundable*).
   (ii) Date of Issuance : 13 April 2015 to 28 April 2015 by 04:00 pm.
   (iii) Last date of submission : 29th April 2015 by 02:00 pm.
   (iv) Technical proposals will be opened on 29th April 2015 at 02:30 pm.
   (v) Date of Opening of Financial proposal will be intimated later.
   (vi) Place of issuance, submission, inquiries and opening will be:-
   Address (Postal) : KW&SB, Block-C, Room No. 7, 9th Mile Karsaz, Sharea Faisal, Karachi.
   Telephone Number : (021) 99245160
   Fax Number : (021) 99245121
   : www.kwsb.gos.pk

5. Terms & Conditions:
   (a) Under following conditions bid will be rejected:-
      (i) Conditional and telegraphic bids/tenders;
      (ii) Bids not accompanied by bid security of required amount and form;
      (iii) Bids received after specified date and time.
      (iv) Black listed firms.
      (v) Bid not accompanied with mandatory requirement as indicated in bidding documents IB 28.7 (a) (1).

   (b) Bid validity Period: - 90 days.

   (c) KW&SB reserves the right to reject all or any bid subject to the relevant provisions of Sindh Public Procurement Rules 2010.

   (d) Responsive Bidder is required to submit following documents as per IB 28.7 of Bid Documents:-
      (1) List of overall experience of works of Rs. 300 M or above of the firm in last 10 years.
      (2) Experience of similar nature works of Rs. 300 M or above.
      (3) Regional experience (Karachi & Sindh) of last 10 years.
      (4) Proposed construction schedule.
      (5) List of staff & CVs of Project Manager and experience.
      (6) List of machinery & equipment.
      (7) Comprehensive Audit Report of last 3 years.
      (8) Bank Certificate/ Bank Statement for last 12 months.
      (9) Average Annual Turnover of last five years.
      (10) Certificate of Registration with Sindh Board of Revenue

   (e) The Bid Document shall be issued to authorize signatory of the Firms on production of valid PEC License, with Category and Specialization codes required for this project.

Project Director K-IV Project
Karachi Water &Sewerage Board
Block-C, Room No. 7
9th Mile Karsaz, Sharea Faisal,
Karachi, Pakistan

Tel No: 99245160
Fax No: 99245121
www.kwsb.gos.pk

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INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

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

A. GENERAL

IB.1 Scope of Bid

1.1 Procuring agency as defined in the bidding data hereinafter called "the procuring agency" wishes to receive bids for the Supply and Fixing and completion of works as described in these bidding documents, and summarized in the bidding data hereinafter referred to as the "Works"

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

IB.2 Source of Funds

2.1 Procuring agency has received/allocated/] applied for loan/grant/ Federal/ Provincial/Local Government funds from the source(s) indicated in the bidding data in various currencies towards the cost of the project /scheme specified in the bidding data, and it is intended that part of the proceeds of this loan/grant/funds 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 interested bidders who are eligible under provisions of Sindh Public Procurement Rules as mentioned below and the criteria given in the Notice Inviting Tender (NIT)/ Bidding Document.

Firms and individuals, national or international, may be allowed to bid for any project where international competitive bidding is feasible. Any conditions for participation shall be limited to those that are essential to ensure the bidder's capability to fulfill the contract in question.

(a) Bidders may be excluded if;

(i) as a matter of law or official regulations, commercial relations are prohibited with the bidder's country by the federal government in case of ICB, or

(ii) a firm is blacklisted/ debarred by the procuring agency and the matter has been reported to the Authority, subject to Rule 30 of Sindh Public Procurement Rules 2010.

(b) Government-owned enterprises or institutions may participate only if they can establish that they are;

(i) legally and financially autonomous, and

(ii) operate under commercial law.

Provided that where government-owned universities or research centers in the country are of a unique and exceptional nature, and their participation is critical to project implementation, they may be allowed to participate; and

Bidders shall include all those contractors who are registered or incorporated in Pakistan, irrespective of the nationality of their owners and professional staff, or

(c) Bidders are:-

(i) pre-qualified with procuring agency for particular project/scheme;

(ii) registered with Pakistan Engineering Council in particular category and discipline,

(iii) registered with relevant tax authorities (income/sales tax, wherever applicable)

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 submits or participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

IB.5 Cost of Bidding

5.1 The bidders shall bear all costs associated with the preparation and submission of their respective bids, and the procuring agency 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 all information that may be necessary for preparing the bid and entering into a contract for Supply and Fixing 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 procuring agency 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 procuring agency, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

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

a. Instructions to Bidders
b. Bidding Data.
c. General Conditions of Contract, Part-I (GCC).
d. Special Conditions of Contract, Part-II (SCC)
e. Specifications.
f. Form of Bid and Appendices to Bid.
g. Bill of Quantities (Appendix-D to Bid).
h. Form of Bid Security.
i. Form of Contract Agreement.
j. Forms of Performance Security, Mobilization Advance Guarantee, Integrity Pact and Indenture bond for secured advance.
k. 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 BD will be rejected.

IB.8 Clarification of Bidding Documents

Any interested bidder requiring any clarification(s) in respect of the bidding documents may notify the procuring agency in writing at the procuring agency's address indicated in the Invitation for Bids/NIT. Procuring agency will respond to any request for clarification provided they are received at least five calendar days prior to the date of opening of bid.

Provided that any clarification in response to query by any bidder; shall be communicated to all parties who have obtained bidding documents.

IB.9 Amendment of Bidding Documents

9.1 At any time prior to the deadline for submission of bids, the procuring agency may, for any reason, whether at his own initiative or in response to a clarification requested by a interested bidder, modify the bidding documents by issuing addendum.

9.2 Any addendum thus issued shall be part of the bidding documents pursuant to sub-clause IB 7.1 hereof and shall be communicated in writing to all bidders. Interested bidders shall acknowledge receipt of each addendum in writing to the procuring agency.

9.3 To afford bidders reasonable time in which to take an addendum into account in preparing their bids, the procuring agency may extend the deadline for submission of bids in accordance with 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 procuring agency shall be in the language stipulated in the bidding data and Special Conditions of the 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 Each bidder shall:

(a) submit a written authorization on the letterhead of the bidding firm, authorizing the signatory of the bid to act for and on behalf of the bidder;

(b) update the information indicated and listed in the bidding data and previously submitted with the application for prequalification, and continue to meet the minimum criteria set out in the prequalification documents, which as a minimum, would include the following :

(i) Evidence of access to financial resources along with average annual Supply and Fixing turnover;

(ii) Financial predictions for the current year and the following two years, including the effect of known commitments;

(iii) Work commitments since prequalification;

(iv) Current litigation information; and

(v) Availability of critical equipment.

And

(c) furnish a technical proposal taking into account the various Appendices to Bid specially the following:

Appendix-E to Bid	Proposed Supply and Fixing Schedule
Appendix-F to Bid	Method of Performing the Work
Appendix-G to Bid	List of Major Equipment
Appendix-K to Bid	Organization Chart for Supervisory Staff

and other pertinent information such as mobilization programme etc;

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

(a) 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;

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

(c) the partner-in-charge shall always be duly authorized to deal with the procuring agency regarding all matters related with and/or incidental to the execution of works as per the terms and Conditions of Contract and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf 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 (a) above as well as in the Form of Bid and in the Form of Contract Agreement (in case of a successful bid);

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

(f) submission of an alternative Letter of Intent to execute a Joint Venture Agreement shall be mandatory.

11.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the bidders‟ proposals to meet the technical specifications and the completion time referred to sub- clause IB 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 or prices submitted by

the bidder or percentage quoted above or below on the rates of Composite Schedule of Rates (CSR), as the case may be.

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 procuring agency when executed and shall be deemed to be covered by rates and prices for other items in the Bill of Quantities. In case of Composite Schedule of Rates, if the bidder fails to mention the percentage above or below, it shall be deemed to be at par with the rates of Composite Schedule of Rates.

12.3 The bid price submitted by the contractor shall include all rates and prices including the taxes. All duties, taxes and other levies payable by the contractor under the contract, or for any other cause during the currency of the execution of the work or otherwise specified in the contract as on the date seven days prior to the deadline for submission of bids.

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 13.7 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 13.7of GCC. The bidders shall furnish the prescribed information for the price adjustment formulae in Appendix-C to Bid, and shall submit with their bids such other supporting information as required under the said Clause. Adjustment in prices quoted by bidders shall be allowed as per Sub-Para 4(ii) of Section C of Instructions to bidders and bidding data.

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 procuring agency's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. The proportion of the bid price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the bidder's home country or, (ii) at 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 the bid.

13.2 The rates of exchange to be used by the bidder for currency conversion shall be the selling rates published and authorized by the State Bank of Pakistan prevailing on the date, 07 (seven) 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 from the date of opening of bid specified in clause IB.23.

14.2 In exceptional circumstances, prior to expiry of the original, the procuring agency may request the bidders to extend the period of validity for a specified additional period, which shall not be for more than one third of the original period of bid validity. The request and the responses thereto, shall be made in writing. A bidder may refuse the request without the forfeiture of the bid security. In case, a bidder agreed to the request, shall not be required or permitted to modify the bid, but will be required to extend the validity of the 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 the bid, a bid security in the amount stipulated in the bidding data 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, 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 the procuring agency, which should commensurate with the bid validity period. The bank guarantee for bid security shall be acceptable in the manner as provided at Annexure BS-1.

15.3 Any bid not accompanied by an acceptable bid security shall be rejected by the procuring agency as non-responsive.

15.4 Bid security shall be released to the unsuccessful bidders once the contract has been signed with the successful bidder or the validity period has expired.

15.5 The bid security of the successful bidder shall 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 sub- clause IB 22.1;

(b) if the bidder does not accept the correction of his bid price pursuant to sub- clause 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; or

(ii) sign the Contract Agreement

IB.16 Alternate Proposals by Bidder

16.1 Each bidder shall submit only one bid either by himself, or as a member of a joint venture, until and unless they have been requested or permitted for alternative bid, then he has to purchase separate bidding documents and alternate bid shall be treated as separate bid.

16.2 Alternate proposals are allowed only for procurement of works where technical complexity is involved and more than one designs or technical solutions are being offered. Two stage two envelope bidding procedure will be appropriate when alternate proposal is required.

16.3 Alternate bid(s) shall contain (a) relevant design calculations; (b) technical specifications; (c) proposed Supply and Fixing methodology; and (d) any other relevant details / conditions, provided that the total sum entered on the Form of Bid shall be that which represents complete compliance with the bidding documents.

IB.17 Pre-Bid Meeting

17.1 Procuring agency may, on his own motion or at the request of any bidder, hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the bidding documents. The date, time and venue of pre-bid meeting, if convened, shall be communicated to all bidders. All bidders or their authorized representatives shall be invited to attend such a pre-bid meeting at their own expense.

17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Procuring agency 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 bidders. Any modification of the bidding documents listed in sub- clause IB 7.1 hereof, which may become necessary as a result of the pre-bid meeting shall be made by the procuring agency 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 Form of 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 Alteration is not to be made neither in the form of bid 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 Each bidder shall prepare by filling out the forms without alterations and shall provide an original copy along with photocopies as per the requirement of the procuring agency specified in the bidding data. The original as well as copies of the document shall be clearly marked as “ORIGINAL” and „COPY”, as the case may be. If there is any discrepancy between original and copy (ies) then the original shall prevail.

18.5 The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, Photostats are also acceptable) and shall be signed by a person(s) duly authorized to sign on behalf of the bidder pursuant to sub- clause IB 11.1(a) hereof. All pages of the bid shall be initialed and stamped by the person(s) signing the bid.

18.6 The bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the procuring agency, or as are necessary to correct errors made by the bidder. Such corrections shall be initialed by the person(s) signing the bid.

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

18.8 Bidders should retain a copy of the bidding documents as their file copy.

D. SUBMISSION OF BIDS

IB.19 Sealing and Marking of Bids

19.1 Each bidder shall submit his bid as under:

(a) ORIGINAL and one copy of the Technical Proposal bid shall be separately sealed and put in separate envelope and marked as such.

(b) The envelope containing the Financial Bid in Original only shall be put in separate . sealed envelope and addressed as given in sub – clause IB 19.2 hereof.

19.2 The inner and outer envelopes shall:

(a) be addressed to the procuring agency at the address provided in the bidding data;

(b) bear the name and identification number of the contract as defined in the bidding data; and

(c) provide a warning not to open before the time and date for bid opening, as specified in the bidding data.

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

19.4 If the outer envelope is not sealed and marked as above, the procuring agency 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 procuring agency at the address specified not later than the time and date stipulated in the bidding data,

(b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims shall 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 Procuring Agency may, at its discretion, extend the deadline for submission of bids by issuing an amendment in accordance with IB 09. In such case, all rights and obligations of the procuring agency and the bidders shall remain the same as mentioned in the original deadline.

IB.21 Late Bids

(a) any bid received by the procuring agency after the deadline for submission of bids prescribed in to clause IB 20 shall be returned unopened to such bidder.

(b) delays in the mail, 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 submit the bid in time.

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 procuring agency 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 to sub - clauses IB 22.1 and IB 27.2.

22.4 Withdrawal of a bid during the interval between the deadlines for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the bid security in pursuance to clause IB 15

E. BID OPENING AND EVALUATION

IB. 23 Bid Opening

23.1 Procuring agency will open the bids, including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of bidders‟ representatives who choose to attend, at the time, date and location stipulated in the bidding data. The bidders or their representatives who are in attendance shall sign an attendance sheet.

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

23.3 Procuring agency shall read aloud the name of the bidder, total bid price and price of any Alternate Proposal(s), if any, discounts, bid modifications**,** substitution and withdrawals, the presence or absence of bid security, and such other details as the procuring agency may consider appropriate, and total amount of each bid, and of any alternative bids if they have been requested or permitted, shall be read aloud and recorded when opened

23.4 Procuring Agency shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with the sub-clause IB.23.3.

IB.24 Process to be Confidential (SPP Rule 53)

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 in accordance with the requirements of Rule 45, which states that Procuring agencies shall announce the results of bid evaluation in the form of a report giving reasons for acceptance or rejection of bids. The report shall be hoisted on website of authority and that of procuring agency if it website exists and intimated to all bidders at least seven (7) days prior to the award of contract The announcement to all bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the procuring agency’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 as per Rule 31; however mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids (SPP Rule 43)

25.1 To assist in the examination, evaluation and comparison of bids, the procuring agency may, at its discretion, ask any bidder for clarification of the 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 procuring agency in the evaluation of the bids in accordance with clause IB 28.

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the procuring agency will determine whether the bidder fulfills all codal requirements of eligibility criteria given in the tender notice such as registration with tax authorities, registration with PEC (where applicable), turnover

statement, experience statement, and any other condition mentioned in the NIT and bidding document. If the bidder does not fulfill any of these conditions, it shall not be evaluated further.

26.2 Once found to be fulfilling the eligibility criteria, as mentioned in sub- clause 26.1, the bids of eligible bidders will be evaluated for technical responsiveness as per specification and criteria given in the bidding documents. Technical and financial evaluations may be carried out in accordance with single stage-single one envelope, single stage-two envelopes, two stage or two stage-two envelopes bidding procedures, depending on the selection procedure adopted by the procuring agency.

26.3 A bid will be considered technically responsive if it (i) has been properly signed; (ii) is accompanied by the required bid security; and (iii) 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 procuring agency's rights or the bidder's obligations under the contract; or (iii) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

26.4 If a bid has major deviations to the commercial requirements and technical specifications will be considered technically non responsive. As a general rule, major deviations are those that if accepted, would not fulfill the purposes for which the bid is requested, or would prevent a fair comparison or affect the ranking of the bids that are compliant with the bidding documents.

(A). Major (material) Deviations include:-

(i) has been not properly signed;

(ii) is not accompanied by the bid security of required amount and manner;

(iii) stipulating price adjustment when fixed price bids were called for;

(iv) failing to respond to specifications;

(v) failing to comply with Mile-stones/Critical dates provided in Bidding Documents;

(vi) sub-contracting contrary to the Conditions of Contract specified in Bidding Documents;

(vii) refusing to bear important responsibilities and liabilities allocated in the Bidding Documents, such as performance guarantees and insurance coverage;

(viii) taking exception to critical provisions such as applicable law, taxes and duties and dispute resolution procedures;

(ix) a material deviation or reservation is one :
(a) which affect in any substantial way the scope, quality or performance of the works;

(b) adoption / rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

(B) Minor Deviations

Bids that offer deviations acceptable to the Procuring Agency and which can be assigned a monetary value may be considered substantially responsive at least as to

the issue of fairness. This value would however be added as an adjustment for evaluation purposes only during the detailed evaluation process.

26.5 If a bid is not substantially responsive, it will be rejected by the procuring agency, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

IB.27 Correction of Errors before Financial Evaluation

27.1 Bids determined to be substantially responsive will be checked by the procuring agency for any arithmetic errors. Errors will be corrected by the procuring agency 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 procuring agency 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 Form of Bid will be adjusted by the procuring agency in accordance with the above procedure for the correction of errors and with the concurrence of the bidders. The amount thus corrected shall be considered as binding upon the bidder. If the bidder does not accept the corrected bid price, his bid will be rejected, and the bid security shall be forfeited in accordance with sub- clause IB 15.6(b) hereof.

IB.28 Financial Evaluation and Comparison of Bids

28.1 The procuring agency 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 procuring agency 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 (if any), for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

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

28.3 The estimated effect of the price adjustment provisions of the conditions of contract, applied over the period of execution of the contract, shall not be taken into account in bid evaluation.

28.4 If the bid of the successful bidder is seriously unbalanced in relation to the procuring agency's estimate of the cost of work to be performed under the contract, the procuring agency may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities to demonstrate the internal consistency of those prices with the Supply and Fixing methods and schedule proposed. After evaluation of the price analyses, the procuring agency may require that the amount of the Performance Security set forth in clause IB.32 be increased at the expense of the successful bidder to a level sufficient to protect the procuring agency against financial loss in the event of default of the successful bidder under the contract

28.5 Bidders may be excluded if involved in **"Corrupt and Fraudulent Practices"** means either one or any combination of the practices given below SPP Rule2(q);

(i) "**Coercive Practice**" 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 Practice" means any arrangement between two or more parties to the procurement process or contract execution, designed to achieve with or without the knowledge of the procuring agency to establish prices at artificial, noncompetitive levels for any wrongful gain;

(iii) "Corrupt Practice" 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 Practice" 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;

(v) "Obstructive Practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in a procurement process, or affect the execution of a contract or deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements before investigators in order to materially impede an investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or acts intended to materially impede the exercise of inspection and audit rights provided for under the Rules.

28.6 Evaluation Report (SPP Rule 45)

After the completion of evaluation process, as described in clauses IB 27 and IB 28, the procuring agency shall announce the results of bid evaluation in the form of report (available on the website of the authority) giving reasons for acceptance and rejection of bid. The report shall be hoisted on website of the authority and that of procuring agencies if its website exists and intimated to all bidders at least seven (7) days prior to the award of contract.

F. AWARD OF CONTRACT

IB.29 Award (SPP Rule 49)

29.1 Subject to clauses IB 30 and IB 34 and provision of the rule: The procuring agency shall 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**,** but not necessarily the lowest submitted price, within the original or extended period of bid validity. Provided that such bidder has been determined to be eligible in accordance with the provisions of clause IB 03 and qualify pursuant to sub-clause IB 29.2.

29.2 Procuring agency, at any stage of the bid evaluation, having credible reasons for or having *prima facie* evidence of any deficiency(ies) in contractor's capacities, may require the contractor to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not for the said project.

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

IB.30 Procuring Agency's Right to reject all Bids or Annul/Cancellation the Bidding Process (SPP Rule 25)

Notwithstanding clause IB 29 and provision of the rule: (1) A procuring agency reserves may cancel the bidding process at any time prior to the acceptance of a bid or proposal; (2) The procuring agency shall incur no liability towards bidders solely by virtue of its invoking sub-rule (1); (3) Intimation of the cancellation of bidding process shall be given promptly to all bidders and bid security shall be returned along with such intimation; (4) The procuring agency shall, upon request by any of the bidders, communicate to such bidder, grounds for cancellation of the bidding process, but is not required to justify such grounds.

IB.31 Notification/Publication of the Award of Contract (SPP Rule 25)

31.1 Prior to expiry of the period of bid validity, including extension, prescribed by the procuring agency, the procuring agency shall notify the successful bidder in writing ("Letter of Acceptance") that his bid has been accepted. This letter shall mention the sum which the procuring agency will pay to the contractor in consideration of the execution and completion of the works by the contractor as prescribed by the contract (hereinafter and in the conditions of contract called the "Contract Price").

31.2 No negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, procuring agency may hold meetings to clarify any item in the bid evaluation report.

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

31.4 Upon furnishing by the successful bidder of a Performance Security and signing of the contract, the procuring agency will promptly notify the name of the successful bidder to all bidders and return their bid securities accordingly.

31.5 Within seven days of the award of contract, procuring agency shall publish on the website of the Authority and on its own website, if such a website exists, the results of the bidding process, identify the bid through procurement identifying numbers, and the following information:

(1) Evaluation Report;
(2) Form of Contract and letter of Award;
(3) Bill of Quantities or Schedule of Requirement.

31.6 Debriefing (SPP Rule 51)

(a) A bidder may ask the procuring agency for reasons for non acceptance of his bid and may request for a debriefing meeting and procuring agency shall give him the reasons for such non acceptance, either in writing or by holding a debriefing meeting with such a bidder.

(b) The requesting bidder shall bear all the costs of attending such a debriefing.

IB.32 Performance Security (SPP Rule 39)

32.1 The successful bidder shall furnish to the procuring agency a Performance Security in the form of pay order or demand draft or bank guarantee, and the amount stipulated in the bidding data 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 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.

32.3 Validity of performance security shall extend at least ninety says beyond the date of completion of contract, or as mentioned in the bidding data to cover defects liability period or maintenance period subject to final acceptance by the procuring agency.

IB.33 Signing of Contract Agreement (SPP Rule 39)

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

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

33.3 A procurement contract shall come into force when the procuring agency requires signs contract, the date on which the signatures of both the procuring agency and the successful bidder are affixed to the written contract. Such affixing of signatures shall take place within the time prescribed in the bidding documents.

Provided that the procuring agency may reduce the maximum time limit for signing of contract, as and when required, and shall be mentioned in the bidding documents.

33.4 Stamp Duty

The formal Agreement between the Procuring Agency and the successful bidder shall be duly stamped at rate of 0.3% of bid price (updated from time to time) stated in Letter of Acceptance.

IB. 34 General Performance of the Bidders

Procuring agency may in case of consistent poor performance of the contractor and his failure to remedy the underperforming contract may take such action as may be deemed appropriate under the circumstances of the case including the rescinding the contract and/or black listing of such contractor and debarring him from participation in future bidding process.

IB.35 Integrity Pact (SPP Rule 89)

The bidder shall sign and stamp the Integrity Pact provided at Appendix-L to the bidding documents for all Provincial/Local Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bidder non-responsive.

IB.36 Instructions not Part of Contract

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

IB.37 Arbitration (SPP Rule 34)

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

BIDDING DATA SHEET

(*This section should be filled in by the procuring agency before issuance of the bidding documents.)* The following specific data for the works to be tendered 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

IB 1.1 Name and address of the procuring agency

Karachi Water & Sewerage Board
Ground Floor Block C
9th Mile Shahrea Faisal
Karachi, Pakistan

IB 1.2. Name of the Project and Summary of the works

NAME OF WORK
SUPPLY AND FIXING OF BOUNDARY PILLARS & WALLS FOR K-IV PROJECT

Summary

Greater Bulk Water supply scheme K-IV Project has been approved by ECNEC. In the Phase-1 of the Scheme 260MGD water will be supplied from Kinjher Lake to Karachi. ROW (124 km long) and utilities areas are required to be demarcated with boundary pillars and wall accordingly as per approved design.

IB 2.1 Name of the Borrower/Source of Financing/Funding Agency

The Employer has arranged funds from Government of Pakistan and Government of Sindh.

Amount and Type of Financing

The Project will be financed by Govt. of Pakistan and Govt. of Sindh in following ratios.

a. GOP 50%
b. GOS 50%

IB 8.1 Time limit for clarification

The Employer, will respond to any request for clarification which he receives earlier than 07 days prior to the deadline for submission of bids.

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

IB 10.1 Bid language

English language will be used.

IB 11.1 Documents Comprising the Bid

Existing text at Para b is deleted.

IB 13 Currencies of Bid and Payment

IB 13.1 Existing text is replaced with following

Bidders to quote entirely in Pak. rupees.

IB 14.1 Period of Bid Validity

Ninety (90) days

IB 15.1 Amount of Bid Security

Each Bidder shall furnish, Bid Security in the shape of Pay-order or Bank Guarantee in the name of Karachi Water & Sewerage Board alongwith Financial Bid equivalent of 2% of Bid amount in Financial Bid envelop.

IB 17.1 Venue, time, and date of the pre-Bid meeting

A Pre-Bid meeting, if required, may be held for which the date, time and place will be provided if agreed by the Employer.

IB 18.4 Number of copies of the Bid to be completed and returned

Following to be added:

The Bidder shall submit Technical Proposal (One Original & One Copy) and Financial Bid (One Original) alongwith Original Bid Document (duly signed and stamped each page) in separate envelop clearly marked as "Technical Proposal" & "Financial Bid".

IB 19.2 (a) Procuring Agency's address for the purpose of bid submission

PROJECT DIRECTOR K-IV PROJECT
Karachi Water & Sewerage Board
Ground Floor Block C, Room No. 7
9th Mile Shahrea Faisal
Karachi, Pakistan

IB 19.2 (b) Name and Identification Number of the Contract

SUPPLY AND FIXING OF BOUNDARY PILLARS & WALLS FOR K-IV PROJECT

IB 20.1 (a) Deadline for submission of bids

29th April 2015 by 02:00 PM

IB 23.1 Venue, time, and date of Bid opening

Opening of Technical Proposals:

Venue : *Office of the Project Director K-IV Project*
Karachi Water & Sewerage Board
Ground Floor Block C, Room No. 7
9th Mile Shahrea Faisal
Karachi, Pakistan

29th April 2015 by 02:30 PM

Following Sub-Clause to be added:

IB 23.5

Day Work:

The rates of Day Work will be quoted by the bidder, however, financial reflect of the same will not be counted in Bid price. Quantities of day work will be evaluated by the Engineer as per requirement of Site. Rates of Day Work may be rationalize (for the items found unreasonable by the Engineer) with the Consultation of Client & Contractor. However, decision of the Engineer in this regard shall be final.

Opening of Financial Proposals:

Venue : *Office of the Project Director K-IV Project*
Karachi Water & Sewerage Board
Ground Floor Block C, Room No. 7
9th Mile Shahrea Faisal
Karachi, Pakistan

Time : *To be announced after Evaluation of Technical Bids*

Date : *To be announced after Evaluation of Technical Bids*

Following sub-clause to be added:

IB 28.7 Evaluation and Comparison of Bids

a. Technical Evaluation

(1) Mandatory Requirements

For consideration of the Technical Proposals submitted by the bidders following are the mandatory requirements:

(a) License of the bidder with Pakistan Engineering Council, valid for the year 2015 in Category C-3 and above and having specialization codes of CE-01 & CE-10.

(b) Bid Security as mentioned in Instruction to Bidders Clause IB-15.

(c) Documentary evidence of the year of establishment of the bidding firm.

(d) Affidavit on stamp paper of Rs.100/- (duly notarize) that the applicant firm is not black listed by any procuring Agency, Govt. or Semi-Govt. Departments, Autonomous bodies, international Organization and any Cantonment Boards in Pakistan.

(e) List of any present or past litigation of the Bidding Firm with any Organization, Govt. Dept. or private concern (**If "No" write "Nil" and submit an affidavit on Stamp Paper duly notarized in this regard**). Litigation statement shall be provided in the following format:-

Name of person/ Entity	Litigation Nature	Name of Project	Litigation date	Litigation result/ In progress concluded	If concluded, mention result

In case of Joint Venture or association, the above data (i to v) for all partners of joint venture or associates shall be submitted.

(f) Certificate of Registration with Sind board of Revenue.

(2) Qualification Requirements

Following documents shall be evaluated (only for those Bidders who clear all mandatory requirements) on the basis of points as detailed below. Financial proposal of only those bidders shall be opened whose Technical Proposal gets 50% in each of the three categories mentioned below and 70% overall qualifying points. The following information shall be presented in an orderly manner and no extra/ additional information is required so as to facilitate efficient evaluation:-

(a) Previous Experience **Max. Point 60**

i. List of overall experience of the firm with details of works in past ten years (10 points for each project of Rs. 300 million or above upto a maximum of 04 projects). Documentary proof (i.e. work order & completion certificate) must be attached. The projects should be presented strictly in the following format and no additional information should be given, Project without work-order and completion certificate of concerned department will not be counted. Max. Point. 40

- Work Order - 05 Points
- Completion Certificates - 05 Points

Sr. No.	Name of Work	Employer/ Client	Amount (Rs.)	Date		Documents enclosed (Y/N)	
				Start	Compl.	W-order	Completion
1							
2							
3							
4							

Max. Point. 10

ii. Experience of similar nature works as prime contractor (05 points for each project of Rs. 300 million or above, in last 10 years upto a maximum of 02 such projects). Documentary proof (i.e. work order & completion certificate) be attached. The projects should be presented strictly in the following format and no additional information should be given:

Sr. No.	Name of Work	Employer/ Client	Amount (Rs.)	Date		Documents enclosed (Y/N)	
				Start	Compl.	W-order	Completion
1							
2							

Max. Point. 10

iii. Regional Experience (Karachi & Sindh) shall be counted for the regional contracts during the last 5 years in which the applicant has worked in the role of Prime Contractor (02 point per project in last 5 years of Rs. 200 million or above)

(b) Proposed Supply and Fixing Schedule, Methodology of Execution, Organization Chart and Personnel. **Max. Point. 20**

i. Proposed Detailed supply and fixing Schedule (inter-relating all the sub-heads of the works) Primavera Schedule- III/PERT — 06

ii. Methodology Execution — 02

iii. Organization Chart — 02

iv. Personnel — 04

(i) Proposed Project Manager - Professional Engineer registered BE (Civil) in PEC with at-least 15 years overall experience and 10 years experience in related works of integrated infrastructure development (detailed CV alongwith PEC registration, to be submitted) (max 02 Points)

- BE (Civil) registered with PEC 15 years overall experience and 10 years related experience. (Max. Point 02)
- BE (Civil) registered with PEC 10 years overall experience and 5 years related experience. (Max. Point 01)

(ii) Employed Engineers with at-least 05 years of experience with their qualification with documentary proof and PEC Registration Number (01 Point for each Engineer Max 02 Points)

v. Machinery/Equipment — Max. Point. 06

List of machinery and equipment with the documentary proof of ownership.

- Jack Hammer 01 Point for each (max 02 Points)
- Excavator 01 Point for each (max 02 Points)
- Dumper 01 Point
- Loader 01 Point

(c) Documentary evidence of Financial Soundness **Max. Point 20**

i. Comprehensive Audited Reports from Chartered Accountant of the firm for last 03 years. (01 Point for each year). — Max. Point. 03

ii. Banker's Certificate of financial soundness issued in last 12 months. Max. Point. 01

iii. Bank Statement for last 12 months. Max. Point. 01

iv. Average Annual Turnover of last 05 years (to be ascertained from Audited Reports or Income Tax return dully accepted by CBR). Max. Point. 15

- Less than Rs. 100 M - 0 Points
- Rs. 100 M to Rs.150 M - 05 Points
- Rs. 150 M to Rs. 200 M - 10 Points
- Rs. 200 M & above - 15 Points

Total Points 100

Note:
"KW & SB" will verify the validity of submitted documents from the respective Employers / Clients / Banks/ Auditors, etc. and if it is found out that any fake / misleading / un-verifiable document or information has been provided by the Bidder then appropriate action regarding disqualification or black-listing of the bidder will be taken as per relevant SPPRA Rules.

b. Commercial Evaluation

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

c. Evaluated Bid Price

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

(1) Making any correction for errors pursuant to Sub-Clause 27.2 hereof.

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

IB 32.1 Standard form and amount of Performance Security acceptable to the procuring agency

Amount of Performance Security shall be as per Clause 10.1 of Part II-Conditions of Particulars Application.

IB 32.3 Stamp duty

0.3% of the bid cost will be paid by successful bidder as stamp duty or as per prevailing law of provincial and federal government.

FB-1

FORM OF BID

Bid Reference No. _____

To,

PROJECT DIRECTOR K-IV PROJECT
Karachi Water & Sewerage Board
Ground Floor Block C
9th Mile Shahrae Faisal
Karachi.

SUBJECT: SUPPLY AND FIXING OF BOUNDARY PILLARS & WALLS FOR K-IV PROJECT

Gentleman,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Specifications, Drawings and Bill of Quantities and Addenda Nos. _____for the execution of the above-named Works, we, the undersigned, offer to execute and complete such Works and remedy any defects therein in conformity with the Conditions of Contract. Specifications, Drawings, Bill of Quantities and Addenda for the sum of Rs._____ (Rupees _____) or such other sum as may be ascertained in accordance with the said conditions.

2. We/ I understand that all the Appendices attached hereto form part of this Bid.

3. As security for due performance of the undertakings and obligations of this Bid, we/ I submit herewith a Bid Security in the amount of Rupees _____ (Rs. _____) drawn in your favour or made payable to you and valid for a period of _____days beginning from the date Bids are opened.

4. We/ I 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.

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

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

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

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

FB-2

9. We undertake, if our/my bid is accepted, to execute the Performance Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.

10. We confirm, if our bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the procuring agency. *(Please delete this in case of Bid form a single bidder)*

Dated this _____day of_____2015

Signature: _____

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

_____

(Name of Bidder in Block Capitals)
(Seal)

Address:_____

_____

_____

Witness:

Signature: _____

Name: _____

Address:_____

_____

Occupation_____

BA-1
APPENDIX - A TO BID

SPECIAL STIPULATIONS

		Clause No.	
1.	Engineer representing Consulting Firm hired by the procuring agency to issue variation in case of emergency	3.1	Up to 2% of the contract price stated in the Letter of Acceptance.
2.	Amount of Performance Security	4.2	The Contractor will deposit 5% of Performance Security in the shape of Bank Guarantee at the time of issuance of Letter of Acceptance.
3.	Time for Furnishing Programme	8.3	Within 14 days from the date of receipt of Letter of Acceptance.
4.	Minimum amount of Third Party Insurance	18.3	Rupees one million (Rs. 1,000,000) per occurrence with number of occurrences unlimited.
5.	Time for Commencement	8.1	Within fourteen (14) days after signing of Contract Agreement.
6.	Time for Completion	8.2 & 10.2	12 Months from the date of receipt of Engineer's Notice to Commence
7.	Amount of Liquidity Damages/Delay Damages/Penalties	8.7	0.1% Damages per day but total amount will not be more than 10% of contract Price
8.	Defects Liability Period	11.1	364 days from the effective date of Taking Over Certificate.
9.	Percentage of Retention Money	14.2	10% of the amount of Interim /Running Payment Certificate.
10.	Limit of Retention Money	14.2	5% of Contract Price stated in the Letter of Acceptance.
11.	Minimum amount of Interim/ Running Payment Certificates	14.2	Rs. 20 M
12.	Time of Payment from delivery of Engineer's Interim/Running Payment Certificate to the procuring agency	14.7	30 days
13.	Mobilization Advance	14.2	10% of Contract Price stated in the Letter of Acceptance.

BB-1
APPENDIX-B TO BID

FOREIGN CURRENCY REQUIREMENTS

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

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

3. Table of Exchange Rates

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

BC-1
Appendix-C To Bid

PRICE ADJUSTMENT UNDER CLAUSE 70/13.8 OF CONDITIONS OF CONTRACT

A. Weight ages or coefficients are used for price adjustment

The source of indices and the weight ages or coefficients for use in the adjustment formula under Clause 13.8 of GCC shall be as follows:

Cost Element	Description	Weightages	Applicable index
1	**2**	**3**	**4**
(i)	Fixed Portion	0.41	
(ii)	Local Labour	0.08	Government of Pakistan (GoP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
(iii)	Cement	0.20	" " "
(iv)	Reinforcing Steel	0.20	" " "
(v)	High Speed Diesel (HSD)	0.11	As per the rates fixed by Oil & Gas Regulatory Authority (OGRA)
	Total	**1.00**	

Notes:

1) Indices for "(ii)" to "(iv)" are taken from the Government of Pakistan Federal Bureau of Statistics, Monthly Statistical Bulletin and (v) is taken from the rates fixed by Oil & Gas Regulatory Authority. The base cost indices or prices shall be those applying 15 days prior to the latest day for submission of bids. Current indices or prices shall be those applying 28 days prior to the last day of the billing period.

2) Any fluctuation in the indices or prices of materials other than those given above shall not be subject to adjustment of the Contract Price.

3) Fixed portion shown here is for typical road project, procuring agency to determine the weight age of Fixed Portion considering only those cost elements having cost impact of seven (7) percent or more on his specific project.

Appendix-D to Bid

BILL OF QUANTITIES

A. Preamble

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

2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract (in case of item not mentioned in Bill of Quantities).

3. The rates and prices entered in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the contract include all costs of contractor's plant, labour, supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the contract. Furthermore all duties, taxes and other levies payable by the contractor under the contract, or for any other cause, as on the date 14 days prior to deadline for submission of Bids in case of ICB/NCB respectively, shall be included in the rates and prices and the total bid price submitted by the bidder.

4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the contractor will have failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities and shall not be paid separately.

5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the works.

6. General directions and description of work and materials are not necessarily repeated nor summarised in the Bill of Quantities. References to the relevant sections of the bidding documents shall be made before entering prices against each item in the priced Bill of Quantities.

7. Provisional sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with sub-clause 13.5 of Part I, General Conditions of Contract.

BILL OF QUANTITIES

GRAND SUMMARY

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Name of Work	Amount (Rs.)
1	Bill No. - 1 (Preliminary and General Items)	
2	Bill No. - 2 (Supply & fixing of Boundary Pillars)	
3	Bill No. - 3 (Supply & fixing of Boundary Wall) (Area-1)	
4	Bill No. - 4 (Supply & fixing of Boundary Wall) (Area-2)	
5	Bill No. - 5 (Construction of Boundary Wall, Columns & Plinth Beam) (Area-1 & 2)	
Provisional sum not to be included in the Bid Price for evaluation. For utilization of this amount Rates indicated in the Day work will be utilized.		10,000,000
	TOTAL RS.	

(Rupees_____)
In Words

_____ _____
CONTRACTOR **CLIENT**

BILL OF QUANTITIES

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Particulars	Qty.	Unit	Unit Rate		Amount (Rs.)
				In Figure	In Words	
1 (A) - Preliminary and General Items Provided One Time						
	All Mandatory condition vehicles must be brand new, latest model, comprehensively insured with installed tracking facility and registered in the name of Employer. ***KW&SB will pay the prices of below items as mentioned in the Client Rates of this BOQ. The payment shall be processed once the items have been provided and registered in name of the Employer / Client applicable Contractor will be liable to deliver these items as per Specification - Special Provision and any price variation (+ or -) shall be assessed by the Contractor and any financial impact shall be considered as incorporated in his overall rates / contract price.***					
Site Office						
1	Construction of 3000 Sft RCC Structure for Site Office comprising deodar wood solid doors, aluminum windows, white marble tiles of 1/2" thickness with chemical polish in floors, imported electrical items, sanitary fittings from Sonix / Master or equivalent with wash basin & WC of Porta / IFO or equivalent complete including Air conditioners etc, as per attached drawings, direction & approval of the Engineer, with and including commercial kitchen, RCC Underground tank of 3000 gallons capacity & Overhead tank of required capacity complete as per drawings with damp proof cover (DPC) for plinth protection including screeding on roof surface of the Site Office as per attached drawing. All of 1st class approved specifications alongwith all allied facilities and utilities as per design provided by Temporary site office upto 1,000 sft. will be provided till construction of above permanent site office as per followings; Fully furnished office of minimum 1,000 sft. accommodation having sitting arrangement with Furniture, Air conditioners, Fridge as per requirement & direction of the Engineer, Electrification Works with proper lightening & power points to be provided as per the approval of the Engineer. Toilet containing WCs, Wash Basin, Shower tray etc. with all required accessories is to be provided in the temporary Site Office. The Contractor shall maintain this office and all charges in respects of providing and maintaining not limited to the utilities like electricity, water supply & Sewerage, janitorial services, tea making items etc., complete.	1	Job.			
Vehicles (Detailed Specifications as per Specification - Special Provision)						
2	Toyota Hiace Van - latest year Model with AC Including registration cost + comprehensive Insurance + Tax for Contract duration + All Applicable Taxes.	1	No.			
3	Suzuki Jimny Jeep - latest year Model with AC including registration cost + comprehensive Insurance + Tax for Contract duration + All Applicable Taxes.	3	Nos.			

Sr. No.	Particulars	Qty.	Unit	Unit Rate		Amount (Rs.)
				In Figure	In Words	
4	Toyota Hilux 4X4 Double Cabin Vigo Champ (V), 2494CC - latest year Model with AC including registration cost + comprehensive Insurance + Tax for Contract duration + All Applicable Taxes. The above vehicles must be brand new, latest model, comprehensively insured, installed tracking facility. The Vehicles are registered in the name of Employer.	1	No.			
Computer and Accessories (Details as per Specification - Special Provisions)						
5	Desktop Computers - Ultrathin Core i7 HP, Dell or IBM	4	Nos.			
6	Photocopier RICOH MP-2001 SP with Network Printer/ Scanner	2	Nos.			
7	HP LaserJet Color Printer (A-3 Size)	2	Nos.			
8	HP LaserJet (B/W) Printer (A-4 Size)	2	Nos.			
9	Digital Camera NIKON Coolpix or equivalent	4	Nos.			
10	Digital Camera as per specifications Canon EOS 60B Lens 18-135 IS with memory card SD-32 GB SANDISK with still Camera Bag or equivalent.	1	Nos.			
11	Book Binding Machine	2	Nos.			
12	Heavy Duty Staplers Machine	2	Nos.			
13	Heavy Duty Punching Machine	1	No.			
14	Multimedia OPTOMA S316 Projector, PC-3D Ready, RS-232 Port with soft carry case or equivalent wall mounted with 12x8 ft Screen.	1	No.			
1 (B) - Preliminary and General Items Provided Per Month						
Maintenance of Site Office						
15	Furniture / A.C / Generator along with Office Stationary for office requirement and furniture for constructed site office and temporary site office.	12	Months			
16	Helper / Messenger (3 Nos.)	12	Months			
17	Tea Boy (including tea making items) (3 Nos.)	12	Months			
18	Security Guard (3 Nos.)	12	Months			
19	Drivers for 5 x vehicles (Sr # 2, 3 & 4)	12	Months			
POL (to be paid by the Contractor on Monthly Basis)						
20	Fuel for 5 x Vehicle (Sr # 2, 3 & 4) (500 Ltrs Per Month for each vehicle) to be paid by the Contractor on monthly basis.	30,000	Ltrs			
Maintenance Charges (to be paid by the Contractor on Monthly Basis)						
21	For 5 x Vehicles (Sr # 2, 3 & 4) Maintenance charges Rs. 25,000/- per month (Rs. 5,000/- per month for each Vehicle).	12	Month			

Sr. No.	Particulars	Qty.	Unit	Unit Rate		Amount (Rs.)
				In Figure	In Words	
Mobile Card (to be paid by the Contractor on Monthly Basis)						
22	Mobile Card pertaining to mobile telephone use in shape of Prepaid Mobile Cards.	12	Month			
Stationary (to be paid by the Contractor on Monthly Basis)						
23	Providing stationery consumable items like pen, pencils, papers, binder cards, plastics, staples, etc.	12	Month			
					Total Amount Bill No.1 Rs.	

(Rupees _____)

In Words

_____ _____

CONTRACTOR **CLIENT**

BILL OF QUANTITIES

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Particulars	Qty.	Unit	Rate		Amount (Rs.)
				In Figure	In Words	
2 -	**Supply & fixing of Boundary Pillars**					
1	Procurement of pre-feb Boundary Pillars as per approved drawings and specifications	3,067	Nos.			
2	Installation of Pre-feb Boundary Pillars as per approved drawings and specifications	3,067	Nos.			
				Total Amount Bill No.2 Rs.		

(Rupees _____)
In Words

_____ _____
CONTRACTOR **CLIENT**

BILL OF QUANTITIES

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Particulars	Qty.	Unit	Rate		Amount (Rs.)
				In Figure	In Words	
3 -	**Supply & fixing of Boundary Wall (Area - 1)**					
1	Procurement of Pre-feb Boundary Wall Columns as per approved drawings and specifications	1,833	Nos.			
2	Installation of Pre-feb Boundary Walls Columns as per approved drawings and specifications	1,833	Nos.			
3	Procurement of Pre-feb Boundary Wall Panels as per approved drawings and specifications	2,035	Nos.			
4	Installation of Pre-feb Boundary Walls Panels as per approved drawings and specifications	2,035	Nos.			
				Total Amount Bill No.3 Rs.		

(Rupees _____)
In Words

_____ _____
CONTRACTOR **CLIENT**

BILL OF QUANTITIES

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Particulars	Qty.	Unit	Rate		Amount (Rs.)
				In Figure	In Words	
4 -	**Supply & fixing of Boundary Wall (Area - 2)**					
1	Procurement of Pre-feb Boundary Wall Columns as per approved drawings and specifications	1,702	Nos.			
2	Installation of Pre-feb Boundary Walls Columns as per approved drawings and specifications	1,702	Nos.			
3	Procurement of Pre-feb Boundary Wall Panels as per approved drawings and specifications	1,889	Nos.			
4	Installation of Pre-feb Boundary Walls Panels as per approved drawings and specifications	1,889	Nos.			
				Total Amount Bill No.4 Rs.		

(Rupees _____)

In Words

_____ _____

CONTRACTOR **CLIENT**

BILL OF QUANTITIES

Name of Project : Greater Karachi Bulk Water Supply Scheme K-IV Phase-I, 260 MGD From Kinjhar Lake to Karachi
Name of Work : Supply & Installation of Boundary Pillar & Wall for K-IV Project

Sr. No.	Particulars	Qty.	Unit	Rate		Amount (Rs.)
				In Figure	In Words	
5 -	**Construction of Boundary Wall (Area 1 & 2)**					
Note:	***All Cement Concrete in contact with earth to be carried out with S.R. Cement***					
1.	***Fairface steel formwork is to be used in all the items of R.C.C***					
1	Excavation for foundation, trenches, drains and other structure works in all kinds of soil (including but not limited to ordinary soil, gravel, morum, etc. but excluding rock) and backfilling the suitable excavated material in foundation, plinth, under floor including breaking clods, watering, consolidation by ramming in layers not exceeding 9 inches (225mm) compacted, dressing and disposal of unsuitable surplus excavated stuff to designated area directed by the Engineer, including all lead and lift.	37,480	Cft.			
2	Excavation for foundation, trenches, drains and other structure works in all kinds of rocks including hard rocks by manual or any other mechanical means including, stacking of materials along side of trench, using suitable materials for backfilling in foundation, trenches, dressing, watering, consolidation by ramming in layers not exceeding 9 inches (225mm) compacted, and disposal of surplus excavated stuff to designated area directed by the Engineer, including all lead and lift.	14,992	Cft.			
3	Providing and laying of CC 1:4:8 using crushed or broken stone graded as specified. (Minimum Compressive cylindrical strength 1000 psi. @ 28 days)	3,122	Cft.			
4	Providing and laying of CC Type 'C' using crushed or broken stone as specified in walls, sills, copings, channels, drains, steps, string courses, corbels, pier caps, hinge stone, bed plates etc, incl from work and fair faces to exposed surfaces. (minimum Compressive cylindrical strength 2000 Psi @ 28 days).	24,537	Cft.			
5	Providing and Laying Reinforced Cement Concrete, fair faced i/c erection and removal of form work as specified but excluding the cost of reinforcement which is to be paid separately, in beams of any section with and including proper vibrating and curing etc complete as per drawing & specification. (Minimum Compressive cylindrical strength 3000 psi @ 28 days but not leaner than 1:2:4).					
a)	For Foundation	7,220	Cft.			
b)	For Plinth Beams.	24,537	Cft.			
c)	For Column.	6,431	Cft.			

Sr. No.	Particulars	Qty.	Unit	Rate		Amount (Rs.)
				In Figure	In Words	
6	Providing and laying uncoursed rubble masonry in cement mortar 1:4 in foundation, plinth as basement as per drawings & specifications including scaffolding, curing etc. complete.	3,683	Cft.			
7	Supply and fix , RCC pipe 230mm bore, laid & jointed with spigot socket or collars, as specified and shown in the drawings.	492	Rft.			
8	Providing & fixing 4" Dia uPVC Pipe class "B" Pipe for Drain Sleeves / Outlet RCC Plinth Beam/Wall, as specified and shown in the drawings.	6,736	Rft.			
9	Supply and fix bars round, using deformed bars Grade-60, incl cutting, bending, binding, wastage & such over laps not shown on drawings and placing reinforcement in position on M.S or CC Precast 1:2:4 chairs of required crushing strength.	146,163	Kg.			
10	Providing & laying Stone Rip Rap as per drawings, specifications and approval of the Engineer.	2,401	Cft.			
11	Providing & applying two coats of special industrial bitumen (60/70 grade) at the rate of 1.0 Kg/Sqm. per coat, complete as per drawings, specification & direction of the Engineer.	36,666	Sft.			
12	Providing and Laying plum cement concrete Ratio 1:3:6, fair faced i/c erection and removal of form work as specified, in foundation of any thickness and of any height with and including curing etc complete as per drawing & specification.	623	Cft.			
				Total Amount Bill No.5 Rs.		

(Rupees _____)

In Words

_____ _____

CONTRACTOR **CLIENT**

BD-8
Appendix-D to Bid

BILL OF QUANTITIES

C. Daywork Schedule

General

1. Reference is made to Sub-Clause 52.4 of the General Conditions of Contract Part-I. Work shall not be executed on a day work basis except by written order of the Engineer. Bidders shall enter basic rates for Daywork items in the Schedules, which rates shall apply to any quantity of Daywork ordered by the Engineer. Nominal quantities have been indicated against each item of Daywork, and the extended total for Daywork shall be carried forward to the Bid Price.

Daywork Labour

2. In calculating payments due to the Contractor for the execution of Daywork, the actual time of classes of labour directly doing the Daywork ordered by the Engineer and for which they are competent to perform will be measured excluding meal breaks and rest periods. The time of gangers (charge hands) actually doing work with the gang will also be measured but not the time of foreman or other supervisory personnel.

3. The Contractor shall be entitled to payment in respect of the total time that labour is employed on Daywork, calculated at the basic rates entered by him in the Schedule of Daywork Rates for labour together with an additional percentage, payment on basic rates representing the Contractor's profit, overheads, etc., as described below:

    a) the basic rates for labour shall cover all direct costs to the Contractor, including (but not limited to) the amount of wages paid to such labour, transportation time, overtime, subsistence allowances and any sums paid to or on behalf of such labour for social benefits in accordance with Pakistan law. The basic rates will be payable in local currency only; and

    b) the additional percentage payment to be quoted by the Bidder and applied to costs incurred under (a) above shall be deemed to cover the Contractor's profit, overheads, superintendence, liabilities and insurances and allowances to labour timekeeping and clerical and office work; the use of consumable stores, water, lighting and power; the use and repair of stagings, scaffolding, workshops and stores, portable power tools, manual plant and tools; supervision by the Contractor's staff, foremen and other supervisory personnel; and charges incidental to the foregoing.

BD-9
Appendix-D to Bid

SCHEDULE OF DAYWORK RATES

I. Labour

Item No.	Description	Unit	Nominal Quantity	Rate (Rs) in Figure	Rate (Rs) in Words	Extended Amount (Rs.)
1	**2**	**3**	**4**	**5**	**6**	**7**
1	Electrician	P.Day				
2	Labourer (unskilled)	P.Day				
3	Plumber	P.Day				
4	Mason (First class)	P.Day				
5	Carpenter	P.Day				
6	Steel work	P.Day				
7	Diesel (HSD)	Ltr.				
8	Petrol super	Ltr.				
9	Dewatering Pump 3" dia with POL	P.Day				
10	Dewatering Pump 4" dia with POL	P.Day				
11	Diesel Generator with POL	P.Day				
12	Generator Operator	P.Day				

Bidder's Signature:_____

Stamp:_____

BD-10
Appendix-D to Bid

Daywork Material

4. The Contractor shall be entitled to payment in respect of materials used for Daywork (except for materials for which the cost is included in the percentage addition to labour costs as detailed heretofore), at the basic rates entered by him in the Schedule of Daywork Rates for materials together with an additional percentage payment on the basic rates to cover overhead charges and profit, as follows:

   a) the basic rates for materials shall be calculated on the basis of the invoiced price, freight, insurance, handling expenses, damage, losses, etc., and shall provide for delivery to store for stockpiling at the site. The basic rates shall be stated in local currency but payment will be made in the currency or currencies expended upon presentation of supporting documentation;

   b) the additional percentage payment shall be quoted by the Bidder and applied to the equivalent local currency payments made under Sub-Para(a) above; and

   c) the cost of hauling materials used on work ordered to be carried out as Daywork from the store or stockpile on the site to the place where it is to be used will be paid in accordance with the terms for Labour and Constructional Plant in this Schedule.

BD-11
Appendix-D to Bid

SCHEDULE OF DAYWORK RATES

II. Materials

Item No.	Description	Unit	Nominal Quantity	Rate (Rs) in Figure	Rate (Rs) in Words)	Extended Amount (Rs.)
1	**2**	**3**	**4**	**5**	**6**	**7**
1	Bitumen 80/100	M.Ton	-		-	
2	Bitumen 80/100	M.Ton	-		-	
3	Cement, ordinary Portland or equivalent in bags	M.Ton	-		-	
4	S.R Cement or equivalent in bags	M.Ton	-		-	
5	Deformed bar all diameter to Grad-60 or equivalent	M.Ton	-		-	
6	Mild Steel (Tor) reinforcing bar all diameter.	M.Ton	-		-	
7	Fine aggregate for concrete as specified in sand.	Cu.M	-		-	
8	Crushed aggregate for concrete as specified in ½" & ¾".	Cu.M	-		-	
9	C.C Block 8"x6"x12"	Each.	-		-	

Bidder's Signature:_____

Stamp:_____

BD-12
Appendix-D to Bid

Daywork Constructional Plant

5. The Contractor shall be entitled to payments in respect of constructional plant already on Site and employed on Daywork at the basic rental rates entered by him in the Schedule of Daywork Rates for constructional plant. The said rates shall be deemed to include complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead, profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants will be paid for separately as described under the section on Daywork Labour.

6. In calculating the payment due to the Contractor for constructional plant employed on Daywork, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Engineer, the travelling time from the part of the Site where the constructional plant was located when ordered by the Engineer to be employed on Daywork and the time for return journey thereto shall be included for payment.

7. The basic rental rates for constructional plant employed on Daywork shall be stated in Pakistani Rupees.

BD-13
Appendix-D to Bid

SCHEDULE OF DAYWORK RATES

III. Constructional Plant

Item No.	Description	Unit	Nominal Quantity	Rate (Rs.) in Figure	Rate Rs.) in Words	Extended Amount (Rs.)
1	**2**	**3**	**4**		**5**	**6**
1	Excavator ,Truck type 100 HP i/c fuel & operator :	P.Hrs.				
2	Concrete statix mixer ¼ cum.y i/c fuel.	P.Hrs.				
3	Front end loader (3 cum.) i/c fuel & operator.	P.Hrs				
4	Water tanker 1200 ltr.	P.Hrs				
5	Tractor with ripper-82 HP	P.Hrs				
6	Grader – 140 HP	P.Hrs				
7	Dumper 18 Ton	P.Hrs				
8	Jack Hamer	P.Hrs				
9	Tractor Trolly (5 cum.)	P.Hrs				

Bidder's Signature:_____

Stamp:_____

BD-14
Appendix-D to Bid

DAYWORK

Summary (Daywork)

		Amount (Rs.)
(I)	Total for Daywork: Labour	
(II)	Total for Daywork : Materials	
(III)	Total for Daywork: Constructional Plant	
	Total for Daywork (Carried forward to Summary Page of Bill of Quantities)	

BE-1
Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

Pursuant to Sub-Clause 7.2 of the Particular Conditions of Contract, the Works shall be completed on or before the date stated in Contract Data. The Bidder shall provide the Construction Schedule in the bar chart and Primavera (level III) Programme Evaluation Review Technique (PERT) showing the sequence of work items by which he proposes to complete the work of the entire Contract. The programme should indicate the sequence of work items and the period of time during which he proposes to complete the Works including the activities like designing, schedule of submittal of drawings, ordering and procurement of materials, manufacturing, delivering, construction of civil works, erection, testing and commissioning of Works to be supplied under the Contract.

A separate Bar Chart Showing monthly percentage progress showing major activities related to Cost of Project as per Specimen below be attached which will be considered as “Scheduled Progress” throughout the currency of Contract unless revised with the approval of Client.

S/No.	Activity	Months										
		1	2	3	4	6	7	8	9	10	11	12
	ABC											
	XYZ											
Percentage Scheduled Progress		5%	15%	-	-	-	-	-	-	-	-	100%

BF-1
Appendix-F to Bid

METHOD OF PERFORMING THE WORK

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

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

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

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

BG-1
Appendix-G to Bid

LIST OF MAJOR EQUIPMENT - RELATED ITEMS

[The bidder will provide on Sheet 2 of this Appendix a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the works. 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.].

BG-2
Appendix-G to Bid

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						

BH-1
Appendix-H to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

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

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

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

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

2. Provision of Services.

    a) Power (expected power load, etc.).

    b) Water (required amount and system proposed).

    c) Sanitation (sewage disposal system, etc.).

3. Construction of Facilities

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

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

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

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

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

BI-1
Appendix-I to Bid

LIST OF SUBCONTRACTORS

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

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

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

BJ-1
Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS (SAMPLE)

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

Month	**Amounts (in Millions)**
1	**2**
1st Month	
2nd Month	
3rd Month	
4th Month	
5th Month	
6th Month	

Bid Price	

BK-1
Appendix-K to Bid

ORGANIZATION CHART FOR THE SUPERVISORY STAFF AND LABOUR

BL-1
Appendix-L to Bid

(INTEGRITY PACT)

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

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

…… [name of 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 Sindh (GoS) or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoS) 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, from Procuring Agency (PA) except that which has been expressly declared pursuant hereto.

[name of Contractor] accepts full responsibility and strict liability 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 PA 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 PA under any law, contract or other instrument, be voidable at the option of PA.

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

……
[Procuring Agency] [Contractor]

BID SECURITY

Security Executed on _____
(Date)

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

Name of Principal (Bidder) with Address _____

_____

Penal Sum of Security Rupees _____ (Rs. _____)

Bid Reference No. _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the bid and at the request of the said Principal (Bidder) we, the Surety above named, are held and firmly bound unto _____ (hereinafter called the 'Procuring Agency') in the sum stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Bidder has submitted the accompanying Bid dated _____ for Bid No. _____ for_____(Particulars of Bid) to the said Procuring Agency; and

WHEREAS, the Procuring Agency 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 procuring agency, conditioned as under:

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

(2) that the bid security of unsuccessful bidders will be returned by the procuring agency 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 procuring agency pursuant to Clause 15.6 of the Instruction to bidders for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefore, on the prescribed form presented to him for signature enter into a formal Contract with the said procuring agency 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 procuring agency for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

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

PROVIDED ALSO THAT the procuring agency 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 procuring agency forthwith and without any reference to the Principal (Bidder) or any other person.

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

SURETY (Bank)

WITNESS:

Signature _____

1. _____

Name _____

_____

Title _____

Corporate Secretary (Seal)

Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

FORM OF PERFORMANCE SECURITY

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Procuring Agency]

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

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the procuring agency) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Procuring Agency, 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 Procuring Agency's above said Letter of Acceptance for _____ (Name of Contract) for the _____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Procuring Agency, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 49, Defects Liability, of Conditions of Contract are fulfilled.

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

We, _____ (the Guarantor), waiving all objections and defences under the Contract, do hereby irrevocably and independently guarantee to pay to the procuring agency without delay upon the procuring agency's first written demand without cavil or arguments and without requiring the procuring agency to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the procuring agency'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 procuring agency’s designated Bank & Account Number.

PROVIDED ALSO THAT the Procuring Agency 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 Procuring Agency forthwith and without any reference to the Principal or any other person.

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

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name _____
Corporate Secretary (Seal)

Title _____

2. _____

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

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of_____(month) 2015 between _____ (hereafter called the "Procuring Agency") of the one part and _____ (hereafter called the "Contractor") of the other part.

WHEREAS the Procuring Agency is desirous that certain Supply and Fixing , viz _____ should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Supply and Fixing 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 / Clarification as agreed or otherwise, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Contract, viz::

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

3. In consideration of the payments to be made by the Procuring Agency to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Procuring Agency to execute and complete the Supply and Fixing and remedy defects therein in conformity and in all respects with the provisions of the Contract.

4. The Procuring Agency hereby covenants to pay the Contractor, in consideration of the execution and completion of the Supply and Fixing as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor Signature of Procuring Agency

_____ _____

(Seal) (Seal)

Signed, Sealed and Delivered in the presence of:

Witness: Witness:

_____ _____

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

MG-1

MOBILIZATION ADVANCE GUARANTEE

Guarantee No._____ Date _____

WHEREAS _____(hereinafter called the 'Procuring Agency') has entered into a Contract for _____ (Particulars of Contract) with _____ (hereinafter called the "Contractor').

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

AND WHEREAS, the Procuring Agency 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 Procuring Agency agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

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

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

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

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

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

GUARANTOR

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

WITNESS

1. _____

_____
Corporate Secretary (Seal)

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

INDENTURE FOR SECURED ADVANCES

(For use in cases in which is contract is for finished work and the contractor has entered into an agreement for the execution of a certain specified quantity of work in a given time)

This INDENTURE made the …… day of .....…… 2015 BETWEEN (hereinafter called "the Contractor" which expression shall where the context so admits or implied be deemed to include his heirs, executors, administrators and assigns) of the one part and THE GOVERNOR OF SINDH (hereinafter called "the Government" of the other part).

WHEREAS by an agreement, dated (hereinafter called the said agreement, the contractor has agreed to perform the under-mentioned Supply and Fixing (hereinafter referred to as the said work):-

AND WHEREAS the contractor has applied to the …….. ……..……..for an advance to him of Rupees ……..…….
(Rs. .....) on the security of materials absolutely belonging to him and brought by him to the site of the said Supply and Fixing the subject of the said agreement for use in the said Supply and Fixing as he has undertaken to execute at rates fixed for the finished work (inclusive of the cost of materials and labour and other charge) AND WHEREAS the Government has agreed to advance to the Contractor the sum of Rupees, (Rs. .....) on the security of materials the quantities and other particulars of which are detailed in Part II of Running Account Bill (B). the said Supply and Fixing signed by the contractor.

Fin R.Form.l7.A

On …… and on such covenants and conditions as are hereinafter contained and the Government has reserved to itself the option of marking any further advance or advances on the security of other materials brought by the Contractor to the site of the said Supply and Fixing .

NOW THIS INDENTURE WTTNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees…….. (Rs. ……..) on or before the execution of these presents paid to the Contractor by the Government (the receipt whereof the Contractor doth hereby acknowledge) and of such further advances (if any) as may be made to him as aforesaid (all of which advances are hereinafter collectively referred to as the said amount) the Contractor doth hereby assign unto the Government the said materials by way of security for the said amount.

And doth hereby covenant and agree with the Government and declare ay follow:-

(1) That the said sum of Rupees. …….. RS. ……) so advanced by the Government to the Contractor as aforesaid and all or any further sum or sums which may be advanced as aforesaid shall be employed by the contractor in or towards expending the execution of the said Supply and Fixing and for no other purpose whatsoever.

(2) That the materials detailed in the said Running Account Bill (B) which have been offered to and accepted by (he Government as security for the said amount are absolutely by the Contractors own property free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind and the contractor hereby agrees, at all times, to indemnify and save harmless the Government against all claims whatsoever to any materials in respect of which an advance has been made to him as aforesaid.

(3) That the said materials detailed in the said Running Account Bill (B) and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereinafter called the said materials) shall be used by the Contractor solely in *the* execution of the said Supply and Fixing in accordance with the directions of the Divisional Officer (hereinafter called the Divisional Officer) and in the terms of the said agreement.

(4) That the Contractor shall make at his own cost all necessary and adequate arrangement for the proper watch, safe custody and protection against all risks of the said material and that until used in Supply and Fixing as aforesaid the said materials shall remain at the site of the said Supply and Fixing in the Contractor's custody and at his own risk and on his own responsibility and shall at all times be open to inspection by (he Divisional Officer or any officer authorized by him. In the event of the said materials of any part (hereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof Contractor will forthwith replace the same with other materials of like qualify or repair and make good the same as required by the Divisional Officer and the materials so brought to replace the said materials so repaired and made good shall also be considered as security for the said amount.

(5) Hurt the said materials shall not on any account be removed from the site of the said Supply and Fixing except with the written permission of the Divisional Officer or an officer authorized by him in that behalf

(6) That the said amount shall be payable in full when or before the Contractor receives payment, from the Government of the price payable to him for the said Supply and Fixing under the terms and provisions of the said agreement PROVIDED THAT if any intermediate payments are made to the contractor on account of work done then on the occasion of each such payment the Government will be at liberty to make a recovery from the Contractors Bill for such payment by deducting there from in the value of the said materials (actually used in the Supply and Fixing and in respect of which recovery has not been made previously) the value for this purpose being determined in respect of each description of material at (the rates at which the amount of the advances made under these presents were calculated).

(7) at if the Contractor shall at any time make any default in the performance or observation in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing to the Government shall immediately on the happening of such default be repayable by the Contractor to the Government together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date or repayment and with all costs, charges, damages and expenses incurred by the Government in or for the recovery thereof or the enforcement of this security or otherwise by reason of (the default of the Contractor and any moneys so becoming due and payable shall constitute a debt due from the Contractor to the Government and the Contractor hereby covenants and agrees with the Government to repay and the same respectively to it accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Government of the said sum of Rupees ..... (Rs. .....) and any further sum or sums which may be advanced as aforesaid and all costs charges damages and expenses payable under these present PROVIDED ALWAYS and it is hereby agreed and declared that not, withstanding anything in the said agreement and without prejudice to the powers contained therein if and whether the covenant for payment and repayment hereinbefore contained shall become enforceable and the money owing shall not be paid to accordingly.

Once there with the Government may at any time thereafter adopt all or any of following courses as it may deem best ;-

(a) Seize and utilize the said materials or any part thereof in the completion of the said Supply and Fixing on behalf of the Contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractor with the actual cost of effecting such completion the amount due in respect of advances under these presents and crediting the Contractor with the value of work done as he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the Contractor he is to pay the same to the Government on demand.

(b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable to the Government under these presents and pay over the surplus (if any) to the Contractor.

(c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except as is expressly provided by the presents interest on the said advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the Supply and Fixing or effect of these presents the settlement of which has not been hereinbefore expressly provided for the same shall be referred to the Superintending Engineer/Executive District Officer/Officer one grade higher to officer signed the agreement Circle whose…… decision shall be final and the provisions of the Arbitration Act 1940 for the time being in force so far as they are applicable shall apply to any such reference.

Singed, sealed and delivered by*
In the presence of

SEAL

1st witness
2nd witness

Singed, sealed and delivered by*
In the presence of

SEAL

1st witness
2nd witness

[Notes on the Conditions of Contract

The Conditions of Contract comprise two parts:

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

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

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

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

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

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

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* Add the following text if the bidding documents, as issued, do not include a copy:
"Copies of the FIDIC Conditions of Contract can be obtained from:
FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland
e-mail: fidic.pub@fidic.org – FIDIC.org/bookshop]

The General Conditions of Contract shall be as follows:-

CONDITIONS OF CONTRACT

FOR WORKS OF CIVIL

ENGINEERING CONSTRUCTION

Third Edition 1987
Reprinted 1988 with editorial amendments
Reprinted in 1992 with further amendments
Issued by
FIDIC (FEDERATION INTERNATIONAL DES INGENIEURS-CONSEILS

The bidders are advised to obtain and a copy of the above document from FIDIC at the following address:-

FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland
fidic.pub@fidic.org

The successful bidder is required to purchase copy of the said document from FIDIC directly prior to signing of contract and the said copy shall be supplied to the Employer for incorporation in the contract. Cost of purchase of the same is deemed to be included in the Contract Price of the Bidder / Contractor.

PARTICULAR CONDITIONS OF CONTRACT – PART-II

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PARTICULAR CONDITIONS OF CONTRACT - PART-II

1.1 DEFINITIONS AND INTERPRETATIONS

1.1.2.2 **Project Director K-IV Project,** Karachi Water & Sewerage Board Block-C, Room No. 7, 9th Mile Karsaz, Sharea Faisal, Karachi. Wherever the term Client or Owner appears in the Tender Document, it shall mean the "Employer".

1.1.2.4 The Engineer is **M/s Osmani & Company (Pvt.) Ltd.**
Consulting Engineers, Osmani House, 245/2K, Block-6, PECHS, Karachi
Phones: 021-34536007 / 008, 34546541 / 42, Fax: 021-34534691
Email: ocl-khi@osmani.com Web: www.osmani.com

or any other competent person appointed 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 matter, disputes and claims relating to the execution of the Works during his tenure.

Wherever the term Consultant or Consultants appears in the Bidding Documents, it shall mean the "Engineer" and vice-versa.

The following paragraph is added

1.1.2.3 "**Contractor**" means any person or persons, company, corporation, firm or joint venture submitting a Bid or Tender.

1.1.4.2 **Contract Price**

Existing text is deleted and substituted with the following;

"**Contract Price**" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions therefrom as may be made and remedying of any defects therein in accordance with the provisions of the Contract.
The following paragraph is added:

1.1.6.10 "**Programme**" means the programme to be submitted by the Contractor in accordance with Sub-Clause 8.3 and any approved revisions thereto.

The following paragraph is added.

1.1.6.11 "**Scheduled Progress**" means the monthly Percentage progress as described in Schedule E of Instruction to Bidders.

1.3 Communications

Existing text is replaced with following:

Wherever these Conditions provide for giving or issuing of approvals, certificates consents, determinations, notices, requests and discharges, these communications shall be:

a. In writing and delivered by hand (against receipt) on Company or Organization letter head signed by the authorized person of concerned Party i.e. Employer, Engineer or Contractor;

b. Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.

Following sub clauses 1.3.1 and 1.3.2 are added;

1.3.1 Correspondence to Contractor

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.

1.3.2 Correspondence to Employer and Engineer

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

a) The Employer is **Project Director K-IV Project,** Karachi Water & Sewerage Board Block-C, Room No. 7, 9th Mile Karsaz, Sharea Faisal, Karachi.

b) The Engineer is **M/S. OSMANI & COMPANY (PVT.) LTD**. Consulting Engineers, Architects and Planners 245/2-K, Block-6, PECHS, Karachi-75400. Tel: (92-21) 34536007/ 08, 34546541/ 42 Fax: (92-21) 34534691,
Email : ocl-khi@osmani.com, Website : www.osmani.com

1.4 Law and Language

(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.

1.5 Priority of Contract Documents

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

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

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

If an ambiguity or discrepancy is found in the document the Engineer shall issue necessary clarification or instruction.

1.6 Contract Agreement

In line six (6) replace the words "**Employer**" with "**Contractor**" and add the following sub paragraphs at the end:

The Contract Agreement would be made on stamp paper of an appropriate value liveable under the law. Cost of stamp duty would be born by the Contractor.

The Contractor shall at his own cost submit 9 x sets of Contract Agreement (photocopies) to employer, or as required by the employer in binded form, duly initialled and stamped by the Employer, and the Contractor for the use of the Employer 2 x sets will be provided by the Contractor to the Engineer. Such submission shall be made within seven (7) days of signing of the Contract Agreement by the Employer and Contractor.

1.9 Delayed Drawing or instruction

Existing clause is deleted;

Following sub-clause 1.9.1 and 1.92 are added;

1.9.1 Shop Drawing

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

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

1.9.2 As-Built Drawings

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

3.1 Engineer's Duties and Authority

Add following after last Para;

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.
(ii) Certifying additional cost.
(iii) Any action regarding to "Performance Security".
(iv) Any action regarding to "Suspension".
(v) Any action regarding to "Extension of Time for Completion".
(vi) Any action regarding to "Liquidated Damages for Delay" or Payment of Bonus for Early Completion of Works.
(vii) Issuance of "Taking Over Certificate".
(viii) Issuing a Variation Order:
(ix) Fixing rates or prices.
(x) Extra payment as a result of Contractor's claims.
(xi) Release of Retention Money to the Contractor.
(xii) Issuance of "Final Payment Certificate".

(xiii) Issuance of “Defect Liability Certificate”.

* (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.)

4.2 Performance Security

Existing first Para is deleted and replaced with following:

The contractor shall provide Performance Security to the procuring agency in the prescribed form from the schedule Bank of Pakistan. The Performance Security shall be 5% of the Contract Price stated in the Letter of Acceptance.

Besides obtaining 5% as Performance Security, the Security Deposit at rate of 5% will also be deducted from running bills, thus amount equal to 10% of the Contract Price is obtained from contractor i.e. 5% as performance security and 5% security deposit as retention money. Deductions from interim/running bills will be made from successful bidder after the bidder has furnished the required performance security and signed the contract agreement.

The cost of complying with requirements of this Sub-Clause (performance security) shall be borne by the contractor.

4.10 Site Data

Existing first paragraph is deleted and replaced with following;

The contractor shall obtain Base data from all available sources including the Employer. However, responsibility of its confirmation, completion and correction rest upon the contractor.

4.12 Unforeseeable Physical Conditions

Existing last para is deleted and replaced with following:

The decision of the Engineer regarding / existence of enforceable physical conditions and impact interim of cost or extension of time for completion shall be considered final and binding on contractor to accept the same.

4.20 Employer’s Equipment and Free-Issue Materials

Existing Clause is deleted

Add following Sub Clauses 4.25, 4.25.1, 4.25.2, 4.25.3, 4.25.4, 4.25.5 and 4.25.6:

4.25 Compliance with Statutes Regulations and Laws

The Employer presupposes that the Contractor has cognizance of all laws of Pakistan pertaining to the execution of the work. The Contractor shall confirm in all respects with the provisions of any such statute, ordinance or law as aforesaid and the regulations or by-laws of any local or other duly constituted authority which may be applicable to the works or public bodies and companies as aforesaid and shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such statute,

ordinance, law regulation or by-law. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Employer / Engineer in writing and any necessary changes shall be adjusted as provided in the Contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinance, rules and regulations and without such notice to the Employer he shall bear all costs arising there from.

The Contractor and his sub-contractors shall convey, store and make use of all explosives, dangerous petroleum acetylene, carbide or calcium and other similar material provided by them for use in or on the works in strict accordance with the provision of all laws, orders and regulations that are in force at the Site or may be issued from time to time by the Government.

Following sub clause 4.25.1 and 4.25.2 are added:

4.25.1 Notice to Adjoining Property Owners

The Contractor shall send or cause to be sent written notices to Owners of property adjacent to the Site or which may be affected in any way by the performance of the work contemplate notifying them as to the extent of the work included in so far as it affect surrounding property and complying with local ordinance and law.

4.25.2 Giving of Notices and Payment Fees

The Contractor shall give all notices and pay all fees and charges required to be given or paid be any national or state statute, ordinance or other law or any regulation or by- law of any local or other duly constituted authority in relation to the execution of the work or of any temporary works and by the rule and regulations of all public bodies and companies whose property of rights are affected or may be affected in any way by the works or any temporary works.

4.25.3 Supply of Water

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

4.25.4 Arms and Ammunition

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

4.25.5 Day and Night Work and Work on Sundays or Holidays

Unless otherwise stated in the Contract, the Works shall be executed in the day only within normal working hours. No work shall be carried out on Site on Sundays (locally recognised as day of rest) and on gazetted holidays, without the consent in writing of the Engineer except if the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the works in which case the Contractor shall immediately advise the Engineer. The Engineer shall not unreasonably withhold any such consent save in exceptional circumstances, nor do so if work on rest days or on gazetted holidays is considered by the Contractor to be necessary to meet the Time for Completion.

In case the contractor needs to work after normal working hours or on Sunday or holidays, he shall get specific approval before hand from the Engineer giving at least 2 days advance written notice. In such case, the contractor undertakes his liability to pay the Engineer for such extra working hours (beyond normal working hours) calculated on the basis of actual extra hours at the rate of 1.5 times of approved man-month rate of the Engineer's staff on duty on overtime payable to the Engineer by the 15th day of next

month.

If the contractor works in night then he will have sufficient lighting arrangement at site of work and at way leaves also. He will also take necessary measures to avoid any accident.

4.25.6 Reporting of Accidents

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

The following Sub-Clause 36.6 is added:

6.3 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and from amongst the Employer's Personnel and Engineer Personnel.

6.10 Records of Contractor's Personnel and Equipment

Existing Clause is deleted and replaced with following:

The Contractor shall submit to the Engineer detail showing number of each class of contract personnel and each type of Contractor Equipment (Stating workability Condition of each) on the site on daily basis and such detail will be recorded in and work diary which will be signed by the Contractor's and the Engineer's on daily basis. The record will be produced as and when demanded.

6.12 Foreign Personnel

Replaced existing last line with following text:

be responsible for making appropriate security arrangements for their return at appropriate time and burial.

7.4 Testing

Add following text at the end of paragraph:

The Engineer shall determine the protocol and frequency of tests as per best Engineering practice and may resort to Third Party testing and verification as and when feel necessary at the cost of contractor.

8.1 Commencement of Works

Existing text is replaced with:

The Contractor shall commence the Works on Site from the date of receipt by him from the Engineer a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

8.3 Programme

Existing text is replaced with following:-

The Contractor shall submit the programme of work before issuance of Letter of Acceptance on bar chart and primavera (level III). The Contractor must also attach monthly progress schedule in terms of Percentage of project as described in Appendix-E

to Bid (BE-1) which will be considered as “Scheduled Progress”.

The approval by the Engineers of the programme shall not relieve the Contractor or the Employer from any obligation under the contract.
The Contractor shall submit the programme of work within 14 days of date of issuance of Letter of Acceptance.

The approval by the Engineers of the programme shall not relieve the Contractor or the Employer from any obligation under the contract.

8.6 Rate of Progress

Existing text is replaced with following:

The Contractor Shall ensure that rate of progress does not fall below 20% of Scheduled Progress as reflected in the programme of work (submitted before issuance of letter of acceptance)

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, is below 20% of Scheduled Progress as reflected in the programme of work, then the Client will have prerogative to either terminate the contract or reduce/delete portion of work if the contractor fails to improve the progress within 30 days of receipt of notice under this Clause. The Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Engineer, to expedite progress. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Sub-Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any moneys due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.”

8.7 Delay Damages

Add following text in the beginning:

If the Contractors fails to follow to “**Scheduled progress**” as submitted in accordance with Appendix – E to Bid (BE-1) and falls below 20% of Schedule Progress than the Employer may reduce the work or terminate the Contract after given 30 days prior notice.

13.4 Payment in Applicable Currencies

Existing text is replaced with following:

Payment shall be made in Pak Rupees only.

Add following Sub Clauses 13.9 to 13.13:

13.9 Sources of Indices and Weightages

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

those given in Appendix-C to Bid, which shall be subject to approval by the Engineer.

13.10 Base, Current, and Provisional Indices

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

13.11 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.

13.12 Weightages

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

13.13 Payment of Income Tax

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

14.2 Advance Payment

Existing text is replaced with following:

Advance payment is given to the contractor to enable him to overcome financial encumbrances and shall be made available by adopting any one of the following methods:-

a. Secured Advance on the written request of the contractor whose contract is for finished work is allowed to a contractor on the basis of non-perishable 11 / noncombustible materials brought and properly stocked/stored to site of work. Secured advance as a good practice is avoided / discouraged. However, wherever allowed, it should be strictly in conformity with the rules and procedure in addition to the condition mentioned below:-

   i. on verification and certification of quality, quantity and market rates of the material by the Assistant Engineer/Engineer‘s representative;

   ii. contractor has to furnish the “Indenture Bond” (Annexure I);

   iii. secured advance shall be paid to the contractor on the quantities brought and properly stored at site of work. Full quantities of materials for entire work / contract should not be advanced;

   iv. recoveries of advances so made should be made from his bills for work done as the materials are used, the necessary deductions be made whenever the items of work in which are used are billed for, or shall be recovered in full within 90 days, even if unutilized;

v. new secured advance should not be allowed until and unless the previous advance, if any, stands fully recovered,

vi. advance amount is calculated on the basis of 75% of the market value of that material.

b. The authority competent to accepting tender can allow the mobilization advance on the works subject to following conditions:

i. stone aggregate, steel, bricks, blocks and other materials which do not suffer destruction, lose life or subject to speedy decays are termed non-perishable.

ii. contractor has provided the performance security;

iii. contractor has furnished the irrevocable bank guarantee of amount equal to mobilization advance in specified form from a scheduled bank in Pakistan in favor of the procuring agency;

iv. contractor shall pay interest on the mobilization advance at the rate of 10% per annum on the advance as prescribed in Sindh Financial Rules. The rates may vary and are subject to change from time to time as per instructions issued by the Government.

v. advance including the interest shall be recovered in 5 equal installments from the 5 R.A bills and in case the number of bills is less than five (5), then 1/5 of the advance inclusive of the interest thereon shall be recovered from each bill and the balance together with interest be recovered from the final bill. It may be insured that there is sufficient amount in the final bill to enable recovery of the mobilization advance. When sufficient amount is not available in final bill, then amount is adjusted from deposits available with procuring agency or by any other means as the procuring agency may deem appropriate.

c. materials to be supplied by the Procuring Agency. Materials, like cement, steel, bitumen or any other material whichever deemed necessary to complete the project/work can be supplied to the contractor by the procuring agency. The list of materials, quantities and rates to be charged from the contractor, shall be given in the Schedule-A; and the cost thereof shall be recovered from the contractor through monthly statements/running bills on the basis of actual consumption subject to following conditions:-

i. It shall be obligatory on the contractor to obtain from procuring agency all such materials required for the work and for making payments therefore, by deductions from the bills at the rates specified, regardless of fluctuations in the market rates or stock rates of the procuring agency;

No carriage or incidental charges are borne by procuring agency for moving the materials beyond the place where contractor has agreed to take delivery thereof;

14.2.1 Mobilization Advance Recovery

a. This Advance shall be recovered @ 15% of each bill of the contractor till the time the whole of the Mobilization Advance is recovered before the date of completion of works.

b. On full recovery of the Mobilization Advance, the Employer will return the said guarantee to the Contractor duly discharge. However, the Employer will be at liberty to encash the Bank Guarantee of the Contractor, if the Contractor fails to extend the said guarantee 15 days before the expiry date of the guarantee.

14.3 Application for Interim Payment Certificates

Add following text at the end:

After verification by the Engineer, the Contractor shall make six (6) copies at his on cost and submit the same to the Engineer for further processing.

14.6 Issue of Interim Payment Certificates

Add following text in the beginning:

Minimum amount of Interim Payment Certificate shall be 20 Million otherwise application of Interim Payment Certificate shall be returned to contractor with a copy to the Employer.

14.9.1 Payment of Retention Money

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

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

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

14.15 Currencies of Payment

Existing text is replaced with following:

Payment shall be made in Pak Rupees only

15.2 Termination by Employer

Add following after sub para (f):

(g) If the rate of progress below than 20% of scheduled progress.

18.1 General Requirements for Insurances

Replaced last line with following text:

Insurance company operating in Pakistan having atleast AA rating from PACRA/ JCR.

The cost of complying with requirements of this Clause shall be borne by the Contractor. The Contractor shall be liable for deductible losses not covered by insurance. The Insurance Policy shall state:-

a. The Employer shall receive at least 30 calendar days written notice of Intended Cancellation or change effect in coverage.
b. The Contractor is fully responsible to provide full indemnity to Employer in respect of liability against loss or damage.

Following Sub Clauses will be considered as deleted:

20.2, 20.3, 20.4, 20.7 and 20.8

20.5 Amicable Settlement

Following text is deleted from the first line:

Under sub clause 20.4 above.

20.6 Arbitration

Existing text is replaced with following:

Disputes not settled amicably shall be settled under the provisions of the Arbitration Act 1940 or any statuary modification or any reactment for the time being enforced. The place of arbitration shall be Karachi.

Note: Appendix General Conditions of Dispute Board Agreement and procedural rules attached as Annex shall be considered as deleted.

SPECIFICATIONS - SPECIAL PROVISIONS

TABLE OF CONTENT

SPECIFICATIONS - SPECIAL PROVISIONS

1. DESCRIPTION OF PROJECT

1.1. General

The Employer intends to Construct Boundary Wall/ Pillars/ Site Office for K-IV Project.

2. THE SITE

2.1. Site of Works

The Site of the Works is the area for construction lying within the right-of-way lines, boundaries and limits shown on the Drawing 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 be comprised in the Site as defined in Clause 1 of the Conditions of Contract.

3. WORK UNDER THE CONTRACT

3.1. General Description

The Contract comprises the execution and completion of the Works, remedying of any defects therein, maintenance of utility services, and the provisions of all labour, materials, equipment, plant and everything whether of a temporary or permanent nature required in and for such execution, completion, remedying and maintenance so far as the necessity for providing the same is specified or can reasonably be inferred from the Contract documents.

The following description of the Works to be performed under this Contract is general in nature and is not intended to describe all of the facilities to be provided under this Contract.

THE WORKS UNDER THIS CONTRACT ARE AS DEFINED IN BIDDING DATA

4. GENERAL RULES OF SPECIFICATIONS

a) Specification or as Specified

"Specification" or "as specified" refers to the specifications outlined in these Documents and where no specifications are available for any work or where the same are found not applicable then the relevant applicable AASHTO, ASTM or BSS specifications or equivalent standards shall apply in the same order.

Any item for which no specifications are outlined but which are identified on drawings, shall be completed according to the standards as per AASHTO / ASTM / BSS, these include items that may be added in the future. The Employer / Employer's Representative may supplement such specifications during the progress of work. All materials and processes used for these items shall be subjected to standard testing and, if found below the pertinent AASHTO / ASTM / BSS standards, shall be removed from the site immediately at Contractor's expense.

b) Standards and Codes

Wherever reference is made in the specifications to the respective standards and codes in accordance to which goods and materials are to be furnished, and work is to be performed or tested, the provisions of the latest current edition or revision of

the relevant standards and codes in effect shall apply, unless otherwise expressly set forth in the Contract.

c) Materials and Processes

All goods and materials to be incorporated in the Works shall be new, unused, of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

d) Equivalent Materials, Processes, etc.

Where specific materials, processes, etc. are specified and the same are not available other alternative materials and processes which ensure an equal or higher quality than those specified will be accepted subject to the Employer / Employer's Representative's prior review and written approval. Differences between the those specified and the proposed alternatives must be fully described in writing by the Contractor and submitted to the Employer / Employer's Representative at least 30 days prior to the date when the Contractor desires the Employer / Employer's Representative's approval who may give such approval after determining that the alternative proposed ensures equal or higher quality.

e) Approved, Directed, Instructed

Approved, directed, instructed means the approval, etc. of the Employer / Employer's Representative unless otherwise stated.

f) Alternatives

Where alternative materials, processes etc., are specified the selection will depend on local conditions and discretion rests with the Employer / Employer's Representative whose decision shall be final and binding.

g) Catalogues / Standards / Manufacturer's Instructions, etc.

Wherever the manufacturer's/supplier's instructions, manuals, guarantees and ASTM/BSS Standards are referred to in the specifications and details of Bills of Quantities; all such literature shall be submitted by the Contractor to the Employer / Employer's Representative for due checking, approval and record.

h) Applicability

Unless stated or specified else-where to the contrary these General Rules shall apply to all sections of work irrespective of their sequence, location and description.

5. DRAWINGS

5.1. Bidding Drawings

Tender Drawings issued with the Tender Documents, called the Tender Drawings, show scope of the work to be performed by the Contractor. The Drawings are generally in sufficient detail so as to be used as a basis for construction, fabrication and for placing orders for materials subject to corrections based on the future issue of supplementary Drawings as provided under Sub-Clause 5.2 hereof.

5.2. Construction Drawings, Supplementary Drawings

After award of Contract, the Contractor shall carry out "Joint Survey" at Site of Works in pursuance to Sub-Clause 6.4, Specifications - Special Provisions. The Contractor shall

submit to the Engineer “Joint Survey”, duly signed, dated and stamped by the representatives of the Employer, Consultant and Contractor.

Simultaneously, the Contractor shall submit to the Engineer detailed “Work Programme” in terms of Sub-Clause 14.1 Conditions of Contract.

After receipt of “Joint Survey” and “Work Programme” from the Contractor, the Engineer will start issuing Construction Drawings to the Contractor. The Engineer shall have authority to issue to the Contractor, from time to time, such Supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Contractor shall follow these Drawings.

The Contractor shall give notice to the Engineer regarding the part of the Drawings which in his opinion contain discrepancies or are not clear. The Engineer shall issue necessary clarifications or Supplementary Drawings in greater details as required to execute the Works. These Supplementary Drawings showing changes from the Bid Drawings, in the opinion of the Contractor, shall be reviewed by the Engineer for his determination of adjustment of the Contract Price under Clause 51 and 52 of the Conditions of Contract.

5.3. Definition of Term Drawings

The term Drawings as used in the Specifications means the Drawings referred in Clauses 5.1 and 5.2 hereof.

5.4. Checking of Drawings

The Contractor shall check all Drawings carefully as soon as practicable after receipt thereof, and shall promptly notify the Engineer of any errors discovered.

5.5. Copies of Drawings

Drawings will be issued to the Contractor as described below.

a). Bidding Drawings

One (1) set of the Tender Drawings will be issued to the Contractor alongwith Tender Documents. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

b). Construction Drawings / Supplementary Drawings

One (1) print of each Construction Drawings / Supplementary Drawing will be issued to the Contractor free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

5.6. Drawings to be Furnished by the Contractor / As-Built Drawings

The Contractor shall submit to the Engineer for review of such drawings as required under the Contract, sufficiently in advance of the work intended to be executed.

The Contractor shall, at all times, keep on Site a separate set of prints on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. The Subcontractor(s) for plumbing, mechanical and electrical shall, at all times, keep on Site, a separate set of prints of the drawings (showing their parts of the Works) on which all significant changes between the work shown on the Drawings and that which is actually

constructed, shall be noted neatly, accurately and promptly as the work progresses. Such drawings shall show the exact physical location and configuration of the works as actually installed.

The Contractor shall, within fourteen (14) days of issuance Taking-Over Certificate for whole of the Works, furnish to the Engineer for his approval two (2) copies of such marked up drawings. One (1) copy of each of the marked up drawings approved by the Engineer shall be returned to the Contractor by the Engineer and these shall be used for the preparation of the As - Built Drawings.

The Contractor shall furnish to the Engineer six (6) complete sets of all As -Built Drawings as well as AutoCAD soft copy within thirty (30) days of receipt of drawings stated above, from the Engineer.

6. SETTING OUT OF WORK AND SURVEY

6.1. Reference Points, Lines

The Contractor shall establish bench marks and / or reference line at the Site in accordance with the instructions of the Engineer. The Contractor shall set out its work from these bench marks and / or lines.

6.2. Verification

The Engineer may make checks as the work progress to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of the Drawings and Specifications. Such checking by the Engineer shall not relieve the Contractor of his responsibility to perform all work in accordance with the Drawings and Specifications and the lines and grades given therein.

6.3. Survey Instruments

The Contractor shall maintain at the Site the requisite surveying instruments in perfect working conditions for the use of the Engineer’s Representative to check levels and lines of the work at all times. These instruments shall include (but not limited to) One Total Station, Adequate nos. of Levels, theodolites, Tapes, etc.

6.4. No work without Joint Survey

The Contractor shall not start the excavation and / or embankment works until the Joint Survey has been done to establish the existing ground levels.

7. APPROVAL OF MATERIALS AND PLANT

7.1. Quality of Materials

All materials, fixtures, fittings, supplies and plant furnished under the Contract shall be new and unused, standard first grade quality and of the best workmanship and design. No inferior or low-grade materials, supplies or articles will be either approved or accepted, and all work of assembly and construction shall be done in a first-class and workmanlike manner. In asking for prices for materials intended for delivery to the Site and incorporation in the Works under any portion of these Specifications, the Contractor shall provide the manufacturer or supplier with complete information as may be necessary to secure compliance to this Clause and, in every case, he shall quote this Clause in full to each such manufacturer or supplier.

7.2. Submission of Samples and Data

As soon as practicable after award of Contract, the Contractor shall submit for the approval of the Engineer drawings, catalogues, diagrams and other descriptive data for all mechanical, electrical, architectural and such other materials and plant designated by the Engineer, which the Contractor proposes for use under this Contract. For certain materials and plant, data may be required to be submitted in accordance with a detail form furnished by the Engineer. Samples of materials (2 sets) shall be submitted by the Contractor to the Engineer at Contractor's cost for approval sufficiently in advance of the materials intended to be incorporated in the Works.

7.3. Testing

Testing, except as otherwise specified herein, shall be performed by a testing agency as proposed by the Contractor and approved by the Engineer, at no extra cost to the Employer. The Engineer may require all testing to be carried out under his supervision only.

The quality control testing shall be performed by the Contractor's competent personnel in accordance with a site testing as approved by the Engineer.

The Contractor shall keep a complete record of all quality tests programme performed on Site.

7.4. Testing Laboratory Certificates

The Engineer may accept a certificate from a commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of these Specifications.

7.5. Inspection

All material and Plant furnished and all work performed under this Contract will be subject to inspection by the Engineer at all times and in all states of completion both off-Site and on-Site. The Contractor shall furnish promptly without additional charge, all facilities, labour and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

7.6. Approved Sample at Site

The Contractor shall, at all times, keep on the Site approved samples. All such samples shall be made available to the Engineer as and when required.

7.7. Survey Teams And Instruments

The contractor shall provide necessary surveying staff and surveying equipment to the Engineer for conducting necessary survey work in connection with checking or establishing line, level, control and quantification of different items of work.

The Contractor shall maintain survey equipment for the use of the Engineer. All survey equipment shall be maintained throughout the Contract period.

a) Expendable Material

The Contractor shall provide adequate supplies of expendable materials, i.e. pencils, rubbers and inks, drawing papers, level books, field books, pegs, brushes and paints as required by the Engineer.

7.8. Establishment of Field Laboratory

The Contractor shall establish a Site laboratory for the purpose of necessary testing. The laboratory equipment shall remain the Contractor's property at all times.

The operation of the lab shall be under the control of Resident Engineer / Material Engineer of the Consultant.

8. CONSTRUCTION SCHEDULE

8.1. Submittal Date

The programme to be submitted by the Contractor in accordance with Clause 14.1 of the Conditions of Contract shall be submitted in the form of a detailed schedule based on a computerized network analysis covering all construction activities indicating critical activities with critical path, resource scheduling for Contractor's Equipment, material and labour, within the period stated in the Appendix A to Bid. All the milestone shall be clearly identified.

8.2. Requirements

The detailed submittal shall consist of schedules, network analysis tabulations and narrative descriptions of the proposed construction programme.

Each summary or detailed schedule shall consist of a bar chart and a time-scaled network. The scheduled start and finish times for all activities on the bar chart shall agree with those on the network. All inter-relationships and inter-dependencies between structures shall be clearly indicated on the schedules.

The network shall show the order and interdependence of activities planned by the Contractor and shall be time-scaled according to calendar dates.

8.3. Monthly Reports

Each month, the Contractor shall submit a report consisting of:

- Copies of the bar charts for the current phase with both actual progress and scheduled progress shown.
- Network analysis tabulations as in Sub-Clause 8.2 above, reflecting actual start and finish dates where applicable.
- A narrative report discussing any significant deviations from the schedule and, if necessary, explaining the steps proposed to be taken to maintain the approved schedule.

9. NOT USED

10. SITE OFFICE AND TEMPORARY FACILITIES TO BE PROVIDED BY THE CONTRACTOR

10.1. Contractor's Office, Facilities etc.

The Contractor shall establish and maintain a Site office as indicated in Bill No. 01. The Contractor shall provide all facilities in connection with the execution, completion, of the Works, remedying defects therein and maintenance of the utilities services. The facilities shall, not be limited to, the Contractor's Site Office, labour camps, workyard and storage areas, temporary water supply, waste water disposal, temporary electricity, medical unit, temporary roads, fire protection and fire fighting equipment etc.

The Contractor shall be solely responsible for arranging the facilities.

The Contractor shall arrange his labour camp, work yard, storage area, site office within the area available at the Site.

10.2. Sign Board

The Contractor shall erect and maintain at the Site in a location to be approved by the Engineer, 3 Sign Boards 4.45M height and 2 M wide for writing the name of Work, name of Employer, name of Consultants, name of Contractor and Project Cost. The notice board shall comprise of the following;

- Frame of 3" dia GI Pipe properly painted as per the direction of the Consultants/ Engineer and as per drawing.

- 2 Nos. Posts of 3" dia GI Pipe 4.45M above ground and 1M below ground embedded in 1:2:4 CC 2'x2'x4' with proper arrangements of anchorage and brasses. Pipes painted with anti-rust as directed by the Engineer.

- 4 Nos. Steel Sheets 0.6M high and 2M wide fixed on both sides with 50mm gap between each. The background of plates is of white color whereas the writing would be black or red color (as approved by the Engineer)

- White imported 3M sheet used as background. The color of monogram would be, green, red or black etc. (as approved by the Engineer)

- Alphabets of appropriate size as approved by the Engineer in 3M reflective sheet in blue/ black color.

The Contractor shall maintain the display of the notice boards at his own cost throughout the length of the project.

10.3 Preliminary and General Items

The Preliminary and General Items including in Bill No. 1 shall be in use of the Engineer and shall become property of the Employer and as-such will be handed-over to the Employer in good working condition on completion of the project.

In case of non-provision of above facilities, the same shall be arranged by the Employer / Engineer and be deducted from any monies due / becoming due to the Contractor by the Employer alongwith 10% overheads till these facilities are provided satisfactorily to the Engineer.

11. SAFETY

12.1 Accident Prevention, Protective Equipment

The Contractor shall comply and enforce compliance by all his Subcontractors with the highest standards of safety and accident prevention in compliance with all applicable laws, ordinance and statutory provisions.

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.

12. The Tendered Rates shall be inclusive of all lead and lift

13. The Contractor's rates shall include all incidental charges in connection with the work such as the cost of removing trees, shrubs, grass, etc., which interfere with the execution of the work as well as the cost of Natural Ground Compaction (NGC) which will be carried out by the Contractor upto the satisfaction of the Engineer prior to the earthwork.

14. No alterations or additions shall be made by the Contractor in the Bill of Quantities and rates must be filled in ink or typed out both in figures and words clearly and legibly in the columns provided in the schedule of quantities. All corrections must be initialed by the contractors. Any Tender which does not comply with this condition will be liable to be summarily rejected and not taken into account when preparing comparative statement.

15. Materials obtained from excavations will be the property of the Employer. Serviceable materials are to be stacked in places pointed out by Engineer. The Contractor undertakes to have the site clean and free from rubbish to the satisfaction of the Engineer. All surplus materials, rubbish, etc., will be removed to places to be fixed by the Engineer and nothing extra will be paid for this.

16. On completion of the work or earlier as directed by the Engineer, the Contractor shall remove all temporary structure (Godowns, site offices, etc.), erected by him at the site of work. He shall fill tanks dug out by him at site, remove all debris and other materials like surplus sand, stone ballast, rubbish, etc.; and in short, shall leave the site in a neat and tidy condition.

17. The contractors in the course of their works should understand that all material (e.g. , stone and other materials) obtained in the work or dismantling, excavation, etc., will be considered as Employer’s property and issued to the contractors (if they require the same for their own use) at rates approved by the Engineer. If the materials are not required by them they will be disposed off in the interest of Employer.

18. The contractor shall inspect the site of works and acquaint himself with the nature and requirements of the work, facilities of access for materials, removal of rubbish, cost of carriage, nature of strata, etc., before submitting his Bid.

19. The contractor shall have to make temporary approach roads, etc., at his own cost to facilitate movement of materials, such approach roads shall be aligned in a manner approved by the Engineer.

20. The contractor shall have to make proper arrangements for road crossing barriers during working hours in the day time as well as in the night when danger lights will have to be provided on either ends at his own cost and no extra cost will be paid. Sufficient barricades and red lights will be provided by the Contractor where required to avoid the chances of accidents. In case an accident occurs for failure on the part of the contractor, he shall be entirely responsible for the consequences.

21. The Contractor shall have to make arrangements for diversions for traffic wherever necessary and shall have to provide diversion and caution boards as per directions of the Engineer at his own cost for which no extra cost will be paid. The diversion shall be watered and consolidated as per directions of the Engineer.

22. No material shall be removed from the site without the written permission of the Engineer.

23. Dewatering including shoring wherever so required for any foundation area, pumping, bailing out water, drainage of water within plot areas if any shall be deemed to have been included in the rates quoted by the tenderers and no extra payment will be made.

24. The rates shall be deemed inclusive of such incidental charges.

25. The Contractors shall execute all works at their own cost for diversion of water away from the plot as per site requirements to have full satisfaction of Engineer and no additional payment will be made on this account.

26. The Engineer reserves the right to select all materials and the type, grade, heating capacity and quantity of proportion of any or all materials as required for a particular work. The decision of Engineer in this respect shall be final and binding on the Contractor. The rejects on materials must be carted at his own cost. If the rejected materials are not removed within one month of its rejection the materials will become the property of the Employer or will be removed at Contractors cost.

27. ATTENDANCE AT MEETINGS

The Contractor shall attend and shall cause his Sub-Contractors to attend any or all meetings when called by the Employer or the Engineer or his Representative to discuss progress of the work and other matters related to the work and the Contract, without any compensation from the Employer.

a). The Contractor shall bear all expenses of the Employer and his agents and representatives and the Engineer, his agents and representatives if requested by the Contractor for any meetings, instructions and approvals away from the Site.

b). The proceedings of the meetings shall be recorded by the Engineer which shall be circulated to all the participants including those of the Contractor. All decisions taken in the meetings shall be binding on the Contractor and shall form part of the Contract.

28. DOCUMENTS NOT TO BE ALTERED OR MUTILATED

No alteration or mutilation (other than filling in all the blanks intended to be filled in) shall be made in the form of Bid or in any of the documents attached to it. Any comments which it is desired to make shall not be placed on any of the documents attached hereto, but shall take the form of a separate statement which shall be as brief as possible and referenced to items, clauses and pages of the annexed documents.

Such statements shall not qualify the acceptance of the Bid based upon a proposed change or changes in the annexed documents, nor shall be binding upon the Employer in any way in making the award. Alterations of already written prices must be signed in the place of alteration by the Bidder or his legally authorised representative.

29. PERSONAL LIABILITY OF PUBLIC OFFICIALS OR ENGINEER

In carrying out any of the provisions of these specifications or in exercising any power of authority granted to them by or within the scope of the Contract, there shall be no liability upon the Employer or his authorized representatives or the Engineer or his authorized representatives their personally or in their official capacity, it being understood that in all matters they act solely as agents and representatives of the Employer.

30. ACCESS AND EXISTING ROADS

If the Contractor finds it necessary or elects to use existing roads, the Contractor shall make all necessary arrangements and obtain all permits from the relevant departments for travel over and use of such roads. The Contractor shall observe all rules regulations of the concerned department regarding the use of said roads. The cost of maintaining all necessary safety measures and temporary structures and making any necessary

repairs, replacements or similar operations and all or any other costs required by reason of his use of such roads shall be borne by the Contractor and the Contractor shall save harmless and indemnify the Employer in respect of all claims, demands proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such operation or interference.

31. FIRST AID FACILITIES

The Contractor shall provide and maintain adequate First Aid Facilities at all times, convenient to the Site to the approval of the Employer.

32. FINAL HAND-OVER

At the end of the Period of Maintenance stipulated in the contract, the Employer on application of the Contractor, shall decide the members of the final hand over committee and announce the same to the Contractor. The committee, after inspection of Work, if satisfied that there are no deficiencies or defects due to work of the Contractor shall certify the final hand-over, and the Employer will then issue a final Certificate of Completion of Work within thirty (30) calendar days thereafter.

33. EMPLOYER AND ENGINEER NOT PERSONALLY LIABLE

No member or officer of the Government or the Employer or the Employer's Representative or the Engineer or his representatives or any one of their respective staffs or their employees shall be in anyway personally bound or liable for the acts or obligations of the contractor under the contract or answerable for any default or omission in the observance or performance of any of the acts, matters or things which are herein, contained.

34. PROGRESS PHOTOGRAPHS

The contractor shall furnish to the Employer and to the Engineer every two weeks at least six photographs to clearly show the progress of construction. The photographs shall be submitted in glossy prints 20 cm x 20 cm. Each print shall be marked on the back with the date and serial number. There shall be no writing, lettering or marking on the face of the photographs. The set of photographs of the Engineer should accompany respective negatives.

35. SITE ORDER BOOK

The Contractor shall maintain site order book {of triplicate leaves} at the Site, for taking down instructions of the Engineer and/ or the Employers, with out any obligation and charges to the Employer / Engineer.

36. BAR BENDING SCHEDULES

The contractor shall be responsible for the preparation of all bar bending schedules at his own cost which shall be based on structural drawings supplied by the Engineer and shall get them approved before the actual execution of work.

37. PROGRESS REPORT

The Contractor shall, during the execution of the work, submit to the Employer (3 copies) and ENGINEER (2 copies) so as to reach them in the first week of every calendar month, a report on the actual progress of the works attained by him during the preceding month fully supported with colour photographs of (5”x7”) size, at least 15, depicting the complete stages of the works. Each photograph should be properly pasted on an A-4 size paper, indicating the location and other relevant information of the area

photographed. The report will be submitted on the standard format to be supplied later on. In case the Supervision Engineer is different from the Design Engineer, one copy each of photographs should be sent to both the Engineer.

The set of photographs for the Design Engineer should be submitted with respective negatives.

PRECAST CONCRETE

A. GENERAL NOTES

1. GENERAL

1. Precast concrete units shall be designed and fabricated by an experienced and approved precast concrete manufacturer. The manufacturer shall have been regularly and continuously engaged in the manufacture of precast concrete units similar to that indicated in the project specifications or drawings for at least 10 years.

2. The contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete units

3. Precast concrete units shall be installed to the lines and grades shown in the contract documents or otherwise specified.

4. Precast concrete units shall be lifted by suitable lifting devices at points provided by the precast concrete producer.

5. Field modifications to the product shall not relieve the precast producer of liability regardless if such modifications result in the failure of the precast concrete unit.

2. SUBMITTALS

The following items may be submitted by the contractor to the Engineer-in-charge for approval;

1. Preconstruction Submittals - Submit quality control procedures established by the precast manufacturer.

2. Shop Drawings for Standard Precast Concrete Units for approval by the Engineer-in-charge.

3. Installation and construction information shall be included on shop Drawings.

4. Details of steel reinforcement size and placement as well as supporting design calculations shall be included in the submittals.

3. DESIGN / DESIGN DATA

1. Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards [ACI 318, ACI 350, ASTM and AASHTO].

2. Design must also consider stresses induced during handling, transportation and installation in order to avoid product cracking or other handling damage. Design loads for precast concrete units shall be indicated on the shop drawings.

3. The precast concrete producer shall supply precast concrete unit design calculations and concrete mix design proportions and appropriate mix design test data. Structural design calculations shall be signed by a licensed professional Engineer.

4. DURABILITY

1. Precast concrete units shall have a 28-day Cylinder compressive strength as follows,

   a) Precast prestressed column 4500 psi
   b) Precast wall panel 3000 psi
   c) Pedestal Column & footing 3000 psi
   d) R.C.C. wall / beam 3000 psi

2. REINFORCEMENT- All non prestressed reinforcement steel shall be deformed bars conforming to ASTM-A615, Grade 60 having minimum yield strength of 60,000 psi.

3. All prestressed steel / wire strands shall conform to ASTM-A416 of Grade 250.

5. ANCHORAGE, LIFTING INSERTS AND DEVICES

For anchors, lifting inserts and other devices, the precast concrete producer shall provide product data sheets and proper installation instructions.

The Precast concrete unit dimensions and safe working load shall be clearly indicated.

6. JOINTS AND SEALANTS

Joints and sealants between adjacent units shall be of the type and configuration indicated on shop drawings meeting specified design and performance requirements

7. CONCRETE MIX DESIGN

The precast concrete producer shall submit a mix design for each strength and type of concrete that will be used. Submitted mix designs shall include the specification details.

8. TEST REPORTS

1. The precast concrete producer shall supply copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast-furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

2. The precast concrete producer shall submit copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the project conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze-thaw durability, abrasion and absorption. Special tests for precast concrete items shall be clearly detailed in the specifications.

B. GENERAL DESCRIPTION

1. MANUFACTURE

1.1. Forms

Manufacturing precast concrete units shall be of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected cause no damage to the precast concrete unit. Forms shall be cleaned of concrete build-up after each use.

Form release agents shall be applied according to the manufacturer's recommendations and shall not be allowed to build up on the form casting surfaces.

1.2. Reinforcement

Applicable ASTM International and/or ACI 318 standards for placement and splicing

Cages of reinforcement shall be fabricated either by tying the bars, wires or welded wire reinforcement into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4. Reinforcing shall be positioned as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 in. Concrete cover shall not be less than 1/2 in., unless otherwise specified. Positive means shall be taken to assure that the reinforcement does not move significantly during the casting operations.

1.3. Embedded Items

Embedded items shall be positioned at locations specified in the design documents. Welding shall be performed in accordance with AWS D1.1 when necessary. Inserts, plates, weldments,

lifting devices and other items to be embedded in precast concrete units shall be held rigidly in place so that they do not move significantly during casting operations.

1.4. Concrete

1.4.1 Concrete Mixing

Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

1.4.2 Concrete Placing

Conventional concrete shall be deposited into forms as near to its final location as practical. Self-consolidating concrete shall be placed in a manner in which it flows and consolidates without segregation or air entrapment. The free fall of the concrete shall be kept to a minimum. Concrete shall be consolidated in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Consolidation efforts are often not required when using self-consolidating concrete. Vibrators used to consolidate concrete shall have frequencies and amplitudes sufficient to produce well-consolidated concrete.

1.4.3 Cold Weather Concreting

Recommendations for cold weather concreting are given in detail ACI 306 R. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. All concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact shall be free from frost. Frozen materials or materials containing ice shall not be used. In cold weather the temperature of concrete at the time of placing shall not be below 45°F. Concrete that freezes before its compressive strength reaches 500 psi shall be discarded.

1.4.4 Hot Weather Concreting

Recommendations for hot weather concreting are given in ACI 305 R.

During hot weather, proper attention shall be given to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90° F.

1.4.5 Concrete Curing

Commence curing operations immediately following the initial set of the concrete and completion of surface finishing.

1.4.6 Curing by Moisture Retention

Moisture shall be prevented from evaporating from exposed surfaces until adequate strength for stripping the precast concrete unit from the forms is reached by one of the following methods:

Cover with polyethylene sheets a minimum of 6 mils thick (ASTM C 171) _Cover with burlap or other absorptive material and keep continually moist _Use of a membrane-curing compound applied at a rate not to exceed 200 sq. ft. per gallon, or per manufacturers' recommendations (ASTM C 309) [Surfaces that will be exposed to weather during service shall be cured as above a minimum of [ ] days. Forms shall be considered effective in preventing evaporation from the contact surfaces. If air temperature is below 50°F the curing period shall be extended.

1.4.7 Curing with Heat and Moisture

Concrete shall not be subjected to steam or hot air until after the concrete has attained its initial set. Steam, if used, shall be applied within a suitable enclosure, which permits free circulation of the steam in accordance with ACI 517.2R. If hot air is used for curing, precautions shall be taken to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150° F. These requirements do not apply to products cured with steam under pressure in an autoclave.

1.4.8 Surface Finish

Unformed surfaces of wet-cast precast concrete products shall be finished as specified. If no finishing procedure is specified, such surfaces shall be finished using a strike-off to level the concrete with the top of the form.

C. QUALITY ASSURANCE

1. Qualifications of Manufacturer

Manufacturer shall have a minimum of Ten (10) years of production experience in architectural precast concrete work of the quality and scope required on this project.

2. Qualifications of Erector

Erection of precast concrete panels shall be performed by an established firm regularly engaged for at least two (2) years in the erection of precast concrete panels of sizes similar to those required on this project.

Perform inspection of panels under the supervision of a foreman employed by the erection firm for this type of work.

3. Testing

All testing shall be performed by the manufacturer's in-house quality control inspectors and in accordance with all provisions, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products as published by PCI.

D. QUALITY CONTROL

The precast concrete producer shall show that the following quality control tests are performed as required and in accordance with the ASTM International standards indicated.

Slump: A slump test shall be performed for each 150 cu yd of concrete produced per mix design, or once a day, whichever comes first. Slump tests shall be performed in accordance with ASTM C 143. Slump flow tests on self-consolidating concrete mixes shall be performed in accordance with ASTM C 1611.

Temperature: The temperature of fresh concrete shall be measured when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064

Compressive Strength: At least four compressive strength specimens shall be made for each 150 cubic yards of concrete of each mix design in accordance with the following applicable ASTM standards; C 31, C 39, C 192, C 497 [no-slump concrete].

Air Content: Tests for air content shall be made on air-entrained, wet-cast concrete for each 150 cu yd of concrete, per mix design, but not less often than once each day when air-entrained concrete is used. The air content shall be determined in accordance with either ASTM C 231 or ASTM C 173 for normal weight aggregates and ASTM C 173 for lightweight aggregates.

Density (Unit Weight): Tests for density shall be performed a minimum of once per week to verify the yield of batch mixes. Density tests shall be performed for each 100 cu yd of lightweight concrete in accordance with ASTM C 138. Density tests shall be performed for each 100 cu yd of concrete per mix design, but not less often than once per day when volumetric batch equipment is used.

E. INSPECTION

The customer or customer's agent (specifier) may place an inspector in the plant when the units covered by this specification are being manufactured. The precast concrete producer shall give notice of days prior to the time the precast concrete units will be available for plant inspection.

F. SUBMITTALS

1. Samples

a). Before starting the manufacture of precast concrete panels, submit for review to the Architect/Engineer one (1) sample which represents the finished product and which clearly indicates the color and texture of the panels.

b). Samples are to be 12" x 12" face size by 1-½" thick.

c). Label each sample to indicate name of manufacturer and finish code.

d). After standard samples are accepted for color and texture, submit three (3) mock-up panels at least 4'-0" x 5'-0" for review of the Architect/Engineer to show the extreme maximum variations which may occur in the color and texture of the production pieces.

e). The mock-up panels are to be the standard of quality for precast concrete panel work, when they are accepted by the Architect/Engineer.

f). The Architect/Engineer should visit the precast plant shortly after the start-up of production in order to inspect actual production pieces.

2. Shop Drawings General Contractor shall expedite the submittal with the Architect to conform with allotted shop drawing approval time, shown on the precast concrete supplier's order acknowledgment.

The content shall be as follows:
Unit shapes (elevations and sections) and dimensions.
Finishes
Joint and connection details.
Lifting and erection inserts.
Location, dimensional tolerances and details of anchorage devices that are embedded in or attached to structure or other construction.
Other items cast into panels.
Handling procedures, plans and/or elevations showing panel location and sequence of erection for special conditions.
Relationship to adjacent material
Show location of unit by same identification mark placed on panel.
Individual panel details may be submitted at the request of the Architect/Engineer. It is recognized that a review of the panel details prior to actual release for production will greatly impact the construction schedule.

3. Test Reports

Submit, upon request, reports on materials, compressive strength tests on concrete and water absorption test on units.

4. Design Calculations

Submit upon request structural design calculations.

5. Design Modifications

Submit design modifications necessary to meet performance requirements and field coordination. Variations in details or materials shall not adversely affect the appearance, durability or strength of the units.

Maintain general design concept without altering the size of members, profiles and alignment.

PART II - PRODUCTS

A. MATERIALS

1. Portland Cement

a). ASTM C150, Type I or III cement. White or gray.

b). Use same brand, type and source of supply of cement for all exposed precast concrete.

2. Air Entraining Agent ASTM C979

3. Aggregates

a). Facing and Backing Aggregates

ASTM C33 and ASTM C330

Provide fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for the entire job. They shall be clean, hard, strong, durable and inert, free of staining or deleterious material.

4. Water

a). Free from foreign materials in amounts harmful to concrete. Potable water is ordinarily acceptable.

5. Reinforcing Steel

a). Reinforcing bars

New billet deformed steel, grade 40 or grade 60, as per ASTM A615.
Weldable deformed steel, as per ASTM A706.
Galvanized reinforcing bars, as per ASTM A775.
Epoxy coated reinforcing bars, as per ASTM A775.

b). Welded wire fabric

Welded steel, as per ASTM A185
Welded deformed steel, as per ASTM A497
Epoxy coated welded wire fabric, as per ASTM A884.
Fabricated steel bar or rod mats, as per ASTM A184
Prestressing strand, as per ASTM A416, grade 270.

6. Cast-in Anchors

a). Materials

Structural steel, as per ASTM A36
Stainless steel, as per ASTM A666, type 304, grade
Carbon Steel plate, as per ASTM A283, grade
Malleable iron castings, as per ASTM A47, grade
Carbon steel castings, as per ASTM A27, grade 60 - 30
Bolts, as per ASTM A307 or A325
Welded headed studs, as per AWS D1.1, Chapter 4, Part F

b). Finish

Shop primer: FS TT-P-86, oil base paint, type I or SSPC-paint 14, or manufacturer's standard.

Galvanized: hot dip galvanized (ASTM A153), electroplated or metallized.

Cadmium coating, as per ASTM A165.

Zinc rich coating: MIL-P-21035, self curing, one (1) component, sacrificial organic coating.

7. Grout

Cement grout: Portland cement, sand and water sufficient for placement and hydration.

Non-shrink grout: Premixed, packaged ferrous and non-ferrous aggregate shrink resistant grout.

B. MIXES

a). Water-Cement Ratio

Maximum of five (5) gallons of water per 94 lbs. of cement.

b). Air Entrainment

Minimum 3% not more than 6% when concrete is placed.

c). Salt

Calcium Chloride and other ionic compounds which are electrolytic will not be permitted in concrete mix.

d). Super Plasticizer

Can be used at manufacturer's option.

e). Concrete Proportions

Selection of proportions for concrete shall be based on the methodology presented in ACI 211.1 for normal weight concrete, ACI 211.2 for lightweight concrete and ACI 211.3 for no-slump concrete. The concrete proportions shall be developed using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Accelerators containing calcium chloride shall not be used in precast concrete containing reinforcing steel or other embedded metal items.

Upon request, the precast concrete producer shall submit a mix design for each strength and type of concrete that will be used. Submitted mix designs shall include the quantity, type, brand and applicable data sheets for all mix design constituents as well as documentation indicating conformance with applicable reference specifications.

The use of self-consolidating concrete is permitted provided that mix design proportions and constituents meet the requirements of this specification.

f). Water-Cement Ratio

Concrete that will be exposed to freezing and thawing shall contain entrained air and shall have water-cement ratios of 0.45 or less. Concrete which will not be exposed to freezing, but which is required to be watertight, shall have a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water or 0.45 or less if exposed to brackish water or sea water. For corrosion protection, reinforced concrete exposed to deicer salts, brackish water or seawater shall have a water-cement ratio of 0.40 or less.

g). Air Content

The air content of concrete that will be exposed to freezing conditions shall be within the limits given below.

Nominal Maximum Aggregate Size (in)	Air Content %	
	Severe Exposure	Moderate Exposure
3/8	6.0 to 9.0	4.5 to 7.5
1/2	5.5 to 8.5	4.0 to 7.0
3/4	4.5 to 7.5	3.5 to 6.5
1	4.5 to 7.5	3.0 to 6.0
1-1/2	4.5 to 7.0	3.0 to 6.0
* For specified compressive strengths greater then 5000 psi, air content may be reduced 1%		

C. MANUFACTURING

Minimum ultimate compressive strength of precast concrete after 28 days shall be a minimum of as shown in the General Notes of Tender Drawing & BOQ.

Water absorption of architectural precast concrete panels shall not exceed a maximum of 6% by weight.

Compression test for precast concrete

Number of tests: Make compression test for each day's production of each type of concrete. Two test cylinders should be made for each load of concrete delivered to the casting bed.

Specimens

Provide test specimens for compression test at 7 and 28 days.
Obtain concrete for specimens from the actual production batch they will represent.

6" x 12" (or 4" x 8") molded concrete cylinder meeting applicable requirements of ASTM C31.
2" x 2" molded or sawed cubes. Test results will be reduced by 20%.

Finishes

Exposed face surfaces of precast concrete panels: Finished to match the approved sample panel.

Back surfaces of precast concrete panels: Should match approved sample panel.
Curing (Wet Cast)

Form cure precast units until a sufficient stripping strength has developed.
Maintain precast units at a minimum temperature of 33° F until 50% of the design strength has been reached.

Panel Identification

Mark each precast concrete panel to correspond to the code markings appearing on the shop drawings for panel location. Do not mark on the finish surfaces.
Maintain a record of casting date.

PART III - EXECUTION

A. JOBSITE CONDITIONS

Before starting to erect the precast concrete panels, the General Contractor shall verify that the structure and anchorage inserts not within the tolerances required to erect the panels have been corrected.

Determine field conditions before commencing erection.

B. PRODUCT DELIVERY, HANDLING AND STORAGE

Delivery and Handling

Deliver all architectural precast concrete units to project site in such quantities and at such times as to assure the continuation of erection.

Handle and transport units in a position consistent with their shape and design in order to avoid stresses which would cause cracking or damage.

Lift or support units only at the points shown on the shop drawings.

Place non-staining resilient spacers of even thickness between each unit.

Support units during shipment on non-staining shock-absorbing material.

Do not place units directly on the ground.

Storage at Jobsite

Store and protect units to prevent contact with soil, staining and physical damage.

Store units, unless otherwise specified, with non-staining resilient supports located in the same positions as when transported.

Store units on firm, level and smooth surfaces to prevent cracking, distortion, warping or other physical damage.

Place stored units so that identification marks are discernible and so that product can be inspected.

C. ERECTION

Clear, well-drained unloading areas and road access around and in the structure shall be provided and maintained by the Contractor, to include providing and maintaining accessible roadways in which cranes and trucks can maneuver under their own power.

Contractor shall erect adequate barricades, warning lights or signs to safeguard traffic in the immediate area of hoisting and handling operations. Any overhead obstructions interfering with the erection must be removed by others and any underground equipment installed where cranes and trucks must maneuver is installed at the risk of the trade requiring them and be protected by that contractor.
Set precast concrete units level, plumb, square and true within the allowable tolerances. The General Contractor shall provide true, level bearing surfaces on all fields placed concrete which are to receive precast concrete units. The General Contractor shall be responsible for providing offset lines and elevations in sufficient detail to allow installation.

Provide temporary supports and bracing, as required, to maintain position, stability and alignment as units are being permanently connected.

Non-cumulative tolerances for location of precast concrete units shall be as follows:

Plan location from building grid datum	± ½"
Plan location from centerline of steel	± ½"
Top elevation for nominal top elevation	
Exposed individual panel	± ¼"
Non-exposed individual panel	± ½".
Exposed relative to adjacent panel	¼"
Non-exposed relative to adjacent panel	½"

Support elevation from nominal elevation

Maximum low	½"
Maximum high	¼"
Maximum plumb variation over height of structure or 100 ft. whichever is less	1"
Plumb in any 10 ft. of element height	¼"
Maximum job in alignment of matching edges	¼"
Joint width (governs over joint taper)	± ¼"
Joint taper maximum	⅜"
Joint taper over 10 ft. in length	¼"
Maximum jog in alignment of matching faces	¼"
Differential bowing or camber as erected between adjacent members of the same design	¼"

Set non-load bearing units dry without mortar, attaining specified joint dimension with, steel or plastic cement spacing shims.

Fasten precast concrete units in place by bolting and/or welding, completing dry packed joints, grouting sleeves and pockets and/or placing cast-in-place concrete joints, as indicated on approved erection drawings.

Temporary lifting and handling devices cast into the precast concrete units shall be completely removed or if protectively treated remove only where they interfere with the work of any other trade.

D. REPAIR

Repair exposed exterior surface to match color and texture of surrounding concrete.
Adhere large patch to hardened concrete with bonding agent.

E. CLEANING

Precast concrete panels will be clean upon completion of erection and leaving the job site.

After installation and joint treatment the General Contractor should protect the architectural precast concrete panels against damage and maintain the cleanliness of the panels. Any final wash-down of the precast architectural panels should be the responsibility of the General Contractor.

F. PROTECTION

All work and materials of other trades shall be adequately protected by the Erector at all times.
A fire extinguisher, of an approved type and in operating condition, shall be located within reach of all burning and welding operations at all times.

G. WARRANTY

The Precast Concrete Manufacturer shall guarantee the precast concrete products against defects in material and workmanship, for a period of minimum one (1) year, after acceptance of the units by the owner.

EXCAVATION, TRENCHING AND BACKFILLING

1. SCOPE

The work covered by this section of the specifications consists of furnishing all plant, labour, equipment, appliances and materials and performing all operations in connection with excavation, trenching and back-filling for sewer and water supply lines and all other structures including all incidental works necessary for excavation to the required depth and dimensions in accordance with the applicable drawings, or as directed by the Engineer. The work shall be carried out in complete conformity with the specifications, set-forth hereunder.

2. SETTING OUT

Lines and levels will be set out by the Contractor who shall be responsible for maintaining all stakes and witness points set-up by the Engineer for the execution of work in strict accordance with them.

3. CLEARING AND GRUBBING

The sites of all excavations shall be cleared of all shrubs, plants, bushes, large roots, rubbish and other objectionable materials. All such materials shall be removed from site of work or otherwise disposed off at no extra cost in a manner satisfactory to the Engineer. All trees and shrubbery that are designated by the Engineer to remain shall be adequately protected and preserved in an approved manner.

4. EXCAVATION

4.1 General

The contractor shall remove the whole of the vegetation, top soil, concrete, flagging, paving, curbing, road metalling and other materials from the site of any excavation and shall keep separately and preserve the same for re-use where applicable. The ground shall be excavated for the permanent and temporary works to the required depths, width and levels so that the dimensions of the permanent work shall not be less than as shown on the Drawings, or as may be directed.

All rubbish, filth and matter of an offensive nature taken out of any excavation shall be disposed off at once and not left on the surface within the site.

4.2 Shoring Excavation

The Contractor shall, to the satisfaction of the Engineer, shore the sides of excavations for structures, trenches and pits to prevent them from slipping or falling. Should any slips fail or settlement nevertheless occur they should be made good by the Contractor at his own expense with selected fill or with mass concrete as may be directed by the Engineer.

In removing shoring from the sides of excavations, care shall be taken to avoid bringing loads on to any concrete until it has hardened sufficiently to carry such loads.

Timber or other material used for shoring the sides of excavations shall be removed as the work proceeds except when ordered to be left, in by the Engineer.

The Contractor shall, not later than four weeks before commencing any excavation, submit to the Engineer for inspection calculations and working drawings for the proposed scheme for strutting and retaining the sides of the excavations and shall not proceed with the appropriate sections of the works until receipt of the Engineer’s written consent.

The receipt of such consent shall not relieve the contractor of any of his duties and responsibilities under the Contract.

4.3 Trial / Test Pits

The Contractor may be required to excavate trial pits and trial trenches upto about 10% of the total quantity of excavation specified in the contract at appropriate locations to determine the actual level of the existing water table, and position of existing conduits, water mains, gas mains, cable ducts and sewers etc. This excavation work shall be done carefully with due precaution, so as not to damage any existing services. The Contractor may be precluded from carrying out any permanent work until this information is obtained and may have to adopt his program in accordance with the information so obtained by the Contractor.

Trial test pits will be required to be dug before or during the execution of work at locations directed by the Engineer for determining the condition of soil, checking the location of utility services water levels etc. The size of individual trial pits may be kept 5ft x 5ft up to the required depth. The dimensions may be varied depending upon the site condition and as per instruction of the Engineer. The Contractor shall obtain prior permission from Engineer in writing before start of work on trial pits. No separate payment shall be made for trail pits required to be dug by the Contractor.

The cost incurred by the Contractor on the trial / test pits shall be deemed to be included by the Contractor in his rates for excavation.

4.4 Classification of Soils

Excavation shall include the removal of all materials in all kinds of soils or stratas of every name and nature. The sub- soil in the project area mostly comprises of clay with fine sand and silt and high sub-soil water level. A considerable amount of dewatering and supports for the sides of excavation will be essential including bore holes, well point system and side supports comprising of shuttering, bracing, strutting and sheet piling. However the Contractor shall make his own assessment after detailed study of the area and digging the required trial / test pits as required in this regard. No claim shall be allowed on account of any omission or error in such data trial / test pits.

If rock is encountered it shall be removed carefully and without excessive noise and vibration. Blasting shall not be allowable. The quantities of earthwork for each category of excavation i.e. soil, and rocks are provisional. The Engineer shall do the classification of soil during actual excavation. In case the Contractor meets rock during the excavation, the contractor shall request the Engineer in writing for a joint inspection for classification of soil. The Engineer shall visit the site during excavation and give his opinion in writing about classification of soil for the particular site or alignment.

The excavation payable shall be limited to the dimensions and elevations as indicated on the drawings. Foundations on made up ground shall be taken down to nascent soil as per direction and approval of the Engineer. Excavation shall extend to a sufficient distance away from walls and footings to allow for placing and removal of forms, installation of services and for inspection. No payment shall be made for this extra excavation. The Contractor's rate for excavation shall be deemed to include for such extra excavation.

In the event of any excavation being carried out deeper than specified, the same shall be filled in by the Contractor at his own cost to the required level with lean concrete if beneath footing or with proper compacted local river sand if beneath slab.

4.5 Soil Investigation

This Clause shall apply to soil mechanics as well as foundation engineering to the Site where the works are being constructed, to determine the suitability of the foundation proposed for the works to be constructed on the site.

The Contractor should carry out his own soil investigation to see the soil conditions and its bearing capacity and this should be priced in the Preliminaries Section of the bill of quantities

a) Digital Submittals of Soil Investigation

All reports and drawings shall be submitted in digital form (CD or similar), as follows:

i). The Contractor shall provide on recordable CD media an identical reproducible copy of the report. This shall be in a PDF format to be directly readable as a single file.

ii). The Contractor shall provide in digital format all relevant information in an editable Excel spreadsheet form able to be directly convertible in “KEY AGS3”. The format spreadsheet will be made available from the Engineer.

The Contractor should make himself aware of the following software to ensure the relevant information and content is provided.

- KEY AGS 97
- HOLEBASE 3
- KEYHOLE 5
- KEYHOLE VETRA

The Contractor shall provide in editable format the following in CD media:

• *.doc (WinWord)	All report text.
• *.jpeg	All borehole records.
• *.jpeg	All laboratory test data sheets and results.
• *.jpeg	All core photography
• *.dwg (AutoCAD V14)	Miscellaneous report drawings

5. POLYTHENE SHEETING

Polythene sheeting where shown on the drawings shall be Visquenn 1000 super D.P.M. Sheeting manufactured by approved supplier in rolls and laid by rolling over the prepared base at the levels and in the areas shown on the drawings. Where a joint is necessary at the side or end of a sheet this shall be a double welt folded joint made by placing the edges together and folding over twice. The joint shall be prevented from opening prior to concreting by blocks placed at intervals on top of the joint. Particular care shall be taken in forming the joint between horizontal and vertical sheets where the concrete requires to be wrapped so that a continuous damp proof membrane is formed.

The contractor shall protect the sheets from damage during laying and subsequent operations and shall replace all damaged sheets to the satisfaction of the Engineer.

6. PRECAUTIONARY AND REMEDIAL MEASURES

6.1. Protection of Existing Facilities and Structures

The Contractor shall take every necessary precaution not to endanger the safety, occupation or operation of any property, structures, installations or services in the vicinity of his operations and shall observe any restrictions imposed by authority concerned / Engineer to this end. Should any such property, structures, installations or services be endangered or damaged as a result of the Contractor's operations, he shall immediately report any such danger or damage to the Engineer's Representative and any authority concerned and shall forthwith undertake remedial measures to the satisfaction of the Engineer or the appropriate authority.

6.2. Planking and Strutting

The Contractor shall provide, if required, at his own expense to the satisfaction of the Engineer all times support effectively the sides of the pipe trenches and other excavation by suitable timbering, sheet piling, sheeting, bracing, strutting etc. Where required the contractor shall use close timbering in all loose or sandy or unstable stratas both above or below ground level, if found necessary by the Engineer and accord approval. It is intend that all timbering and side supports for sewer trenches shall be removed as the work proceeds. The Contractor shall ensure that the removal of timbering and side supports is done gradually and carefully to avoid any damage to existing or new structures, roads, pavements or any other private or public property. All timbering, sheeting and their supports shall be of adequate strength and dimension and fully braced and strutted so that no collapse, subsidence or any damage to public or private property shall take place. The Contractor shall be solely responsible for the sufficiency of all timbering, sheet piling and their supports to be used and all damages to persons or property resulting from

the improper quality, strength, placing, maintaining or removal of the same shall be payable by him under all circumstances.

In removing timbering, shoring and strutting and all other supports from excavation and trenches etc., special care shall be taken to avoid bringing pressure to beat on any concrete or other work until it has hardened sufficiently to resist such pressure.

6.3. Removal of Water

The Contractor shall build all drains and do ditching, pumping and all other work necessary to keep the excavation clear of sewage, storm water and water from any source during the progress of the work and until the finished work is safe from injury. All water pumped or drained from the work shall be disposed of in a manner satisfactory to the Engineer and necessary precautions against flooding shall be taken. The contractor should submit the Methodology of dewatering for approval. It may also be noted that any approval of the methodology will not relieve the contractor from any of his responsibilities / obligations.

The Contractor shall be required to arrange well point equipment and / or adequate number of tube wells or both and pumping machinery for dewatering and lowering the existing water table for construction purposes in the areas where sub-soil water or any sewage and water from any other sources are encountered. The system shall be capable of working non-stop 24 hours a day for the entire duration of the work without break during excavation, and for laying of sewer, pipes and bedding, construction of manhole, construction of structures, testing of sewers/ pipes and backfilling. The system of dewatering proposed to be adopted shall be submitted by the contractor with sufficient details along with the tender for approval of the Engineer. The Contractor is required to visit the site before submitting his tender and investigate the available mean of disposal of pumped water including laying of temporary pipeline for transmission of water during the period of excavation providing bedding, laying & jointing of sewer, pipes and construction of any structure up to ground level. The cost of all such works required for pumping and disposal of water from trenches/ pits shall be considered to be included in the BOQ rates for excavation.

6.4. Maintenance of Excavation

All excavation shall be properly maintained with while they are opened land exposed. Sufficient suitable barricades, warning lights, flood lights, signs, and similar items shall be provided by the Contractor. The Contractor shall be responsible for any damage due to his negligence.

6.5. Surplus Materials

All surplus materials shall be disposed off at locations approved by the Engineer. The disposal of surplus material shall not interfere with other works and shall not damage or spoil other material. When it is necessary to haul earth or rock material over street or pavement, the Contractor shall prevent such materials from falling on the street or pavement.

6.6. Cutting Pavement

In cutting or breaking street surfacing, the Contractor shall not use equipment which will damage the adjacent pavement. Existing paved surface shall be cut back beyond the edge of trenches to form neat square cuts. The road ballast and other materials shall be placed on one side and shall be preserved for re-installment when the trench is filled. Wherever necessary or required for the convenience of the public or individual residents, at street crossings and at private driveways, the Contractor shall provide suitable temporary bridges over unfilled excavations. All such bridges shall be maintained in service until backfilling has been completed. The Contractor shall keep the road crossings manned 24 hours per day. During night time, enough red lights shall be provided to warn traffic. If detour is necessary, the Contractor shall make proper detour for the traffic and shall install- signs 3 ft x 4 ft in size indicating the detour.

7. FILL, BACKFILLING AND RESTORING OF GROUND TO ORIGINAL CONDITION

7.1. Fill, where required to raise the sub-grade for concrete slabs, shall be clean, unadulterated local river sand and shall be free from wood, stones and other debris. Excavated material shall only be used for fill if approved by the Engineer or his representative.

All fill backfilling or earthwork in embankment shall be compacted by mechanical rammer, or other approved equipment in layers not more than 150 mm thick. Each layer shall be uniformly spread and fully compacted and shall have proper moisture content for the required degree of compaction which shall be done by mechanical tampers as approved by Engineer.

After completion and final approval of the work of sewers and other construction as shown on drawings and prior to backfilling, forms shall be removed carefully and excavation shall be cleaned of stones and debris. Backfill shall be brought to a suitable elevation above ground to provide for anticipated settlement and shrinkage thereof.

Backfill shall not be placed against walls etc., prior to the water proofing treatment if provided and approved by the Engineer. Backfill shall be brought up evenly on each side of walls as far as practicable. Heavy equipment for spreading and compacting backfill shall not be operated closer to the wall than distance equal to the height of the backfill above the top of base slab footing. No back filling shall be done before the new structure has been cured for atleast two weeks.

7.2. Backfilling and Restoring of Ground to Original Condition

The back filling of the trench shall be allowed after the sewer pipe has been laid and jointed over the specified bed, inspected, checked, tested and approved by the Engineer. Backfilling of the trenches shall be carried out by filling to depth up to half pipe level. The filling shall then be thoroughly rammed more filling shall be carried out and rammed again until the consolidated filling reaches pipe top level. Only selected, dry materials free from stones or debris shall be used for backfilling, which shall be spread and rammed evenly across the trench. Thereafter, the trench shall be filled in layers not exceeding 150 mm in depth, each layer being properly rammed before the next layer is placed so that 95-100% compaction is obtained as per AASHTO Standard.

On completion of backfilling, the Contractor shall level all grounds disturbed by him in the course of the work, spread topsoil where necessary as directed by the Engineer.

8. ACCEPTANCE OF EARTHWORK AND FILLING

Acceptance of earthwork and filling shall be determined by testing the degree of compaction and the levels and evenness of surface of the approved materials. Such testing and acceptance shall be performed as the work progresses. Each layer shall be tested and approved prior to progressing with additional layers. The engineer shall have the right to retest any areas at any time and the Contractor shall be responsible for correcting and deficiencies.

9. COMPACTION PROCEDURE

The procedure for compacting the existing sub-grade and any filling material is subject to the approval by the Engineer and shall be generally as outlined below. The adoption of the procedure outlined below and the giving of approval by the Engineer shall not relieve the Contractor of his responsibility in providing compacted soil in accordance with sub-clause a below.

a) Each layer of profile shall be compacted to give a minimum density of 90% of the Maximum Dry Density throughout the whole thickness of the layer or the top 300 mm of existing sub-grade. The maximum dry density being established by B.S Standard Tests (or AASHO equivalent tests). (B.S test to BS 1377:1975 – Test No. 9 AASHO test to AASHO T 160 – 61).

b) After carrying out the grading, leveling, scarifying, pulverizing, etc., of the soil layer to be compacted as per specifications, the Contractor shall add the necessary amount of water to permeate the pulverized soil in the quantity required, all in accordance with the instructions of the Engineer.

c) The soil shall then be thoroughly mixed after adding each lot of water so as to achieve homogenous moisture content in the whole thickness of the layer.

d) Before compacting, sample from the pulverized soil will be taken and tested, in order to check the natural moisture content and to bring it within +2 and or -4 per cent of the Optimum

Moisture Content. When the material is within this moisture range, it shall be primarily leveled in order to commence earth compaction.

e) After primary leveling referred to above, compaction shall be commenced by means or approved rollers depending on the type or soil being compacted in order to obtain the required density.

f) The rolling shall be carried out until the soil reaches the required density. If the surface is super-elevated, rolling shall commence from lower side and continue to the higher side. In order to compensate for the amount of water lost in evaporation in the course of compaction, additional quantities of water shall be added as required.

g) The surface shall thereafter be leveled longitudinally and transversely by motor graders and finally rolled to achieve uniform compaction free from undulations, soft spots and depressions all in conformity with the allowable tolerances for evenness of surfaces.

h) Compaction of sloped sections of embankments and ditches shall be carried out as hereinafter specified with regard to pulverization of soil, addition of the necessary water. Shaping and compaction to the required degree of compaction and the required design sections.

i) The Contractor's attention is drawn to the necessity of providing all machinery, equipment and attachments required for the effective and efficient shaping and compaction of these sloped sections.

10. DEGREE OF COMPACTION

The maximum dry reference density and optimum moisture for earthwork materials shall be determined by the BS or AASHTO tests by using the methods described in Clause A–5 above subject to approval of the Engineer.

The density and thickness of any compacted layer shall be ascertained by obtaining a specimen from the soil after completing compaction In accordance with the B.S or AASHO Specifications and control curves of dry density compaction and optimum moisture content established for each type of soil material being used. In case this specimen does not conform with the required density and thickness, additional tests may be taken to determine' the limits of the failing area, after which the contractor shall scarify, pulverize, water, compact and level the layer again, and if necessary, add new material (or otherwise modify the existing material) at his own expense, all in accordance with specifications, until the required result is obtained. The Contractor shall allow in his daily work program enough time to permit the performance and checking of the above tests, all in accordance with the instructions of the Engineer and under his guidance.

11. BORROW

In case of non-sufficiency of excavated material and un-suitability of earth for backfilling, conforming to the above specifications, such material shall be brought from the approved source, by the Contractor.

12. GRADING

After the completion of all backfilling operations, the Contractor shall grade the work areas to the lines, grades and elevations shown on the drawings or as directed by the Engineer. Finished grading shall not be done until the installation of all utilities of appurtenances has been completed and tested. Prior to final acceptance, all damage due to settlement shall be repaired by an at the expense of the Contractor.

13. TESTING OF SOIL IN PLACE

The Engineer will make tests using the calibrated sand cone method/core cutter method to determine the density of soil in place. If soil in place fails to meet the specified degree of compaction the areas represented by the failing tests shall be removed, replaced and compacted to the specified density in the manner directed by the Engineer and at no additional cost to the Employer.

14. REMOVAL OF EXCESS AND UNDESIRABLE MATERIALS

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

14.2. The Contractor shall keep all excavated soil sprinkled with water during the excavation work so as to prevent any dust nuisance.

14.3. Surplus Excavation Debris etc.

All surplus soil arising out of the work shall be carried away to approved site, within a week, deposited and spread as directed by the Engineer.

The Contractor shall carry out the cutting of existing bituminous road as required for excavation for carrying out the work, to the full depth of hard crest of any existing thickness. The stone metal soling etc. shall be separately stacked along the side of excavation for possible reuse.

15. PROTECTION OF UTILITY SERVICES

15.1 Utility Lines

The Contractor shall take every necessary precaution not to endanger the safety, occupation or operation of any property, structures, installations or services in the vicinity of his operations and shall observe any restrictions imposed by authority concerned / Engineer to this end. Should any such property, structures, installations or services be endangered or damaged as a result of the Contractor's operations, he shall immediately report any such danger or damage to the Engineer's Representative and any authority concerned and shall forthwith undertake remedial measures to the satisfaction of the Engineer or the appropriate authority.

When any existing utility lines are encountered within the area of operations, the contractor shall take all necessary measures so that these are neither disturbed nor damaged. The Contractor shall be fully and solely responsible for any damage occurring due to non-providing of adequate measures for the protection of such services. The Contractor shall be required to obtain all necessary permissions from different departments / agencies in writing prior to start of work and maintain the affective liaison for trouble free progress of work(s). The contractor shall pay all fees, charges officially levied by such department / agencies while issuing required permission. The Contractor shall furnish originals of payment receipts alongwith his written request for allowing payments by the Engineer accordingly. In case of restoration to unavoidable damage to any utility service, line or by passing such line the procedure as detailed shall be followed in accordance with rules, regulation, specification or practice as preferred by the concerned department / agency.

15.2 Damage to Surface

If carriage ways, verges or footways in roads, whether paved or unpaved, or gardens, plantations or other surfaces are damaged outside the limits of the excavations due to lack of proper traffic control or moving plant and equipment or other operations of the contractor then such surfaces shall be reinstated by the contractor at his own expenses. The surfaces shall be restored to their original condition using such materials as may be required whether obtained from the excavated materials or not.

15.3 Maintenance of Traffic

The Contractor shall keep the road crossings manned 24 hours per day. During night time, enough red lights shall be provided to warn traffic. If detour is necessary, the Contractor shall make proper detour for the traffic and shall install signs 3 ft x 4 ft in size indicating the detour.

When the excavation is in roads, care shall be taken to cause the least inconvenience to traffic. When directed or necessary for the maintenance of traffic, the contractor shall remove from the site all materials as excavated from the trenches and return the same as necessary for refilling after the structures have been completed or the pipes tested and approved.

15.4 Control of Traffic on Roads

The Contractor shall ensure that the flow of traffic over the existing roads and access to properties is maintained at all times during the contract. The flow of traffic is to take place at all time over a reasonable surface, which is to be segregated as far as possible from areas where work is in progress. The contractor shall provide flagmen and signaling equipment as may be necessary to control the traffic to the satisfaction of the Engineer and the appropriate controlling Authority. In the planning and execution of any temporary or permanent works, which may effect the traffic flow and / or access to properties, the contractor shall co-operate closely with the Engineer and the appropriate controlling Authority.

16. MEASUREMENT AND PAYMENT

16.1 Excavation and Backfilling

Measurement and payment for excavation and filling shall be made in accordance with the following provision:

a) Method of Measurement

The measurement shall be made of the earth acceptably excavated for trenches and structures within the lines and grades shown on the drawing or as directed by the Engineer.

b) Basis of Payment

i). Payment for earth excavations for trenches and structures will be made at unit price stated in Bid Schedule of this contract or in applicable Variation Orders.

ii). For the purpose of measurement, the depth of filling shall be taken as consolidated depth.

PLAIN & REINFORCED CONCRETE

1. SCOPE OF WORK

The work to be done under this section of the specifications shall consist of furnishing all plant, labour, equipment, appliances and materials and in performing all operations in connection with providing and placing plain and reinforced cement concrete, in position as shown on the drawings including furnishing formwork, batching, mixing, finishing and curing as per drawings or as directed by the Engineer.

2. CLASSES OF CONCRETE

The classes of concrete recognized in these specifications shall be designated: A, B, C, D1, D2, D3, Y and Lean concrete. The class of concrete to be used shall be as called for on the Drawings or as directed by the Engineer or specified in the special provisions. The following requirements shall govern unless otherwise shown on the Drawings.

Class A1 concrete shall be used everywhere, for non-reinforced and reinforced concrete structures, except as-noted below or directed by the Engineer. Concrete placed underwater shall be Class A2 with a minimum cement content of three hundred fifty (350) kg per cubic meter of concrete with a slump between ten (10) and fifteen (15) cm. Concrete placed for piles shall be Class A3 with a minimum content of four hundred (400) kg per cubic meter.

Class B Concretes shall be used only where specified.

Class C concretes shall be used for cribbing, or as otherwise directed by the Engineer or specified in the Special Provision or on the Drawing.

Class D1, D2 or D3, concrete shall be used for pre-stressed and post-tensioned elements, as indicated on drawings.

Class Y concrete shall be used as a filler in steel grid bridge floors, in thin reinforced sections or as otherwise specified in the Special Provisions.

Lean concrete shall be used in thin layers underneath footings and when called for on the Drawings or directed by the Engineer.

The concrete of the various classes shall satisfy the requirements shown in Table.

Table
Portland Cement Concrete Requirement

Class of Concrete	Min. cement Kg/ Cubic Meter	Max. Size of Coarse Aggregate (mm)	28 days compressive strength (Min) (Cylinder) (Kg/ Sq.cm.)	Consistency (Range in Slump) Vibrated (mm)	Maximum permissible water-Cement Ratio
A1	300	20	210	25-75	0.58
A2	350	25	245	100-150	0.58
A3	400	38	280	100-150	0.58
B	250	51	170	25-75	0.65
C	275	38	210	25-75	0.58
D1	450	25	350	50-100	0.40
D2	500	25	425	50-100	0.40
D3	550	25	500	50-100	0.40
Y	400	13	210	25-75	0.58
Lean Concrete	175	51	100	-	-

2.1. Types of Concrete Works

2.1.1 Underground Concrete

Concrete poured below Natural Surface Level with or without shuttering and shoring.

2.1.2 On-ground Concrete

Concrete poured by exiting formwork with necessary bracings on ground.

2.1.3 Elevated Concrete

Concrete poured by existing props, bracing and towers to support the formwork at higher levels.

3. EFFECT OF MATERIALS STRENGTH

The cement and aggregate used have significant influence on strength properties. The use of unsound aggregates will produce large variations in the strength of concrete. In general, however, a good aggregate will develop the full strength of the cementing matrix and therefore should cause little variation in the product. Strength is increases slightly with larger size coarse aggregates.

4. MATERIALS

4.1 Cement

i). The cement shall be fresh and of approved origin and manufacture, it shall be one of the following as may be specified by the Engineer.

   a). Ordinary or Rapid Hardening Portland Cement shall comply with the requirements of PS 232 or BS 12.

   b). Sulphate-Resisting Portland Cement complying with the requirements of PS 612 or BS 4027.

ii). Unless otherwise specified, ordinary Portland Cement shall conform the requirements of the standard specifications for Portland Cement, AASHTO Designation M55, ASTM Designation C150.

iii). Mill Certificates shall accompany delivery of the material to the work.

iv). There shall be sufficient cement on site to ensure that each section of work is completed without interruption. If the cement is supplied by the Employer, the contractors should inform the Employer of his requirements much before its use in construction.

v). Cement reclaimed from cleaning of bags or from leaky containers shall not be used.

vi). The Contractor shall provide and erect (at his cost) in a suitable place dry, well ventilated, weather-proof and waterproof shed of sufficient capacity to store the cement.

vii). The cement shall be used as soon as possible after delivery and cement which has become stale or unsuitable through absorption of moisture from the atmosphere or otherwise shall be rejected and removed immediately from the site at the Contractor's expense. Any cement in containers damaged so as to allow the contents to spill or access of the atmosphere to the cement prior to opening at the time of concrete mixing shall be rejected and removed immediately from the site at the Contractor's expenses.

viii). Cement stored through a monsoon or for more than six months should not be used in reinforced concrete.

ix). Different brand or different types of cement from the same mill, or the same brand or type from differing mills shall not be mixed or used alternately in the same item of construction unless authorized by the Engineer, after preparing new mix designation.

4.2 Water

The water for curing, for washing aggregates and for mixing shall be fresh, clean, clear, potable and free from impurities & deleterious matter. Water containing less than 2000 parts per million (ppm) of total dissolved solids with following limits on contaminants, recommended to be used for concrete.

Contaminants	Conventional Reinforced Concrete	Pre-stressed Concrete	Non-reinforced Concrete
OIL	None	None	None
CHLORIDES, ppm	1,000	650	2,000
SULPHATES, ppm	1,000	800	1,500

In no case shall the water contain an amount of imparities that will cause arrange in the setting time of Portland cement of more than twenty five (25) percent nor a reduction in the compressive strength of mortar at fourteen (14) days of more than five (5) percent when compared to the result obtained with distilled water.

In addition to the above requirements, water for curing concrete shall not be contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

When required by the Engineer, the quality of the mixing water shall be processed by the standard method of test for quality of water to be used in concrete. AASHTO Methods of Sampling and Testing, Designation T26 and BS 12.

5. AGGREGATES

a) The quality and sources of all aggregates for concrete shall be approved by the Engineer before the materials are delivered to the site. Aggregates shall be obtained from a source known to produce aggregates satisfactory for concrete and shall be chemically inert, strong, hard, durable of limited porosity and free from adhering coatings, clay lumps, coal and coal residues, and organic or other impurities that may cause corrosion of the reinforcement or may impair the strength or durability of the concrete.

   The aggregates, if directed by the Engineer shall be tested in accordance with the requirements of BS 812.

b) Wherever feasible the nominal maximum size of aggregate for cast-in-place reinforced concrete slabs and other thin members shall also be 20mm (¾"). If there are difficulties in placing such a concrete the maximum size may be restricted to 12mm (½") provided the requirements for strength are satisfied.

c) The nominal maximum size of the aggregate for precise concrete shall not be large than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear distance between reinforcing bars or between bars and forms, whichever is least. In precast columns the nominal maximum size of the aggregate shall be limited as above but shall not be larger than two-thirds of the minimum clear distance between bars.

d) Fine Aggregates

Fine aggregate shall be hard coarse sand, crushed stone or gravel screening and shall conform to the requirements of PS 243 and / or BS 882. Only fine aggregate of grading zones 1 to 3 (BS 882) mainly passing a 3/16 inch BS shall be used, aggregate of zones 4 may be used for special mixes.

Fine aggregates shall conform to BS 882 Grading Zone 1 and 2 and shall be graded as follows:

Percentage (by weight) passing

B.S. Sieve	Grading Zone 1	Grading Zone 2
3/8"	100	100
3/16"	90 - 100	90 - 100

B.S. Sieve	Grading Zone 1	Grading Zone 2
No. 7	60 - 95	75 - 100
No. 14	30 - 70	55 - 99
No. 25	15 - 34	35 - 59
No. 52	5 - 20	8 - 30
No. 100	0 - 10	0 - 10

e) Coarse Aggregate

Coarse Aggregates shall be crushed stones, comprising of angular or rounded in shape and shall have granular or crystalline or smooth (but not glassy) non powdery surface free from friable, flaky and laminated pieces, mica and shale and all such matters as may be injurious to the concrete. All coarse aggregate shall conform to BS.

f) Storage

All aggregates shall be stored on properly constructed paving and bins or as directed by the Engineer. There shall be a physical partition between the stockpiles of coarse and fine aggregates. If required aggregates shall be washed and screened to the satisfaction of the Engineer.

g) Sieve Analysis

Sieve analysis of all the aggregates to be used in the works shall be carried out as and when required by the Engineer. All aggregates shall be subject to the approval of the Engineer.

f) Rejected Aggregates

Any aggregates not found to be of the specified standard shall be rejected by the Engineer and all such rejected material shall have to be removed from site without delay.

Concrete structures constructed with rejected aggregates shall be dismantled and rebuilt at the Contractor's expense.

6. COMPOSITION OF CONCRETE

a) Cement and Aggregates

The fine aggregate and the coarse aggregates shall be measured separately by weight. The proportions weight of cement to fine aggregate and coarse aggregate shall be determined by mix design approved by the Engineer. The Contractor shall propose mix designs duly supported by cube tests for each grade of concrete for the approval of the Engineer.

b) Water Cement ratio

The quality of water used shall be just sufficient to produce a dense concrete of adequate strength and workability for its purpose. For all external if work and foundations the water / cement ratio shall not exceed 0.55.

c) Workability

The workability shall be controlled by direct measurement of the water content, allowance being made for any water in the fine and coarse aggregates. The concrete shall be just sufficiently workable to be placed and compacted, without difficulty, by the means available.

The workability shall be determined by either the slump or compaction factor tests as directed by the Engineer and these shall be performed in accordance with the methods given in PS 422 and PS 717. The slump or compaction factor for each grade of concrete shall be determined during the Preliminary Test mixes and the value obtained shall not be modified without the written consent of the Engineer. Unless otherwise permitted or specified, the concrete shall be pro- portioned and produced to have a slump of 75 mm or less if consolidation is to be done by vibration, and 125mm or less if consolidation is to be by methods other than vibration. A tolerance of upto 25mm above the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit, Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

7. PLASTICIZER / ADMIXTURE

Admixtures shall only be allowed to be used with written permission of the Engineer. If air-entraining agents, water reducing agents, set retarders or strength accelerators are permitted to be used, in exact dosage recommended by the manufacturer.

The Contractor shall submit concrete mix design for approval, prior to the commencement of work. No work shall be carried out without getting written approval of concrete Design Mix from the Engineer.

8. FORMWORK

a). General

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

- Earth cuts shall not be used as forms for vertical surface of reinforced concrete work unless required or permitted.

- Mud centering shall not be permitted.

- Formwork shall be of wrought timber, steel, plywood, proprietary building boards which gives the required finish to the surface of concrete. Wooden formwork shall be free from loose knots and shall be well seasoned.

- The formwork shall conform to the shape, line and dimension as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete and shall be sufficiently tight to prevent loss of liquid from the concrete.

  The design and engineering of the formwork as well as its construction shall be the responsibility of the contractor. Where necessary to maintain the specified tolerances the formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Design of formwork shall, in general, conform to ACI 347-68.

  In normal circumstances (General where temperatures are above $20^{o}C$ ($68^{o}F$)) and where ordinary cement is used forms may be struck after expiry of the following periods:

Concrete work	Period
Walls, columns and vertical sides of beams	48 hours or as may be decided by the Engineer.
Slabs (shores or props left under)	6 days
Beams soffits (shores or pros left under)	12 days
Removal of shores or props to slabs: i). Spanning upto 14 ft ii). Spanning above 14 ft.	 10 days 16 days
Removal of shores or props to beams: i). Spanning upto 20 ft ii). Spanning above 20 ft.	 18 days 25 days

  For rapid hardening cement 3/7 of the above period will be sufficient in all cases except vertical sides of slabs beams and columns which should be retained for minimum 24 hours.

b). Making Forms

Concrete forms shall be constructed and maintained so as to prevent warping and the opening of joints due to the shrinkage of the lumber and shall be true to the dimensions, lines and grades of the structure and with the sufficient strength, rigidity, shape and surface

smoothness as to leave the finished works true to the dimensions shown on drawings or required by the Engineer and with the surface finish as specified.

Dimensional Tolerances

Dimensions	Permissible Deviation (mm)
Position on plan of any point measured from the nearest Grid line.	+5
Vertically Plumbness in height 1 in 400. Maximum permitted.	+10
Cross section and linear dimensions of beams, slabs, columns and walls Up to and including 1m.	+7
Over 1m up to and including 15m.	+15
Bow and camber other than designed camber of any Point of the surface from a straight line joining the Extremities of that surface up to and including 3m apart.	+5
Level from designed level with reference to the nearest Datum of the upper or lower surface as may be specified of any slab or other element or component.	+10

Forms for exposed surfaces shall preferably be lined with, plywood, or other approved material, or may with the Engineer's permission, be made of dressed lumber of uniform thickness. Forms shall be filled at all sharp corners(Minimum two (2) cms triangular, fillets) and shall be given a level or draft in the case of all projections, such as girders and copings, to ensure easy removal.

Form fasteners consisting of form bolts, clamps or other devices shall be used as necessary to prevent spreading of the forms during concrete placement. Bolt and tie positions shall be arranged to conform to the symmetry of formwork panels. The use of ties consisting of twisted wire loops to hold forms in position will not be permitted. Metal ties or anchorage within the forms shall be so constructed as to permit their removal to the minimum depth of cover for the class of concrete and exposure condition.

Fitting for metal ties shall be of such design that, upon their removal, the cavities that are left will be of the smallest possible size. The cavities shall be filled with cement mortar and the surface left sound, smooth, even, and uniform in colour. Anchor devices may be cast into the concrete for later use in supporting forms or for lifting precast members. The use of driven types of anchorage's for fastening forms or form supports to concrete will not be permitted.

Void formers shall be secured in position at regular intervals to prevent displacement and distortion during concreting. The void formers shall be supported on precast concrete blocks or rigid welded steel cradles to the approval of the Engineer. The ties securing the void formers shall be attached to the formwork and cross bearers of the falsework. The void formers shall not be tied to or be supported on the reinforcement.

The inside surfaces of forms shall be cleaned of all dirt, mortar and foreign material. Forms which will later be removed shall be thoroughly coated with form oil prior to use. The form oil shall be a commercial quality form oil or other approved coating which will permit the ready release of the forms and will not discolour the concrete. Care shall be taken to ensure that the lubricant does not come into contact with the reinforcement. All exposed surfaces of similar portions of the concrete structure shall be formed with the same forming material or with materials which produce similar concrete surface textures, colour and appearance.

Concrete shall not be deposited in the forms until all work in connection with constructing the forms has been completed, all materials required to be embedded in the concrete have been placed for the unit to be poured, and the Engineer has inspected and approved said forms and materials.

The rate of depositing concrete in forms shall be such as to prevent deflections of the forms or form panels in excess of the deflections permitted by these specifications. Maximum deflection allowed due to prop settlement is 5 mm and due to bending of shutters is 3 mm, when measured with 3 meter straight edge.

Forms for all concrete surfaces, which will not be completely enclosed or hidden below the permanent ground surface, shall conform to the requirements herein for forms for exposed surfaces. Interior surfaces of underground drainage structures shall be considered to be completely enclosed surfaces.

Formwork for concrete placed under water shall be watertight. When lumber is used, this shall be planed and tongued and grooved.

Forms for exposed concrete surfaces shall be designed and constructed so that the formed surface of the concrete does not undulate excessively in any direction between studs, joists, form stiffeners, form fasteners, or wale's undulations exceeding two (2) mm of the center to center distance between studs, joints, form stiffeners, form fasteners, or wales will be considered to be excessive. Should any form or forming system, even though previously approved for use, produce a concrete surface with excessive undulations, its use shall be discontinued until modifications, satisfactory to the Engineer have been made. Portions of concrete structures with surface undulations in excess of the limits herein may be rejected by the Engineer, and he may ask the contractor for the rectification measures.

Forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods, which shall be determined, as herein specified. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer will order the work stopped until the defects have been corrected.

The shape, strength, rigidity, water-tightness, and surface smoothness of reused forms shall be maintained at all times. Any warped or bulged lumber must be resized before being fused. Forms that are unsatisfactory in any respect shall not be reused.

For narrow walls and columns, where the bottom of the form is inaccessible, the lower form boards shall be adjustable so that they may be removed for cleaning out extraneous material immediately before placing the concrete.

c). Rigid with Allowance for Camber and Bulges

It shall be fabricated and erected in position, perfect in alignment, levels and true to plumb and shape and securely braced so as to enable it to with stand all weights, live and vibrating, to be endured during placing of concrete and its subsequent hardening till the form work is struck. It shall be sufficiently rigid as not to loose its form or bulge, or deflect and to give the finished concrete the required lines, plumb, size and shape.

d). Materials and Labour

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

e). Form work not to interfere or injure work

The form work shall be so designed and arranged as not to unduly interfere with concrete, during its placing and easy to be removed without injuring the finished concrete.

Wedges, clamps, bolts and the rods shall be used, when permitted and where practicable, in making the form work rigid and in holding it to true position.

f). Joints in Formwork

All joints in the form work shall be sufficiently closed to prevent undue leakage of mortar from concrete or show any appearance of leaking mortar on concrete surface.

g). Treatment and Inspection of Forms

All rubbish particularly chipping, shavings and saw dust etc. shall be removed from the interior of the forms, immediately before placing concrete. Forms shall be coated with

approved mould oil before reinforcement is placed. Surplus oil on forms and any oil on reinforcing steel shall be removed.

h). Removal of Form Work

In the determination of the time for the removal of formwork consideration shall be given to the location and character of the structure, the weather and other conditions influencing the setting of the concrete and the materials used in the mix.

The following periods, exclusive of the days when the temperature is below two (2) degree C, for removal of forms and supports shall be used as a minimum subject to the approval of the Engineer.

Arch Center	14 days
Centering Under Beams	14 days
Supports under Flat Slabs	14 days
Floor Slabs	14 days
Vertical Wall Surfaces	24 Hours
Columns	24 Hours
Side of Beams	36 Hours
Top Slabs R.C. Box Culverts	14 days

However, when the temperature remains Five (5)°C or below the period of false work removal shall be extended and shall be advised by the Engineer, whereas the period for which the temperature is below Two (2)°C that period shall be disregarded in calculating the minimum time which elapses before form work is removed.

Side forms for precast members may be removed the next day not before (i.e. 24 hours) after placing concrete therein.

If high early strength cement is used, these periods may be reduced as directed by the Engineer.

All forms shall be removed except where no permanent access is available to the cells. The forms supporting the deck of box girders and the forms in hollow abutments or piers may remain in place. Prior to completion of fixing the deck forms, the inside of box girders shall be cleared of all loose material and swept clean.

Methods of form removal likely to cause overstressing of the concrete shall not be used. In general, the forms shall be removed from the bottom upwards. Forms and their supports shall not be removed without approval. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own weight.

In general, arch centering or falsework shall be struck and the arch made self-supporting before the railing or coping is placed. This precaution is essential in order to avoid jamming of the expansion joints and variations in alignment. For tiled spandrel arches, such portions of the spandrel walls shall be left for construction subsequent to the striking of centers, as may be necessary to avoid jamming of the expansion joints.

Centers shall be gradually and uniformly lowered in such a manner as to avoid injurious stresses in any part of the structure. In arch structures of two or more spans, the sequence of striking centers shall be approved by the Engineer.

i). 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, and any advice, permission or approval given by the Engineer or his Authorised Representative, related to the removal and striking of forms, centering and supports shall not relieve the Contractor from the responsibilities herein defined.

j). Treatment after Removal of Forms

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

k). Form work shall not be measured or paid for separately and shall be deemed to be included in the unit price of concrete whether cast-in-situ or precast and subsequently fixed in position.

9. BATCHING OF CONCRETE

The Contractor shall provide such means and equipment as are required to determine accurately control the amount of each separate ingredient entering the concrete. Such means, the equipment and its operation shall at all times be subject to approval by the Engineer. The amount of cement, water, sand and each size of coarse aggregate entering each batch of concrete shall be determined by weighing or by volumetric measurement if permitted by the Engineer.

10. MIXING CONCRETE

10.1 Mixings General

The concrete shall be mixed only in the quantity required for immediate use. Concrete that has developed an initial set shall be rejected.

Concrete shall be thoroughly mixed in a mixer of an approved size and type that will ensure a uniform distribution of the materials throughout the mass.

All concrete shall be mixed in mechanically operated mixers. Mixing plant and equipment for transporting and placing concrete should be arranged with an ample auxiliary installation to provide a minimum supply of concrete in case of breakdown of machinery or in case the normal supply of concrete should be disrupted. The auxiliary supply of concrete shall be sufficient to complete the casting of a section up to a construction joint

Equipment having components made of aluminum or magnesium alloys, which would have contacted with plastic concrete during mixing, transporting or pumping of Portland cement concrete, shall not be used.

Concrete mixers shall be equipped with adequate water storage and a device for accurately measuring and automatically controlling the quantity of water used.

Materials shall be measured by weighing except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall ensure accurate measurement of each ingredient.

The accuracy of all weighing devices except that for water shall be such that successive quantities can be measured to within one (1) percent of the desired value. Cement in standard packages (bags) approved by the Engineer need not be weighed. The water measuring device shall be accurate to plus or minus half percent ± 0.50%. All measuring devices shall be subject to the approval of the Engineer. Scales and measuring devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy.

Weighing equipment shall be isolated so that vibration or movement of other operating equipment do not effect the accuracy of reading. When the entire plant is running, the scale reading at cut-off shall not vary from the weight designated by the Engineer more than one (1) percent for cement, one and half (1½) percent for any size of aggregate or one (1) percent for the total aggregates in any batch. Where volumetric measurements are authorized by the Engineer the weight proportion shall be converted to equivalent volumetric proportions. In such cases, suitable allowances shall be made for variations in the moisture condition of the aggregates, including the bulking effect in the fine aggregates. Boxes or similar containers of the exact volume required shall be filled and struck off. Measurement by wheel barrow volumes will not be permitted.

10.2 Mixing at Site

Concrete mixers may be of the revolving drum or the revolving blade type and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. The pick-up and throw-over blades of mixer shall be restored or replaced when any part or sections is worn two and half (2.5) cms. or below than the original height of the manufacturer's design. Mixers and agitators, which have an accumulation of hard concrete or rnortar, shall not be used.

When bulk cement is used and volume of the batch is one cubic meter or more, the scale and weigh hopper for Portland cement shall be separate and distinct from the aggregate hopper or hoppers. The discharge mechanism of bulk cement weigh hopper shall be interlocked against opening before the full amount of cement is in the hopper. The discharging mechanism shall also be interlocked against opening when the amount of cement in the hopper is underweight by more than one percent or overweight by more than three (3) percent of the amount specified

When the aggregates contain more water than the quantity necessary to produce a saturated surface-dry condition, representative samples shall be taken and the moisture content determined for each kind of aggregate.

The temperature of mixed concrete immediately before placing, shall be not more than thirty two (32) degree C. Aggregates and water shall be cooled as necessary to produce concrete within this temperatures limit. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.

The batch shall be so charged into the mixer that some water will enter in advance of cement and aggregates. All water shall be in the drum by the end of the first quarter of the specified mixing time.

Cement shall be batched and charged into the mixer by means that will not result in loss due to the effect of wind, or in accumulation of cement on surfaces of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cement in the concrete mixture.

The entire contents of a batch mixer shall be removed from the drum before materials for a succeeding batch are placed therein. The materials composing a batch except water shall be deposited simultaneously into the mixer.

All concrete shall be mixed for a period of not less than one and half (1½) minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at the speed for which it has been designed.

Mixers shall be operated with an automatic timing device that can be locked by the Engineer. The time device and discharge mechanism shall be so interlocked that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed. In case of failure of the timing device, the Contractor will be permitted to operate while it is being repaired, provided he furnishes an approved timepiece equipped with minute and second hands. If the timing device is not repaired within twenty four (24) hours, further use of the mixer will be prohibited until repairs are made.

The first batch of concrete material placed in the mixer shall contain cement, sand and water in excess to the requirement of mix, to ensure that the drum does not extract mortar from the mix changing its design characteristics. When mixing is to stop for a period of one hour or more, the mixer shall be thoroughly cleaned.

10.3 Plant Mixing

At central mixing plant, batches shall be discharged from the weighing hopper into the mixer either directly by gravity or by an elevating container large enough to contain the batch. The plant shall be arranged to ensure that there is no loss of cement during transfer from weighing hopper to the mixer drum. The mixing time shall neither be less than fifty (50) second, nor more than ninety (90) seconds.

The plasticizer, accelerator or retarder or water reducing admixture, if required, shall be fed separately at the rate recommended by the manufacturer, as established by laboratory trials.

10.4 Transit Mixing

Truck mixers, unless otherwise authorized by the Engineer shall be of the revolving drum type, watertight and so constructed that the concrete can be mixed to ensure a uniform distribution of materials throughout the mass. All solid materials for the concrete shall be accurately measured and charged into the drum at the proportioning plant. The truck mixer shall be equipped with a device by which the quantity of water added can be readily verified. The mixing water may be added directly to the batch, in case the concrete batch is poured within twenty five(25) minutes of adding water.

The maximum size of batch in truck mixers shall not exceed the maximum rated capacity of the mixer as stated by the manufacturer, and stamped in metal on the mixer. Truck mixing shall be continued for not less than fifty (50) revolutions after all ingredients including water, are in the drum. The mixing speed shall not be less than six (6) rpm, nor more than ten (10) rpm.

Mixing shall begin within thirty (30) minutes after the cement has been added either to the water or aggregate but when cement is charged in to a mixer drum containing water or surface-wet aggregate and when the temperature is above thirty two (32) degree C, this limit shall be reduced to fifteen (15) minutes. The limitation in time between the introduction of the cement to the aggregate and the beginning of the mixing may be waived when, in the judgment of the Engineer the aggregate is sufficiently free from moisture, so that there will be no harmful effects on the cement.

10.5 Partial Mixing at the Central Plan

When a truck mixer, or an agitator provided with adequate mixing blades, is used for transportation the mixing time at the stationary plant mixer may be reduced to thirty (30) seconds and the mixing completed in a truck mixer/agitator. The mixing time in the truck mixer or agitator equipped with adequate mixing blades shall be as specified for truck mixing.

10.6 Stiff Concrete Mix

For mixing concrete of zero slump to be laid by pavers, gravity mixer shall not be used. Only force mixer of moving blades shall be allowed to ensure homogenous mix.

10.7 Hand Mixing

Hand mixing of materials shall not be allowed in any case.

11. CONSOLIDATION

a). All concrete shall be consolidated by vibration, spading, roding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone packets which may cause honey-combing, pitting or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per min. and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen, use of vibrators to transport concrete with forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 450mm (18”) apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operations.

b). Over-vibration or vibration of very wet mixes is harmful and should be avoided.

12. HAULING & DELIVERY OF MIXED CONCRETE

12.1 Hauling

Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place.

Truck agitators shall be loaded not to exceed the manufacturer's rated capacity. They shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.

Bodies of non-agitating hauling equipments hall be so constructed that leakage of the concrete mix, or any part thereof, will not occur at any time, and they shall be self-cleaning during discharge.

For zero slump concrete to be laid be paver, concrete will be allowed to be hauled in open trucks. However concrete hauled in open-top vehicles shall be protected during hauling against rain or exposure to the sun for more than twenty (20) minutes when the ambient temperature exceeds twenty five (25) degree C.

No additional water shall be incorporated in to the concrete during hauling or after arrival at the delivery point.

The rate of discharge of mixed concrete from truck mixer agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within one hour, or before two hundred fifty (250) revolutions of the drum or blades, whichever comes first, after the introduction of cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is thirty (30) degree c or above, a time less than one hour will be required except when retarder is used in which case it shall be one (1) hour.

When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is thirty (30) degree C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed forty five (45) minutes.

12.2 Delivery

The organization supplying concrete shall have sufficient plant capacity and Transportation vehicles to ensure continuous delivery at the rate required. The rate of the delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing, and finishing of the concrete. The rate shall be such that the interval between batches shall not exceed twenty (20) minutes. The methods of delivering and handling the concrete shall be such as will facilitate placing with the minimum rehandling and without damage to the structure of the concrete.

12.3 Retempering

The concrete shall be mixed only in such quantities as are required for immediate use and any concrete that has developed initial set shall not be used. Concrete that has partially hardened shall not be retempered or remixed.

13. HANDLING AND PLACINE CONCRET

13.1. General

In preparation for the placing of concrete all saw dust, chips and other construction debris and extraneous matter shall be removed from inside the formwork, and struts, stays and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their services unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete.

No concrete shall be used that does not reach its final position in the forms within the time stipulated above under item "Hauling and Delivery of Mixed Concrete".

Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. The use of long troughs, chutes and pipes for conveying concrete to the forms shall be permitted only on written authorization of the Engineer. In any case the Engineer will

reject the use of equipment for concrete transportation that will allow segregation loss of fines, or in any other way will have a deteriorating effect on the concrete quality.

Open troughs and chutes shall be of metal or metal lined; where steep slopes are required the chutes shall be equipped with baffles or be in short lengths that reverse the direction of movement.

All chutes, troughs and pipes shall be kept clean and free from coatings of hardened concrete by thoroughly flushing with water after each run; water used for flushing shall be discharged clear off the structure.

When placing operations would involve dropping the concrete more than one and half (1½) meters, it shall be conveyed through sheet metal or other approved pipes. As far as practicable the pipe shall be kept buried in the newly placed concrete. After initial set of the concrete the forms shall not be jarred and no loading of any kind shall be placed on the ends of projecting reinforcement bars.

The concrete shall be placed as nearly as possible to its final position and the use of vibrators for extensive shifting of the mass of fresh concrete will not be permitted.

13.2. Pneumatic Placing

Pneumatic placing of concrete will be permitted only if authorized by the Engineer. The equipments hall be so arranged that no vibration will occur that might damage freshly placed concrete.

Where concrete is conveyed and placed by pneumatic means, the equipment shall be suitable in kind and adequate in capacity for the work.

The machines hall be located as close as practicable to the work. The discharge lines shall be horizontal or inclined upwards from the machine. At the conclusion of placing the concrete, the entire equipment shall be thoroughly cleaned.

13.3. Pumping

The placing of concrete by pumping will be permitted only if specified in the Special Provisions or if authorized by the Engineer. The equipment shall be so arranged that no vibration will occur that might damage freshly placed concrete.

Where concrete is conveyed and placed by mechanically applied pressure the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is obtained. When pumping is completed the concrete remaining in the pipeline if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned.

13.4. Placing Concrete Under Water

Concretes hall not be placed under water except where inevitable in which case approval must be sought from the Engineer and the work carried out under his immediate supervision. In this case the method of placing shall be as hereinafter specified.

Concrete deposited under water shall be Class A concrete with a minimum cement content of three hundred fifty (350) Kg per cubic meter of concrete.

The slump of concrete shall be maintained between ten (10) and fifteen (15) cm. To prevent segregation it shall be carefully placed in a compact mass, in its final position, means of a tremie, a bottom-dump bucket, or other approved means, and it shall not be disturbed after being placed. Water must not be allowed to flow past the fresh concrete surface.

A tremie shall consist of a tube having a diameter of not less than 25 cm constructed in sections having flanged couplings fitted with gaskets with a hopper at the top. The tremie shall be supported. So as to permit free movement of the discharge end over the entire top surface of the work and so as to permit rapid lowering when necessary to retard or stop the flow of concrete.

The discharge end shall be closed at the start of work so as to prevent water entering the tube and shall be completely submerged in concrete at all times; the tremie tube shall be kept full to the bottom of the hopper. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, but always keeping it in the placed concrete. The flow shall be induced until the work is completed.

When the concrete is placed with a bottom-dump bucket, the top of the bucket shall be open. The bottom doors shall open freely downward and outward when tripped. The bucket shall be completely filled and slowly lowered to avoid backwash. It shall not be dumped until it rests on the surface upon which the concrete is to be deposited and when discharged shall be withdrawn slowly until well above the concrete.

Dewatering may proceed when the concrete seal is sufficiently hard and strong. All laitance or other unsatisfactory material shall be removed from the exposed surface by scraping, chipping or other means, which will not injure the surface of the concrete.

13.5. Compaction

Concrete, during and immediately after placing shall be thoroughly compacted, except lean concrete under footings and concrete deposited under water. Concrete in walls, beams, columns, etc shall be placed in horizontal layers not more than thirty (30) centimeters thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead. Each layer shall be placed and compacted before the preceding layer has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the layers. Each layer shall be compacted so as to avoid the formation of a construction joint with a preceding layer, which has not taken an initial set.

The compaction shall be done by mechanical vibration. The concrete shall be vibrated internally unless special authorization of other methods is given by the Engineer or is provided herein. Vibrators shall be of a type, design, and frequency approved by the Engineer. The intensity of vibration shall be such as visibly to affect a mass of concrete with a 3 cm slump over a radius of at least half a meter. The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms. Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures and into the corners and angles of the forms and shall be applied at the point of placing and in the area of freshly placed concrete. The vibrators shall be inserted into and withdrawn from the concrete slowly. The vibration shall be of sufficient duration and intensity to compact the concrete thoroughly but shall not be continued at any one point to the extent that localized areas of grout are formed. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective. Vibration shall not be applied directly to the reinforcement or to sections or layers of concrete that have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation and vibrators shall not be used to transport concrete neither in the forms nor in troughs or chutes.

Vibration shall be supplemented by such external vibrator as is necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations impossible to reach with the normal vibrators.

13.6. Concrete in Hot & Cold Weather

a) Concrete in hot weather

Concerting shall be avoided in timely hot weather and shall be done only in better part of the day. It should be particularly avoided in dry, hot and windy weather for member with large surface areas exposed to the weather. Aggregate shall be carefully stored under shelter and shall be sprinkled with cold water from time to time to check high temperature.

Water, to be used for concreting, shall be carefully used and, if necessary, crashed ice shall be added to bring the temperature as low as 70^{O} F in order to at resulting temperature of concrete is not above 100^{O} F. Execs of water shall not be added and the specified water of cement ratio shall be maintained.

b) Concert In Cold Weather

When depositing concert is unavoidable at a temperature below 36^{O} F, precaution shall be taken to ensure that the concert shall have a temperature of at least 40^{O} F, at the time of placing of concert. The temperature of concert shall be maintained at not less than 40^{O} F until it is thoroughly hardened. Sand or other material shall not be used in the prevention of freezing and no frozen materials or material containing ice or snow shall be used.

13.7. Surface finishes/ rendering

a) General

Concrete surface finishes shall be classified as follows:
Bridge Deck Surface Finish
Sidewalk Surface Finish
Ordinary Surface Form Finish
Class 1 Surface Form Finish

The bridge deck surface finish shall be given to the surface of the bottom Slabs of all box type underpass structures.

The requirements for sidewalk surface finish apply to the surface of the bottoms labs in box culverts, except that the acceptable variation from a three-meter straightedge shall be 10 mm, and brooming shall be omitted.

The ordinary surface form finish shall be the final finish applied to all Surfaces after removal of forms, unless otherwise specified or called for on the drawings.

The Class 1 surface form finish shall be applied only where specified or as required by the Engineer when the ordinary surface finish did not produce the required smooth, even surface of uniform texture and appearances.

b) Bridge Deck Surface Finish

A smooth riding surface of uniform texture, true to the required grade and cross-section, shall be obtained on all bridge roadway decks. The Contractor may use hand tools, or finishing machines or a combination of both, conforming to the requirements specified herein for finishing bridge roadway deck concrete.

Finishing of concrete placed in bridge decks shall consist essentially of compacting and striking off the surface of the concrete as placed and floating with longitudinal floats the surface so struck off.

The placing of concrete in bridge roadway decks will not be permitted until the Engineer is satisfied that the rate of producing concrete will be sufficient to complete the proposed placing and finishing operations within the schedule time, that experienced finishing machine operators and concrete finishers are employed to finish the deck, that fogging equipment and all necessary finishing tools and equipment are on hand at the site of the work and in satisfactory condition for use. Finishing machines shall be set up sufficiently in advance of use to permit inspection by the Engineer during the daylight hours before each Pour.

The adjustment and operation of deck finishing machines shall be verified by moving the machine over the full length of the deck section to be placed and traversing the float completely across all end bulkheads before placement of concrete is begun.

Unless adequate lighting facilities are provided by the Contractor, the placing of concrete in bridge decks shall cease at such time that finishing operations can be completed during daylight hours.

Rails for the support and operation of finishing machines and headers for hand-operated strick-off devices shall be completely in place and firmly secured for the scheduled length for concrete placement before placing of concrete. Rails for finishing machines shall extend beyond both ends of the scheduled length for concrete placement to a sufficient distance that will permit the float of the finishing machine to fully clear the concrete to be placed. Rails or

headers shall be adjustable for elevation and shall be set to elevations, with allowance for anticipated settlement, camber, and deflection of false work, as required to obtain a bridge roadway deck true to the required grade and cross-section. Rails or headers shall be of a type and shall be so installed that no springing or deflection will occur under the weight of the finishing equipment and shall be so located that finishing equipment may operate without interruption over the entire bridge roadway deck to be finished.

Rails or headers shall be adjusted as necessary to correct for unanticipated settlement or deflection which may occur during finishing operations.

Should settlement or other unanticipated events occur, which in the opinion of the Engineer would prevent pouring of bridge deck conforming to the requirements of these specifications, placing of deck concrete shall be discontinued until corrective measures satisfactory to the Engineer are provided. In the event satisfactory measures are not provided prior to initial set of the concrete in the affected area, the placing of concrete shall be discounted and a bulkhead installed at a location determined by the Engineer. All concrete in place beyond the bulkhead shall be removed.

Unless otherwise permitted by the Engineer, bridge deck concrete shall be placed in a uniform heading approximately parallel to the bridge pier or bent caps. The rate of placing concrete shall be limited to that which can be finished before the beginning of initial set except that concrete for the deck surface shall not be placed more than (03) meters ahead of strick off.

After the concrete has been placed, compacted and consolidated, the surface of the concrete shall be carefully struck off by means of a hand operated strick board operating on headers, or by a finishing machine operating on rails. A uniform deck surface true to the required grade and cross-section shall be obtained.

Following strike off, the surface of the concrete shall be floated longitudinally. In the event strick-off is performed by means of a hand-operated strike board, two (2) separate hand-operated float boards for longitudinal floating shall be provided. The first float shall be placed in operation as soon as the condition of the concrete will permit and the second float shall be operated as far back of the first float as the workability of the concrete will permit.

In the event the strike off is performed with a finishing machine, longitudinal floating of the concrete shall be performed by means of a hand-operated float board or a finishing machine equipped with a longitudinal wooden float. The longitudinal wooden float on the finishing machine shall have a length of not less than two and half (2.5) meters nor more than three and half (3.5) meters. When both strike off and longitudinal floating are to be performed by finishing machines, one machine, with operator, shall be used for strike off and a second machine, with a second operator, shall be used for longitudinal floating. Longitudinal floating may be performed with the same finishing machine that is used for strike off provided that the length of deck unit being placed is not more than 10 meters and the strike off operation is completed for said deck unit before the condition of the concrete requires that longitudinal floating be started.

Finishing machines used for strike off having a wheel base 1.8 meters or less shall be followed by 2 separate hand-operated float boards for longitudinal floating. All the provisions in this item pertaining to hand-operated float boards shall apply to the 2 separate float boards for longitudinal floating.

Longitudinal floats, either hand-operated or machine-operated, shall be used with the long axis of the float parallel to the center line of the bridge roadway. The float shall be operated with a combined longitudinal and transverse motion planning off the high areas and floating the material removed into the low areas. Each pass of the float shall lap the pervious pass by one-half the length of the float. Floating shall be continued until a smooth riding surface is obtained.

In advance of curing operations, the surface of the concrete shall be textured by brooming with a stiff bristled broom or by other suitable devices, which will result in uniform scouring. The operation shall be performed at a time and in a manner to produce a hardened surface having a uniform texture.

Hand-operated float boards shall be from three and half (3.5) to five (5) meter long, ribbed and trussed as necessary to provide a rigid float and shall be equipped with an adjustable handle each end. The float shall be wood, not less than two and half (2.5) cms thick and from ten (10) cm to twenty (20) cm wide. Adjusting screws spaced as not to exceed 60 cms on centers shall be provided between the float and the rib. The float board shall be maintained free of twist and true at all time.

Hand-operated float boards shall be operated from transverse finishing bridges. The finishing bridges shall span completely the roadway area being floated & a sufficient number of finishing bridges shall be provided to permit operation of the floats without undue delay. Not less than two (2) transverse finishing bridges shall be provided when hand-operated float boards are used. When a finishing machine is used for longitudinal floating, one finishing bridge equivalent to the transverse finishing bridge specified herein shall be furnished for use by the Engineer.

All finishing bridges shall be of rigid construction and shall be free of excessive wobble and springing when used by the operators of longitudinal floats and shall be easily moved.

The finished surface of the concrete shall be tested by means of a straightedge three (3.0) meter long. The surface shall not vary more than three (3) mm from the lower edge of the straightedge. All high areas in the hardened surface in excess of three (3) mm as indicated by testing shall be removed by abrasive means. After grinding by abrasive mean has been performed, the surface of the concrete shall not be smooth or polished. Ground areas shall not be of uniform texture and shall present neat and approximately.

Where the concrete of the bridge deck is to be covered by bituminous surfacing, earth or other cover, two and half 2.5 cms or more in thickness, the surface of the concrete shall not vary more than nine (9) mm from the lower edge of the three (3) meter straightedge Bridge deck surface under the curbs, railings and sidewalk shall be struck off to the same plane as the roadway and left undisturbed when future widening is shown on the plans.

c) Sidewalk Surface Finish

After the concrete has been placed it shall be compacted and the concrete shall be struck off by means of a strike board, floated with a wooden or cork floating and finish with a broom. An approved edging tool shall be used on all edges and at all expansion joints. Brooming shall be transverse to the line of traffic and if water is necessary, it shall be applied to the surface immediately in advance of brooming. The surface shall not vary more than six (6) mm under a three-meter straightedge, and the finished surface shall be free of blemishes.

d) Ordinary Surface from Finish

Ordinary surface finish shall consist of filling holes or depressions in the surface of the concrete, repairing all rock pockets, removing stains and discoloration visible from traveled ways. Ordinary surface finish shall be applied to all concrete surfaces either as a final finish or preparatory to the Class 1 finish. On surfaces, which are to be buried underground or surface, which are enclosed, such as the cells of box girders; the removal of fins will not be required.

Except as provided herein, all from bolts and any metal placed for the convenience of the Contractor shall be removed to a depth of at-least two and half (2.5) cms below the surface of the concrete. All rock pockets and other unsound concrete shall be removed. The resulting holes or depression shall be cleaned and filled with mortar. From bolts projecting into the cells of box girders need not be removed unless permanent access is provided into the cells, in which case such bolts shall be removed flush with the surface of the concrete. Mortar used to fill bolt holes shall consist of one part cement and two parts sand. Other depressions and pockets shall be filled with either packed mortar or air blown mortar as directed by the Engineer. Mortar shall be cured in conformance with the requirements in item 401:3.8 (c) “Curing Structures”

If rock pockets or holes in the opinion of the Engineer, are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

e) Class 1 Surface from Finish

Class 1 surface finish shall consist of finishing the surfaces of the structure as necessary to produce even surfaces of uniform texture and appearance, free of unsightly bulges, depression and other imperfections. The degree of care in building forms and character of materials used in form work will be a contributing factor in the amount of additional finishing required to produce even surfaces of uniform texture and appearance, free of unsightly bulges, depressions and other imperfections, and the Engineer shall be the sole judge in this respect.

After completion of the ordinary surface finish, areas which do not exhibit the required smooth, even surface of uniform texture and appearance shall be sanded with power sanders or other approved abrasive means until smooth, even surfaces of uniform texture and appearance are obtained. The use of power carborundum stones or disks will be required to remove bulges and other imperfections.

Class 1 surface finish shall not be applied until a uniform appearance can be obtained.

Class 1 surface finish may be required to be applied as the final finish for the following surfaces, unless otherwise directed by the Engineer.

i. All form finish surfaces of bridge super-structures except the under surfaces between girders and the inside vertical surfaces of T girders.

ii. All surfaces of bridge piers, columns and abutments, and retaining walls above finished ground and to at least three tenth (0.3) meter below finished ground.

iii. All surfaces of open spandrel arch rings, spandrel columns and abutment walls.

iv. All surfaces of pedestrian undercrossing, except floors and surfaces to be covered with earth.

v. Surface above finished ground of culvert headwalls, end walls and retaining walls.

vi. Surface inside of culvert barrels having a height of one and half (1.5) meters or more for a distance inside the barrel at least equal to the height of the culvert.

vii. All surface of railings.

f) Surface Rendering

All faces of concrete which are to come in contact with backfill or pavement materials shall be applied two coats of hot bitumen of approved quality, before placing any material around concrete.

14. FINISHING

a). Finishing of concrete surfaces shall be performed only by skilled workmen and as directed by the Engineer. Formed surfaces upon or against which backfill or concrete is to be placed will require no treatment after form removal except for the removal and repair of defective concrete and for the specified curing. Unformed surfaces that will be covered by backfill or by concrete shall be finished by sufficient leveling and screeding to produce an even uniform surface.

b). A hard steel trowel finish shall be applied to unformed surfaces that will be exposed or subjected to the action of flowing later. Floating and trowelling shall be started as soon as the screeded surface has stiffened sufficiently, and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture.

15. CURING AND PROTECTION

a). The concrete shall be kept continuously wet by the application of water for a minimum period of Seven (07) days after the concrete has been placed. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold

temperatures and mechanical injury and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. Cotton mats, burlaps, rugs, carpets or earth or sand blanket, may be used as a curing medium to retain the moisture. The entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed.

At the expiration of the curing period the concrete surface shall be cleared of all curing mediums.

b). Surface exposed to the air may be cured by the application of an imperious membrane (i.e. curing compound) with prior written approval from the Engineer.

c). For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:

- Ponding or continuous sprinkling.
- Application of absorptive mats or fabric kept continuously wet.
- Application of sand kept continuously wet.

d). Curing shall be continued minimum Seven (07) days in the case of all concrete except concrete with Rapid-hardening Portland Cement for which the minimum period shall be three (03) days.

16. TEST OF CONCRETE QUALITY

Samples of fine and coarse aggregate to be used shall be selected by the Engineer. It shall be the responsibility of the Contractor to designate the source or sources of aggregate and obtain the necessary samples and submit them for testing at least thirty (30) days before actual concreting operations are to being.

Samples of aggregates shall be obtained and tested in accordance with the following standard AASHTO methods.

i)	Sampling aggregates	T-2
ii)	Sieve analysis	T-27
iii)	Amount of material passing the no. 200 sieve	T-11
iv)	Organic impurities	T-11
v)	Mortar Strength	T-71
vi)	Sodium sulphate soundness	T-104
vii)	Friable particles	T-112
viii)	Abrasion loss	T-96
ix)	Specific Gravity	T-84
x)	Absorption	T-85
xi)	Production of Plastic Fines	T-210
xii)	Fineness Modulus	T-27
xiii)	Sand Equivalent	T-17
xiv)	Potential Reactivity of Carbonate Rocks for Concrete Aggregate (Rock Cylinder Method)	ASTM C 586
xv)	Potential Alkali Reactivity of Cement Aggregate Combinations (Morta-Bar Method)	ASTM C 227
xvi)	Potential Reactivity of Aggregates (Chemical Methods)	ASTM C 289

No aggregate for testing during the production of concrete shall be sampled at the discharge gates of the bins feeding the weight hopper. The Contractor, at his expense, shall provide safe and suitable facilities for obtaining the samples no concreting work on the project will be permitted until the Engineer signifies in writing his approval. Following the performance of the necessary tests, on all materials involved in making concrete.

17. MEASUREMENT AND PAYMENT

17.1. General

Except otherwise specified herein or elsewhere in the Contract Documents no separate measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bills of Quantities but shall not be limited to the following. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bills of Quantities.

17.2. Plain and Reinforced Concrete

a) Measurement

Concrete shall be measured as executed but no deduction shall be made for the following:-

- Volume of any steel embedded in the concrete
- Volume occupied by water pipes, conduits etc. not exceeding 25 sq.cm. each in cross sectional area.
- Voids not exceeding 0.10 Sq.M. in work given in Sq.M. If any void exceeds 0.10 Sq.M. total void shall be deducted.
- Void, which are not to be deducted as specified above, refer only to opening or vents which are wholly within the boundary of measured areas. Openings or vents which are at the boundary, measured areas shall always be subject to deductions irrespective of size.

Concrete work shall be classified and measured separately as listed under items of Bills of Quantities.

Measurement of acceptably completed works of plain and reinforced cement concrete will be made on the basis of concrete placed and compacted in position within the neat lines of the structure as shown on the drawings or as directed by the Engineer.

b) Payment

Payment will be made for the acceptable measured quantity of plain and reinforced cement concrete on the basis of unit rate quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the items.

STEEL REINFORCEMENT

1. SCOPE

The work under this section of specifications consists of furnishing, cutting, fabricating, bending and placing steel reinforcement and Welded wire, fabric of the type, size, shape and grade required in accordance with these specifications, in concrete structures or elsewhere as shown on the drawings and special provisions or as directed by the Engineer.

2. APPLICABLE STANDARDS

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

Pakistan Standard

PS 241	Tensile Testing of Steel
PS 244	Bend test for Steel
PS 580	Rolled deformed Steel bars (intermediate grade) for concrete reinforcement.
PS 605	Rolled deformed steel bars (hard grade) for concrete reinforcement.
PS 606	Rolled formed Steel bars (structural grade) for concrete reinforcement.
PS 607	General technical delivery requirement for steel

British Standard

BS 693	General requirements for Oxy-acetylene welding of mild steel
BS 785	Hot rolled bars and hard drawn wire for the reinforcement of concrete
BS 1856	General requirement for the metal arc welding of mild steel
BS 4449	Hot rolled steel bars for reinforcement of concrete
BS 4461	Cold worked steel bars for reinforcement of concrete
BS 4466	Bending dimensions and scheduling of bars for the reinforcement of concrete

ASTM Standard

A 305	Minimum requirement for the deformations of deformed steel bars for concrete reinforcement
A 615	Deformed billet steel bars (Grades 40 and 60) for concrete reinforcement – AASHTO M-30.

In addition to the above, the latest editions of other Pakistan Standards, British standards, American Concrete Institute Standards, American Society for Testing and Materials Standards and other standard as may be specified by the Engineer for Special Material and construction are also relevant.

3. MATERIAL AND SIZE OF BARS

a). Reinforcement for concrete shall conform to the respective Pakistan, British, ASTM, or other Standards as specified in the Drawings and in the Contract Documents or as may be specified by the Engineer.

b). Unless otherwise specified, all plain reinforcing bars shall comply with the requirements of BS 4449 for plain mild steel bars and shall have a minimum characteristic strength of 280 MPa (40000 psi)

c). Unless otherwise specified, all deformed reinforcing bars shall comply with the requirements of BS 4461 for deformed cold worked new stock billet steel bars and shall have minimum characteristic strength of 460 MPa (60000 psi).

d). If the reinforcement is supplied by the Employer, the Contractor should inform the Employer of his requirements much before its use in construction.

e). Reinforcement of all types is to be stored at on site in an approved manner so as to avoid damage.

f). If the reinforcement is supplied by the Employer, the Contractor should report immediately on receipt of any consignment, any deviation from the standard of three enforcement bars beyond those allowed in respective standards. If the Engineer directs, the Contractor shall test the samples of reinforcement at his cost and submit to him the test report.

g). Steel wire mesh reinforcement shall conform to requirements of ASTM Designation A 185 - 64 or BS 4483, 1969: Standard Specifications for Welded Steel Wire Fabric for concrete reinforcement. It shall be used where shown on the Drawings.

h). Reinforcement shall be free from all loose or flaky rust and mill scale, or coating, including ice, and any other substance that would reduce or destroy the bend. Reduced sections steel reinforcement shall not be used.

4. DELIVERY & STORAGE

Steel reinforcement bars shall be kept in bundles firmly secured and tagged. Each bar or bundle of bars shall be identified by marks stamped on hot or cold or painted on or by any other means, The identifying marks shall contain the following information:

- Name of the producer or his trade.
- Standard to which the bars have been manufactured.
- The class type and strength
- The diameter
- The number of the test certificate

The method of storage shall be approved by the Engineer. Reinforcing bars shall be stored in racks or platforms above the surface of ground and shall be protected free from scaling, rusting, oiling, coatings, damage, contamination and structural defects prior to placement in works. Bars of different diameters and grades of steel reinforcement shall be kept separately.

5. BAR BENDING SCHEDULES

The Contractor shall prepare bar bending schedules of all the reinforcing steel bars and these bar bending schedules shall be submitted to the Engineer for his approval. The Contractor shall obtain approval of the bar bending schedules atleast one month prior to the actual execution of the works at site.

6. FABRICATING, BENDING & PLACING

a). All metal reinforcement shall be free from loose mill scale, loose rust, mud, oil, grease, or other harmful matter immediately before the concrete is placed.

b). Reinforcement is to be accurately placed as shown in the drawings, and secured against displacement by using 16 gauges GI wire ties or suitable slips at intersections and supported from the formwork by using concrete, metal or plastic chairs and spacers or hangers of an approved pattern. Where concrete blocks are used for ensuring the cover, they shall be made of mortar not leaner than 1 part of cement to 2 parts of sand.

c). Bars used for concrete reinforcement shall be fabricated in accordance with the dimensions shown in the bar bending schedule approved by the Engineer.

d). The cutting tolerance for all bars shall be ± 1 inch.

e). Where an overall or an internal dimension of a bent bar is specified in the schedule, the bending tolerance, unless otherwise stated, shall be as in Table - 1.

f). Bent bar reinforcement shall cold bent to the shapes shown on the drawings bars shall be bent around a pin having the following diameters (D) in relation to the diameter of the bar (d):

Strips & columns tie bars	D = 4 x d	
Other bars having	D = 5 x d	D = 10 x d

d < 3.5 cm (1-$^{3}/_{8}$") (No. 11 bars)
d > 3.5 cm (1-$^{3}/_{8}$")

Table
Bending Tolerances

Dimensions of bent bars		Tolerance	
Over	**Up to & including**	**Plus**	**Minus**
Inch	Inch	Inch	Inch
--	36	2	2
36	72	2	4
72	--	2	10

g). Vertical bars in columns shall be offset at least one bar diameter at lapped splices. To ensure proper placement, templates shall be furnished for all column dowels.

h). Reinforcement shall not be bent or straightened in a manner that will injure the material.

i). No bars shall be bent twice in the same place, nor shall they be straightened after bending.

j). Unless permitted, by Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete.

k). Bars which depend for their strength on cold working shall not be heated for any reason. Other kinds of reinforcement larger than 40 mm in dia: may be bent by the use of heat at cherry - red heat (not exceeding 840 Bars) bent shall not be cooled by quenching.

l). No splice of reinforcement shall be made except as shown on the working drawings.

m). Welding shall be permitted for bars only under suitable conditions and with suitable safeguards in accordance with BS 693, BS 1856, or AWS D 12.1, provided the type of reinforcement bar has the required welding properties. Tack welding may be used to fix in position bars that cross each other, only with prior approval of the Engineer.

n). Exposed reinforcement intended for bonding with future extensions is to be effectively protected from corrosion. Protection is also to be provided to reinforcement partly built into concrete where the exposed pat is to be built into later concrete.

o). No concreting is to be carried out until the reinforcement has been checked and approved by the Engineer.

p). All detailing shall be done as per ACI standards ACI - 315 and ACI - 318.

q). Minimum Concrete clear cover for reinforcing steel shall be as follows:

Structural Members	**Minimum Cover, inch**
a) Concrete cast against and permanently exposed to earth	3 inch
b) Concrete exposed to earth or weather:-	
Bar Dia > 20 mm	2 inch
Bar Dia > 16 mm	1.6 inch
c) Concrete not exposed to weather or in contact with ground	
Slabs, Walls	0.8 inch
Beams, Columns (Primary Reinforcement)	1.6 inch

All reinforcing steel shall be held firmly in place before and during the placing of concrete by means of wires and supports adequate to prevent displacement during the course of construction.

7. MEASUREMENT & PAYMENT

7.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no separate measurement and payment will be made for providing and installing chairs, supports, hooks, spacers, binding wires and laps not shown on Drawings including wastage and rolling margin, the cost of which shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of quantities.

7.2 Measurement

All measurements of acceptably completed works of reinforcement shall be made in linear dimensions end to end according to the cut lengths shown in bar bending schedules approved by the Engineer and converted into theoretical weight as per schedules.

7.3 Payment

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

BLOCK WORKS

1. SCOPE

These specifications cover the supply of materials manufacture and workmanship of concrete blocks intended to be used for the construction of block walling, partitions, facings, claustra, etc, required for the project.

2. MATERIALS

2.1 Cement

Cement for solid or hollow blocks are mortar shall be ordinary Portland cement ASTM Designation: C 150-74.

2.2 Aggregate

Aggregate for solid and hollow concrete blocks shall conform to the requirements for fine aggregates in the “CONCRETE “section.

2.3 Water

Water to be used in blocks shall conform to the requirements specified for water in the “CONCRETE “section.

2.4 Additives

Additives shall only be used with the Consultant's written instructions and shall be from approved manufacturers and used strictly in accordance with the manufacturer's instructions.

2.5 Wall Ties

Wall ties shall be galvanized wire butter-fly type to BS1243:1978 and DD140 Part 1:1986 and DD140:Part2:1987.

2.6 Damp Proof Course

Damp proof courses and the like shall be a high strength preformed self-adhesive membrane 1.5mm thick comprising of rubber/bitumen compound and three layers cross laminated HDPE carrier film obtained from an approved manufacturer.

3. MANUFACTURE OF CONCRETE BLOCKS

Aggregate shall be so sized, graded, proportioned and thoroughly mixed in a bath mixer with such proportions of cement and water as to produce homogeneous concrete mixture. However, in no case shall the proportion of cement in the mixture be less than five (5) standard bags (each weighing 50 kgs) per cubic meter of concrete.

Concrete blocks shall be obtained from an approved local factory. The blocks shall be press moulded in approved moulds and vibrating pressure machine with a minimum of 28000 cycles per minute.

Hollow concrete blocks shall comply with the following requirements: -

Compressive Strength at Twenty Eight (28) Days Over Cross-Sectional Area:-

a) Load Bearing Walls
60 kgs/cm2 average of 12 blocks
50 kgs/cm2 minimums for any block

b) Non-Load-Bearing Walls.
30 kgs/cm2 averages of 12 blocks
25 kgs/cm2, minimum for any block

4. MORTAR

Mortar shall be prepared in the following proportions with the addition of the minimum quantity of clean water for workability.

Cement and sand mortar (1:3) mix, shall be composed of one part cement to three parts of sand by volume.

Cement mortars shall be used within thirty (30) minutes after mixing. Hardened mortars shall not be used in the work and shall, upon the request of the Consultant, be immediately removed from the site.

5. WORKMANSHIP

All block work shall be set out and built to the respective dimensions, thickness and heights shown on the Drawings and / or as instructed by The Consultant.

The blocks shall be well soaked before being used and the tops of walls left off shall be wetted before work is recommended. All blocks shall be well buttered with mortar before being laid and all joints shall be thoroughly flushed up as the work proceeds. All joints shall be in uniform manner and shall not exceed 10 mm., no one portion being raised more than 1.00 meter above another at one time, and wall of partition necessarily left at different levels must be raked backfill perpends quains, internal and external angles, etc. shall be kept strictly true and square and the whole properly bonded together and leveled round. All block work shall be plumbed vertically.

The surface of the walls and partitions prepared for plastering shall have the joints raked out 20 mm from the face of the wall to form key for the plaster.

All block walls shall be bonded to reinforced concrete columns by means of wall ties, complying in all respects with B.S 1243 latest edition. The ties shall be minimum 200 mm, long of which 100 mm shall be embedded in the reinforced concrete column and the remainder set into the block wall at the rate of two (2) ties per meter. Partitions shall be bonded to main walls by toothing at every fourth coursed into main walls to a depth of not less than 100 mm.

All walls and partitions shall be properly cured by sprinkling water for a period not less than three (3) days after completion of laying the course.

PILING

1. DESCRIPTION

This work shall consist of performing all operations in connection with furnishing of cast in place piles and load testing of specific piles to obtain the specified bearing value complete in place and strictly in accordance with these specifications and as shown on the drawings.

When test piles and load tests are required, the data obtained from such load tests will be used in conjunction with other available subsoil information to determine the number and lengths of piles to be furnished. The Engineer will not prepare the itemised list of piles for any portion of the foundation area until all loading tests representative of that portion have been completed.

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

The kind and type of piles shall be as shown on the Drawings and/or as specified. No alternate types or kinds of piling shall be used, except with the written approval of the Engineer each time an alternate type or kind is proposed for use in a particular structure.

2. MATERIAL REQUIREMENTS

2.1 Cast-in-Place Concrete Piles

Cast-in-place concrete piles shall consist of one of the following two types as shown on the Drawings and/or as specified:

- Concrete cast in drilled holes.
- Steel shells or tubes driven permanently to the required bearing value and filled with concrete. The steel shell or tube may or may not act as a permanent load-carrying member.

Concrete for cast-in-place piles shall be Class A or as shown on the drawing and meet all the requirements unless otherwise specified. The concrete shall be cast in dry holes or shells/pipes.

Reinforcement, if called for, shall conform to the requirements under “Steel Reinforcement”.

Steel shells/pipes shall be of sufficient strength and rigidity to permit driving to the required bearing value or depth without injury. The steel shells may be cylindrical or tapered, step-tapered or a combination, and either plain circular or fluted. The different types shall conform to the corresponding ASTM Standards. The minimum average tensile strength of the steel shall be 3,500 kg/cm^2 (50,000 psi).

When called for on the Drawings or by the Engineer, the pile shells or tubes shall be factory coated on both interior and exterior surfaces by red lead paint conforming to AASHTO M-72, or as otherwise stated. The coatings shall not interfere with producing satisfactory welds when assembling pile sections.

3. CONSTRUCTION REQUIREMENTS

3.1 Location and Site Preparation

Piles shall be used where indicated on the Drawings or as directed by the Engineer.

All excavation for the foundation in which the piles are to be driven shall be completed before the driving is begun, unless otherwise specified or approved by the Engineer. After driving is completed, all loose and displaced materials shall be removed from around the piles by hand excavation, leaving clean solid surfaces to receive the concrete of the foundations.

3.2 Determination of Pile Length

The criteria for pile length and bearing capacity will be determined by the Engineer according to the results from test piling and load tests. The piles shall be driven to such depths, that the bearing loads indicated on the Drawings are obtained.

The criterion for pile length may be one of the following:

a) Piles in sand and gravel shall be driven to a bearing value determined by use of the pile driving formula or as decided by the Engineer.

b) Piles in clay shall be driven to a depth as directed by the Engineer. However, the bearing value shall be controlled by the appropriate pile driving formula if called for by the Engineer.

c) Piles shall be driven to refusal on rock or hard layer when so directed by the Engineer.

The Contractor shall be responsible for correct pile lengths and bearing capacities according to the criterion or criteria given by the Engineer.

3.3 Piles Cast in Place

Piles cast in place shall consist of concrete cast in drilled holes or in steel shells or pipes driven to the required bearing.

a) Boring Procedure

The method and equipment of boring generally either the dry method, wet method, temporary casing method or permanent casing method shall be one which maintains stability, verticality or batter (as shown on the Drawing) of the wall and base of borehole by the use of temporary casing and/or bentonite slurry. However, it will be the responsibility of the contractor to suggest the method and the equipment to be used by him for boring for pile for the approval of engineer. Notwithstanding the approval of Engineer the contractor shall not be relieved of his responsibility for his proposed method.

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

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

b) Use of Casing

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

- **Temporary Casing Method**

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

for the following conditions and operations in particular during all conditions of river current which may occur during the period of works:

a) Open temporary casing to ensure against blow-in of soil.

b) Concrete of the pile, until temporary casing is extracted.

- **Safety of Casing**

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

  Where the use of temporary casing is approved for the purpose of maintaining the stability and over-rapid withdrawal of the boring tools which could lead to excessive removal of soil and water and disturbance of the surrounding ground and when boring through any permeable stratum (including silt), the water level in the boring shall be maintained between one (1) meter and two (2) meters above the external water level, unless the engineer directs otherwise.

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

- **Permanent Casing Method**

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

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

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

c) Bentonite Slurry

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

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

Tests shall be carried out to ensure that the proposed constitution of the slurry is compatible with the ground water. Proposals for the construction and physical properties of the slurry shall include average, minimum and maximum values. The specific gravity for the slurry shall not be less than one and three hundredth (1.03) in any case at any time. The contractor shall use additives where necessary, to ensure the satisfactory functioning of the slurry. A manufacturer's certificate shall be provided to the Engineer by the Contractor for each consignment of bentonite brought on site.

Notwithstanding the Manufactures Certificate the Engineer may ask the contractor to arrange and conduct tests for specific gravity, PH value and viscosity or any other test which he deems is necessary to check the quality of bentonite.

The test apparatus and Test Method shall be those given in;

“Recommended practice”

Standard by American Petroleum Institute, New York City 1957, reference, API RP29 Section I, II & IV.

The contractor shall promptly make the arrangement for such test, without any additional cost to the project.

- **Precautions**

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

  The level of the bentonite slurry shall be maintained in the bore during excavation of pile, so that the internal fluid pressure always exceeds the external water pressure.

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

d) Excavation from Bore holes

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

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

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

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

e) Samples and Tests

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

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

f) Limitations of Boring Sequence

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

g) Piling Reinforcement

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

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

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

3.4 Concreting of Piles

The following particular requirements shall be observed.

i) Materials

Comprehensive strength of concrete in piles shall be of Class-A using minimum 400 kg. Cement in $1m^3$ of concrete for piles or otherwise as shown on the drawings.

Suitable re-trader, plasticiser may be added as approved by the Engineer.

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

ii) Commencement of Concreting

Prior to placing any concrete:

a) Any heavy contaminated bentonite slurry, which could impair the free flow of concrete from the tremie pipe, shall be removed.

b) Any loose or soft material/soil shall be removed from the bottom of the bore by methods acceptable to the Engineer.

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

- Adequacy of the Contractors equipment and arrangement.
- Proficiency of his personnel.
- Cleanliness of the borehole.
- Length of the borehole in accordance with Drawings/Instructions.

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

The Engineer may desire that prior to the concreting a pile, sample of slurry be taken from the base of the borehole using an approved sampling device and its specific gravity determined.

iii) Placing of Concrete

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

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

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

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

The concrete shall be placed in one continuous operation from tip to cut-off elevation and shall be carried out in such a manner as to avoid segregation. The method of placing the concrete and the consistency (slump) shall conform to the requirements of Item 401 or to the satisfaction of the Engineer.

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

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

iv) Withdrawal of Temporary Casing

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

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

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

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

3.5 Steel Shells and Pipes

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

3.6 Splicing of Piles

Splicing of piles, when permitted by the Engineer, shall be made as shown on the Drawings and as specified with materials having same quality and characteristic as for the material used for the pile itself. For Steel Shells and Pipes, the Splicing shall be as under:

If the ordered length of the steel pipe, or shell is insufficient to obtain the specified bearing value, an extension of the same cross-section shall be spliced to it. Unless otherwise shown on the Drawings, splices shall be made by butt-welding the entire cross-section to form an integral pile using the electric arc method. The sections connected shall be properly aligned so that the axis of the pile will be straight. Piles bent or otherwise injured shall be rejected.

3.7 Cutting of Piles

Top of piles shall be embedded in the concrete footing as shown on the Drawings.

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

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

3.8 Defective Piles

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

(a) A second pile shall be driven or cast adjacent to the defective pile.

(b) The pile shall be spliced or built up as otherwise provided herein or the underside of the footing lowered to properly imbed the pile.

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

3.9 Test Piles

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

Test piles to be load tested in accordance with sub-Section 407.3.8 shall be driven in locations determined by the Engineer. These piles shall not be utilised in the structure unless otherwise directed.

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

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

3.10 Load Tests

Load tests shall be made where specified and/or where called for by the Engineer. Unless otherwise permitted by the Engineer the load tests shall be completed before the remaining piles in the same structure are cast.

In any case no pile should be subjected to load test unless the concrete has attained the specified strength at 28 days, which shall be evidenced through the concrete cylinder compressive strength.

Load tests shall be made by the methods approved by the Engineer. The Contractor shall submit to the Engineer detailed plans of the loading system and apparatus he intends to use at least 3 weeks in advance. The apparatus shall be so constructed as to allow the various increments of the load to be placed gradually without causing vibration to the test piles. Tension anchor piles if used, shall be of a design and driven to a depth satisfactory to the Engineer. Steel shells or piles whose walls are not of adequate strength to withstand the test loading when empty, shall have the required reinforcement and concrete placed before loading for a load test is applied. Through cylinder tests it is ensured that the concrete has attained the desired strength at 28 days.

Load cell/hydraulic pump pressure and dial gauges should be preferably re-calibrated at site and certified calibration curve shall accompany each device.

Suitable approved apparatus for determining accurately the load on the pile and the settlement of the pile under each increment of load shall be supplied by the Contractor. The apparatus shall have a working capacity of two (2.0) times the design load for the pile being tested. Reference points for measuring pile settlement shall be sufficiently removed from the test pile to preclude all possibility of disturbance.

All pile load settlements shall be measured by adequate devices, such as gauges, and shall be checked by means of an Engineer's level. Increments of deflection shall be read just after each load increment is applied and at 15 minute intervals thereafter. The safe allowable load shall be considered as 50 percent of the load which, after 48 hours of continuous application, has caused not more than 6 mm of permanent settlement, measured at the top of the pile. This maximum settlement should not increase by continuous application of the test load for 60 hours or longer (AASHTO).

The pile load test should be carried out in accordance of ASTM D1143 – 81 (re-approved 1987). The load should be applied using the standard loading procedure as described Clause 5.1 of ASTM 1143 and interpreted below:

Sr. No.	Increment No.	Load % of Design Load	Time	Sr. No.	Decrement No.	Load % of Design Load	Time
1	1	25	2 hours *	9	1	175	20 minutes
2	2	50	2 hours *	10	2	150	20 minutes
3	3	75	2 hours *	11	3	125	20 minutes
4	4	100	2 hours *	12	4	100	20 minutes
5	5	125	2 hours *	13	5	75	20 minutes
6	6	150	2 hours *	14	6	50	20 minutes
7	7	175	2 hours *	15	7	15	20 minutes
8	8	200	24 hours *	16	8	0	20 minutes

*** The load should be maintained in each increment until the rate of settlement is not greater than 0.25mm/hr, but not longer than 2 hrs.**

The full test load shall remain on the test pile for not less than 48 hours. If pile failure occurs continue jacking until the settlement for equal to 15% of the pile diameter. Full report should be submitted by the Contractor in accordance with ASTM 1143.

The test pile shall be considered satisfactory provided the load-settlement curve shows no signs of failure and the permanent settlement at the top of the pile after completion of the test does not exceed 6.00 mm.

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

3.11 Pile Records

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

Cast-in-Place Piles

Pile type and nominal dimensions.

Date of boring commenced, level reached each day and date of casting.

Soil samples taken from pile boring operation and soil test results.

Strata and ground water encountered with levels, description shall be in accordance with B.S.C.P. 2001.

Length of finished pile and tip elevation.

Dia of borehole.

Elevation of the bottom of boreholes.

Date of placing concrete; theoretical and actual quantities of concrete used in pile.

Lengths and diameter of temporary casing and permanent lining and the elevation of the tip of temporary casing and of permanent lining.

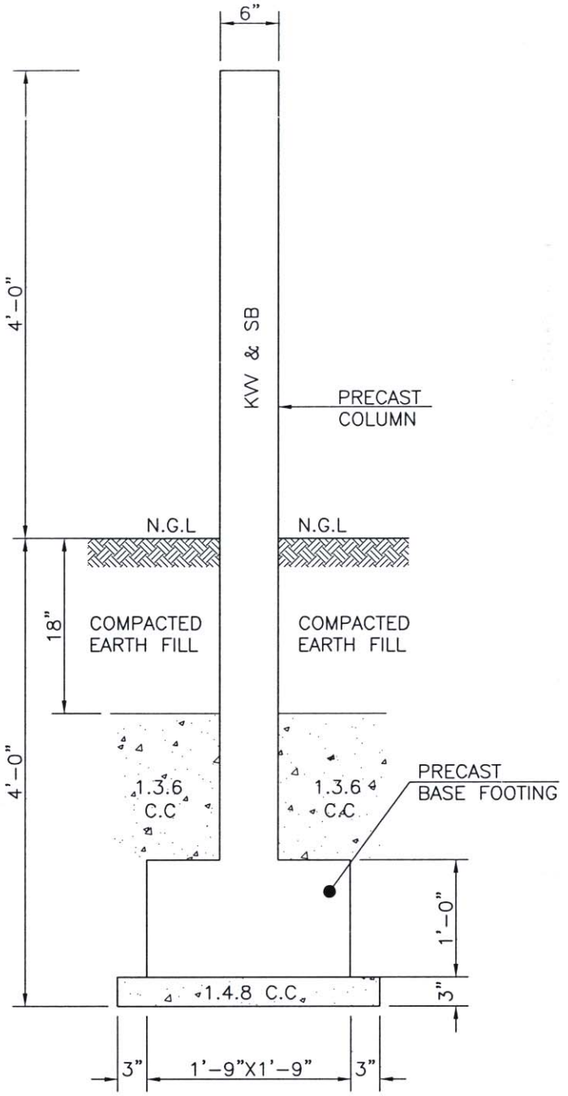
Details of Reinforcement.

Details of penetration during boring operation or driving of steel shell (driving records as for driven piles).

Quality, consistency and other test results on concrete.

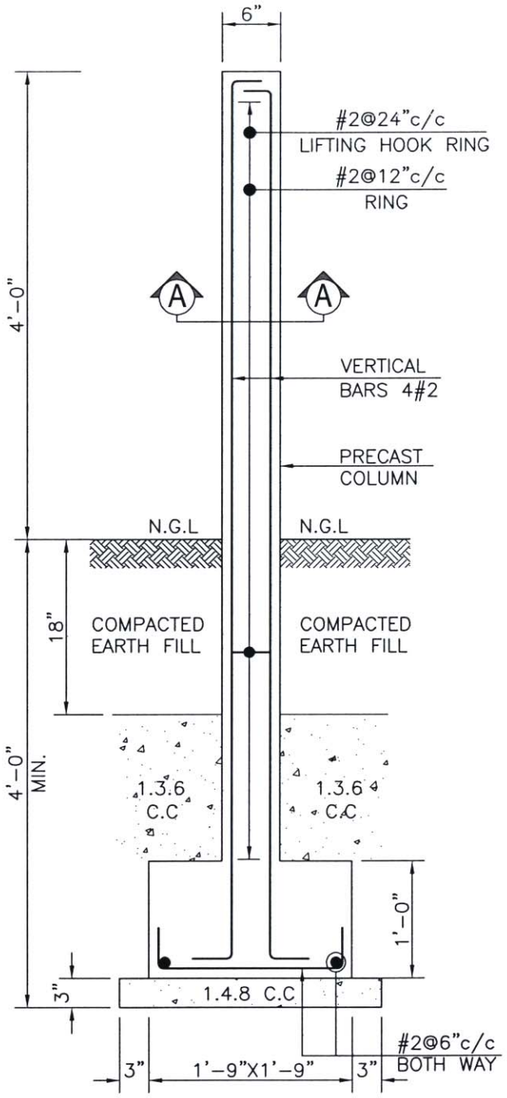
Time interval between boring or driving and concreting.

Any other relevant information.



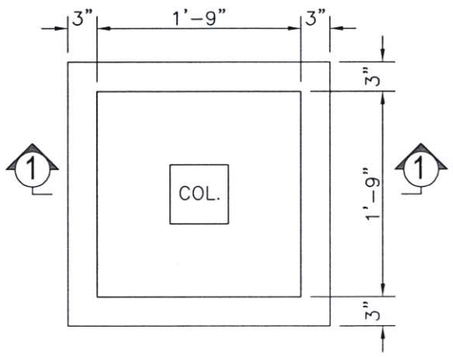
TYP. SECTION 1-1

PRECAST COLUMN FOOTING
(DIMENSION DETAILS)



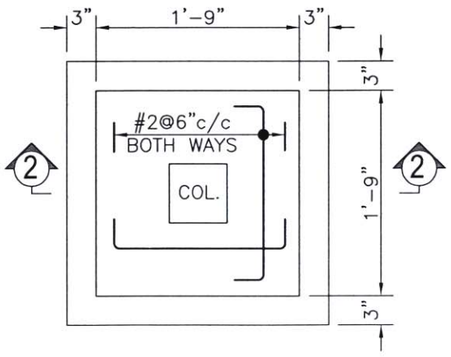
TYP.SECTION 2-2

PRECAST COLUMN FOOTING
(REINFORCEMENT DETAILS)



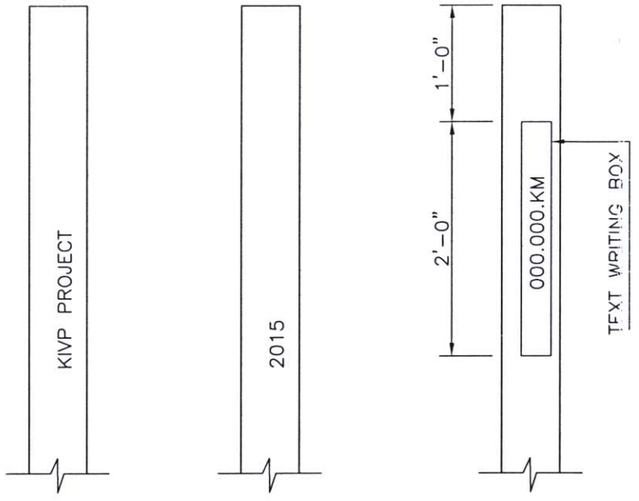
TYP. PLAN OF FOOTING

SCALE 3/4"=1'-0" (DIMENSION DETAILS)



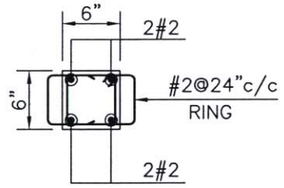
TYP. PLAN OF FOOTING

SCALE 3/4"=1'-0" (REINFORCEMENT)



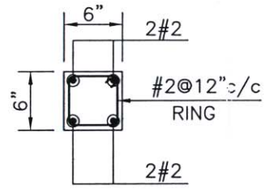
PRECAST COLUMN 4SIDE TEXT DETAILS

SCALE 3/4"=1'-0" DIMENTION DETAILS



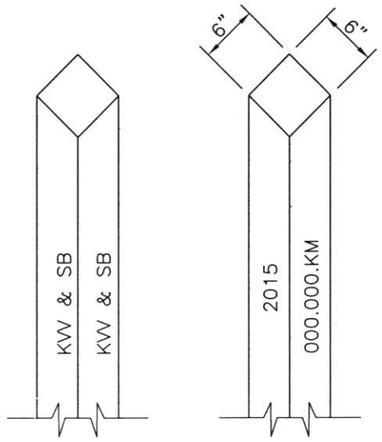
HOOK DETAILS

SCALE 3/4"=1'-0"



SECTION A-A

SCALE 3/4"=1'-0"



PRECAST COLUMN ISOMETRIC VIEW

SCALE 3/4"=1'-0" DIMENTION DETAILS

NOTES

1. ALL DIMENSIONS, CHAINAGES AND LEVELS ARE IN METRES/ MILLIMETERS UNLESS INDICATED OTHERWISE.
2- THE MINIMUM COMPRESSIVE CYLINDRICAL STRENGTH OF CONCRETE SHALL BE 2500 PSI AT 28 DAYS. FOR COLUMNS, WALL & FOUNDATIONS.
3- ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM-A615 GRADE 60 HAVING A MINIMUM YIELD STRENGTH OF 60,000 PSI.

S. No	Date	Revisions	Drawn	Checked
T0	APR.15	ISSUED FOR TENDER	M.A	S.A

Project:
GREATER KARACHI WATER SUPPLY SCHEME K-IV PHASE-I 260 MGD

Client: **KARACHI WATER & SEWERAGE BOARD**

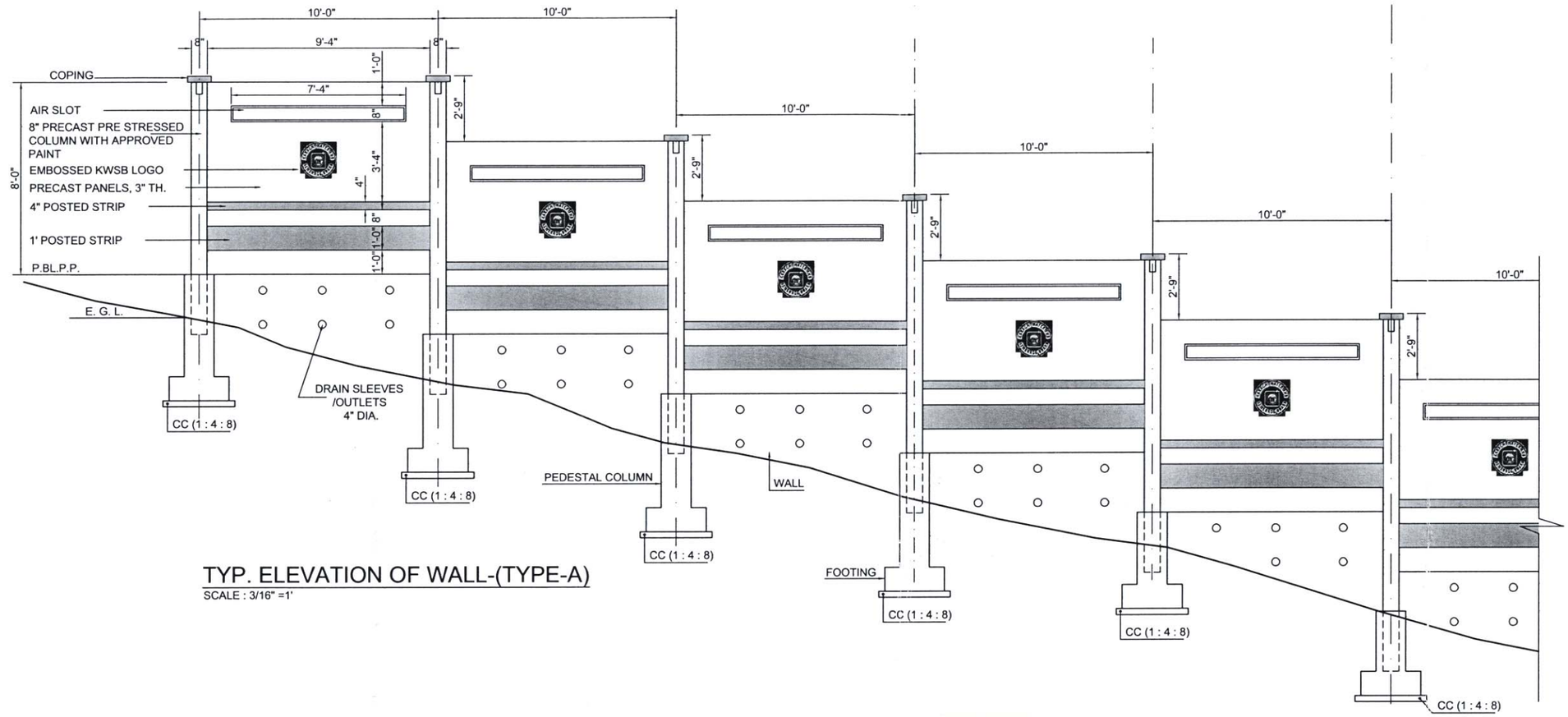
Project Consultant:

OSMANI
عثماني
Engineering - Architecture - Planning - Mapping - Technology
Pakistan - Abu Dhabi, UAE

245/2-K, Block 6, PECHS, Karachi-75400, Pakistan.
Tel. (92-21) 34536007-08, 34546541-42, Fax (92-21) 34534691,
E-mail: dhacity@osmani.com, URL: www.osmani.com

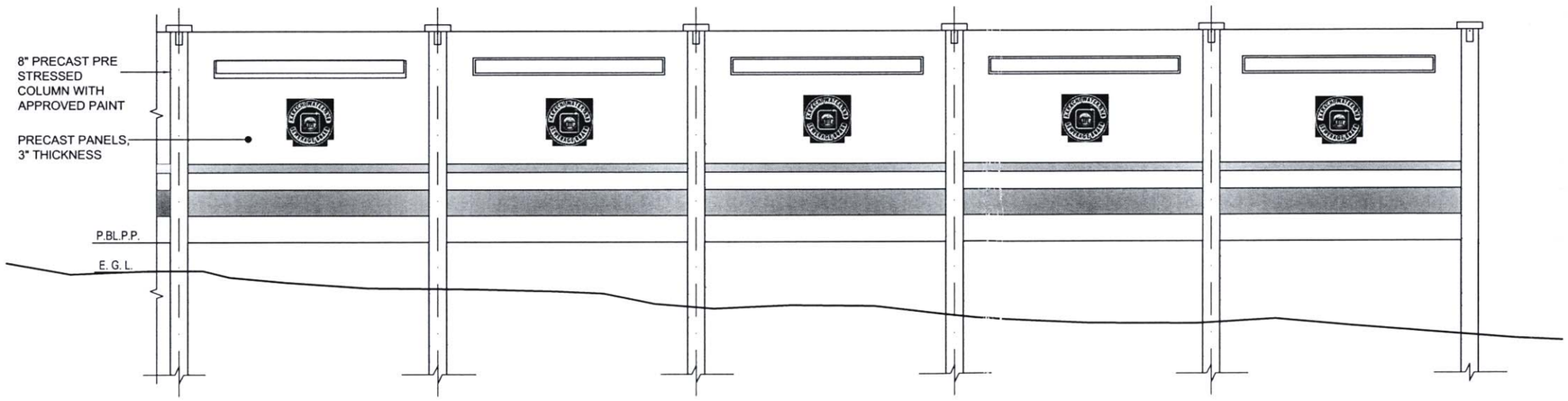
Status of Drawing:	TENDER DRAWINGS
Drawing Discipline:	STRUCTURE
Drawings Title:	BOUNDRY PILARS
Location Description:	DISTRICTS KARACHI & THATTA, SINDH

Caded By:	Designed by:	Checked by:	Coordinated By:	Approved By:
MUMTAZ	ISHRAQ	SHOAB AHMED	-----	-----
Scale: AS SHOWN @ A3 SHEET	CTB File Name: OCL 100	Dated: APRIL 2015	Project No: 2850	Sheet No. 1
Dwg N0: 2850-03-S01 T0				Rev No: T0
Cad File Name	2850-03-S01 T0			



TYP. ELEVATION OF WALL-(TYPE-A)

SCALE : 3/16" =1'



TYP. ELEVATION OF WALL- (TYPE-B)
(FOR AVERAGE TERRAIN)

SCALE : 3/16" =1'

NOTES

1) ALL DIMENSIONS & LEVELS ARE IN FEET.

2) THIS DRAWINGS SHOULD BE READ IN CONJUNCTION WITH ARCHITECTURAL AND PROFILE DRAWINGS.

3) DIFFERENCE OF ELEVATION BETWEEN E.G.L. & PROPOSED BOTTOM LEVEL OF PRECAST PANEL IF IS MORE THAN 3'-0" THEN THE PROPOSED BOTTOM LEVEL OF PRECAST WALL PANEL SHALL BE REVISED WITH CONSULTATION OF ENGINEER-IN-CHARGE.

4) FOR SECTIONS DETAILS REFER DRAWING NO.-S02 .

S. No.	Date	Revisions	Drawn	Checked
T0	APR.15	ISSUED FOR TENDER	M.A	S.A

Project:
GREATER KARACHI WATER SUPPLY SCHEME K-IV PHASE-I 260 MGD

Client:
KARACHI WATER & SEWERAGE BOARD

Project Consultant:

OSMANI
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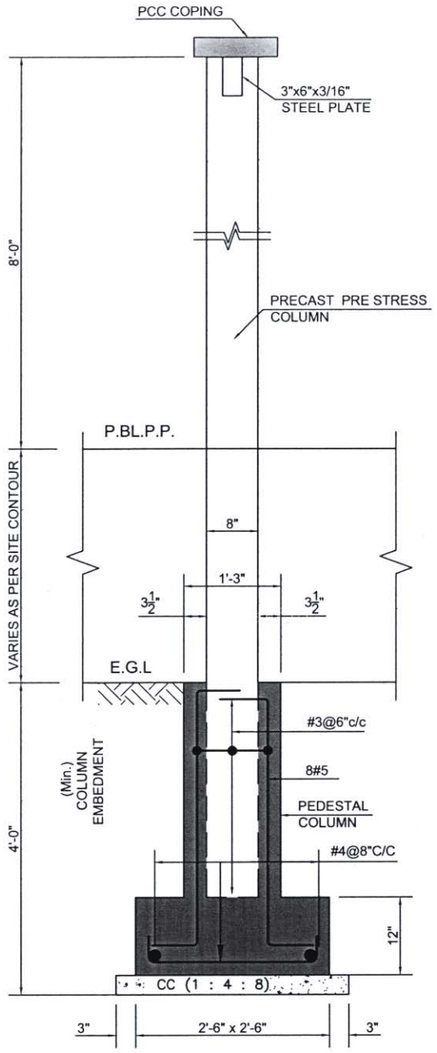
Tel. (92-21) 34536007-08, 34546541-42, Fax (92-21) 34534691,
E-mail: dhacity@osmani.com, URL: www.osmani.com

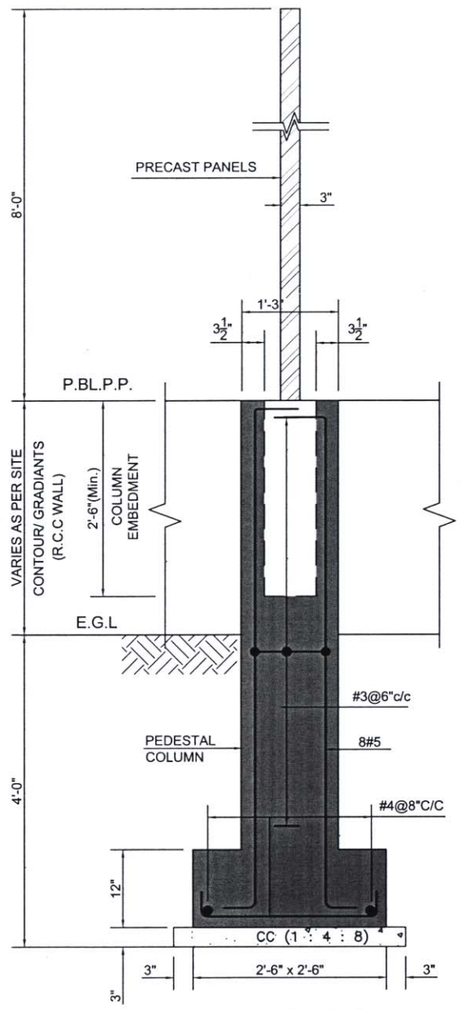
Status of Drawing:	Working Drawings
Drawing Discipline:	STRUCTURE
Drawings Title:	TYP. ELEV. OF BOUNDARY WALL (TYPE A & B)
Location Description:	DISTRICTS KARACHI & THATTA, SINDH

Caded By:	Designed by:	Checked by:	Coordinated By:	Approved By:
MUMTAZ	ISHRAQ	SHOAIB AHMED	------	-
Scale: ○ A3 SHEET	CTB File Name: OCL100	Dated: APRIL,2015	Project No: 2850	Sheet No. 1
Dwg N0: S01				Rev No: T0
Cad File Name	2850-03-S01			

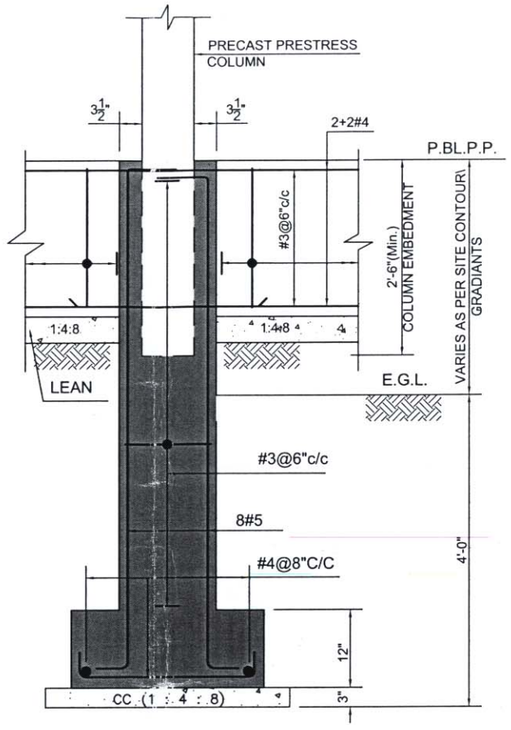
Drawing file path & name : E:\2400-82-3-S01-C.dwg
User and Plot Date : Mumtaz - Fri, 03 Apr 2015 - 4:26pm



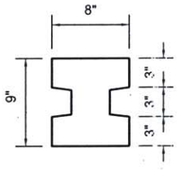
SECTION A-A
(FOR TYPE–B)–F1
SCALE:1/2" = 1'



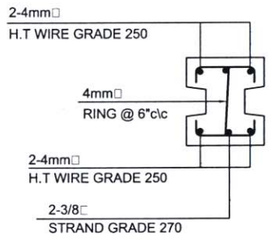
SECTION B-B
(FOR TYPE –A) F1
SCALE:1/2" = 1'



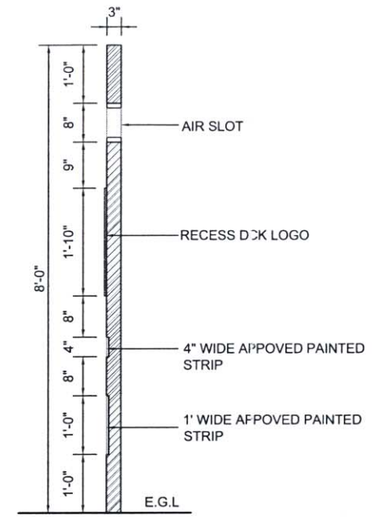
SECTION C-C
(FOR TYPE –A)
SCALE:1/2" = 1'



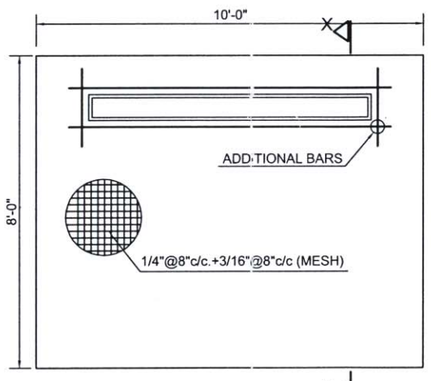
DIMENSIONAL DETAIL



REINF. DETAIL

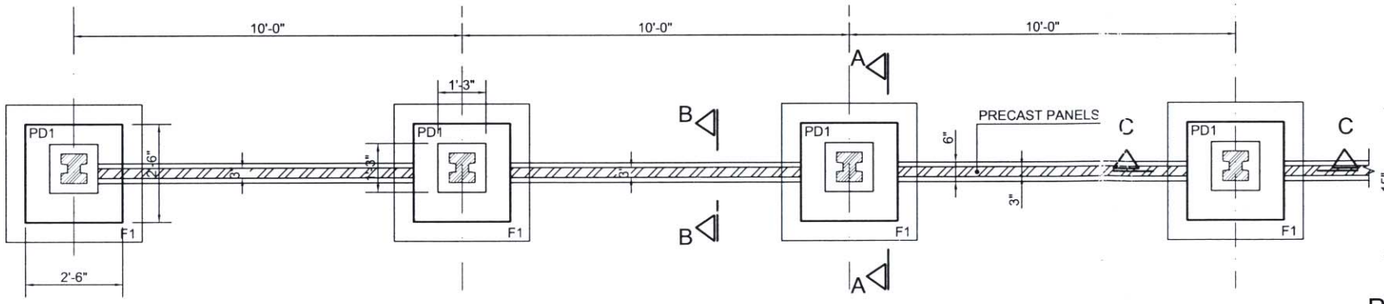


SECTION X-X
SCALE:3/8" = 1'

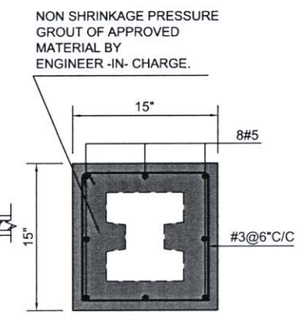


TYP.ELEVATION OF WALL PANEL
SCALE : 3/8" =1'
(REINFORCEMENT DETAILS OF PRODUCT MANUFACTURER SHALL BE FOLLOWED)

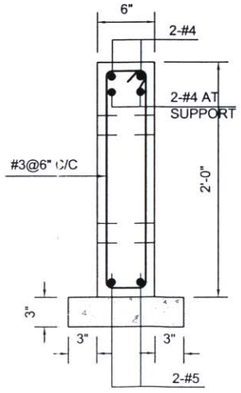
PRECAST PRESTRESS COLUMN DETAILS
SCALE : 3/4" =1'



FOUNDATION PLAN (TYPE -A & TYPE -B)
SCALE : 1/4" =1'



PEDESTAL COLUMN PD1
SCALE : 3/4" =1' (REINFORCEMENT)



SECTION B-B
(FOR TYPE -A)
SCALE : 3/4" =1'

NOTES:

1. ALL DIMENSIONS ARE IN FEET AND INCHS.
2. READ ALL DRAWINGS IN CONJUNCTION WITH APPROVED ARCHITECTURAL, PLUMBING, SEWERAGE, MECHANICAL, ELECTRICAL AND ANY OTHER RELEVANT DRAWINGS.
3. DO NOT SCALE THE DRAWINGS WRITTEN DIMENSIONS, GIVEN ON THE DRAWING,SHALL GOVERN.
4. ALL LEVELS SHOULD BE CONFIRMED FROM ARCHITECTURAL DRAWINGS BEFORE EXECUTION .
5. THE FOUNDATION HAS BEEN DESIGNED ON AN ALLOWABLE BEARING CAPACITY OF 1.25 Tsf FOR ISOLATED FOOTING AT 4'-0" BELOW NATURAL GROUND LEVEL THE CONTRACTOR IS REQUIRED TO RECONFIRM BEARING CAPACITY OF SOIL BEFORE EXECUTION OF WORK. IN CASE OF ANY VARIATION IN BEARING CAPACITY VALUES DESIGN OF FOUNDATION IS REQUIRED TO BE REVIEWED IN CONSULTATION WITH DESIGN CONSULTANT.
6. THE MINIMUM WORK COMPRESSIVE CYLINDER STRENGTH OF CONCRETE SHALL BE 2500 PSI AT 28 DAYS. USING O.P. CEMENT.
7. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM-A615 GRADE (60 Ksi) HAVING A MINIMUM YIELD STRENGTH OF 60,000 PSI.
8. CLEAR COVER TO REINFORCEMENT SHALL BE FOR FOOTING 3", BEAM & COLUMN 1.5".
9. ALL SURFACES IN CONTACT WITH EARTH SHALL BE TREATED WITH TWO (02) COATS OF HOT BITUMEN EMULSION OF GRADE (10/20).
10. FOR TYP. ELEV. OF BOUNDARY WALL DETAILS REFER DRAWING NO.-S01.

LEGEND:

1- WALL TYPE A - AT LOCATION OF SLOPING GROUND PROFILE .

2- WALL TYPE B - AT LOCATIONS WHERE THE GROUND GRADES ARE CHANGING AND FORMING SAG.

3- E.G.L. - EXISTING GROUND LEVEL.

4- P.BL.P.P - PROPOSED BOTTOM LEVEL OF PRECAST WALL PANEL.

S. No	Date	Revisions	Drawn	Checked
T0	APR.15	ISSUED FOR TENDER	M.A	S.A

Project:
GREATER KARACHI WATER SUPPLY SCHEME K-IV PHASE-I 260 MGD

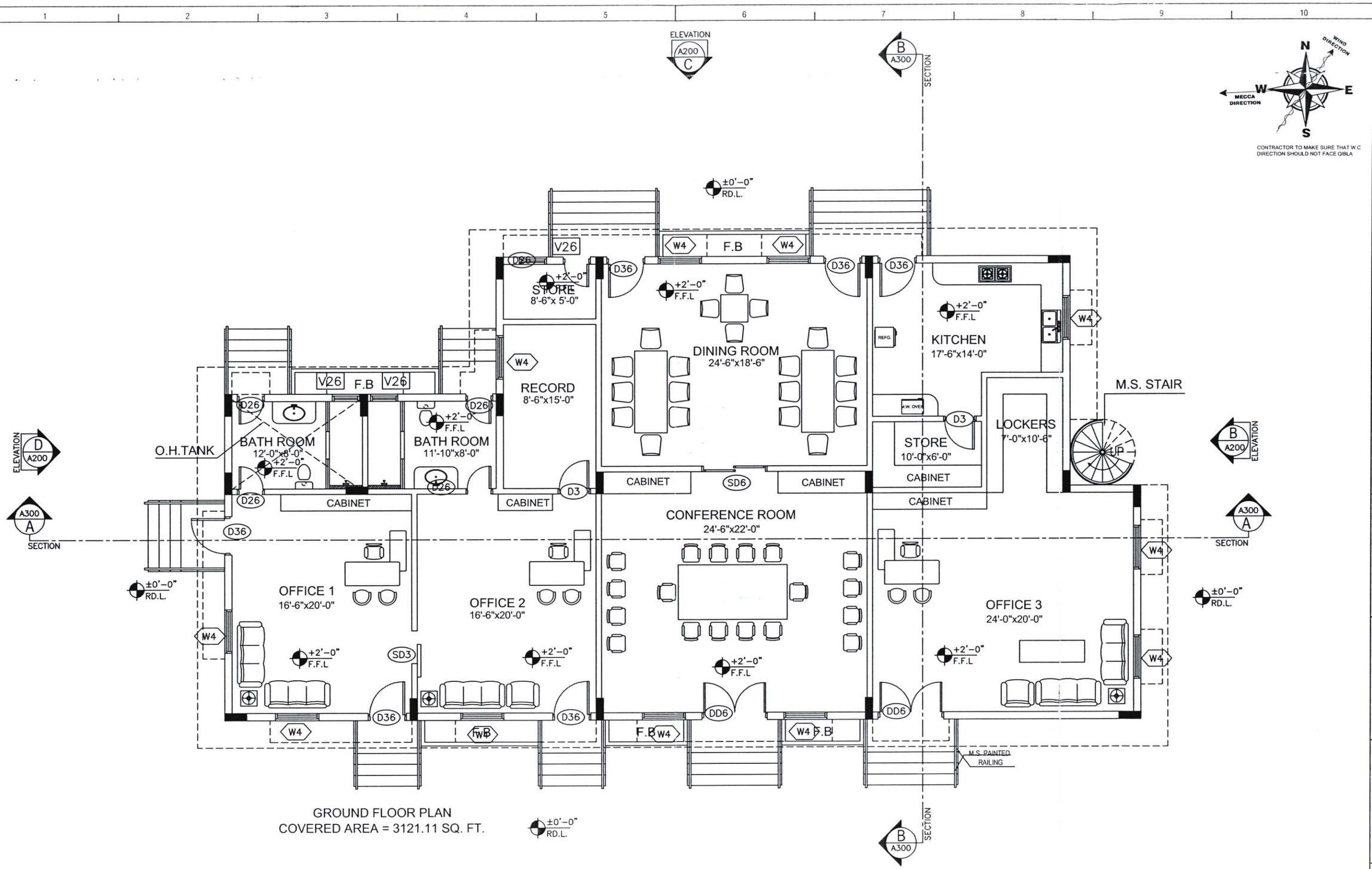
Client:
KARACHI WATER & SEWERAGE BOARD

Project Consultant:
OSMANI
Engineering - Architecture - Planning - Mapping - Technology
245/2–K, Block 6, PECHS, Karachi–75400, Pakistan.
Tel. (92–21) 34538007–08, 34548541–42, Fax (92–21) 34534891,
E–mail: dhacity@osmani.com, URL: www.osmani.com

Status of Drawing:	TENDER DRAWINGS
Drawing Discipline:	STRUCTURE
Drawings Title:	BOUNDARY WALL FOUNDATION PLAN & SECTIONAL DETAILS
Location Description:	DISTRICTS KARACHI & THATTA, SINDH

Caded By:	Designed by:	Checked by:	Coordinated By:	Approved By:
MUMTAZ	ISHRAQ	SHOAIB AHMED	------	--
Scale: @ A3 SHEET	CTB File Name: OCL100	Dated: APRIL,2015	Project No: 2850	Sheet No. 1
Dwg NO: S02				Rev No: T0
Cad File Name	2850-03-S02			

Drawing file path & name : E:\2400-82-3-S02-C.dwg
User and Plot Date : Mumtaz - Fri, 03 Apr 2015 - 4:26pm



Client:

KARACHI WATER AND SEWERAGE BOARD

Project:

BUILDING PLAN OF K - IV PROJECT K.W.S.B.

S. No	Date	Issuance	Checked	Issued

S. No	Date	Revisions	Drawn	Checked

Status of Drawings: TENDER DRAWINGS

Drawings Discipline: ARCHITECTURAL DRAWINGS

Building / Job Name: OFFICE BUILDING

Drawings Title: GROUND FLOOR PLAN

Caded By:	BUSHRA
Designed by:	FARAN
Checked by:	KAMRAN
Coordinated By:	THK
Approved By:	--
Cad File Name:	2850-1-1-2-A100T0

Dated:	Apr,2015
Scale:	1/4"=1' @A1SHEET
ctb	File Name OCL100
Plot No:	--
Project No:	2850
Rev No:	T0
Dwg N0:	A100

Consultant:

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Engineering - Architecture - Planning - Mapping - Technology

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OSMANI HOUSE: 245/2-K, Block 6, PECHS, Karachi-75400, Pakistan.
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E-mail: ocl-khi@osmani.com, Website: www.osmani.com

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ELEVATION A200 C

B A300 SECTION

N WIND DIRECTION

W MECCA DIRECTION E

S

CONTRACTOR TO MAKE SURE THAT W.C DIRECTION SHOULD NOT FACE QIBLA

ELEVATION D A200

O.H.TANK
11'-10"x7'-10"X5'-6"
3199 GALLONS

+14'-0" F.F.L

RIDGE

VALLEY

DN.

B A200 ELEVATION

A300 A SECTION

A300 A SECTION

VALLEY

RIDGE

±0'-0" RD.L.

ROOF PLAN

A A200 ELEVATION

B A300 SECTION

Client:

KARACHI WATER AND SEWERAGE BOARD

Project:

BUILDING PLAN OF K - IV PROJECT K.W.S.B.

S. No	Date	Issuance	Checked	Issued

S. No	Date	Revisions	Drawn	Checked

Status of Drawings: TENDER DRAWINGS

Drawings Discipline: ARCHITECTURAL DRAWINGS

Building / Job Name: OFFICE BUILDING

Drawings Title: ROOF PLAN

Caded By:	BUSHRA
Designed by:	FARAN
Checked by:	KAMRAN
Coordinated By:	THK
Approved By:	--
Cad File Name	2850-1-1-2-A10010

Dated: Apr,2015

Scale: 1/4"=1' @A1SHEET

ctb File Name OCL100

Plot No: --

Project No: 2850

Rev No: T0

Dwg NO: A101

Consultant:

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OSMANI HOUSE: 245/2-K, Block 6, PECHS, Karachi-75400, Pakistan.
Tel. (92-21) 34536007-08, 34548541-42, Fax (92-21) 34534691,
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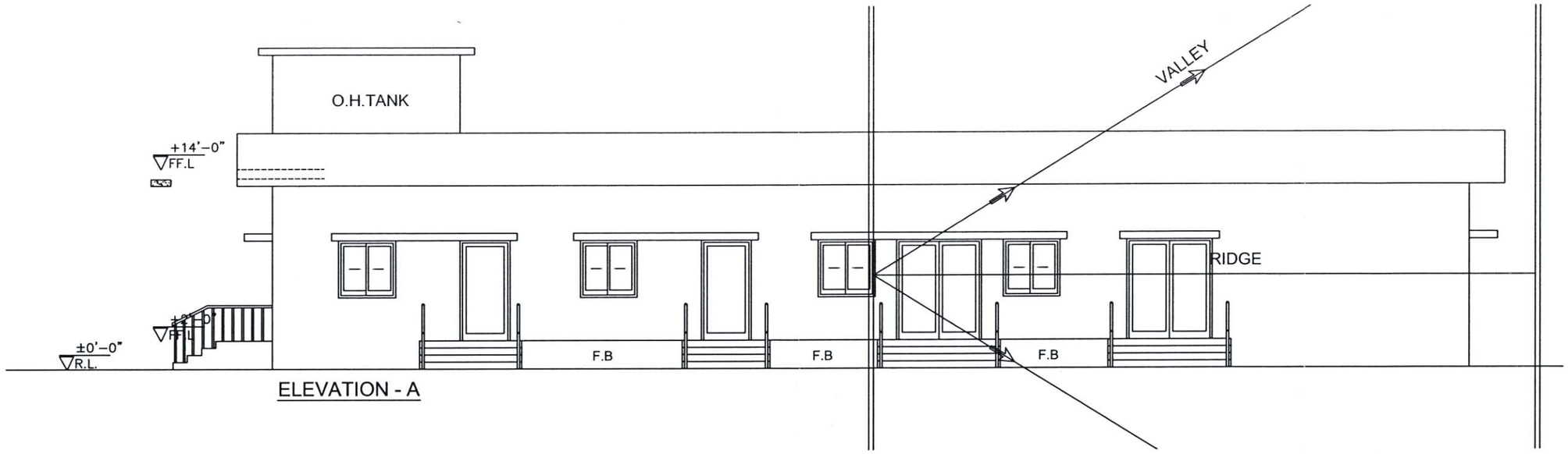
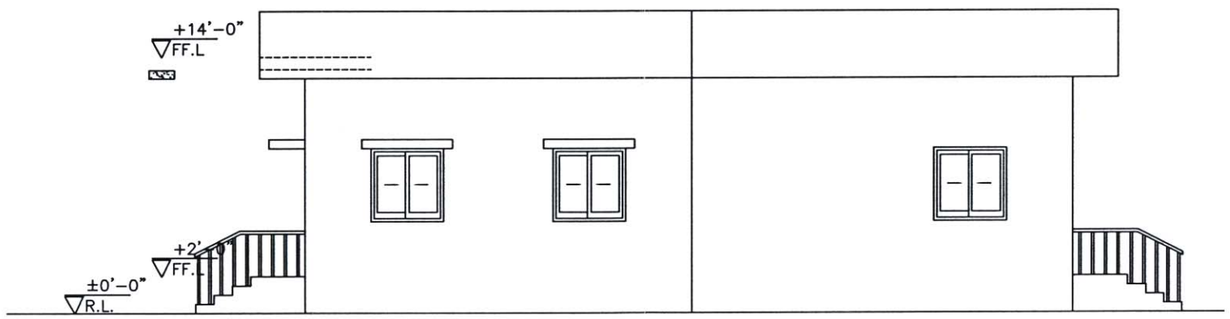
Drawing file path & name D:\ASHFAR 2850-K-IV 01-Office Building 1 Arch 02 Tender Dwgs 2850-1-1-2-A10010.dwg

User and Plot Date Ghaffar - Mon, 13 Apr 2015 - 10:03am



ELEVATION - A



ELEVATION - B

Client:

KARACHI WATER AND SEWERAGE BOARD

Project:

BUILDING PLAN OF K - IV PROJECT K.W.S.B.

S. No	Date	Issuance	Checked	Issued

S. No	Date	Revisions	Drawn	Checked

Status of Drawings: TENDER DRAWINGS

Drawings Discipline: ARCHITECTURAL DRAWINGS

Building / Job Name: OFFICE BUILDING

Drawings Title: ELEVATION A & B

Caded By:	BUSHRA
Designed by:	FARAN
Checked by:	KAMRAN
Coordinated By:	THK
Approved By:	--
Cad File Name	2850-1-1-2-A100T0

Dated: Apr,2015 | Scale: 1/4"=1' @A1SHEET | ctb File Name OCL100

Plot No: -- | Project No: 2850

Rev No: T0 | Dwg NO: A200

Consultant:
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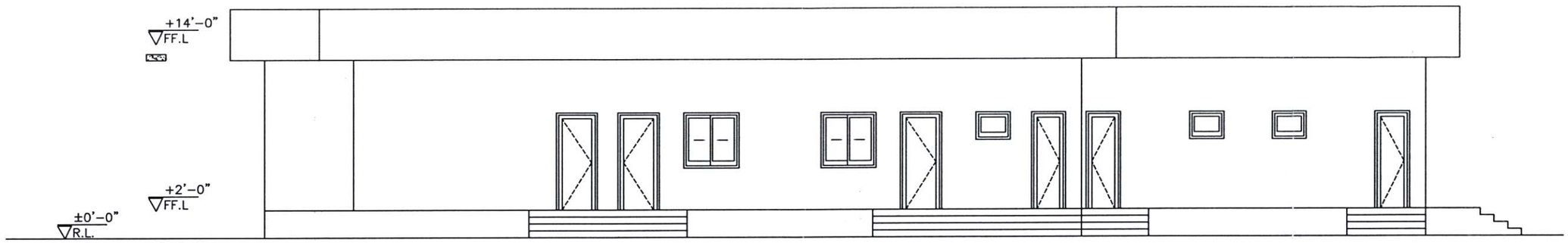
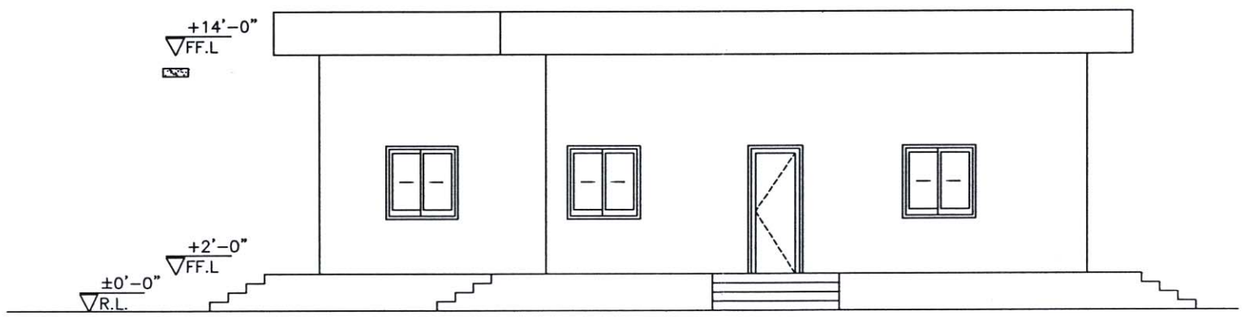


ELEVATION - C



ELEVATION - D

Client:
KARACHI WATER AND SEWERAGE BOARD

Project:
BUILDING PLAN OF K - IV PROJECT K.W.S.B.

S. No	Date	Issuance	Checked	Issued

S. No	Date	Revisions	Drawn	Checked

Status of Drawings: TENDER DRAWINGS
Drawings Discipline: ARCHITECTURAL DRAWINGS
Building / Job Name: OFFICE BUILDING
Drawings Title: ELEVATION C & D

Caded By:	BUSHRA
Designed by:	FARAN
Checked by:	KAMRAN
Coordinated By:	THK
Approved By:	--
Cad File Name	2850-1-1-2-A100T0
Dated:	Apr,2015
Scale:	1/4"=1' @A1SHEET
ctb	File Name OCL100
Plot No:	--
Project No:	2850
Rev No:	T0
Dwg NO:	A201

Consultant:
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OSMANI & COMPANY (PVT.) LTD.
Architects - Consulting Engineers - Planners
OSMANI HOUSE: 245/2-K, Block 6, PECHS, Karachi-75400, Pakistan.
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E-mail: ocl-khi@osmani.com, Website: www.osmani.com
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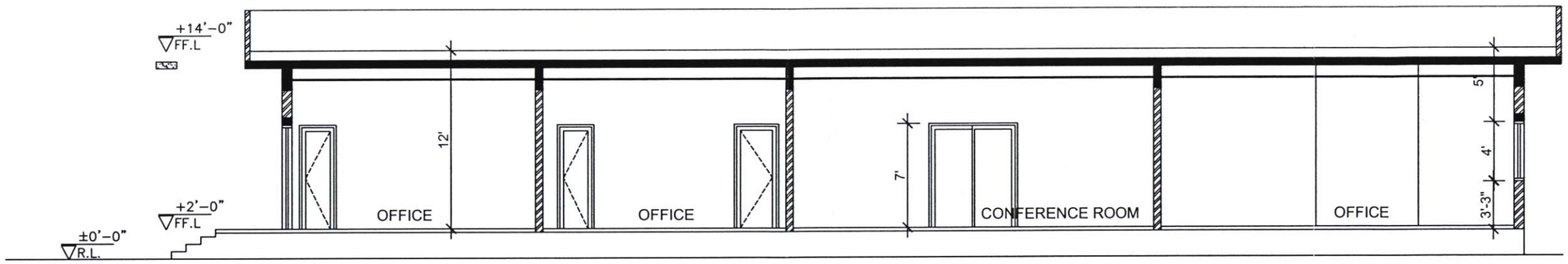
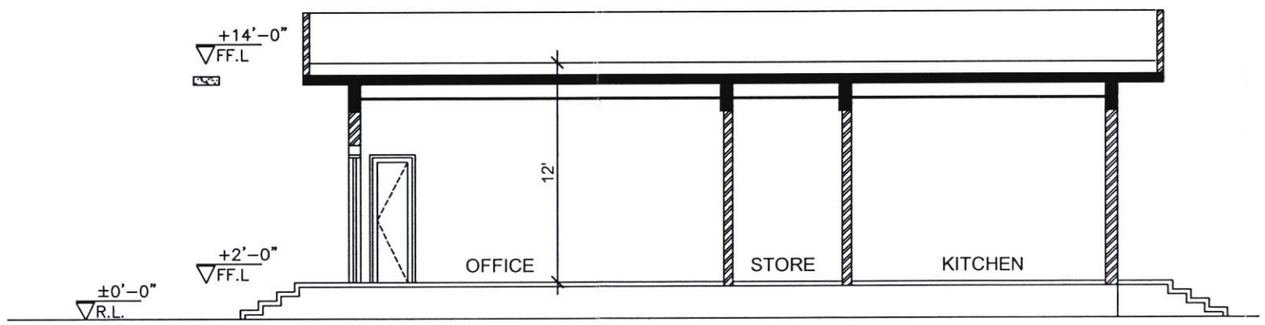


SECTION - A-A



SECTION - B-B

Client:
KARACHI WATER AND SEWERAGE BOARD

Project:
BUILDING PLAN OF K - IV PROJECT K.W.S.B.

S. No	Date	Issuance	Checked	Issued

S. No	Date	Revisions	Drawn	Checked

Status of Drawings: TENDER DRAWINGS
Drawings Discipline: ARCHITECTURAL DRAWINGS
Building / Job Name: OFFICE BUILDING
Drawings Title: SECTION A-A & B-B

Caded By:	BUSHRA
Designed by:	FARAN
Checked by:	KAMRAN
Coordinated By:	THK
Approved By:	--
Cad File Name	2850-1-1-2-A100T0
Dated:	Apr,2015
Scale:	1/4"=1' @A1SHEET
ctb	File Name OCL100
Plot No:	--
Project No:	2850
Rev No:	T0
Dwg NO:	A300

Consultant:
OSMANI
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