



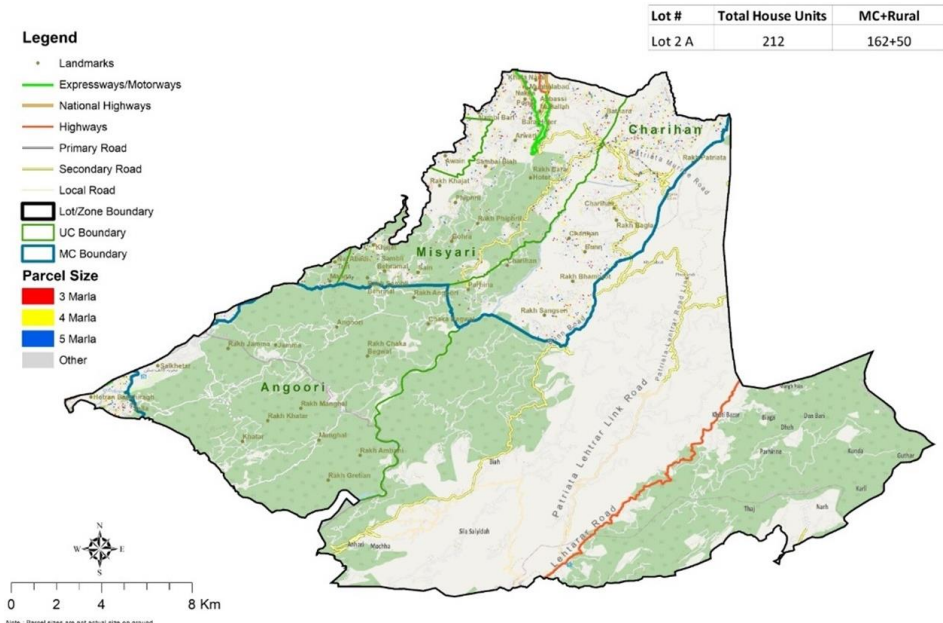
The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



BIDDING DOCUMENT
(Drafted as per PPRA SBD)

**SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ROOFTOP
RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT
LOT 2A (210 Households)**

(SINGLE STAGE TWO ENVELOPE)



Procurement Reference No. UU/2024-25/15

DECEMBER 2024

Bidder's Signature & Stamp

PREFACE

1. The information contained in this Bidding Document or subsequently provided to Bidder(s), whether verbally or in written form by or on behalf of the Urban Sector Planning and Management Services Unit (Private) Limited (The Urban Unit), or any of their employees or advisors, shall be subject to the terms and conditions set out in this Bidding Document and any other terms and conditions subject to which such information is provided.
2. This Bidding Document does not purport to contain all the information each Bidder may require. This Bidding Document may not be appropriate for all persons, and it is not possible for The Urban Unit, their employees or advisors to consider the investment objectives, financial situation and particular needs of each Bidder who reads or uses this Bidding Document. Certain Bidders may have better knowledge of the proposed Project than others may. Each Bidder should conduct its own investigations and analysis and should check the accuracy, reliability and completeness of the information in this Bidding Document and obtain independent advice from appropriate sources. The Urban Unit, its Representatives, their employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the Bidding Document.
3. The Urban Unit may, in their absolute discretion, but without being under any obligation to do so, update, amend, add to any or all of the provisions or supplement the information of this Bidding Document or cancel the present Invitation and call for fresh Invitations. Such changes would be intimated to all Bidders using this Bidding Document.
4. The Urban Unit reserves the right to reject any or all of Bids submitted in response to this Invitation at any stage without assigning any reasons whatsoever before acceptance of any bid. The Urban Unit also reserves the right to hold or withdraw from or cancel the process at any stage up to the final / shortlisting / selection.
5. Neither the Urban Unit nor their employees or representatives will have any liability in case of non-receipt of any correspondence from them to the bidders due to postal delays.
6. Mere submission of this Bid does not vest any right in the Bidder for being selected for the project.
7. All the procurement procedures shall be conducted in accordance with Punjab Procurement Authority Act-2009 and Punjab Procurement Rules-2014. In case of any conflict between the provision of this document and PPRA Act-2009/ PPRA Rules-2014, the latter shall prevail.

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**INVITATION
FOR
BIDS**

INVITATION FOR BIDS

Procurement Reference No. UU/2024-25/15

SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ROOFTOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT

LOT 2A (210 Households)

RAINWATER HARVESTING PROJECT FOR MURREE DISTRICT

(Funded by the Government of Punjab ADP CM Package for Murree)

The Urban Sector Planning and Management Services Unit Pvt. Limited is inviting sealed bids under the Single Stage Two Envelopes bidding procedure from eligible sole proprietors, firms, contractors / constructors or registered companies qualifying eligibility criteria and registered with the Federal Board of Revenue (FBR) and Income Tax and Punjab Revenue Authority (PRA) Department. The procurement title is "SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ROOFTOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT" and will be allotted in individual lots and conducted in accordance with the Punjab Procurement Rules 2014 (as amended up to date).

In this lot, complete Rainwater Harvesting Systems (RWH) are to be installed for approximately 210 houses/residential units of low-income of 3, 4, and 5 Marlas area in Murree District as identified by the client. The contractor is expected to mobilize in January 2024. The details of the project lot and requirements are described as follows.

Lot No.	Description of Work	House Sizes (Marla)	Food Water Tank (Gallons)	House Number	Engineering Cost Estimate (Millions)
2A	Supply, Installation, Testing and Commissioning of Rooftop Rainwater Harvesting System in Murree District	3, 4, 5 Marla	300 & 500 Gallons	210	95.07

ELIGIBILITY CRITERIA

- The interested bidders (including JV partners) must be registered with PEC in the category C-4 or above with valid registration certificates.
- Bidders must attach at least 1 project with the value of PKR 80 million during the last five years with any authority or government or private sector entity along with authenticated proof including Letter of Award / Purchase or Work Order / Contract / completion certificate (any of these documents will be acceptable).
- Valid NTN certificate as taxpayer with FBR shall also be required.
- Average annual turnover of the last three years must be 100 million. (Audited statements or income tax returns of last three financial years up to June 2023 to be attached).
- The bidders bidding for Lot 2A must enclose the bid security amounting to PKR 950,700/- (1% of the estimated cost at PKR 95.07 Million) in favor of The Urban Sector Planning and Management Services Unit (Private) Limited. Bid Security shall be submitted in the form of Call Deposit Receipt / Bank Guarantee / Demand Draft / Pay Order valid for a minimum period of six (6) months from a scheduled bank.

IMPORTANT NOTES

- Financial bid of only technically responsive bidders will be opened.
- In case of difference between unit price and total price, unit price shall prevail and its total price shall be "final".

3. In case of difference between amount in “words” and amount in “figures”, amount in “words” shall be considered final.
4. Bidders are required to quote for all items listed. Partial bidding is not permitted.
5. Evaluation shall be carried out on the basis of Least Cost Method (subject to qualifying the eligibility and technical criteria).
6. Contract will be awarded to the technically responsive first lowest evaluated bidder.
7. Unit Rates must be inclusive of all applicable taxes, duties and charges etc.
8. Overwriting, cutting, use of fluid etc. in unit rates are not allowed which may lead to cancellation of bid offered.
9. The bidders who submitted the bid shall be agreeing with all terms and conditions mentioned in this bidding document.
10. The bidding document, including specifications and terms & conditions, is available and must be downloaded from Punjab Procurement Regulatory Authority (PPRA) and the Urban Unit websites.
11. The **pre-bid meeting will be held on 12th December 2024** at the location: KSD Hall-The Urban Unit, 503 –Shaheen Complex, Egerton Road, Lahore, at **12:00 Noon**. The bidders are requested to submit their queries in written form at the time of pre-bid meeting.
12. The **deadline for submitting bids is 23rd December till 12:00 Noon, Pakistan** Standard Time. The bid opening will take place at 12:30 PM on the same day at the address provided below, and bidders or their authorized representatives are welcome to attend.
13. In case of any calculation errors in financial proposal, the arithmetically corrected amount shall be considered as final.

For any inquiries or clarifications, feel free to reach out to the procurement department.

Procurement Manager

The Urban Unit

503 – Shaheen Complex, Egerton Road, Lahore

Ph: 042-99205316-22

Fax: 042-99205323

www.urbanunit.gov.pk

**INSTRUCTIONS
TO
BIDDERS**

INSTRUCTIONS TO BIDDERS

(Note: These Instructions to Bidders along with Bid 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 The Employer as defined in the Bid data sheet hereinafter called “the Employer” wishes to receive bids for the construction and completion of works and remedying any defects therein as described in these Bidding Documents, and summarized in the Bid data sheet hereinafter referred to as the “Works”.
- 1.2 The successful bidder will be expected to complete the Works within the time specified in Appendix-A to Bid.

IB.2 Source of Funds

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

IB.3 Eligible Bidders

- 3.1 This Invitation for Bids is open to all bidders meeting the following requirements:
 - a. The Invitation to Bids is open to all suppliers i.e. association of firms/companies/sole proprietor/ general order suppliers/ JVs, registered with relevant Registration Authorities and be registered with PEC in the category C-4 or above with valid registration certificates and Tax Departments/ Authorities (Income Tax, Sales Tax & Punjab Sales Tax etc.), except as provided hereinafter.
 - b. Bidders should not be associated, or have been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Procuring Agency to provide consultancy services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods to be purchased under this Invitation to Bids.
 - c. Bidders must have completed and/or substantial projects related to water supply or construction projects as main contractor with the value of Rupees 100 million during the last five years with any authority or government or private sector along with authenticated proof including letter of award and completion certificate. The average annual turnover of the last three years must be 100 million.
 - d. Government-owned enterprises may participate only if they are duly/legally authorized in this regard by the respective/relevant competent forum/authority.

- e. Bidders shall not be under a declaration of blacklisting by the Procuring Agency.
- f. In the case of a Joint Venture, Consortium, or Association, all members shall be jointly and severally liable for the execution of the Contract in accordance with the terms and conditions of the Contract. The limit on the number of members of a JV or Consortium or Association is two. The Joint Venture, Consortium, or Association shall nominate a Lead Member as nominated in the BDS, who shall have the authority to conduct all business for and on behalf of any and all the members of the joint venture, consortium, or association during the Bidding process, and in case of award of contract, during the execution of contract.
- g. The appointment of Lead Member in the Joint Venture, Consortium, or Association shall be confirmed by submission of a valid JV or Consortium agreement to the Procuring Agency.
- h. Any agreement that forms a Joint Venture, Consortium or Association shall be required to be submitted as part of the Bid and shall be attested.
- i. Any bid submitted by the Joint Venture, Consortium or Association shall indicate the part of proposed contract to be performed by each party and each party shall be evaluated or post qualified with respect to its contribution only and the responsibilities of each party and shall not be substantially altered without prior written approval of the Procuring Agency and in line with any instructions issued by the Authority.
- j. A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be Non-Responsive. A Bidder may be considered to have a conflict of interest with one or more parties in this Bidding process, if they:
 - i. are associated or have been associated, directly or indirectly with a firm or any of its affiliates which have been engaged by the Procuring Agency to provide consulting services for the preparation of the design and other documents to be used.
 - ii. have controlling shareholders in common; or
 - iii. receive or have received any direct or indirect subsidy from any of them; or
 - iv. have the same legal representative for purposes of this Bid; or
 - v. have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Procuring Agency regarding this Bidding process;

IB.4 One Bid per Bidder

- 4.1 Each bidder shall submit only one bid for the Lot either by himself, or as a partner in a joint venture.

IB.5 Cost of Bidding

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

IB.6 Site Visit

- 6.1 The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All costs in this respect shall be at the bidder's own expense.
- 6.2 The bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidders, their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

- 7.1 The Bidding Documents, in addition to invitation for bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.
1. Instructions to Bidders.
 2. Bid data sheet.
 3. General Conditions of Contract, Part-I(GCC).
 4. Special Conditions of Contract, Part-II(SCC).
 5. Specifications – Special Provisions.
 6. Specifications – Technical Provisions.
 7. Form of Bid & Appendices to Bid, including a Certificate that the bidder is not currently blacklisted by the Procuring Agency.
 8. Bill of Quantities (Appendix-D to Bid).
 9. Form of Bid Security.
 10. Form of Contract Agreement.
 11. Forms of Performance Security, Mobilization Advance, Bank Guarantee and Secured Advance.
 12. Drawings.
- 7.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents

- 8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for

Bids at time of pre-bid meeting. The Employer will respond to any request for clarification which he receives **prior** to the deadline for submission of bids. The exact number of days will be mentioned in the Bid Data Sheet keeping in view the time given for submission of bids.

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

IB.9 Amendment of Bidding Documents

- 9.1 At any time at least three days prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.
- 9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to IB 7.1 hereof and shall be communicated in writing via email to all purchasers of the Bidding Documents, **at least three (03) days prior to the closing date of submission of the bid & Upload on Web site.** Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.
- 9.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20

C. PREPARATION OF BIDS

IB.10 Language of Bid

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

IB.11 Documents Comprising the Bid

- 11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid and the other the Financial Bid, containing the documents listed in Bid data sheet under the heading of IB 11.1 A & B respectively. Both envelopes to be enclosed together in an outer single envelope called the Bid. Each bidder shall furnish all the documents as specified in Bid data sheet 11.1 A & B.
- 11.2 Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together with a copy of the proposed agreement. The role to be played by each partner to be specified therein; **and, the concerned partner should have the requisite qualification/ experience to successfully execute the assigned task.** Bids submitted by a joint venture of two (2) or more firms shall also comply with the following requirements:

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

11.3 The Bidder shall furnish, as part of the Technical Bid, a Technical Proposal for including a statement of work methods, work plan , equipment, personnel, schedule, **qualification/ experience required to successfully execute the individually assigned tasks** and any other information as stipulated in Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

- 12.1 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in IB 1.1 hereof, based on the unit rates and / or prices submitted by the bidder for the Lot .
- 12.2 The bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by a bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Bill of Quantities.
- 12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date **of opening of the bids** shall be included in the rates and prices and the total Bid Price submitted by a bidder.

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

IB.13 Currencies of Bid and Payment

- 13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. However, subject to GCC clause 71.1, payments in foreign currency are not permissible.

IB.14 Bid Validity

- 14.1 Bids shall remain valid for the period stipulated in the Bid data sheet after the Date of Bid Opening specified in Clause IB.23.
- 14.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period which shall in no case be more than the original bid validity period or 180 days whichever is more. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiting his Bid Security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects. Rule 28 of PPR-14 shall be applicable for Bid Validity period.

IB.15 Bid Security

- 15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount stipulated in the Bid data sheet in Pak Rupees or an equivalent amount in a freely convertible currency.
- 15.2 The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 30 days beyond the Bid Validity date.
- 15.3 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.
- 15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, after expiry of grievance period or disposal of complaint if any, complying with the relevant provisions of PPR-14.
- 15.5 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed the Contract Agreement.

15.6 The Bid Security may be forfeited:

- (a) If the bidder withdraws his bid except as provided in IB 22.1;
- (b) If the bidder does not accept the correction of his Bid Price pursuant to IB 27.2 hereof; or
- (c) In the case of successful bidder, if he fails within the specified time limit to:
 - (i) Furnish the required Performance Security;
 - (ii) Sign the Contract Agreement, or
 - (iii) Furnish the required JV agreement within 7 days of the receipt of letter of acceptance.

IB.16 Alternate Proposals by Bidder

16.1 No alternate proposals are allowed in single stage two envelope method.

IB.17 Pre-Bid Meeting

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

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

17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in IB 7.1 hereof, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and or through the minutes of the pre-bid meeting.

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

IB.18 Format and Signing of Bid

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

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

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

- 18.4 The Bidder shall prepare one original of the Technical Bid and one original of the Financial Bid comprising the Bid as described in Bid data sheet against IB 11 and clearly mark it “ORIGINAL - TECHNICAL BID” and “ORIGINAL - FINANCIAL BID”. In addition, the Bidder shall submit two (2) copies of the Bid and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.
- 18.5 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the Bid data sheet and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid, except for unamended printed literature, shall be signed or initialed by the person signing the bid.
- 18.6 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.
- 18.7 Bidders shall indicate in the space provided in the Letter of Technical and Financial Bids, their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.
- 18.8 Bidders should retain a copy of the Bidding Documents as their file copy.

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

IB.19 Sealing and Marking of Bids

- 19.1 Each bidder shall submit his bid as under:
- (a) ORIGINAL and each copy of the Bid with Lot Number shall be separately sealed and put in separate envelopes and marked as such.
 - (b) The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in IB 19.2 hereof.
 - (c) The technical bid should comprise of documents listed in IB11.1 (A) & the Financial Bid should comprise of documents listed in IB 11.1 (B) which shall be placed in separate envelopes in accordance with IB 11.1.
- 19.2 The inner and outer envelopes shall:
- (a) Be addressed to the Employer at the address provided in the Bid data sheet;
 - (b) Bear the name and identification number of the contract & LOT as defined in the Bid data sheet; and

- (c) Provide a warning not to open before the time and date for bid opening, as specified in the Bid data sheet.
- 19.3 In addition to the identification required in IB 19.2 hereof, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause IB.21
- 19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

- 20.1 (a) Bids must be received by the Employer at the address specified no later than the time and date stipulated in the Bid data sheet.
- (b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.
- (c) Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.
- (d) Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by E mail .
- 20.2 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an amendment in accordance with Clause IB.9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.21 Late Bids

21. (a) Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 will be returned unopened to such bidder.
- (b) Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

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

- 22.2 The modification, substitution, or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked “MODIFICATION”, “SUBSTITUTION” or “WITHDRAWAL” as appropriate.
- 22.3 No bid may be modified by a bidder after the deadline for submission of bids except in accordance with IB 22.1 and 27.2.
- 22.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

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

IB. 23 Bid Opening

- 23.1 The Employer will open the Technical Bids in public at the address, date and time specified in the Bid data sheet in the presence of Bidders’ designated representatives and anyone who choose to attend. The Financial Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening.
- 23.2 First, envelopes marked “WITHDRAWAL” shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding Withdrawal Notice contains a valid authorization to request the withdrawal and is read out at bid opening.
- 23.3 Second, outer envelopes marked “SUBSTITUTION” shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Financial Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Financial Bid will remain unopened in accordance with IB 23.1. No envelope shall be substituted unless the corresponding

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

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

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

Preliminary Examination of Technical Bids

- 23.6 a) The Employer shall first examine qualification and experience Data as per appendix M and N submitted by the Bidder. The technical proposal examination of those bidders only shall be taken in hand who meet the minimum requirement as mentioned in appendix M and N. Only substantially responsive qualification shall be considered for further evaluation.
 - b) The Employer shall examine the Technical Bid to confirm that all the documents have been provided, and to determine the completeness of each document submitted.
- 23.7 The Employer shall confirm that all the documents and information have been provided for evaluation of Technical bid as required under these bidding documents.
- 23.8 At the end of the evaluation of the Technical Bids, the Employer will invite only those bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Financial Bids .
- The date, time, and location of the opening of Financial Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice for the opening of Financial Bids.
- 23.9 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially non-responsive to the requirements of the Bidding Document and return their Financial Bids unopened as per rule 38(2)(a)(vii) of PPR-14.
- 23.10 The Employer shall conduct the opening of Financial Bids of all Bidders who submitted substantially responsive Technical Bids, publically in the presence of Bidders` representatives who choose to attend at the address, date and time specified by the Employer. The Bidder`s representatives who are present shall be requested to sign a register evidencing their attendance.
- 23.11 All envelopes containing Financial Bids shall be opened one at a time and the following read out and recorded:
- (a) The name of the Bidder;
 - (b) Lot Name /Number

- (c) Whether there is a modification or substitution;
- (d) The Bid Prices, including any discounts; and
- (e) Any other details as the Employer may consider appropriate.

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

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

IB.24 Process to be Confidential

- 24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of final bid evaluation report for the LOT which shall be done at least 10 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 (if applicable), final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than ten 10 days after the announcement of Technical and Financial Bids. No bidder will be allowed to file grievance petition w.r.t. Technical Evaluation after announcement/ uploading of Financial Evaluation Report. However mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

- 25.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause IB.28.
- 25.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its bid may be rejected. Rule 33 of PPR-14 shall be applicable for clarifications.

IB.26 Examination of Bids and Determination of Responsiveness

- 26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.
- 26.2 A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required Bid Security; (iv) Includes signed Integrity Pact where required as per clause IB.35; and (v) conforms to all the terms,

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

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

IB.27 Correction of Errors

- 27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
 - (b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line item total as quoted will govern and the unit rate will be corrected.
- 27.2 The amount stated in the Letter of Financial Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with IB.15.6 (b) hereof.

IB.28 Evaluation and Comparison of Bids

- 28.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26.
- 28.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:
- (a) Making any correction for errors pursuant to Clause IB.27;
 - (b) Excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

- (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 Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require 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 Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

- 29.1 Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to IB 29.2.
- 29.2 The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in bidder's capacities, may require the bidders to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

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

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

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

IB.31 Notification of Award

- 31.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing (“Letter of Acceptance”) that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the “Contract Price”).
- 31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted. However, the lowest evaluated bidder may further reduce the Bid Price voluntarily without compromising the quality/ quantity.
- 31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.
- 31.4 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities. No bid security can be returned without exhausting the grievance period or without finally disposing off the complaint of the non-responsive bidder. However, bid security may be returned earlier if any bidder submits affidavit that he is satisfied with the proceedings and hence his bid security may be returned.

IB.32 Performance Security

- 32.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bid data sheet and the Conditions of Contract within a period of 14 days after the receipt of Letter of Acceptance. On submission of Performance Security, the bid security of the successful bidder may be returned.
- 32.2 Failure of the successful bidder to comply with the requirements of IB.32.1 or IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. Rule 56 of PPR-14 shall be applicable for performance Security.

IB.33 Signing of Contract Agreement

- 33.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer 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 Employer and the successful bidder shall be executed within 14 days of the receipt of the Contract Agreement by the successful bidder from the Employer.

IB. 34 General Performance of the Bidders

The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded

contracts, interalia, reject his bid and/or refer the case to the concerned forum(s). Upon such reference, the concerned forum(s) in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

IB.35 Integrity Pact

The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all 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. Submission of Bids shall be construed as evidence that the bidder has admitted all provisions of the Instruction to the Bidders.

IB.37 PPRA Act, 2009 and PPR-14 will have over-riding effect

PPRA Act, 2009 and PPR-14 as amended upto date will supersede and will have an over-riding effect in case in case of any contradiction with these Instructions, the Contract or any other part of the Bidding Documents.

BID DATA SHEET

[NOTES ON BID DATA SHEET]

This Section is intended to assist the Employer in providing the specific information in relation to corresponding clauses in Instructions to Bidders and should be prepared to suit each individual contract.

The Employer should provide in the Bid data sheet information and requirements specific to the circumstances of the Employer, the processing of the Bid, the applicable rules regarding Bid Price and currency, and the **Bid evaluation criteria** *{both qualitative and quantitative as per requirement}* that will apply to the Bids. In preparing this section, the aspects which should be taken into consideration may inter-alia includes the following:

- (a) Information that specifies and complements the provisions of section from Instruction to Bidders must be incorporated.
- (b) Amendments and/or supplements, if any, to the provisions of Instructions to Bidders, necessitated by the circumstances of each individual contract, can be introduced only in this section since Instructions to Bidders will remain unchanged.]

BID DATA SHEET

1.1 Name and address of the Employer:

*Urban Sector Planning and Management Services Unit Pvt. Ltd.
503-Shaheen Complex, Egerton Road, Lahore*

1.1 Name of the Project & Summary of the Works:

The subject of procurement is:

*SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ROOFTOP RAINWATER
HARVESTING SYSTEM IN MURREE DISTRICT*

LOT 2A (210 Households)

Delivery of materials and commencement of works: To begin immediately after the signing of contract.

Completion time frame of contract: 180 days

PROJECT OVERVIEW

Rainwater Harvesting is an initiative designed to address critical environmental and resource challenges. Rainwater harvesting is essential in Murree due to the region's vulnerability to water scarcity, particularly during dry periods. Climate change is an additional threat that puts increased pressure on already stressed hydrological systems and water resources. Rainwater harvesting is listed among the specific adaptation measures to cope with future climate change. At present, there is limited application of RWH in the region, despite its high potential for alleviating the impacts of climate change on water security in Murree and many other cities.

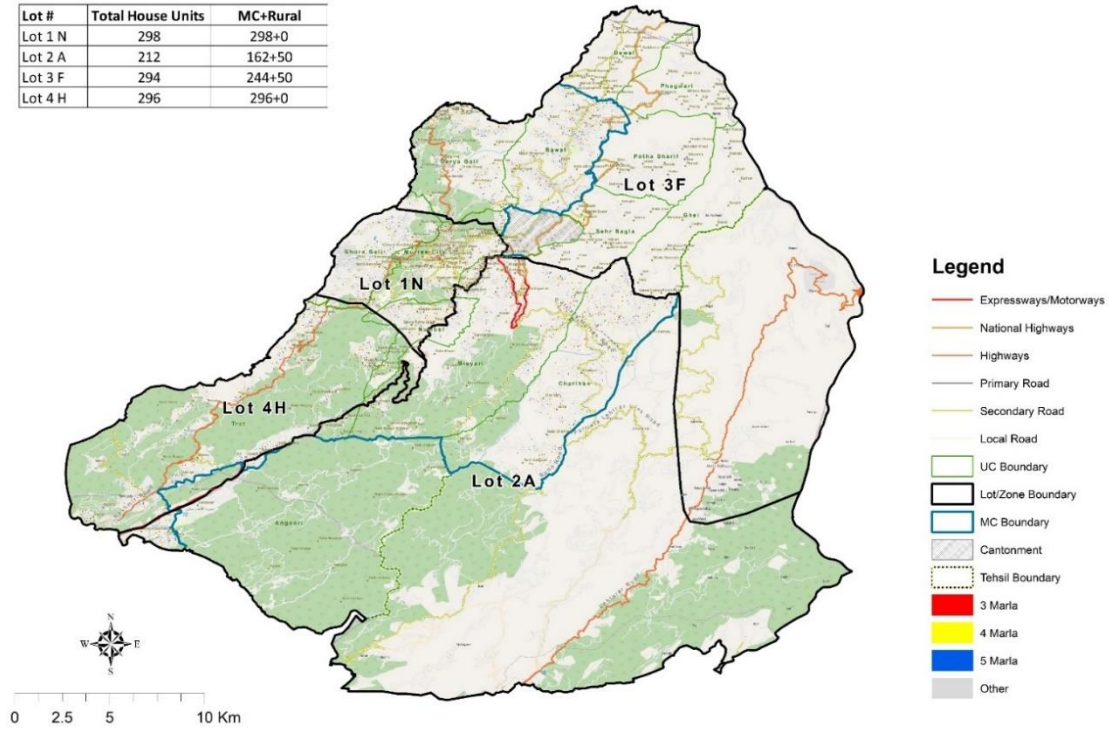
The proposed project aims to address water scarcity by including rooftops of 3, 4, and 5 Marla properties. Broad coverage shall ensure the efficient utilization of available surfaces, enhancing the project's viability as a solution to augment conventional water sources and promote sustainable water management practices.

Central to the project's goals is the reduction of dependency on conventional water sources. By installing storage tanks, the project ensures that harvested rainwater is readily available for use during dry periods of HHs. This approach not only alleviates the strain on municipal water supplies and groundwater but also fosters resilience in water supply systems, thereby integrating rainwater into the existing water supply infrastructure for a more sustainable and efficient water management system.

The map below indicates the identified properties of sizes 3 Marla, 4 Marla and 5 Marla as well as the spatial distribution of the four (4) lots in the Murree District.

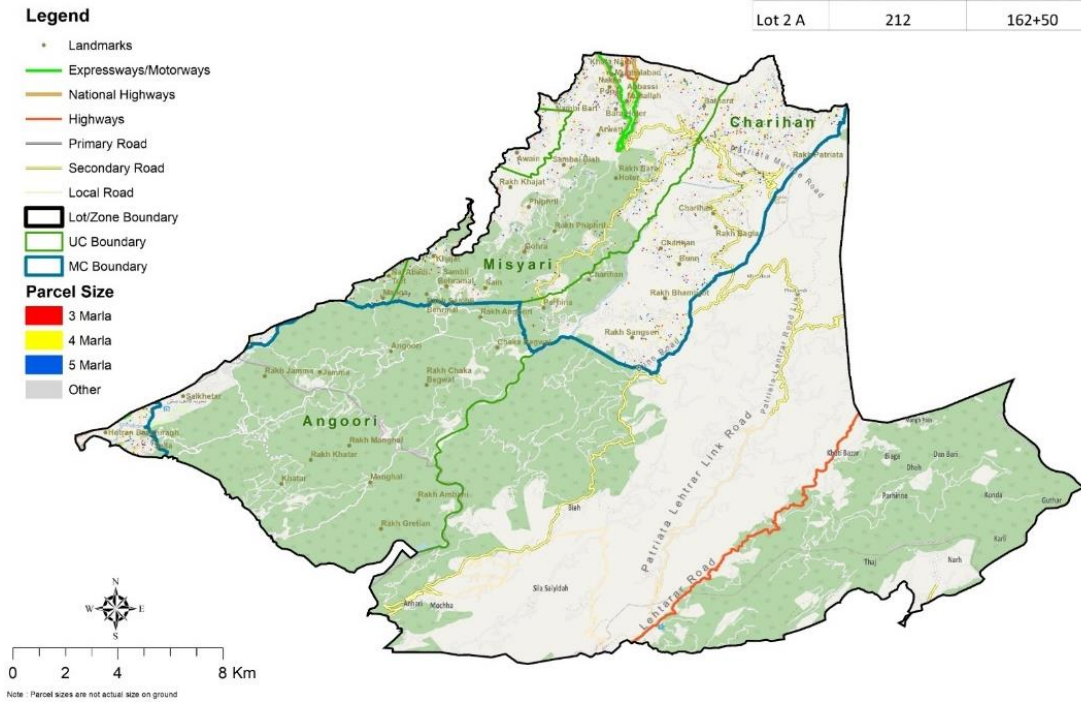
District Murree Lots

Lot #	Total House Units	MC+Rural
Lot 1 N	298	298+0
Lot 2 A	212	162+50
Lot 3 F	294	244+50
Lot 4 H	296	296+0



The map below indicates the identified properties of sizes 3, 4 and 5 Marla in the Lot 2A.

Lot #	Total House Units	MC+Rural
Lot 2 A	212	162+50



SUMMARY OF PROJECT

This tender document discusses the Lot 2A of the project in which Rainwater Harvesting Units are to be installed for total of 210 houses/residential units of low-income 3, 4, and 5 Marla houses in Murree District. The table below provides detail of scope of work to be included in each project Lot.

Lot No.	Description of Work	House Sizes (Marla)	Food Water Tank (Gallons)	House Number	In Rs Millions
2A	Supply, Installation, Testing and Commissioning of Rooftop Rainwater Harvesting System in Murree District	3, 4, 5 Marla	300 & 500 Gallons	210	95.07

Defect liability period for the project would be 1 year from completion/operationalization of the rainwater harvesting systems. Total time for completion of the project is 180 days from the award of contract. The contractor is expected to start the mobilization & site execution of the awarded work in January 2024. The details of the project tasks are described as follows.

MAIN TASKS FOR THE INSTALLATION OF RWH SYSTEMS

The Project aims to construct Rainwater Harvesting (RWH) systems across various locations to optimize rainwater collection and utilization. This initiative will contribute to sustainable water management and alleviate water scarcity issues in the targeted areas. Details of main tasks to be performed by the contractor includes but are not limited to the following:

- 1) **Site Survey and Preparation:** Conduct comprehensive site surveys for each of the identified locations for 3, 4, and 5 Marla. Assess the roof size, slope, and structural integrity to ensure optimal rainwater collection. Clear and prepare each site for construction, removing any obstructions that could hinder the installation process.
- 2) **Procurement of Materials:** Send submittal for procurement approval with samples (each type for 3, 4, 5 Marla) to the engineer. Source and purchase all required materials, including storage tanks, gutters, downspouts, filtration systems, and plumbing supplies. Ensure that all materials meet quality standards and are suitable for the specific requirements of the RWH systems.
- 3) **Installation of Gutters and Downspouts:** Install or upgrade gutters and downspouts on each roof to effectively channel rainwater into the storage tanks. This step is crucial for maximizing the efficiency of rainwater collection.
- 4) **Storage Tanks:** Construct or install storage tanks at each site, ensuring proper placement and secure installation. The tanks will be designed to handle the expected volume of rainwater and should be durable enough to withstand environmental conditions. Each tank should be imprinted with the project logo and the project name as specified by the client. Moreover, the color of the tank is subject to approval of the client (White for 5 Marla, Blue for 4 Marla and Green for 3 Marla Units). The contractor is also required to install the information plate at each house (*refer to the Technical Specifications for details*).
- 5) **Installation of Filtration and Treatment Systems:** Set up first flush diverters, filters, and any additional treatment systems to ensure the quality of harvested rainwater. This ensures that the water collected is suitable for its intended uses.
- 6) **Plumbing and Installation:** Install the necessary plumbing to connect storage tanks to distribution points. Set up necessary allied features, if needed, to facilitate the distribution of water to different parts of the property. This ensures efficient water usage and accessibility.
- 7) **Overflow and Drainage Systems:** Implement overflow systems to manage excess rainwater during heavy rains. Ensure proper drainage to prevent flooding or waterlogging, protecting both the property and the RWH system.
- 8) **System Testing and Commissioning:** Test each RWH system to ensure that all components are functioning correctly. Conduct any necessary adjustments or repairs to optimize performance. Commission the systems once they are fully operational.
- 9) **Training and Handover:** Provide training to property owners or maintenance personnel on how to operate and maintain the RWH systems. Hand over comprehensive documentation and user manuals for each system to ensure proper usage and upkeep.
- 10) **Water Quality & Level Indicators/Sensors:** Provide and add the Water Quality Indicator System (to measure PH, TDS, EC), and Water Meter in tanks. Install smart water meters and gateway system to relay the information as approved by the Engineer.
- 11) **As-Built Drawings:** Submit as-built drawing(s) and proof of asset installed with specified logo clearly displayed.

12) **Progress Reporting Mechanism:** The contractor will report the progress of the project execution. The reporting mechanism may be android app based and/or dashboard based or as specified by the client. The contractor is liable to upload component wise pictures of each rainwater harvesting system for the approval of Engineer Incharge and/or supervisory authority.

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

Name of financing institution: Government of the Punjab

2.1 Amount and type of financing:

Name of Project/ Grant (Development or Non-Development): ADP Chief Minister Initiative – Murree Development Program - Rainwater Harvesting Project for Murree District.

4.1 One bidder cannot apply twice for the lot. Technical and Financial proposals for each bid will be submitted separately, with bid security to be submitted with Technical Proposal..

8.1 Time limit for clarification:

07 days prior to the date of submission of bids

10.1 Bid language:

English

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

- (a) Letter of Technical Bid
- (b) Bid Security (IB.15)
- (c) Written confirmation authorizing the signatory of the Bid to commit the Bidder (IB.18.5)
- (d) Pending litigation information
- (e) Certificate that the bidder is not currently blacklisted by the Procuring Agency
- (f) Special Stipulations (as filled by the Employer) (appendix –A)
- (g) Proposed Construction Schedule (appendix –E)
- (h) Method of Performing the Work (appendix –F)
- (i) Availability of Critical Equipment (appendix –G)
- (j) Construction Camp and Housing Facilities (appendix –H)
- (k) List of Sub-contractors (as required) (appendix –I)
- (l) Organization Chart for Supervisory Staff (appendix –K)
- (m) Integrity Pact (appendix –L)
- (n) Financial Competence and Access to financial Resources (appendix –M)
- (o) Past Performance, Current Commitment, Qualification and Experience (appendix –N)

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

- (a) Letter of Financial Bid
- (b) Foreign Currency Requirements (appendix –B)
(If required and only in case of International Bidding)
- (c) Price Adjustment under Clause 70 (appendix –C)
- (d) Bill of Quantities (appendix –D)
- (e) Estimated Progress Payments (appendix –J)

11.3 Bidders to furnish detailed Work Plan

13.1 Bidders to quote entirely in Pak. Rupees.

14.1 Period of Bid Validity:

120 Days

15.1 Amount of Bid Security:

Lot	Bid Security for Lot
Lot 2A	<i>The bidders bidding for Lot 2A must enclose the bid security amounting PKR 950,700/- (1% of the estimated cost 95.07 Million) in favour of The Urban Sector Planning and Management Services Unit (Private) Limited. Bid Security shall be submitted in the form of Call Deposit Receipt / Bank Guarantee / Demand Draft / Pay Order valid for a period of minimum of six (6) months from a scheduled bank.</i>

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

Pre-bid meeting will be held on:

Day: Thursday

Date: 12th December, 2024

Time: 12:00 Noon

Address: KSD Hall, The Urban Unit, 503, Shaheen Complex, Egerton Road, Lahore

(The bidders are requested to submit their comments in written form at the time of pre-bid meeting.)

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

One original and Two copies of original.

19.2(a) Employer's address for the purpose of Bid submission:

Bid shall be submitted to:

The Urban Unit

503 – Shaheen Complex, Egerton Road, Lahore

Ph: 042-99205316-22

Fax: 042-99205323

www.urbanunit.gov.pk

19.2(b) Name and Number of the Contract:

*'SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ROOFTOP RAINWATER
HARVESTING SYSTEM IN MURREE DISTRICT'
LOT 2A (210 Households)*

The estimated Contract Price of Project Lot is:

Sr	Project Description	Estimated Cost (PKR) in Million
1	Supply, Installation, Testing, Commissioning of Rooftop Rainwater Harvesting System in Murree District (210 HH) Lot 2A	95.07

20.1(a) **Deadline for submission of bids:**

Day: Monday

Date: 23rd December 2024

Time: 12:00 Noon

23.1 **Venue, time, and date of Bid opening:**

Day: Monday

Date: 23rd December 2024

Time: 12:30 PM

Address:

KSD Hall, The Urban Unit,

Office 503, Shaheen Complex, Egerton Road, Lahore.

32.1 **Standard form and amount of Performance Security acceptable to the Employer:**

Amount of Performance Guarantee is: 5% of the Contract Price

Performance Security in the form of Bank Guarantee from a schedule bank as per State Bank of Pakistan in favour of "Urban Sector Planning and Management Services Unit (Private) Limited" equivalent to 5% of the total contract amount shall be submitted by the successful bidder right after contract signing till completion of project and defect liability period.

**Letters of Technical Bid/ Financial Bid,
And
Appendices to Bid**

Letter of Technical Bid

Date:

Bid Reference No:

(Name of Contract/Works)

LOT Number /Name

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (IB). Complete bidding document is binding upon us and we fully understand that the PPRA Act, 2009 and the PPR-14 as amended upto date supercedes this bidding document, in case of any contradiction, and the same are also binding upon us;
- (b) We offer to execute and complete in conformity with the Bidding Documents the following Works:..... LOT
- (c) Our Bid consisting of the Technical Bid and the Financial Bid shall be valid for a period of days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) As security for due performance of the under takings and obligations of our bid, we submit here with a Bid security, in the amount specified in Bid data sheet, which is valid (at least) 30 days beyond validity of Bid itself.
- (e) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process.

LTB-2

- (f) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors. This permission is extended for verification of any information provided in our Technical Bid which comprises all documents enclosed herewith in accordance with IB.11.1 of the Bid data sheet.

Name

In the capacity of

Signed

.....

Duly authorized to sign the Bid for and on behalf of

Date

.....

Address.....

Letter of Financial Bid

Date:

Bid Reference No:

Lot Reference Number / Lot No.....

(Name of Contract/Works)

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (IB)9;
- (b) The total price of our Bid, excluding any discounts offered in item (c) below is:.....
- (c) The discounts offered and the methodology for their application are:.....
- (d) Our Bid shall be valid for a period of days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (e) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;

- (f) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed and we do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other bidder for the Works.
- (g) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (h) We agree to permit Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors. This permission is extended for verification of any information provided in our Technical Bid which comprises all documents enclosed herewith in accordance with IB.11.1 of the Bid data sheet.
- (i) If awarded the contract, the person named below shall act as Contractor's Representative.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

Address.....

SPECIAL STIPULATIONS

Clause

Conditions of Contract

1.	Engineer's Authority to issue Variation in emergency <i>{if applicable}</i>	2.1	Up-to 15% of the accepted Contract amount of the complete contract for all variations. No variation can be carried out without the written approval of the Engineer. The Engineer may also direct deletion in scope of work up to 5 %.
2	Variation <i>{if applicable}</i>	2.1(b) (viii)(b)	The Engineer shall require prior written approval of the Employer for every variation.
3.	Law applicable	5.1(b)	The relevant laws applied in the Province of Punjab.
4.	Amount of Performance Security	10.1	5% of Contract Price stated in the Letter of Acceptance.
5.	Time for Furnishing Programme	14.1	Within 7 days from the date of receipt of Letter of Acceptance.
6.	Minimum amount of Third Party Insurance	23.2	Third Party Per occurrence with number of occurrence unlimited (i) For property, full repair cost or full replacement cost as the case may be per occurrence with the number of occurrence unlimited (ii) In case of death, Pak Rs. 1,000,000/- per person (iii) In case of major injury, Pak Rs. 500,000/- per person. (iv) In case of minor injury, Pak Rs. 100,000/- per person. The Workmen compensation Policy must contain following conditions of indemnification per occurrence with the number of occurrence unlimited: In case of death, Pak Rs. 1,000,000/- per person: In case of major injury, Pak Rs. 500,000/- per person ill. In case of minor injury, Pak Rs. 100,000/- per person. (As per applicable laws of Pakistan)
7.	Time for Commencement	41.1	Within 7 days from the date of receipt of Engineer's Notice to Commence which shall be issued within 7 days after signing of Contract Agreement.
8.	Time for Completion	43.1, 48.2	180 days

9.	a) Amount of Liquidated Damages	47.1	Applicable rate shall not exceed one-half (0.5) percent per week, and the maximum shall not exceed ten (10) percent of the Contract Price after that Procuring Agency may proceed for the termination of contract along with other remedies available under Punjab Procurement Rules 2014.
	b) Amount of Bonus <i>{if applicable}</i>	47.3	Nil
10.	Defects Liability Period	49.1	365 Days from the effective date of Taking Over Certificate.
11.	Percentage of Retention Money	60.2	10% of the amount of Interim Payment Certificate.
12.	Limit of Retention Money	60.2	5% of Contract Price stated in the Letter of Acceptance.
13.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	No bill / invoice should be less than PKR 3 million.
14.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer.	60.10	30 days in case of local currency.
15.	Mobilization Advance * (Interest Free) <i>{if applicable}</i>	60.12	10% of Contract Price as stated in the Letter of Acceptance against unconditional, non-recourse, irrevocable bank guarantee from a scheduled bank in Pakistan acceptable to the employer.
16.	Recovery of Mobilization Advance	60.12	Effective from 3rd IPC and spread over 8 IPCs. Any remaining amount shall be adjusted in Final Payment Certificate (FPC)

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	-----
-----	-----
-----	-----

NOT APPLICABLE

PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT

**NOT APPLICABLE
(PRICE IS FIXED)**

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 in accordance with provisions of the Contract.
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 for submission of Bids, 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.
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 58.2 of Part I, General Conditions of Contract.

BILL OF QUANTITIES

B. Work Items

1. The Bill of Quantities contains the following Bills and Schedule:

BOQ - Lot 2A

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



The Urban Unit

Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT,
INSTALLATION, TESTING COMMISSIONING OF ROOF TOP RAINWATER
HARVESTING SYSTEM IN MURREE DISTRICT**

BILL OF QUANTITIES



The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING
COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

LOT-02 (A) (03,04 & 05 MARLA)

S. No.	Description of Work	House Sizes (Marla)	Food Water Tank (Gallons)	House Numbe r	BOQ Amount (R.s)	Total Amount (R.s)	In Million s
1	Rainwater Harvesting System	3	300	65			
2	Rainwater Harvesting System	4	500	65			
3	Rainwater Harvesting System	5	500	80			
4	Rainwater Harvesting System Public Buildings/ Schools ((Details attached)			20			
5	Providing and fixing Water Meter DN-20 (Conventional)			232			
6	(PIU) Furniture, Fixtures, Motor Bikes, IT System for Control Room at PIU UU. (Details attached)						
7	Tanks & Tap Systems for Additional water for community			7			
8	Community (Food Grade Water Tank 500 & 1000 Gallon with Khuras on Floor and PPRCE Piping System) (Details attached)			10			



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Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



9	Furniture & Fixture for Community Mob Offices (For 04 Zone & 01 for Kotli Sattian (Details attached)			5			
10	Community Mobilization Mobile Lab & Equipment (Details attached)						
			Total House No	210	Total Cost of Lot-02		

Rates :-

Standardized items (MRS) as notified by the finance department on the basis of current Market for the period of 2nd BI-ANNUAL (01.07.2024 to 31.12.2024) MURREE) have been followed whereas non standardized prevailing market rates of materials, pipes, fittings, equipment etc. have been provided adding due provision of carriage to site, fixing/ installation, testing, other incidental costs, taxes etc.

The financial proposal/bid shall not exceed the advertised tender amount/engineering estimate/technical sanction of the lot



The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



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Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



**URBAN SECTOR PLANNING AND
MANAGEMENT SERVICES UNIT
(PVT.) LTD.**



**G3 ENGINEERING CONSULTANTS
(PVT)LTD.**
House No.57-M Gulberg-III, Lahore,
Pakistan

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING
COMMISISING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

SUMMARY OF ENGINEER'S ESTIMATE COST

S. No.	Land Area in 05 Marla	Property Units	Unit Rate (Rs)	Total Amount (Rs)	In Millions
Estimate For Rainwater Harvesting Systems for 5 Marla Houses (Food Grade Water Tank 500 Gallons)					
1	Upto 5 Marla	1	-		
				Sub-Total	
				Add 5% PST Cost	
				Total Cost R.s	

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 05 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
		Schedule Items					
1	Ch:-23/27-c	Downspout Rain Water Collection Diverter Pipe Connected 4" Inch					
		Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D'Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	15.00			
		Rain Water Over Flow Pipe 4" Inch					
2	Ch:-23/27-c	Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	10.00			
		Conveyance System					
		First Flush Diverter 4inch (Filters out initial dirty waterbefore it enters the storage tank)					
		Providing and fixing first flush diverter having 4" dia uPVC pipe, as shown in design drawings, complete in all respects and as per satisfaction of the Engineer Incharge.	P.Rft	12.00			
3		Foundation Pad For Water Tank					
i	Ch:-7/4-i	Pacca brick work in foundation Pad for Water Tank Cement, sand mortar:- Ratio 1:4 complete in all respect as approved and directed by the Engineer Incharge.	100Cft.	22.98			
ii	Ch:-11/7-c	Cement plaster of Foundation Pad for Water Tank 1:2 upto20' (6.00 m) height: ¾" (20 mm) thick complete in all respect as approved and directed by the Engineer Incharge.	100 Sft.	30.63			

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 05 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
iii	Ch:-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	14.73			
iv	Ch:-6/6-a-iii	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- Ratio (1:2:4))	Cft	6.28			
v	Ch:-6/12-b-ii	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- (ii) (Grade-60)	100 Kg	17.59			
Painting old surfaces:-							
vi	Ch:-13/4-a-ii	Painting corrugated surfaces, patent roofing, etc. with oil paint.ii) each subsequent coat	100 Sft.	2250.00			
4		Distribution System					
Piping for distributing water from the tank to various outlets							
i	Ch:-23/46-c-ii	Providing, laying, testing and commissioning of POLY PROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe cost water supply pipe (Dadex/ Popular/Beta or approved equivalent manufacturer, with specified pressure rating PN (Pressure Nominal) and conforming to DIN8077- 8078 code i/c cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer Incharge. (Internal / External Diameters mentioned. For (Wash Room & Kitchen)					
		PN-25 pipe 3/4" 20 mm Dia	R.ft	70.00			

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 05 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
5		Taps					
i	Ch:-19/27	Providing and fixing chromium plated bib cock:- for Wash Room and kitchen (ii) 1.5 cm (½")	Each	2.00			
6		Ball Valve					
	Ch:-23/45-ii	Providing and fixing CP heavy duty brass Ball valve with CP handle ofspecified diameter made of Faisal/Sonex / Master best quality or equivalent complete in all respect as approved and directed by the Engineer Incharge. ii) 3/4" dia	Each	1.00			
Sub Total Amount of Schedule Items						-	
Non-Schedule Items							
1		Collection System					
		Gutters (Size 6"x5")					
i	N S	Providing, Laying fixing and testing erection Plain Gauge 20 (1.0 mm thick) Galvanized sheet Steel gutter Slope 0.4% including Support Angle, nuts, bolts, Painting & Angle Iron Size 1½"x1½"x¼/8" the cost of complete erection in all respects, as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.					
		Gutters (Length Varies as per Site)	P.Rft	80.00			
ii	N S	Providing and fixing of 4" dia uPVC Unions, Tees, Elbows Complete all in respect. (No.s Varies as per Site)	Each	6.00			
2		Leaf Screens Filter/Rainy Filter					
i	N S	Providing and fixing of Leaf Screens Plain Gauge 20Galvanized sheet Steel, A mesh steel Net was also providedwith thickness of 2mm wire and 1 inch box Length by width. and as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			
3	N S	Clean Out Plug					
		Providing and fixing of Clean Out Plug as per drawings & specifications and /or asapproved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 05 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
4		Storage System 500 Gallons					
		Food Grade Water Tank					
i	N S	Providing and fixing Food graded water tank five layer walls, all weather resident, 100% virgin food grade plastic, able to maintain pressure, free from algal formation, UV resistant layer of required capacity 500 gallons, in approved Color, labeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					
		Tank 500 Gallons	Each	1.00			
5		PRE-FILTER 5 MIC					
i	N S	Providing and fixing Jumbo sand water filter Specification PRE-FILTER 5 MIC: Filter out solid sediment, mud and rust from the feed water up to 5 mic. CARBON PRE-FILTER: Activated Carbon Filter out color, odor, chemical (For Example: Chloride Working pressure: ≤0.4mpa, Working temperature: 0-49°C, Color: Blue, Size: 2.5*20 inch complete in all respect as per drawing & site engineer incharge. for kitchen	Each	1.00			
6		Stainless Steel Plate with Engraving					
	N S	Stainless Steel Plate with Engraving	Each	1.00			
7		TDS Sensor Meter					
	N S	Providing and Installation of TDS Sensor Meter	Each	1.00			
Sub Total Amount of Non Schedule Items							
Total Amount Rs one Unit Cost for 5 Marla							

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING
COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

SUMMARY OF ENGINEER'S ESTIMATE COST

S. No.	Land Area in 4 Marla	Property Units	Unit Rate(Rs)	Total Amount (Rs)	In Millions
Estimate For Rainwater Harvesting Systems for 4 Marla Houses (Food Grade Water Tank 500 Gallons)					
1	Upto 4 Marla	1	0		
				Sub-Total	
				Add 5% PST Cost	
				Total Cost R.s	

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
		Schedule Items					
1	Ch:-23/27-c	Downspout Rain Water Collection Diverter Pipe Connected 4" Inch					
		Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-	P.Rft	15.00			
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)					
		Rain Water Over Flow Pipe 4" Inch					
2	Ch:-23/27-c	Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	10.00			
		Conveyance System					
		First Flush Diverter 4inch (Filters out initialdirty water before it enters the storage tank)					
		Providing and fixing first flush diverter having 4" dia uPVC pipe, as shown in design drawings, complete in all respects and as per satisfaction of the Engineer Incharge.	P.Rft	12.00			
3		Foundation Pad For Water Tank					
i	Ch:-7/4-i	Pacca brick work in foundation Pad for Water Tank Cement, sand mortar:- Ratio 1:4 complete in all respect as approved and directed by the Engineer Incharge.	100Cft.	22.98			
ii	Ch:-11/7-c	Cement plaster of Foundation Pad for WaterTank 1:2 upto 20' (6.00 m) height: ¾" (20 mm) thick complete in all respect as approved and directed by the Engineer Incharge.	100 Sft.	30.63			

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSIOING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
iii	Ch:-10/3	Supplying and filling sand under floor; orplugging in wells.	100 Cft	14.73			
iv	Ch:-6/6-a-iii	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laidin position, or prestressed members cast insitu, complete in all respects:- Ratio (1:2:4))	Cft	6.28			
v	Ch:-6/12-b-ii	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints andfastenings, including cost of binding wire and labour charges for binding of steelreinforcement (also includes removal of rustfrom bars):- (ii) (Grade-60)	100 Kg	17.59			
		Painting old surfaces:-					
vi	Ch:-13/4-a-ii	Painting corrugated surfaces, patent roofing, etc. with oil paint.ii) each subsequent coat	100 Sft.	1,750.00			
4		Distribution System					
		Piping for distributing water from the tank to various outlets					
i	Ch:-23/46-c-ii	Providing, laying, testing and commissioning of POLY PROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe cost water supply pipe (Dadex/ Popular/Beta or approved equivalent manufacturer, with specified pressure rating PN (Presure Nominal) and conforming to DIN8077-8078 code i/c cost of solvent, specials, making jharries complete in all respect as approvedand directed by Engineer Incharge. (Interna I/ External Diameters mentioned. For (Wash Room & Kitchen)					
		PN-25 pipe 3/4" 20 mm Dia	R.ft	70.00			
5		Taps					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
i	Ch:-19/27	Providing and fixing chromium plated bib cock:- for Wash Room and kitchen (ii) 1.5 cm (½")	Each	2.00			
6		Ball Valve					
	Ch:-23/45-ii	Providing and fixing CP heavy duty brass Ball valve with CP handle ofspecified diametermade of Faisal/Sonex / Master best quality or equivalent complete in all respect as approved and directed by the Engineer Incharge. ii) 3/4" dia	Each	1.00			
Sub Total Amount of Schedule Items							
Non-Schedule Items							
1		Collection System					
		Gutters (Size 6"x5")					
i	N S	Providing, Laying fixing and testing erection Plain Gauge 20 (1.0 mm thick) Galvanized sheet Steel gutter Slope 0.4% includingSupport Angle, nuts, bolts, Painting & Angle Iron Size 1½"x1½"x 1/8" the cost of complete erection in all respects, as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete allin respect.					
		Gutters (Length Varies as per Site)	P.Rft	100.30			
ii	N S	Providing and fixing of 4" dia uPVC Unions, Tees, Elbows Complete all in respect. (No.s Varies as per Site)	Each	6.00			
2		Leaf Screens Filter/Rainy Filter					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSIOING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
i	N S	Providing and fixing of Leaf Screens Plain Gauge 20 Galvanized sheet Steel, A mesh steel Net was also provided with thickness of 2mm wire and 1 inch box Length by width. and as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			
3	N S	Clean Out Plug Providing and fixing of Clean Out Plug as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			
4		Storage System 500 Gallons					
		Food Grade Water Tank					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
i	NS	Providing and fixing Food graded water tank five layer walls, all weather resident, 100% virgin food grade plastic, able to maintain pressure, free from algal formation, UV resistant layer of required capacity 500 gallons,in approved Color, labbeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					
		Tank 500 Gallons	Each	1.00			
5		PRE-FILTER 5 MIC					
i	NS	Providing and fixing Jumbo sand water filter Specification PRE-FILTER 5 MIC: Filter out solid sediment, mud and rust from the feed water up to 5 mic. CARBON PRE-FILTER: Activated Carbon Filter out color, odor, chemical (For Example: Chloride Working pressure: ≤0.4mpa,Working temperature: 0-49°C, Color: Blue,Size: 2.5*20 inch complete in all respect as per drawing & site engineer incharge. for kitchen	Each	1.00			
6		Stainless Steel Plate with Engraving					
	NS	Stainless Steel Plate with Engraving	Each	1.00			
7		TDS Sensor Meter					
	NS	Providing and Installation of TDS SensorMeter	Each	1.00			
Sub Total Amount of Non Schedule Items							
Schedule Items+ NS Total Amount Rs one Unit Cost for 4 Marla							

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSONING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 04 Marla Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT					
SUMMARY OF ENGINEER'S ESTIMATE COST					
S. No.	Land Area in 03 Marla	Property Units	Unit Rate(Rs)	Total Amount (Rs)	In Millions
Estimate For Rainwater Harvesting Systems for 3 Marla Houses (Food Grade Water Tank 300 Gallon)					
1	Upto 03 Marla	1	-		
Sub-Total					
Add 5% PST Cost					
Total Cost R.s					

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONGOF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
		Schedule Items					
1	Ch:-23/27-c	Downspout Rain Water Collection Diverter Pipe Connected 4" Inch					
		Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-	P.Rft	15.00			
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)					
		Rain Water Over Flow Pipe 4" Inch					
2	Ch:-23/27-c	Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	6.00			
		Conveyance System					
		First Flush Diverter 4inch (Filters out initialdirty water before it enters the storage tank)					
		Providing and fixing first flush diverter having 4" dia uPVC pipe, as shown in design drawings, complete in all respects and as per satisfaction of the Engineer Incharge.	P.Rft	10.00			

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
3		Foundation Pad For Water Tank					
i	Ch:-7/4-i	Pacca brick work in foundation Pad for Water Tank Cement, sand mortar:- Ratio 1:4 complete in all respect as approved and directed by the Engineer Incharge.	100Cft.	22.98			
ii	Ch:-11/7-c	Cement plaster of Foundation Pad for Water Tank 1:2 upto 20' (6.00 m) height: 3/4" (20 mm) thick complete in all respect as approved and directed by the Engineer Incharge.	100 Sft.	30.63			
iii	Ch:-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	14.73			
iv	Ch:-6/6-a-iii	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- Ratio (1:2:4))	Cft	6.28			
v	Ch:-6/12-b-ii	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- (ii) (Grade-60)	100 Kg	17.59			
		Painting old surfaces:-					
vi	Ch:-13/4-a-ii	Painting corrugated surfaces, patent roofing, etc. with oil paint. ii) each subsequent coat	100 Sft.	1,410.00			
4		Distribution System					
		Piping for distributing water from the tank to various outlets					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSIONING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
i	Ch:-23/46-c-ii	Providing, laying, testing and commissioning of POLY PROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe cost water supply pipe (Dadex/ Popular/Beta or approved equivalent manufacturer, with specified pressure rating PN (Pressure Nominal) and conforming to DIN8077- 8078 code i/c cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer Incharge. (Internal / External Diameters mentioned. For (Wash Room & Kitchen)					

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
		PN-25 pipe 3/4" 20 mm Dia	R.ft	60.00			
5		Taps					
i	Ch:-19/27	Providing and fixing chromium plated bib cock:-for Wash Room and kitchen (ii) 1.5 cm (½")	Each	2.00			
6		Ball Valve					
	Ch:-23/45-ii	Providing and fixing CP heavy duty brass Ballvalve with CP handle ofspecified diameter madeof Faisal/Sonex / Master best quality or equivalent complete in all respect as approved anddirected by the Engineer Incharge. ii) 3/4" dia	Each	1.00			
Sub Total Amount of Schedule Items							
Non-Schedule Items							
1		Collection System					
		Gutters (Size 5"x5")					
	N S	(For Gutter Option-1 & Option-2 Available but we select option-1 with Box Type Gutter) Providing, Laying fixing and testing erection Plain Gauge 20 (1.0 mm thick) Galvanized sheet Steel gutter Slope 0.5% including Support Angle, nuts, bolts, Painting & Angle Iron Size 1½"x1½"x 1/8" the cost of complete erection in all respects, as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.					
2		Gutters (Length Varies as per Site)	P.Rft	112.00			
i	N S	Providing and fixing of 4" dia uPVC Unions, Tees, Elbows Complete all in respect. (No.s Varies as per Site)	Each	6.00			
3		Leaf Screens Filter/Rainy Filter					

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONGOF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
i	N S	Providing and fixing of Leaf Screens Plain Gauge 20 Galvanized sheet Steel, A mesh steel Net was also provided with thickness of 2mm wire and 1inch box Length by width. and as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			
4	N S	Clean Out Plug Providing and fixing of Clean Out Plug as per drawings & specifications and /or as approved and directed by the Engineer Incharge Completeall in respect.	Each	1.00			
5		Storage System 500 Gallons					
		Food Grade Water Tank					
i	N S	Providing and fixing Food graded water tank five layer walls, all weather resident, 100% virgin food grade plastic, able to maintain pressure, free from algal formation, UV resistant layer of required capacity 500 gallons, in approved Color, labeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					
		Tank 500 Gallons	Each	1.00			
6		PRE-FILTER 5 MIC					
i	N S	Providing and fixing Jumbo sand water filter Specification PRE-FILTER 5 MIC: Filter out solid sediment, mud and rust from the feed water up to5 mic. CARBON PRE-FILTER: Activated Carbon Filter out color, odor, chemical (For Example: Chloride Working pressure: ≤0.4mpa,Working temperature: 0-49°C, Color: Blue,Size: 2.5*20 inch complete in all respect as per drawing & site engineer incharge. for kitchen	Each	1.00			
7		Stainless Steel Plate with Engraving					

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSIONING OF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For 03 Marla Rain Water Harvesting System (Food Grade Water Tank 300 Gallon)							
	N S	Stainless Steel Plate with Engraving	Each	1.00			
8		TDS Sensor Meter					
	N S	Providing and Installation of TDS Sensor Meter	Each	1.00			
		Sub Total Amount of Non Schedule Items					
		Schedule Items+ NS Total Amount Rs one Unit Cost for 3 Marla					

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONGOF ROOF
TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

(PIU) Furniture, Fixtures, IT System for Control Room at PIU UU

S. No.	Description of Work	Unit	Quantity	Rate (Rs.)	Total Amount (Rs.)	Remarks
1	Size 98" C735 QLED TV , Display Type QLED , Display Resolution 3840x2160 , CPU 64-bit A73*4@1.6GHz max, GPU G52(2EE)MP2, 550Mhz, OS Android R, RAM/ROM DDR4-2666: 3G Bytes,	No's	1			
2	Laptop 16 MRW13 - M3 Pro Chip12-Core CPU 18-Core GPU 18GB 512GB SSD 16" or equivalent Liquid Retina XDR Screen Display Backlit Magic KBTouch ID & Force Touch TrackPad (Space Black, 2023)	No's	1			
3	Providing and testing Mirrorless Digital Camera Specification 24.3MP FX-Format CMOS Sensor EXPEED 6 Image Processor UHD 4K and Full HD Video Recording 3.6m-Dot OLED Electronic Viewfinder 3.2" 1.04m-Dot Tilting Touchscreen LCD 5- Axis Sensor-Shift Vibration Reduction ISO 100-51200, Up to 4.5 fps Shooting Built-In Wi-Fi and Bluetooth Dual SD UHS-II Card Slots complete in all respect or equivalent	No's	1			
4	Laptop - Raptor Lake - 13thGen Core i7 1355U Processor 32-GB 512GB SSD Intel Iris Xe Graphics 15.6" Full HD 1080p IPS 250nits MicroEdge AG Display Backlit KB TPM W11 (Natural Silver, HP Direct Local Warranty)	No's	7			
5	Desktop PC having Processor Intel i5 12th Gen or equivalent, with motherboard B760M Maxsun or equivalent, and RAM 16GB 3200Mhz, and 512 NVMe, and Graphics Card RTX 2060 or equivalent, complete with LCD Display with specifications 27" IPS display, 100Hz Refresh rate, HDMI & built-in speakers	No's	2			
6	Video Conferencing Systems (Logitech RALLY PLUS - UHD 4K Conference Camera System with Speaker and Mic Pod Set)	No's	1			
7	Photocopier machine and other accessories	No's	1			
8	Furniture & Fixture (details attached)	No's	1			
9	Mobile Projector	No's	1			
10	Motor Bikes (details attached)	No's	1			
				Sub-Total		
				Add 5 % PST Cost		
				Total Cost R.s		

**ROOFTOP RAINWATER HARVESTING IN,
MURREE DISTRICT**

Item No	Description of Items	Specifications	Unit	Quantity	Rate	Amount	Remarks
	Furniture & Fixture						
1	Executive Office Chairs	Jumbo Executive Office Chair frame made in imported plywood and upholstery in imported leather rexine arms in SS with upholstery. Mechanism	Nos	3			
2	Executive Office Table	Size 1500mm x 900mm x 760mm Imported 17mm mdf super gloss UV sheet sheet with MS 18swg Powder Coated frame. Table Size: 1500mm x 900mm x 760mm With fixed Side rack . All edges of table finished with imported 1mm PVC tape with imported edge binding machine. Imported heavy channel install in drawers with imported unique handles	Nos	3			
3	Cherry Office Chair	Size: 22 W 19 D 38 H (Inches) Material: Fabric Padded Seat Base: Nylon Arms: Polyurethane (PU) Mesh back Built-in Lumbar support Tilt Mechanism Height Adjustable Highly-Durable	Nos	8			

4	Conference Room Table	Size 3650mm x 1200mm x 760mm Base made in 18SWG MS Pipe with selected powder coating color with inner sides fitted with imported 17mm MDF Tactile lamination sheet. Top made in 1.5 inches thickness in same sheet. All edges are covered with 1mm imported PVC Tape with imported edge binding machine. Technology Box with HDMI, VGA, Ethernet and Power options installed in top.	Per Seat	2			
5	Chair for Meeting	Imported Matrix Chair (Br) experience the leisure of comfort with incredible features: A-Grade foam in seat first quality abs material approved with BIFMA with Fixed base.	Nos	8			
6	Levi Mesh Back Visitor Chair	Mesh Back Mesh seat Lumbar Support Ergonomic Design Suitable for long hours Comfortable (MN 100 visitor)	Nos	8			
7	Printer Tables	Size 400mm x 400mm x 500mm Base made in 18SWG MS 1 x 1 inch pipe and top with 1.5inch thickness of 17mm MDF Tactile Lamination Sheet.	Nos	4			
8	1-Seater Budget Sofa,	Frame made in solid Wood and finish with imported 1st quality foam and upholstery in imported leather rexine	Nos	4			

9	Table for Guests	Size 900mm x 900mm x 400mm Base made in 18SWG MS Pipe with selected Texture Powder Coating and top made in 1.5 inch thickness MDF Tactile Lamination Sheet	Nos	4			
10	6 x 4 Feet Glass Four Door Wooden Lamination Wardrobe Cupboard Showcase		Nos	4			
11	Rack for Office Files		Nos	4			
	Sub-Total						

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISISONG OF
ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

MOTOR BIKES FOR FIELD SURVEY

Motor Bikes Honda CD 70 (For Field Survey)	Qty	Rate	Amount	
1	1	-		Import Country Local Engine Type Petrol Starting Kick Starter Colors black, blue, red Top Speed 80 KM/Hour Trail - Bike Warranty - Traction Control - Power Modes - Torque 5.0 Nm @ 5500.0 RPM Release Date - Body Type Standard Engine 4-Stroke OHC Air Cooled Engine Capacity 72 cc Fuel System Carburettor Horse Power 5.1 HP @7500.0 RPM Compression Ratio 9.3:1 Bore & Stroke 47.0 x 41.4 mm Ignition Type CDI
Total Price R.s				

ROOFTOP RAINWATER HARVESTING IN, MURREE

DISTRICT COMMUNITY FURNITURE &

Item No	Description of Items	FIXTURE Specifications	Unit	Quantity	Rate	Amount	Remarks
	Furniture & Fixture						
1	Cherry Office Chair	Size: 22 W 19 D 38 H (Inches) Material: Fabric Padded Seat Base: Nylon Arms: Polyurethane (PU) Mesh back Built-in Lumbar support Tilt Mechanism Height Adjustable Highly-Durable	Nos	8			
2	Table for office	Size 900mm x 900mm x 400mm Base made in 18SWG MS Pipe with selected Texture Powder Coating and top made in 1.5 inch thickness MDF Tactile Lamination Sheet	Nos	1			
					Sub-Total		
					Add 5 % PST Cost		
					Total Cost R.s		

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISSIOING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT					
SUMMARY OF ENGINEER'S ESTIMATE COST					
S. No.	Land Area in 03 Marla	No's	Unit Rate(Rs)	Total Amount (Rs)	In Millions
Estimate For Community (Food Grade Water Tank 500 & 1000 Gallon)					
1		1	-		
				Sub-Total	
				Add 5% PST Cost	
				Total Cost R.s	

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For Community (Food Grade Water Tank 500 & 1000 Gallon)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
1		Dressing and levelling					
	Ch:-3/18-b	Dressing and levelling of earhtwork to designed section, etc. complete:-					
		c) Gravel work or soft rock not requiring blasting.	1000 Cft.	100.00			
		Khuras on Floor					
		P.C.C (1:2:4)					
2	Ch:-6/5-f	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):	100Cft	33.30			
		(f) Ratio 1: 2: 4					
3		Foundation Pad For Water Tank					
i	Ch:-7/4-i	Pacca brick work in foundation Pad for Water Tank Cement, sand mortar:- Ratio 1:4 complete in all respect as approved and directed by the Engineer Incharge.	100Cft.	40.06			
ii	Ch:-11/7-c	Cement plaster of Foundation Pad for Water Tank 1:2 upto 20' (6.00 m) height: ¾" (20 mm) thick complete in all respect as approved and directed by the Engineer Incharge.	100 Sft.	40.06			
iii	Ch:-10/3	Supplying and filling sand under floor; orplugging in wells.	100 Cft	28.86			
iv	Ch:-6/6-a-iii	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- Ratio (1:2:4))	Cft	9.82			
v	Ch:-6/12-b-ii	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- (ii) (Grade-60)	100 Kg	27.49			
4		Storage System 500 Gallons					
		Food Grade Water Tank					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For Community (Food Grade Water Tank 500 & 1000 Gallon)							
i	N.s	Providing and fixing Food graded water tank of required capacity 500 gallons, in approved Color, labbeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					

PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING COMMISOSNG OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT							
Estimate For Rainwater Harvesting System at Murree							
ABSTRACT OF ENGINEER'S ESTIMATE COST							
S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For Community (Food Grade Water Tank 500 & 1000 Gallon)							
		Tank 500 Gallons	Each	1			
		Storage System 1000 Gallons					
		Food Grade Water Tank					
ii	N.s	Providing and fixing Food graded water tank of required capacity 1000 gallons, in approved Color, labbeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					
		Tank 1000 Gallons	Each	1			
4		Distribution System					
		Piping for distributing water from the tank to various outlets					
i	Ch:-23/46-c-	Providing, laying, testing and commissioning of POLY PROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe cost water supply pipe (Dadex/ Popular/Beta or approved equivalent manufacturer, with specified pressure rating PN (Presure Nominal) and conforming to DIN8077-8078 code i/c cost of solvent, specials, making jharries complete in all respect as approvedanddirected by Engineer Incharge. (Interna I/ External Diameters mentioned. For (Wash Room & Kitchen)					
		PN-25 pipe 20 mm Dia	R.ft	80			
		PN-25 pipe 25 mm Dia	R.ft	100			
5		Taps					
i	Ch:-19/27-ii	Providing and fixing chromium plated bib cock:-	Each	4			
Total Amount Rs one Unit Cost							

ROOFTOP RAINWATER HARVESTING IN, MURREE DISTRICT

Testing Equipment for Client

Item No	Description of Items	Specifications	Unit	Quantity	Rate	Amount	Remarks
	Mobile Community Mob & Lab Vehicle for Client						
a	Suzuki Every	Dimensions (Length x Width x Height) 3395 x 1475 x 1895 mm Ground Clearance 150 mm Displacement 658 cc Transmission Manual Horse Power 43 hp Torque 58 Nm Boot Space 650 L Kerb Weight 890 - 900 KG Fuel Type Petrol Mileage -Fuel Tank Capacity 37 L Seating Capacity 4 - Persons Top Speed 140 KM/H Tyre Size 145/80/R12 Engine 0.66 Liter SOHC 12 Valve Inline-3 Gearbox 5-Speed Manual	Nos	1			
b	Testing Equipment						
1	Dynamic Cone Penetormeter	Dynamic Cone Penetormeter . Includes: 1. 8 kg Dropping weight with 757 drop. 2. Two Penetormeter tips 60 degree cone, 20mm dia. 3. Clevis Block. 4. Drive rod one meter long. 5. Vertical scale. (All contained in a wooden carrying case)	Nos	3			

2	Digital Vernier Calipers 300 x 0.0.1 mm	<p>Range: 0 to 300 mm. Resolution: 0.01 mm. Accuracy: Approx. ± 0.02 mm (check specifics for the model). Functions: External, internal, and depth measurement modes, digital display, inch/metric switch. Material: Stainless steel or plastic. Battery: Typically CR2032 or similar</p>	Nos	5			
	Air Gradient Open air (Model O-1PST) (Brand new, Along with shipping, Delivety and custom duties)	<p>Model O-1PST (AirGradient Open Air)Microcontroller ESP32-C3-MINI (32-bit RISC-V single-core processor, up to 160MHz, 384 KBROM, 400 KB SRAM, 8 KB SRAM in RTC, 4 MB flash in chip package)WiFi 2.4GHz IEEE 802.11 b/g/n-compliantBluetooth Bluetooth LE: Bluetooth 5, Bluetooth meshExtensions Broken out on PCB: I2C, 3 GPIO, 2 UARTPeripherals Status LED, Push Button, USB C ConnectorExternal Hardware Watchdog Texas Instruments TPL5010Particle Sensor Module Plantower PMS5003T (laser scattering principle).Accuracy: $\pm 10\%$@100~500μg/m³, $\pm 10\mu$g/m³@0~100μg/m³CO2 Sensor Module SenseAir S8 (NDIR). 400 to 10000ppm. Accuracy: ± 40 ppm $\pm 3\%$ of reading at 5to 30°C, 20-70%RH (400 - 2000ppm range)TVOC/NOx</p>	Nos	3			

		<p>Module Sensirion SGP41. Accuracy: TVOC <±15 @ 0 to 500 VOC Index; NOx <±50 @ 0 -500 NOx Index Temperature and Humidity ENS210 (inside PMS5003T module). Accuracy: Temperature ±0.2°C @ 0 - 70°C; Humidity ±3.5% RH @ 20 - 80% RH Enclosure ASA Plastic, UV Resistant and Weather Proof Mounting Options Wall or pole mounting options Cable 4m USB C Cable including data lines for flashing Certifications CE, RoHS, REACH, FCC ID: 2AC7Z-ESPC3MINI License Open Hardware under CC-BY-SA, Source Code available</p>					
	<p>Digital Distance Meter upto 100 meter</p>	<p>Range: Up to 100 meters. Accuracy: ±1 to ±2 mm. Resolution: 1 mm. Laser: Class 2 (typically 620-690 nm). Measurement Modes: Single, continuous, area, volume, Pythagorean. Display: Backlit LCD, multiple units (meters, inches, feet). Battery: Rechargeable lithium-ion or AAA, with auto power-off. Environmental Resistance: Water-resistant (IP54/IP65). Speed: 0.5 to 4 seconds.</p>	<p>Nos</p>	<p>4</p>			

		Temperature Range: 0°C to 40°C (varies by model)							
							Sub-Total		
							Add 5 % PST Cost		
							Total Cost R.s		

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING
COMMISSIONING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

SUMMARY OF ENGINEER'S ESTIMATE COST

S. No.	Public property / Schools	Property Units	Unit Rate (Rs)	Total Amount (Rs)	In Millions
Estimate For Rainwater Harvesting Systems for Public property / Schools (Food Grade Water Tank 500 Gallons)					
1	Upto 5 Marla	1	-		
			Sub-Total		
			Add 5% PST Cost		
			Total Cost R.s		

**PROJECT NAME:- HIRING OF CONTRACTOR SERVICES FOR PROCUREMENT, INSTALLATION, TESTING
COMMISSIONING OF ROOF TOP RAINWATER HARVESTING SYSTEM IN MURREE DISTRICT**

Estimate For Rainwater Harvesting System at Murree

ABSTRACT OF ENGINEER'S ESTIMATE COST

S. No.	Ref No/ Item Code	Description of Items	Unit	Quantity	Unit Rate (Rs)	Total Amount (Rs)	Remarks
Estimate For Public property / Schools Rain Water Harvesting System (Food Grade Water Tank 500 Gallons)							
MRS, 2nd BI-ANNUAL-2024 (01.07.2024 to 31.12.2024) MURREE							
		Schedule Items					
1	Ch:-23/27- c	Downspout Rain Water Collection Diverter Pipe Connected 4" Inch					
		Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	15.00			
		Rain Water Over Flow Pipe 4" Inch					
2	Ch:-23/27- c	Providing, laying, cutting, jointing, testing and disinfecting pipe line in trenches with PVC/ uPVC pipes of B.S.S. with `D' Class working pressure complete in all respects:-					
		PVC/ uPVC pipes of B.S.S. with `D' 4" i/d (100 mm) (Length Varies as per Site)	P.Rft	10.00			
		Conveyance System					

		First Flush Diverter 4inch (Filters out initial dirty water before it enters the storage tank)					
		Providing and fixing first flush diverter having 4" dia uPVC pipe, as shown in design drawings, complete in all respects and as per satisfaction of the Engineer Incharge.	P.Rft	12.00			
3		Foundation Pad For Water Tank					-
i	Ch:-7/4-i	Pacca brick work in foundation Pad for Water Tank Cement, sand mortar:- Ratio 1:4 complete in all respect as approved and directed by the Engineer Incharge.	100Cft.	22.98			-
ii	Ch:-11/7-c	Cement plaster of Foundation Pad for Water Tank 1:2 upto 20' (6.00 m) height: ¾" (20 mm) thick complete in all respect as approved and directed by the Engineer Incharge.	100 Sft.	30.63			-
iii	Ch:-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	14.73			-
iv	Ch:-6/6-a-iii	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- Ratio (1:2:4))	Cft	6.28			-

v	Ch:-6/12-b-ii	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- (ii) (Grade-60)	100 Kg	17.59			-
		Painting old surfaces:-					-
vi	Ch:-13/4-a-ii	Painting corrugated surfaces, patent roofing, etc. with oil paint.ii) each subsequent coat	100 Sft.	2250.00			-
4		Distribution System					
		Piping for distributing water from the tank to various outlets					
i	Ch:-23/46-c-ii	Providing, laying, testing and commissioning of POLY PROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe cost water supply pipe (Dadex/ Popular/Beta or approved equivalent manufacturer, with specified pressure rating PN (Pressure Nominal) and conforming to DIN8077-8078 code i/c cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer Incharge. (Internal / External Diameters mentioned. For (Wash Room & Kitchen)					
		PN-25 pipe 3/4" 20 mm Dia	R.ft	70.00			
5		Taps					
i	Ch:-19/27	Providing and fixing chromium plated bib cock:- for Wash Room and kitchen (ii) 1.5 cm (1/2")	Each	2.00			
6		Ball Valve					

	Ch:-23/45- ii	Providing and fixing CP heavy duty brass Ball valve with CP handle of specified diameter made of Faisal/Sonex / Master best quality or equivalent complete in all respect as approved and directed by the Engineer Incharge. ii) 3/4" dia	Each	1.00			
		Sub Total Amount of Schedule Items					
		Non-Schedule Items					
1		Collection System					
		Gutters (Size 6"x5")					
i	NS	Providing, Laying fixing and testing erection Plain Gauge 20 (1.0 mm thick) Galvanized sheet Steel gutter Slope 0.4% including Support Angle, nuts, bolts, Painting & Angle Iron Size 1½"x1½"x□□1/8" the cost of complete erection in all respects, as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.					-
		Gutters (Length Varies as per Site)	P.Rft	112.00			
ii	NS	Providing and fixing of 4" dia uPVC Unions, Tees, Elbows Complete all in respect. (No.s Varies as per Site)	Each	6.00			
2		Leaf Screens Filter/Rainy Filter					

i	NS	Providing and fixing of Leaf Screens Plain Gauge 20 Galvanized sheet Steel, A mesh steel Net was also provided with thickness of 2mm wire and 1 inch box Length by width. and as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			
3	NS	Clean Out Plug Providing and fixing of Clean Out Plug as per drawings & specifications and /or as approved and directed by the Engineer Incharge Complete all in respect.	Each	1.00			-
4		Storage System 500 Gallons					-
		Food Grade Water Tank					-
i	NS	Providing and fixing Food graded water tank five layer walls, all weather resident, 100% virgin food grade plastic, able to maintain pressure, free from algal formation, UV resistant layer of required capacity 500 gallons, in approved Color, labeled with project logo and a seal of "NOT FOR SALE" marked on tank, complete in all respect as approved and directed by the Engineer Incharge.(White, Green and Blue)					-
		Tank 500 Gallons	Each	1.00			-
5		PRE-FILTER 5 MIC					-

i	NS	Providing and fixing Jumbo sand water filter Specification PRE-FILTER 5 MIC: Filter out solid sediment, mud and rust from the feed water up to 5 mic. CARBON PRE-FILTER: Activated Carbon Filter out color, odor, chemical (For Example: Chloride Working pressure: ≤0.4mpa, Working temperature: 0-49°C, Color: Blue, Size: 2.5*20 inch complete in all respect as per drawing & site engineer incharge. for kitchen	Each	1.00			
6		Stainless Steel Plate with Engraving					
	NS	Stainless Steel Plate with Engraving	Each	1.00			
7		TDS Sensor Meter					
	NS	Providing and Installation of TDS Sensor Meter	Each	1.00			
		Sub Total Amount of Non Schedule Items					
Total Amount Rs one Unit Cost							



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**BD-8 to BD-14
NOT APPLICABLE &
DELETED**



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BE-1

Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE / WORK PLAN

Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to Bid, the Construction Schedule / Work Plan in the bar chart (CPM, PERT or any other to be specified herein) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the Works and parts of the Works may meet Employer’s completion targets in days noted below and counted from the date of receipt of Engineer’s Notice to Commence (Attach sheets as required for the specified form of Construction Schedule):

<u>Description</u>	<u>Time for Completion</u>
a) Whole Works	_____ 180 _____ days
b) Part-A	_____ days (If applicable)
c) Part-B	_____ days (If applicable)
d) _____	_____ days
e) _____	_____ days



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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.
4. Quality control / Quality assurance measures to be adopted including procedures to be followed for carrying out all tests required under specifications.



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BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

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

LIST OF MAJOR EQUIPMENT

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



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BG-2
Appendix-G to Bid

Equipment:

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

No.	PLANT/EQUIPMENT				
	Equipment Type and Characteristics	Total Nos. available	Under Utilization on other projects, if applicable	Nos. waiting to be shifted to new project(s)	Min. Number Required for this Project
1	Level				
2	Cutter for PPRC				
3	Wrenches				
4	Drill Machine				
5	Welding Machine				
6	Small Grinding Machine				
7	Heater for Pipe Jointing				
8	Keys to tighten nuts/bolts				
9	Scaffolding				



CONSTRUCTION CAMP AND HOUSING FACILITIES

The Contractor in accordance with Clause 34 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).

NOT APPLICABLE



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Appendix-H to Bid

5. Other Items Proposed (Security services, etc.). The Contractor should mention here what are his proposed environmental measures for the project as per EPA rules like treatment of wastewater and water quality etc. The Contractor shall submit a detailed EMP (Environmental Management Plan) to describe how materials are removed from site and disposed off at a safe location, prevention for the contamination of ground and surface water in neighboring areas etc. including remedial measures for adoption.
6. Detail of testing Lab with testing equipment etc.

NOT APPLICABLE



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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.

NOT APPLICABLE

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



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BJ-1

Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS

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

Quarter/ Year/ Period	Amounts (1,000 Rs.)
1	2
1 st Month	
2 nd Month	
3 rd Month	
4 th Month	
5 th Month	
6 th Month	
Bid Price	



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BK-1

Appendix-K to Bid

**ORGANIZATION CHART
FOR THE
SUPERVISORY STAFF AND LABOUR**



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

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

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

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

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

Name of Employer:
Signature:

[Seal]

Name of Contractor:
Signature:

[Seal]



EVALUATION CRITERIA/ FINANCIAL COMPETENCE AND ACCESS TO FINANCIAL RESOURCES

The financial position of the bidder shall be checked as per following details:

1. SOUNDNESS AND ACCESS TO FINANCIAL RESOURCES:

“The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credits, and other financial means, other than any contractual advance payments, to meet the financial requirements of the contract in the amount of his bid. As a minimum, the Bidder must show that his resources, in terms of at least his latest years working capital and line of credits, will be adequate to cover an amount equivalent to his bid price and current work commitments i.e. [5 x working capital + Project/General {to be decided by the procuring agency} specific lines of credit*– 40% of current contract commitments] ≥ Estimated Price of the works/PC-1.

Working capital is the difference between current assets and current liabilities and measures the firm’s ability to generate cash in the short term.”

**Any line of credit indicated for this (tendered) project needs to have been certified by the Bank and the said certificate is enclosed with this Appendix.*

2. AVERAGE ANNUAL CONSTRUCTION TURNOVER

Criteria	Bidders’ are to list their certified yearly turnover for last ___ years (Authenticated audited financial statements may be required)
2A. Annual Turnover (last 3 years) The total annual turnover indicated in audit report/tax return of last three years should be equal to or above PKR: 100 million Audit statement of last three financial years up to June 2023 must be attached. OR Income Tax Returns	
2B. Tax Return Active Tax Payer for Financial Year 2022-23	

Note: If JV is allowed then this Appendix has to be modified accordingly listing all the information for financial competence and access to financial resource of the lead partner/JV members.



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BN-1
Appendix-N to Bid

PAST PERFORMANCE, CURRENT COMMITMENT, QUALIFICATION AND EXPERIENCE

1) General Construction Experience or Similar Size and Nature

Requirement	Bidder to Provide details	Role
1A. Company Profile Years of operations (From Registration date of NTN / FBR) Five (05) Years in Category C4		
1B. Relevant Experience Relevant assignments / construction projects over last 5 years up to 80 million each. <i>Purchase orders / supply orders/completion certificates must be attached.</i>		

2) Note: If JV is allowed then this Appendix has to be modified accordingly listing all the information for past performance, current commitments, qualification and experience of the lead partner/JV members.



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BN-2
Appendix-N to Bid

3) Human Resource/Personnel Requirements

HR required for the Project

- I. One (01) Civil Engineer PEC registered with five (05) year of experience as contractor's Resident Engineer
- II. Two (02) Field Inspectors (DAE/BTech in Civil/Mechanical/Electrical/Electronics) with three (03) year of experience
- III. One (01) Quantity Surveyor (DAE/BTech in Civil) with three (03) year experience

All staff to be based in Murree for the duration of the project as per approval of the Engineer/Team Lead.

List of staff with detailed CVs (and latest degrees) will be provided by successful Bidder with necessary details. Separate HR/personnel will be required.

- The Bidder must demonstrate that it has the personnel for the **key positions** that meet the following requirements:
- 01-page CV need to be added for each key staff



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FORMS

**BID SECURITY
PERFORMANCE SECURITY
CONTRACT AGREEMENT
MOBILIZATION ADVANCE GUARANTEE/BOND
AND
INDEMNITY BOND FOR SECURED ADVANCE**



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BS-1

**BID SECURITY
(Bank Guarantee)**

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

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

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

- (1) that the Bid Security shall remain in force up to and including the date 30 days after the deadline for validity of bids as stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived;
- (2) that the Bid Security of unsuccessful Bidders will be returned by the Employer after expiry of its validity or upon signing of the Contract Agreement; and
- (3) that in the event of failure of the successful Bidder to execute the proposed Contract Agreement for such work and furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to Clause 15.6 of the Instruction to Bidders for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified therefore, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within fourteen (14) days of his being requested to do so, a Performance Security with good and sufficient surety, as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.



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BS-2

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

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

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

SURETY (Bank)

WITNESS:

1. _____

Corporate Secretary (Seal)

2. _____

Name, Title & Address

Signature _____

Name _____

Title _____

Corporate Guarantor (Seal)



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Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



PS-1

**FORM OF PERFORMANCE SECURITY
(Bank Guarantee)**

Guarantee No. _____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address: _____
(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 Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ (Name of Contract) for the _____ (Name of Project).

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

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We, _____ (the Guarantor), waiving all objections and defences under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

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.

Witness:

1. _____

Corporate Secretary (Seal)

2. _____

Name, Title & Address

Guarantor (Bank)

Signature _____

Name _____

Title _____

Corporate Guarantor (Seal)



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CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the “Agreement”) made on the _____ day of _____ (month) 20____ between

_____ (hereafter called the “Employer”) of the one part and _____ (hereafter called the “Contractor”) of the other part.

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

NOW this Agreement witnesseth as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda / 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 (Technical & Financial);
 - (d) Special Stipulations (Appendix-A to Bid);
 - (e) The Special Conditions of Contract – Part II;
 - (f) The General Conditions – Part I;
 - (g) The Drawings;
 - (h) The priced Bill of Quantities (Appendix-D to Bid);
 - (i) The completed Appendices to Bid (B, C, E to O);
 - (j) The Specifications.
 - (k) _____ (any other)
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.



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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

(Seal)

Signature of Employer

(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:

(Name, Title and Address)

Witness:

(Name, Title and Address)



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MG-1

MOBILIZATION ADVANCE GUARANTEE
(Unconditional Bank Guarantee)

Guarantee No. _____ Date _____

WHEREAS _____ (hereinafter called the 'Employer') has entered into a Contract for

_____ (Particulars of Contract)

with _____ (hereinafter called the "Contractor").

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

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

AND WHEREAS, _____

(Scheduled Bank in Pakistan acceptable to the Employer)

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

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

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

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

(Date)

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

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



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MG-2

GUARANTOR

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

WITNESS

1. _____

Corporate Secretary (Seal)

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



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IB-1

**INDEMNITY BOND
FOR SECURED ADVANCE
AGAINST MATERIALS BROUGHT AT SITE**

(ON RS.40 NON-JUDICIAL STAMP PAPER)

This Deed of Indemnity is issued by M/s. _____
_____ (Name of the Contractor) in favour of
M/s. _____ (Name of the Employer).

Whereas _____ (hereinafter called the Employer) has paid the Secured Advance against the cost of material through any Bank or like agency by any other method by virtue of the terms of the contract existing between the parties. The details of the material and their price for which secured advance is being sought for the period _____ the consumption of the material is as under:-

- | | | | | |
|----|-------|--------------|-----------|-------------|
| 1. | _____ | at Rs. _____ | per _____ | = Rs. _____ |
| 2. | _____ | at Rs. _____ | per _____ | = Rs. _____ |
| 3. | _____ | at Rs. _____ | per _____ | = Rs. _____ |
| 4. | _____ | at Rs. _____ | per _____ | = Rs. _____ |

THEREFORE THIS DEED OF INDEMNITY WITNESSETH AS FOLLOWS:

I/We _____ of M/s. _____ do hereby indemnify M/s _____ for all losses due to thefts, arson, pilferage, loss due to flood and inundation, shortage, deterioration and depreciation etc. through any act of Man or God or slump in the Market of any or all the materials financed or paid by the Employer on our request for financing payment against material.

I/We _____ shall indemnify _____ against any or all claims, action damages arising out of or resulting to the said material.

I/We _____ further declare that we will faithfully abide by the above declaration and solemnly affirm that we will not remove, sell, pilferage any of the materials against which M/s _____ has paid us such a secured advance and will not pledge the same with any Bank, Finance Corporation, Firm, Company, Individual or the like agency or create any charge whereon in any from what so ever.

I/We _____ do hereby also declare that in the event of my/our infringement of the declaration made above _____ will be entitled to forfeit all such material and also proceed against me/us according to the relevant clause pertaining to breach of contract and further invoke the power or seek any remedies secured of _____ under the contract Agreement signed with us or otherwise available under law.

Place _____ Dated _____

Contractor _____



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[Notes on the Conditions of Contract]

The Conditions of Contract comprise two parts:

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

Over the years, a number of “model” General Conditions of Contract have evolved. Assistance has been obtained for the one used in these Standard Bidding Documents from the International Federation of Consulting Engineers (Federation Internationale des Ingenieurs-Conseils, or FIDIC), making the same compatible with the PPRA, Act, 2009 and the PPR-14.

These 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 Special 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.



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CONDITIONS OF CONTRACT

FOR WORKS OF CIVIL

ENGINEERING CONSTRUCTION

**PART I GENERAL CONDITIONS
WITH FORMS OF TENDER AND AGREEMENT**



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Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



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PART I - GENERAL CONDITIONS

Definitions and Interpretation

1.1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:

- (a) (i) "Employer" means the person named as such in Part II of these Conditions and the legal successors in title to such person, but not (except with the consent of the Contractor) any assignee of such person.
- (ii) "Contractor" means the person whose tender has been accepted by the Employer and the legal successors in title to such person, but not (except with the consent of the Employer) any assignee of such person.
- (iii) "Subcontractor" means any person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person.
- (iv) "Engineer" means the person appointed by the Employer to act as Engineer for the purposes of the Contract and named as such in Part II of these Conditions.
- (v) "Engineer's Representative" means a person appointed from time to time by the Engineer under Sub-Clause 2.2.
- (b) (i) "Contract" means these Conditions (Parts I and II), the Specification, the Drawings, the Bill of Quantities, the Tender, the Letter of Acceptance, the Contract Agreement (if completed) and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement (if completed).
- (ii) "Specification" means the specification of the Works included in the Contract and any modification thereof or addition thereto made under Clause 51 or submitted by the Contractor and approved by the Engineer.
- (iii) "Drawings" means all drawings, calculations and technical information of a like nature provided by the Engineer to the Contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor and approved by the Engineer.
- (iv) "Bill of Quantities" means the priced and completed bill of quantities forming part of the Tender.

- (v) "Tender" means the Contractor's priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.
 - (vi) "Letter of Acceptance" means the formal acceptance by the Employer of the Tender.
 - (vii) "Contract Agreement" means the contract agreement (if any) referred to in Sub-Clause 9.1.
 - (viii) "Appendix to Tender" means the appendix comprised in the form of Tender annexed to these Conditions.
- (c)
- (i) "Commencement Date" means the date upon which the Contractor receives the notice to commence issued by the Engineer pursuant to Clause 41.
 - (ii) "Time for Completion" means the time for completing the execution of and passing the Tests on Completion of the Works or any Section or part thereof as stated in the Contract (or as extended under Clause 44) calculated from the Commencement Date.
- (d)
- (i) "Tests on Completion" means the tests specified in the Contract or otherwise agreed by the Engineer and the Contractor which are to be made by the Contractor before the Works of any Section or part thereof are taken over by the Employer.
 - (ii) "Taking-Over Certificate" means a certificate issued pursuant to Clause 48.
- (e)
- (i) "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.
 - (ii) "Retention Money" means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 60.2(a).
 - (iii) "Interim Payment Certificate" means any certificate of payment issued by the Engineer other than the Final Payment Certificate.
 - (iv) "Final Payment Certificate" means the certificate of payment issued by the Engineer pursuant to Sub-Clause 60.8.
- (f)
- (i) "Works" means the Permanent Works and the Temporary Works or either of them as appropriate.
 - (ii) "Permanent Works" means the permanent works to be executed (including Plant) in accordance with the Contract

- (iii) "Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.
- (iv) "Plant" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.
- (v) "Contractor's Equipment" means all appliances and things of whatsoever nature (other than Temporary Works) required for the execution and completion of the Works and the remedying of any defects therein, but does not include Plant, materials or other things intended to form or forming part of the Permanent Works.
- (vi) "Section" means a part of the Works specifically identified in the Contract as a Section.
- (vii) "Site" means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.
- (g) (i) "cost" means all expenditure properly incurred or to be incurred, whether, on or off the Site, including overhead and other charges properly allocable thereto but does not include any allowance for profit.
 - (ii) "day" means calendar day.
 - (iii) "foreign currency" means a currency of a country other than that in which the Works are to be located.
 - (iv) "writing" means any hand-written, type-written, or printed communication, including telex, cable and facsimile transmission.

1.2 **Headings and Marginal Notes**

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

1.3 **Interpretation**

Words importing persons or parties shall include firms and corporations and any organization having legal capacity. Interpretation by PPRA shall be final w.r.t. the legal provisions. The PPRA Act, 2009 and the PPR-14 shall supersede the provisions/ text in this document in case of any conflict.

1.4 **Singular and Plural**

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

1.5 **Notices, Consents, Approvals, Certificates and Determinations**

Wherever in the Contract provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise

specified such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify" or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.

Engineer and Engineer's Representative

2.1 Engineer's Duties and Authority

- (a) The Engineer shall carry out the duties specified in the Contract.
- (b) The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that if the Engineer is required, under the terms of his appointment by the Employer, to obtain the specific approval of the Employer before exercising any such authority, particulars of such requirements shall be set out in Part II of these Conditions. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Engineer.
- (c) Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

2.2 Engineer's Representative

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

2.3 Engineer's Authority to Delegate

The Engineer may from time to time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.

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

- (a) any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof; and
- (b) if the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

2.4 Appointment of Assistants

The Engineer or the Engineer's Representative may appoint any number of persons to assist the Engineer's Representative in the carrying out of his duties under Sub-Clause 2.2. He shall notify to the Contractor the names, duties and scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the Contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to secure their acceptance of materials, Plant or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Engineer's Representative.

2.5 Instructions in Writing

Instructions given by the Engineer shall be in writing, provided that if for any reason the Engineer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Engineer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub-Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Engineer any oral instruction of the Engineer and such confirmation is not contradicted in writing within 7 days by the Engineer, it shall be deemed to be an instructions of the Engineer.

The provisions of this Sub-Clause shall equally apply to instructions given by the Engineer's Representative and any assistants of the Engineer or the Engineer's Representative appointed pursuant to Sub-Clause 2.4.

2.6 Engineer to Act Impartially

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

- (a) giving his decision, opinion or consent,
- (b) expressing his satisfaction or approval,
- (c) determining value, or
- (d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor

He shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 67.

Assignment and Subcontracting

3.1 Assignment of Contract

The Contractor shall not, without the prior consent of the Employer (which consent, notwithstanding the provisions of Sub-Clause 1.5, shall be at the sole discretion of the Employer), assign the Contract or any part thereof, or any benefit or interest therein or thereunder, otherwise than by:

- (a) a charge in favour of the Contractor's bankers of any monies due or to become due under the Contract, or
- (b) assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.

4.1 Subcontracting

The Contractor shall not subcontract the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents servants or workmen.

Provided that the Contractor shall not be required to obtain such consent for:

- (a) the provision of labour,
- (b) the purchase of materials which are in accordance with the standards specified in the Contract,
- (c) the subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

4.2 Assignment of Subcontractors' Obligations

In the event of a Subcontractor having undertaken towards the Contractor in respect of the work executed, or the goods, materials, Plant or services supplied by such Subcontractor, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time, after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.

Contract Documents

5.1 Language/s and Law

There is stated in Part II of these Conditions:

- (a) the language or languages in which the Contract documents shall be drawn up, and
- (b) the country or state the law of which shall apply to the Contract and according to which the Contract shall be construed.

If the said documents are written in more than one language, the language according to which the Contract shall be construed and interpreted is also stated in Part II of these Conditions, being therein designated the "Ruling Language". Interpretation by PPRA shall be final w.r.t. the legal provisions. The PPRA Act, 2009 and the PPR-14 shall supersede the provisions/ text in this document in case of any conflict.

5.2 Priority of Contract Documents

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

- (1) The Contract Agreement (if completed);
- (2) The Letter of Acceptance;
- (3) The Tender;
- (4) Part II of these Conditions;
- (5) Part I of these Conditions; and
- (6) Any other document forming part of the Contract.

6.1 Custody and Supply of Drawings and Documents

The Drawings shall remain in the sole custody of the Engineer, but two copies thereof shall be provided to the Contractor free of charge. The Contractor shall make at his own cost any further copies required by him. Unless it is strictly necessary for the purposes of the Contract, the Drawings, Specification and other documents provided by the Employer or the Engineer shall not, without the consent of the Engineer, be used or communicated to a third party by the Contractor. Upon issue of the Defects Liability Certificate, the Contractor shall return to the Engineer all Drawings, Specification and other documents provided under the Contract.

The Contractor shall supply to the Engineer four copies of all Drawings, specification and other documents submitted by the Contractor and approved by the Engineer in accordance with Clause 7, together with a reproducible copy of any material which cannot be reproduced to an equal standard by photocopying. In addition the Contractor shall supply such further copies of such Drawings, Specification and other documents as the Engineer may request in writing for the use of the Employer, who shall pay the cost thereof.

6.2 One Copy of Drawings to be Kept on Site

One copy of the Drawings, provided to or supplied by the Contractor as aforesaid, shall be kept by the Contractor on the Site and the same shall at all reasonable times be available for inspection and use by the Engineer and by any other person authorised by the Engineer in writing.

6.3 Disruption of Progress

The Contractor shall give notice to the Engineer, with a copy to the Employer, whenever planning or execution of the Works is likely to be delayed or disrupted unless any further drawing or instruction is issued by the Engineer within a reasonable time. The notice shall include details of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

6.4 Delay and Cost of Delay of Drawings

If, by reason of any failure or inability of the Engineer to issue, within a time reasonable in all the circumstances, any drawing or instruction for which notice has been given by the Contractor in accordance with Sub-Clause 6.3, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

6.5 Failure by Contractor to Submit Drawings

If the failure or inability of the Engineer to issue any drawings or instructions is caused in whole or in part by the failure of the Contractor to submit Drawings, Specification or other documents which he is required to submit under the Contract, the Engineer shall take such failure by the Contractor into account when making his determination pursuant to Sub-Clause 6.4.

7.1 Supplementary Drawings and Instructions

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 carry out and be bound by the same.

7.2 Permanent Works Designed by Contractor

Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall submit to the Engineer, for approval:

- (a) such drawings, specifications, calculations and other information as shall be necessary to satisfy the Engineer as to the suitability and adequacy of that design, and
- (b) operation and maintenance manuals together with drawings of the Permanent Works as completed, in sufficient detail to enable the Employer to operate, maintain, dismantle, reassemble and adjust the Permanent Works incorporating that design. The Works shall not be considered to be completed for the purposes of taking over in accordance with Clause 48 until such operation and

maintenance manuals together with drawings on completion have been submitted to and approved by the Engineer.

7.3 Responsibility Unaffected by Approval

Approval by the Engineer, in accordance with Sub-Clause 7.2, shall not relieve the Contractor of any of his responsibilities under the Contract.

General Obligations

8.1 Contractor's General Responsibilities

The Contractor shall, with due care and diligence, design (to the extent provided for by the Contract), execute and complete the Works and remedy any defects therein in accordance with the provisions of the Contract. The Contractor shall provide all superintendence, labour, material, Plant, Contractor's Equipment and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract.

8.2 Site Operations and Methods of Construction

The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction. Provided that the Contractor shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of Permanent Works, or for the design or specification of any Temporary Works not prepared by the Contractor. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such Works, notwithstanding any approval by the Engineer.

9.1 Contract Agreement

The Contractor shall, if called upon so to do, enter into and execute the Contract Agreement, to be prepared and completed at the cost of the Employer, in the form annexed to these Conditions with such modification as may be necessary.

10.1 Performance Security

If the Contract requires the Contractor to obtain security for his proper performance of the Contract, he shall obtain and provide to the Employer, such security within 30 days after the receipt of the Letter of Acceptance, in the sum stated in the Appendix to Tender. When providing such security to the Employer, the Contractor shall notify the Engineer of so doing. Such security shall be in the form annexed to these Conditions or in such other form as may be agreed between the Employer and the Contractor. The institution providing such security shall be subject to the approval of the Employer. The cost of complying with the requirements of this Clause shall be borne by the Contractor, unless the Contract otherwise provides.

10.2 Period of Validity of Performance Security

The performance security shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. No claim shall be made against such security after the issue of the Defects Liability Certificate in accordance with Sub-Clause 62.1 and such security shall be returned to the Contractor within 14 days of the issue of the said Defects Liability Certificate.

10.3 **Claims under Performance Security**

Prior to making a claim under the performance security the Employer shall, in every case, notify the Contractor stating the nature of the default in respect of which the claim is to be made.

11.1 **Inspection of Site**

The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigations undertaken relevant to the Works but the Contractor shall be responsible for his own interpretation thereof.

The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time) before submitting his Tender, as to:

- (a) the form and nature thereof, including the sub-surface conditions,
- (b) the hydrological and climatic conditions,
- (c) the extent and nature of work and materials necessary for the execution and completion of the Works and the remedying of any defects therein, and
- (d) the means of access to the Site and the accommodation he may require, and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.

The Contractor shall be deemed to have based his Tender on the data made available by the Employer and on his own inspection and examination, all as aforementioned.

12.1 **Sufficiency of Tender**

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices stated in the Bill of Quantities, all of which shall, except insofar as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, Plant or services or of contingencies for which there is a

Provisional Sum) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein.

12.2 **Not Foreseeable Physical Obstructions or Conditions**

If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of any costs which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price,

and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.

13.1 **Work to be in Accordance with Contract**

Unless it is legally or physically impossible, the Contractor shall execute and complete the Works and remedy any defects therein in strict accordance with the Contract to the satisfaction of the Engineer. The Contractor shall comply with and adhere strictly to the Engineer's instructions on any matter, whether mentioned in the Contract or not, touching or concerning the Works. The Contractor shall take instructions only from the Engineer (or his delegate).

14.1 **Programme to be Submitted**

The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, submit to the Engineer for his consent a programme, in such form and detail as the Engineer shall reasonably prescribe, for the execution of the Works. The Contractor shall, whenever required by the Engineer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. The Employer shall also be provided a copy of each document provided by the Contractor for record and information.

14.2 **Revised Programme**

If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the programme to which consent has been given under Sub-Clause 14.1, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to such programme necessary to ensure completion of the Works within the Time for Completion. The Employer shall also be provided a copy of each document provided by the Contractor for record and information.

14.3 Cash Flow Estimate to be Submitted

The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, provide to the Engineer for his information a detailed cash flow estimate, in quarterly periods, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at quarterly intervals, if required to do so by the Engineer. The Employer shall also be provided a copy of each document provided by the Contractor for record and information.

14.4 Contractor not Relieved of Duties or Responsibilities

The submission to and consent by the Engineer of such programmes or the provision of such general descriptions or cash flow estimates shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

15.1 Contractor's Superintendence

The Contractor shall provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorised representative approved of by the Engineer, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Works. Such authorised representative shall receive, on behalf of the Contractor, instructions from the Engineer.

If approval of the representative is withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving notice of such withdrawal, remove the representative from the Works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another representative approved by the Engineer.

16.1 Contractor's Employees

The Contractor shall provide on the Site in connection with the execution and completion of the Works and the remedying of any defects therein:

- (a) only such technical assistants as are skilled and experienced in their respective callings and such foremen and leading hands as are competent to give proper superintendence of the Works, and

- (b) such skilled, semi skilled and unskilled labour as is necessary for the proper and timely fulfilling of the Contractor's obligations under the Contract.

16.2 **Engineer at Liberty to Object**

The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Works any person provided by the Contractor who, in the opinion of the Engineer, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence on Site is otherwise considered by the Engineer to be undesirable, and such person shall not be again allowed upon the Works without the consent of the Engineer. Any person so removed from the Works shall be replaced as soon as possible. The Employer may also register objection in this regard for reasonable decision by the Engineer.

17.1 **Setting-out**

The Contractor shall be responsible for:

- (a) the accurate setting-out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing,
- (b) the correctness, subject as above mentioned of the position, levels dimensions and alignment of all parts of the Works, and
- (c) the provision of all necessary instruments, appliances and labour in connection with the foregoing responsibilities.

If, at any time during the execution of the Works, any error appears in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer, shall, at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer, in which case the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting-out the Works.

18.1 **Boreholes and Exploratory Excavation**

If, at any time during the execution of the Works, the Engineer requires the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be the subject of an instruction in accordance with Clause 51, unless an item or a Provisional Sum in respect of such work is included in the Bill of Quantities.

19.1 **Safety, Security and Protection of the Environment**

The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:

- (a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons,
- (b) provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and
- (c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

19.2 **Employer's Responsibilities**

If under Clause 31 the Employer shall carry out work on the Site with his own workmen he shall, in respect of such work:

- (a) have full regard to the safety of all persons entitled to be upon the Site, and
- (b) keep the Site in an orderly state appropriate to the avoidance of danger to such persons.

If under Clause 31 the Employer shall employ other contractors on the Site he shall require them to have the same regard for safety and avoidance of danger.

20.1 **Care of Works**

The Contractor shall take full responsibility for the care of the Works and materials and Plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate for the whole of the Works, when the responsibility for the said care shall pass to the Employer. Provided that:

- (a) if the Engineer issues a Taking-Over Certificate for any Section or part of the Permanent Works the Contractor shall cease to be liable for the care of that Section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and
- (b) the Contractor shall take full responsibility for the care of any outstanding Works and materials and Plant for incorporation therein which he undertakes to finish during the Defects Liability Period until such outstanding Works have been completed pursuant to Clause 49.

20.2 **Responsibility to Rectify Loss or Damage**

If any loss or damage happens to the Works, or any part thereof, or materials or Plant for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in Sub-Clause 20.4, the Contractor shall, at his own cost, rectify such loss or damage so that the Permanent Works conform in every respect with the provisions of the Contract to the satisfaction of the Engineer. The Contractor shall also be liable for any loss or damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

20.3 Loss or Damage Due to Employer's Risks

In the event of any such loss or damage happening from any of the risks defined in Sub-Clause 20.4, or in combination with other risks, the Contractor shall, if and to the extent required by the Engineer, rectify the loss or damage and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer. In the case of a combination or risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.

20.4 Employer's Risks

The Employer's risks are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (b) rebellion, revolution, insurrection, or military or usurped power, or civil war,
- (c) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- (e) riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractor and arising from the conduct of the Works,
- (f) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract,
- (g) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible. [It shall be ensured that the Design Consultants remain available for Top Supervision and rectification of any subsequent faults/ issues till the successful completion of the project/ closing of the contract including defect liability period if any];
- (h) any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions.

21.1 Insurance of Works and Contractor's Equipment

The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 20, insure:

- (a) the Works, together with materials and Plant for incorporation therein, to the full replacement cost (the term "cost" in this context shall include profit),
- (b) an additional sum of 15 per cent of such replacement cost, or as may be specified in Part II of these Conditions, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and
- (c) the Contractor's Equipment and other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

21.2 **Scope of Cover**

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

- (a) the Employer and the Contractor against all loss or damage from whatsoever cause arising, other than as provided in Sub-Clause 21.4, from the start of work at the Site until the date of issue of the relevant Taking-Over Certificate in respect of the Works or any Section or part thereof as the case may be, and
- (b) the Contractor for his liability:
 - (i) during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liability Periods, and
 - (ii) for loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

21.3 **Responsibility for Amounts not Recovered**

Any amounts not insured or not recovered from the insurers shall be borne by the Employer or the Contractor in accordance with their responsibilities under Clause 20.

21.4 **Exclusions**

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by:

- (a) war, hostilities (where war be declared or not), invasion, act of foreign enemies,

- (b) rebellion, revolution, insurrection, or military or usurped power, or civil war,
- (c) ionising, radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, or
- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.

22.1 **Damage to Persons and Property**

The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

- (a) death of or injury to any person, or
- (b) loss of or damage to any property (other than the Works),

which may arise out of or in consequence of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions defined in Sub-Clause 22.2.

22.2 **Exceptions**

The "exceptions" referred to in Sub-Clause 22.1 are:

- (a) the permanent use or occupation of land by the Works, or any part thereof,
- (b) the right of the Employer to execute the Works, or any part thereof, on, over, under, is or through any land,
- (c) damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any defects therein, in accordance with the Contract, and
- (d) death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents servants or other contractors, not being employed by the Contractor, or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or, where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.

22.3 **Indemnity by Employer**

The Employer shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the exceptions defined in Sub-Clause 22.2

23.1 Third Party Insurance (including Employer's Property)

The Contractor shall, without limiting his or the Employer's obligation and responsibilities under Clause 22, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person (other than as provided in Clause 24) or loss of or damage to any property (other than the Works) arising out of the performance of the Contract, other than the exceptions defined in paragraphs (a), (b) and (c) of Sub-Clause 22.2.

23.2 Minimum Amount of Insurance

Such insurance shall be for at least the amount stated in the Appendix to Tender.

23.3 Cross Liabilities

The insurance policy shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Employer as separate insureds.

24.1 Accident or Injury to Workmen

The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor, other than death or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.

24.2 Insurance Against Accident to Workmen

The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works. Provided that, in respect of any persons employed by any Subcontractor, the Contractor's obligations to insure as aforesaid under the Sub-Clause shall be satisfied if the Subcontractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such Subcontractor to produce to the Employer, when required, such policy of insurance and the receipt for the payment of the current premium.

25.1 Evidence and Terms of Insurances

The Contractor shall provide evidence to the Employer prior to the start of work at the Site that the insurances required under the Contract have been effected and shall, within 84 days of the Commencement Date, provide the insurance policies to the

Employer. When providing such evidence and such policies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the Employer.

25.2 **Adequacy of Insurances**

The Contractor shall notify the insurers of changes in the nature, extent or programme for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of the Contract and shall, when required, produce to the Employer the insurance policies in force and the receipts for payment of the current premiums.

25.3 **Remedy on Contractor's Failure to Insure**

If the Contractor fails to effect and keep in force any of the insurances required under the Contract, or fails to provide the policies to the Employer within the period required by Sub-Clause 25.1, then and in any such case the Employer may effect and keep in force any such insurances and pay any premium as may be necessary for that purpose and from time to time deduct the amount so paid from any monies due or to become due to the Contractor, or recover the same as a debt due from the Contractor.

25.4 **Compliance with Policy Conditions**

In the event that the Contractor or the Employer fails to comply with conditions imposed by the insurance policies effected pursuant to the Contract, each shall indemnify the other against all losses and claims arising from such failure.

26.1 **Compliance with Statutes, Regulations**

The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:

- (a) any National or State Statute, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution and completion of the Works and the remedying of any defects therein, and
- (b) the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works,

and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provisions. Provided always that the Employer shall be responsible for obtaining any planning, zoning or other similar permission required for the Works to proceed and shall indemnify the Contractor in accordance with Sub-Clause 22.3.

27.1 **Fossil**

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Employer and the Contractor, be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same. If, by reason of such instructions, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

28.1 Patent Rights

The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Contractor's Equipment, materials or Plant used for or in connection with or for incorporation in the Works and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or Specification provided by the Engineer.

28.2 Royalties

Except where otherwise stated, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works.

29.1 Interference with Traffic and Adjoining Properties

All operations necessary for the execution and completion of the Works and the remedying of any defects therein shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with:

- (a) the convenience of the public, or
- (b) the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person.

The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters insofar as the Contractor is responsible therefore.

30.1 Avoidance of Damage to Roads

The Contractor shall use every reasonable means to prevent any of the roads or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his Subcontractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of materials, Plant, Contractor's Equipment or Temporary Works from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such roads and bridges.

30.2 Transport of Contractor's Equipment or Temporary Works

Save insofar as the Contract otherwise provides, the Contractor shall be responsible for and shall pay the cost of strengthening any bridges or altering or improving any road communicating with or on the routes to the Site to facilitate the movement of Contractor's Equipment or Temporary Works and the Contractor shall indemnify and keep indemnified the Employer against all claims for damage to any such road or bridge caused by such movement, including such claims as may be made directly against the Employer, and shall negotiate and pay all claims arising solely out of such damage.

30.3 Transport of Materials or Plant

If, notwithstanding Sub-Clause 30.1, any damage occurs to any bridge or road communicating with or on the routes to the Site arising from the transport of materials or Plant, the Contractor shall notify the Engineer with a copy to the Employer, as soon as he becomes aware of such damage or as soon as he receives any claim from the authority entitled to make such claim. Where under any law or regulation the haulier of such materials or Plant is required to indemnify the road authority against damage the Employer shall not be liable for any costs, charges or expenses in respect thereof or in relation thereto. In other cases the Employer shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Contractor in respect thereof and in respect of all claims, proceedings damages, costs, charges and expenses in relation thereto. Provided that if and so far as any such claim or part thereof is, in the opinion of the Engineer, due to any failure on the part of the Contractor to observe and perform his obligations under Sub-Clause 30.1, then the amount determined by the Engineer, after due consultation with the Employer and the Contractor, to be due to such failure shall be recoverable from the Contractor by the Employer and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided also that the Employer shall notify the Contractor whenever a settlement is to be negotiated and, where any amount may be due from the Contractor, the Employer shall consult with the Contractor before such settlement is agreed.

30.4 Waterborne Traffic

Where the nature of the Works is such as to require the use by the Contractor of waterborne transport the foregoing provisions of this Clause shall be construed as

though "road" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.

31.1 Opportunities for Other Contractors

The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to:

- (a) any other contractors employed by the Employer and their workmen,
- (b) the workmen of the Employer, and
- (c) the workmen of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works.

31.2 Facilities for Other Contractors

If, however, pursuant to Sub-Clause 31.1 the Contractor shall, on the written request of the Engineer:

- (a) make available to any other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible,
- (b) permit the use, by any such, of Temporary Works or Contractor's Equipment on the Site, or
- (c) provide any other service of whatsoever nature for any such,

the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

32.1 Contractor to Keep Site Clear

During the execution of the Works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Contractor's Equipment and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required.

33.1 Clearance of Site on Completion

Upon the issue of any Taking-Over Certificate the Contractor shall clear away and remove from that part of the Site to which such Taking-Over Certificate relates all Contractor's Equipment, surplus materials, rubbish and Temporary Works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period.

Labour

34.1 Engagement of Staffs and Labour

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

35.1 Returns of Labour and Contractor's Equipment

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor's Equipment as the Engineer may require.

Materials, Plant and Workmanship

36.1 Quality of Materials, Plant and Workmanship

All materials, Plant and workmanship shall be:

- (a) of the respective kinds described in the Contract and in accordance with the Engineer's instructions, and
- (b) subjected from time to time to such tests as the Engineer may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.

The Contractor shall provide such assistance, labour, electricity, fuels, stores, apparatus and instruments as are normally required for examining, measuring and testing any materials or Plant and shall supply samples of materials, before incorporation in the Works, for testing as may be selected and required by the Engineer.

36.2 Cost of Samples

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract.

36.3 Cost of Tests

The cost of making any test shall be borne by the Contractor if such test is:

- (a) clearly intended by or provided for in the Contract, or
- (b) particularised in the Contract (in cases only for a test under load or of a test to ascertain whether the design of any finished or partially finished work is appropriate

for the purposes which it was intended to fulfil) in sufficient detail to enable the Contractor to price or allow for the same in his Tender.

36.4 Cost of Tests not Provided for

If any test required by the Engineer which is:

- (a) not intended by or provided for,
- (b) (in the cases above mentioned) not so particularised, or
- (c) (through so intended or provided for) required by the Engineer to be carried out at any place other than the Site or the place of manufacture, fabrication or preparation of the materials or Plant tested,

shows the materials, Plant or workmanship not to be in accordance with the provisions of the Contract to the satisfaction of the Engineer, then the cost of such test shall be borne by the Contractor, but in any other case Sub-Clause 36.5 shall apply.

36.5 Engineer's Determination where Tests not Provided for

Where, pursuant to Sub-Clause 36.4, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:

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

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

37.1 Inspection of Operations

The Engineer, and any person authorised by him, shall at all reasonable times have access to the Site and to all workshops and places where materials or Plant are being manufactured, fabricated or prepared for the Works and the Contractor shall afford every facility for and every assistance in obtaining the right to such access. The Employer may also inspect the site/ works anytime and may record and duly communicate the observations, specially w.r.t. quality and quantity, for reasonable and just decision by the Engineer for which the Engineer shall be personally held responsible along-with the Resident Supervision firm if any which employed the Engineer.

37.2 Inspection and Testing

The Engineer shall be entitled, during manufacture, fabrication or preparation to inspect and test the materials and Plant to be supplied under the Contract. If materials or Plant are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the Contractor shall obtain permission for the Engineer to carry out such inspection and testing in those workshops or places.

Such inspection or testing shall not release the Contractor from any obligation under the Contract. The Employer may also inspect the site/ works anytime and may record and duly communicate the observations, specially w.r.t. quality and quantity, for reasonable and just decision by the Engineer for which the Engineer shall be personally held responsible along-with the Resident Supervision firm if any which employed the Engineer.

37.3 Dates for Inspection and Testing

The Contractor shall agree with the Engineer on the time and place for the inspection or testing of any materials or Plant as provided in the Contract. The Engineer shall give the Contractor not less than 24 hours notice of his intention to carry out the inspection or to attend the tests. If the Engineer, or his duly authorised representative, does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Engineer, proceed with the tests, which shall be deemed to have been made in the presence of the Engineer. The Contractor shall forthwith forward to the Engineer duly certified copies of the tests readings. If the Engineer has not attended the tests, he shall accept the said readings as accurate.

37.4 Rejection

If, at the time and place agreed in accordance with Sub-Clause 37.3, the materials or Plant are not ready for inspection or testing or if, as a result of the inspection or testing referred to in this Clause, the Engineer determines that the materials or Plant are defective or otherwise not in accordance with the Contract, he may reject the materials or Plant and shall notify the Contractor thereof immediately. The notice shall state the Engineer's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected materials or Plant comply with the Contract. If the Engineer so requests, the tests of rejected materials or Plant shall be made or repeated under the same terms and conditions. All costs incurred by the Employer by the repetition of the test 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 from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

37.5 Independent Inspection

The Engineer may delegate inspection and testing of materials or Plant to an independent inspector. Any such delegation shall be effected in accordance with Sub-Clause 2.4 and for this purpose such independent inspector shall be considered as an assistant of the Engineer. Notice of such appointment (not being less than 14 days) shall be given by the Engineer to the Contractor.

38.1 Examination of Work before Covering up

No part of the works shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any such part of the Works which is about to be covered up or put out of view and to examine foundations before any part of the Works is placed

thereon. The Contractor shall give notice to the Engineer whenever any such part of the Works or foundations is or are ready or about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Works or of examining such foundations. A copy of such notices shall also be communicated to the Employer.

38.2 Uncovering and Making Openings

The Contractor shall uncover any part of the Works or make openings in or through the same as the Engineer may from time to time instruct and shall reinstate and make good such part. If any such part has been covered up or put out of view after compliance with the requirement of Sub-Clause 38.1 and is found to be executed in accordance with the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount the Contractor's costs in respect of such of uncovering, making openings in or through, reinstating and making good the same, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer. In any other case all costs shall be borne by the Contractor.

39.1 Removal of Improper Work, Materials or Plant

The Engineer shall have authority to issue instructions from time to time, for:

(a) the removal from the Site, within such time or times as may be specified in the instruction, of any materials or Plant which, in the opinion of the Engineer, are not in accordance with the Contract,

(b) the substitution of proper and suitable materials or Plant, and

(c) the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which, in respect of

(i) materials, Plant or workmanship, or

(ii) design by the Contractor or for which he is responsible,

is not, in the opinion of the Engineer, in accordance with the Contract.

39.2 Default of Contractor in Compliance

In case of default on the part of Contractor in carrying out such instruction within the time specified therein or, if none, within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and all costs consequent thereon or incidental thereto 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 monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Suspension

40.1 Suspension of Work

The Contractor shall, on the instructions of the Engineer, suspend the progress of the Works or any part thereof for such time and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the Works or such part thereof so far as is necessary in the opinion of the Engineer. Unless such suspension is:

- (a) otherwise provided for in the Contract,
- (b) necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible,
- (c) necessary by reason of climatic conditions of the Site, or
- (d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof (save to the extent that such necessity arises from any act or default by the Engineer or the Employer or from any of the risks defined in Sub-Clause 20.4), Sub-Clause 40.2 shall apply.

40.2 Engineer's Determination following Suspension

Where, if specifically mentioned in the SCC, pursuant to Sub-Clause 40.1, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension,

and shall notify the Contractor accordingly, with a copy to the Employer
{inclusion of this clause is to be decided by the procuring agency}.

40.3 Suspension lasting more than 84 Days

If the progress of the Works or any part thereof is suspended on the written instructions of the Engineer and if permission to resume work is not given by the Engineer within a period for 84 days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of Sub-Clause 40.1, the Contractor may give notice to the Engineer requiring permission, within 30 days from the receipt thereof, to proceed with the Works or that part thereof in regard to which progress is suspended. If, within the said time, such permission is not granted, the Contractor may, but is not bound to, elect to treat the suspension, where it affects part only of the Works, as an omission of such part under Clause 51 by giving a further notice to the Engineer to that effect, or, where it affects the whole of the Works, treat the suspension as an event of default by the Employer and terminates his employment under the Contract in accordance with the provisions of Sub-Clause

69.1, whereupon the provisions of Sub-Clause 69.2 and 69.3 shall apply. The above course may be adopted if specifically given in the SCC.

Commencement and Delays

41.1 Commencement of Works

The Contractor shall commence the Works as soon as is reasonably possible after the receipt by him of notice to this effect from the Engineer, which notice shall be issued within the time stated in the Appendix to Tender after the date of the Letter of Acceptance. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

42.1 Possession of Site and Access Thereto

Save insofar as the Contract may prescribe:

- (a) the extent of portions of the Site of which the Contractor is to be given possession from time to time,
- (b) the order in which such portions shall be made available to the Contractor,

and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will, with the Engineer's notice to commence the Works, give to the Contractor possession of

- (c) so much of the Site, and
- (d) such access as, in accordance with the Contract, is to be provided by the Employer as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in Clause 14, if any, and otherwise in accordance with such reasonable proposals as the Contractor shall, by notice to the Engineer with a copy to the Employer, make. The Employer will, from time to time as the Works proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with such programme or proposals, as the case may be.

42.2 Failure to Give Possession

If the Contractor suffers delay and/or incurs costs from failure on the part of the Employer to give possession in accordance with the terms of Sub-Clause 42.1, the Engineer may, after due consultation with the Employer and the Contractor, determine:

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

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

{inclusion of this clause is to be decided by the procuring agency}.

42.3 **Rights of Way and Facilities**

The Contractor shall bear all costs and charges for special or temporary wayleaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Works.

43.1 **Time for Completion**

The whole of the Works and, if applicable, any Section required to be completed within a particular time as stated in the Appendix to Tender, shall be completed, in accordance with the provisions of Clause 48, within the time stated in the Appendix to Tender for the whole of the Works or the Section (as the case may be), calculated from the Commencement Date, or such extended time as may be allowed under Clause 44.

44.1 **Extension of Time for Completion**

In the event of:

- (a) the amount or nature of extra or additional work,
- (b) any cause of delay referred to in these Conditions,
- (c) exceptionally adverse climatic conditions,
- (d) any delay, impediment or prevention by the Employer, or
- (e) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,

Being such as fairly to entitle the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer.

44.2 **Contractor to Provide Notification and Detailed Particulars**

Provided that the Engineer is not bound to make any determination unless the Contractor has

- (a) within 30 days after such event has first arisen notified the Engineer with a copy to the Employer, and
- (b) within 30 days or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any

extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

44.3 **Interim Determination of Extension**

Provided also that where an event has a continuing effect such that it is not practicable for the Contractor to submit detailed particulars within the period of 30 days referred to in Sub-Clause 44.2(b), he shall nevertheless be entitled to an extension of time provided that he has submitted to the Engineer interim particulars at intervals of not more than 30 days and final particulars within 30 days of the end of the effects resulting from the event. On receipt of such interim particulars, the Engineer shall, without undue delay, make an interim determination of extension of time and, on receipt of the final particulars, the Engineer shall review all the circumstances and shall determine an overall extension of time in regard to the event. In both such cases the Engineer shall make his determination after due consultation with the Employer and the Contractor and shall notify the Contractor of the determination, with a copy to the Employer. No final review shall result in a decrease of any extension of time already determined by the Engineer.

45.1 **Restriction on Working Hours**

Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried on during the night or on locally recognised days of rest without the consent of the Engineer, except when 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. Provided that the provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by multiple shifts.

46.1 **Rate of Progress**

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, 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 so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognised 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 Clause, involve the Employer in additional supervision costs, such cost 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 monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

47.1 **Liquidated Damages for Delay**

If the Contractor fails to comply with the Time for Completion in accordance with Clause 48, for the whole of the Works or, if applicable, any Section within the relevant time prescribed by Clause 43, then the Contractor shall pay to the Employer the relevant sum stated in the Appendix to Tender as liquidated damages for such default and not as a penalty (which sum shall be the only monies due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, subject to the applicable limit stated in the Appendix to Tender. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

47.2 Reduction of Liquidated Damages

If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking-Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of Alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

48.1 Taking-Over Certificate

When the whole of the Works have been substantially completed and have satisfactorily passed any Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer with a copy to the Employer, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of the Works. The Engineer shall within 21 days of the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking-Over Certificate, stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the Works specified therein. The Contractor shall be entitled to receive such Taking-Over Certificate within 21 days of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

48.2 Taking Over of Sections or Parts

Similarly, in accordance with the procedure set out in Sub-Clause 48.1, the Contractor may request and the Engineer shall issue a Taking-Over Certificate in respect of:

- (a) any Section in respect of which a separate Time for Completion is provided in the Appendix to Tender,
- (b) any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and, otherwise than as provided for in the Contract, occupied or used by the Employer, or
- (c) any part of the Permanent Works which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contract or has not been agreed by the Contractor as a temporary measure).

48.3 Substantial Completion of Parts

If any part of the Permanent Works has been substantially completed and has satisfactorily passed any Tests on Completion prescribed by the Contractor, the Engineer may issue a Taking-Over Certificate in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete with due expedition any outstanding work in that part of the Permanent Works during the Defects Liability Period.

48.4 Surfaces Requiring Reinstatement

Provided that a Taking-Over Certificate given in respect of any Section or part of the Permanent Works before completion of the whole of the Works shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such Taking-Over Certificate shall expressly so state.

Defects Liability

49.1 Defects Liability Period

In these Conditions the expression "Defects Liability Period" shall mean the defects liability period named in the Appendix to Tender, calculated from:

- (a) the date of completion of the Works certified by the Engineer in accordance with Clause 48, or
- (b) in the event of more than one certificate having issued by the Engineer under Clause 48, the respective dates so certified,

and in relation to the Defects Liability Period the expression "the Works" shall be construed accordingly.

49.2 **Completion of Outstanding Work and Remedying Defects**

To the intent that the Works shall, at or as soon as practicable after the expiration of the Defects Liability Period, be delivered to the Employer in the condition required by the Contract, fair wear and tear excepted, to the satisfaction of the Engineer, the Contractor shall:

- (a) complete the work, if any, outstanding on the date stated in the Taking-Over Certificate as soon as practicable after such date, and
- (b) execute all such work of amendment, reconstruction, and remedying defects, shrinkages or other faults as the Engineer may, during the Defects Liability Period or within 14 days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to its expiration, instruct the Contractor to execute.

49.3 **Cost of Remedying Defects**

All work referred to in Sub-Clause 49.2(b) shall be executed by the Contractor at his own cost if the necessity thereof is, in the opinion of the Engineer, due to:

- (a) the use of materials, Plant or workmanship not in accordance with the Contract,
- (b) where the Contractor is responsible for the design of part of the Permanent Works, any fault in such design, or
- (c) the neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.

If, in the opinion of the Engineer, such necessity is due to any other cause, he shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

49.4 **Contractor's Failure to Carry Out Instructions**

In case of default on the part of the Contractor in carrying out such instruction within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and if such work is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all cost consequent thereon or incidental thereto 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 monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

50.1 **Contractor to Search**

If any defect, shrinkage or other fault in the Works appears at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor, with a copy to the Employer, to search under the directions of the Engineer for the cause thereof. Unless such defect, shrinkage or other fault is one for which the Contractor is liable under the Contract, the Engineer shall, after due consultation with the

Employer and the Contractor, determine the amount in respect of the costs of such search incurred by the Contractor, which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer. If such defect, shrinkage or other fault is one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case remedy such defect, shrinkage or other fault at his own cost in accordance with the provisions of Clause 49.

Alterations, Additions and Omissions

51.1 Variations

The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

- (a) increase or decrease the quantity of any work included in the Contract,
- (b) omit any such work (but not if the omitted work is to be carried out by the Employer or by another contractor),
- (c) change the character or quality or kind of any such work,
- (d) change the levels, lines, position and dimensions of any part of the Works,
- (e) execute additional work of any kind necessary for the completion of the Works, or
- (f) change any specified sequence or timing of construction of any part of the Works.

No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

51.2 Instructions for Variations

The Contractor shall not make any such variation without an instruction of the Engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

52.1 Valuation of Variations

All variations referred to in Clause 51 and any additions to the Contract Price which are required to be determined in accordance with Clause 52 (for the purposes of this Clause referred to as "varied work"), shall be valued at the rates and prices set out in

the Contract if, in the opinion of the Engineer, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the varied work, the rates and prices in the Contract shall be used as the basis for valuation so far as may be reasonable, failing which, after due consultation by the Engineer with the Employer and the Contractor, suitable rates or prices shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

52.2 Power of Engineer to Fix Rates

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

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

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

52.3 Variations Exceeding 15 per cent

If, on the issue of the Taking-Over Certificate for the whole of the Works, it is found that as a result of:

- (a) all varied work valued under Sub-Clauses 52.1 and 52.2, and
- (b) all adjustments upon measurement of the estimated quantities set out in the Bill of Quantities, excluding Provisional Sums, dayworks and adjustment of price made under Clause 70.

but not from any other cause, there have been additions to or deductions from the Contract Price which taken together are in excess of 15 per cent of the "Effective Contract Price" (which for the purposes of this Sub-Clause shall mean the Contract Price, excluding Provisional Sums and allowance for dayworks, if any) then and in

such event (subject to any action already taken under any other Sub-Clause of this Clause), after due consultation by the Engineer with the Employer and the Contractor, there shall be added to or deducted from the Contract Price such further sums as may be agreed between the Contractor and the Engineer or, failing agreement, determined by the Engineer having regard to the Contractor's Site and general overhead costs of the Contract. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer. Such sum shall be based only on the amount by which such additions or deductions shall be in excess of 15 per cent of the Effective Contract Price.

52.4 **Daywork**

The Engineer may, if in his opinion it is necessary or desirable, issue an instruction that any varied work shall be executed on a daywork basis. The Contractor shall then be paid for such varied work under the terms set out in the daywork schedule included in the Contract and at the rates and prices affixed thereto by him in the Tender.

The Contractor shall furnish to the Engineer such receipts or other vouchers as may be necessary to provide the amounts paid and, before ordering material, shall submit to the Engineer quotations for the same for his approval.

In respect of such of the Works executed on a daywork basis, the Contractor shall during the continuance of such work, deliver each day to the Engineer an exact list in duplicate of the names, occupation and time of all workmen employed on such work and a statement, also in duplicate, showing the description and quantity of all materials and Contractor's Equipment used thereon or therefore other than Contractor's Equipment which is included in the percentage addition in accordance with such daywork schedule. One copy of each list and statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor.

At the end of each month the Contractor shall deliver to the Engineer a priced statement of the labour, materials and Contractor's Equipment, except as aforesaid, used and the Contractor shall not be entitled to any payment unless such lists and statements have been fully and punctually rendered. Provided always that if the Engineer considers that for any reason the sending of such lists or statements by the Contractor, in accordance with the foregoing provision, was impracticable he shall nevertheless be entitled to authorise payment for such work, either as daywork, on being satisfied as to the time employed and the labour, materials and Contractor's Equipment used on such work, or at such value therefore as shall, in his opinion, be fair and reasonable.

Procedure for Claims

{inclusion of any one or all of the following clauses 53.1 to 53.5 is to be decided by the procuring agency}.

53.1 **Notice of Claims**

Notwithstanding any other provision of the Contract, if the Contractor intends to claim any additional payment pursuant to any Clause of these Conditions or

otherwise, he shall give notice of his intention to the Engineer with a copy to the Employer, within 30 days after the event giving rise to the claim has first arisen; provided this is expressly provided in the SCC.

53.2 Contemporary Records

Upon the happening of the event referred to in Sub-Clause 53.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessarily admitting the Employer's liability, the Engineer shall, on receipt of a notice under Sub-Clause 53.1, inspect such contemporary records and may instruct the Contractor to keep any further contemporary records as are reasonable and may be material to the claim of which notice has been given. The Contractor shall permit the Engineer, the Employer and the Administrative Department, to inspect all records kept pursuant to this Sub-Clause and shall supply him with copies thereof as and when the Engineer so instructs.

53.3 Substantiation of Claims

Within 30 days, or such other reasonable time as may be agreed by the Engineer, of giving notice under Sub-Clause 53.1, the Contractor shall send to the Engineer an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based; provided this is expressly provided in the SCC. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Engineer may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer, the Contractor shall send a final account within 30 days of the end of the effects resulting from the event. The Contractor shall send a copy to the Employer and the Administrative Department all accounts sent to the Engineer pursuant to this Sub-Clause.

53.4 Failure to Comply

If the Contractor fails to comply with any of the provisions of this Clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount as the Engineer or any arbitrator or arbitrators appointed pursuant to Sub-Clause 67.3 assessing the claim considers to be verified by contemporary records (whether or not such records were brought to the Engineer's notice as required under Sub-Clause 53.2 and 53.3).

53.5 Payment of Claims

The Contractor shall be entitled to have included in any interim payment certified by the Engineer pursuant to Clause 60 such amount in respect of any claim as the Engineer, after due consultation with the Employer and the Contractor, may consider due to the Contractor provided that the Contractor has supplied sufficient particulars

to enable the Engineer to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

Contractor's Equipment, Temporary Works and Materials

54.1 Contractor's Equipment, Temporary Works and Materials; Exclusive Use for the Works

All Contractor's Equipment, Temporary Works and materials provided by the Contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the Site to another, without the consent of the Engineer. Provided that consent shall not be required for vehicles engaged in transporting any staff, labour, Contractor's Equipment, Temporary Works, Plant or materials to or from the Site.

54.2 Employer not Liable for Damage

The Employer shall not at any time be liable, save as mentioned in Clauses 20 and 65, for the loss of or damage to any of the said Contractor's Equipment, Temporary Works or materials.

54.3 Customs Clearance

The Employer will use his best endeavours in assisting the Contractor, where required, in obtaining clearance through the Customs of Contractor's Equipment, materials and other things required for the Works.

54.4 Re-export of Contractor's Equipment

In respect of any Contractor's Equipment which the Contractor has imported for the purposes of the Works, the Employer will use his best endeavours to assist the Contractor, where required, in procuring any necessary Government consent to the re-export of such Contractor's Equipment by the Contractor upon the removal thereof pursuant to the terms of Contract.

54.5 Conditions of Hire of Contractor's Equipment

With a view to securing, in the event of termination under Clause 63, the continued availability, for the purpose of executing the Works, of any hired Contractor's Equipment, the Contractor shall not bring on to the Site any hired Contractor's Equipment unless there is an agreement for hire thereof (which agreement shall be deemed not to include an agreement for hire purchase) which contains a provision that the owner thereof will, on request in writing made by the Employer within 7 days after the date on which any termination has become effective, and on the

Employer undertaking to pay all hire charges in respect thereof from such date, hire such Contractor's Equipment to the Employer on the same terms in all respect as the same was hired to the Contractor save that the Employer shall be entitled to permit the use thereof by any other contractor employed by him for the purpose of execution and completing the Works and remedying any defects therein, under the terms of the said Clause 63.

54.6 Costs for the Purpose of Clause 63

In the event of the Employer entering into any agreement for the hire of Contractor's Equipment pursuant to Sub-Clause 54.5, all sums properly paid by the Employer under the provision of any such agreement and all costs incurred by him (including stamp duties) in entering into such agreement shall be deemed, for the purpose of Clause 63, to be part of the cost of executing and completing the Works and the remedying of any defects therein.

54.7 Incorporation of Clause in Subcontracts

The Contractor shall, where entering into any subcontract for the execution of any part of the Works, incorporate in such subcontract (by reference or otherwise) the provisions of this Clause in relation to Contractor's Equipment, Temporary Works or materials brought on to the Site by the Subcontractor.

54.8 Approval of Materials not Implied

The operation of this Clause shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

Measurement

55.1 Quantities

The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract.

56.1 Works to be Measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Contract and the Contractor shall be paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorised agent, who shall:

- (a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and
- (b) supply all particulars required by the Engineer.

Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

57.1 **Method of Measurement**

The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.

57.2 **Breakdown of Lump Sum Items**

For the purposes of statements submitted in accordance with Sub-Clause 60.1, the Contractor shall submit to the Engineer, within 30 days after the receipt of the Letter of Acceptance, a breakdown for each of the lump sum items contained in the Tender. Such breakdowns shall be subject to the approval of the Engineer.

Provisional Sums

58.1 **Definition of "Provisional Sum"**

"Provisional Sum" means a sum included in the Contract and so designated in the Bill of Quantities for the execution of any part of the Works or for the supply of goods, materials, Plant or services, or for contingencies, which sum may be used, in whole or in part, or not at all, on the instructions of the Engineer. The Contractor shall be entitled to only such amounts in respect of the work, supply or contingencies to which such Provisional Sums relate as the Engineer shall determine in accordance with this Clause. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

58.2 **Use of Provisional Sums**

In respect of every Provisional Sum the Engineer shall have authority to issue instructions for the execution of work or for the supply of goods, material, Plant or services by:

- (a) the Contractor, in which case the Contractor shall be entitled to an amount equal to the value thereof determined in accordance with Clause 52, and
- (b) a nominated Subcontractor, as hereinafter defined, in which case the sum to be paid to the Contractor therefore shall be determined and paid in accordance with Sub-Clause 59.4.

58.3 **Production of Vouchers**

The Contractor shall produce to the Engineer all quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums, except where work is valued in accordance with rates or prices set out in the Tender.

Nominated Subcontractors

59.1 **Definition of "Nominated Subcontractors"**

All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials, Plant or services for which Provisional Sums are included in the Contract, who may have been or be nominated or selected or approved by the Employer or the Engineer, and all persons to whom by virtue of the provisions of the Contract the Contractor is required to subcontract shall, in the execution of such work or the supply of such goods, materials, Plant or services, be deemed to be subcontractors to the Contractor and are referred to in this Contract as "nominated Subcontractors".

59.2 **Nominated Subcontractors; Objection to Nomination**

The Contractor shall not be required by the Employer or the Engineer, or be deemed to be under any obligation, to employ any nominated Subcontractor against whom the Contractor may raise reasonable objection, or who declines to enter into subcontract with the Contractor containing provisions:

- (a) that in respect of the work, goods, materials, Plant or services the subject of the subcontract, the nominated Subcontractor will undertake towards the Contractor such obligations and liabilities as will enable the Contractor to discharge his own obligations and liabilities towards the Employer under the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities, and

(b) that the nominated Subcontractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Subcontractor, his agents, workmen and servants and from and against any misuse by him or them of any Temporary Works provided by the Contractor for the purposes of the Contract and from all claims as aforesaid.

59.3 **Design Requirements to be Expressly Stated**

If in connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the Permanent Works or of any Plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Subcontract. The nominated Subcontract shall specify that the nominated Subcontractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities.

59.4 **Payments to Nominated Subcontractors**

For all work executed or goods, materials, Plant or services supplied by any nominated Subcontractor, the Contractor shall be entitled to:

(a) the actual price paid or due to be paid by the Contractor, on the instructions of the Engineer, and in accordance with the subcontract;

(b) in respect of labour supplied by the Contractor, the sum, if any, entered in the Bill of Quantities or, if instructed by the Engineer pursuant to paragraph (a) of Sub-Clause 58.2, as may be determined in accordance with Clause 52; and

(c) in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision has been made in the Bill of Quantities for a rate to be set against the relevant Provisional Sum, at the rate inserted by the Contractor against that item or, where no such provision has been made, at the rate inserted by the Contractor in the Appendix to Tender and repeated where provision for such is made in a special item provided in the Bill of Quantities for such purpose.

59.5 **Certification of Payments to Nominated Subcontractors**

Before issuing, under Clause 60 any certificate, which includes any payment in respect of work done or goods, materials, Plant or services supplied by any nominated Subcontractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions, included in previous certificates in respect of the work or goods, materials, Plant or services of such nominated Subcontractor have been paid or discharged by the Contractor. If the Contractor fails to supply such proof then, unless the Contractor:

(a) satisfies the Engineer in writing that he has reasonable cause for withholding or refusing to make such payment, and

(b) produces to the Engineer reasonable proof that he has so informed such nominated Subcontractor in writing,

the Employer shall be entitled to pay to such nominated Subcontractor direct, upon the certificate of the Engineer, all payments, less retention, provided for in the nominated Subcontract, which the Contractor has failed to make to such nominated Subcontractor and to deduct by way of set-off the amount so paid by the Employer from any sums due or to become due from the Employer to the Contractor.

Provided that, where the Engineer has certified and the Employer has paid direct as aforesaid, the Engineer shall in issuing any further certificate in favour of the Contractor, deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

Certificates and Payment

60.1 Monthly Statements

The Contractor shall submit to the Engineer after the end of each month six copies for further process, and one copy each to the Employer and the Administrative Department, each signed by the Contractor's representative approved by the Engineer in accordance with the Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself to be entitled up to the end of the month in respect of:

- (a) the value of the Permanent Works executed,
- (b) any other items in the Bill of Quantities including those for Contractor's Equipment, Temporary Works, dayworks and the like,
- (c) the percentage of the invoice value of listed materials, all as stated in the Appendix to Tender, and Plant delivered by the Contractor on the Site for incorporation in the Permanent Works but not incorporated in such Works,
- (d) adjustments under Clause 70, and
- (e) any other sum to which the Contractor may be entitled under the Contract or otherwise.

60.2 Monthly Payments

The Engineer shall, within 30 days of receiving such statement, certify to the Employer the amount of payment to the Contractor which he considers due and payable in respect thereof, subject:

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

(b) Secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer. Provided that the Engineer shall not be bound to certify any payment under this Sub-Clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender.

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

60.3 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 pursuant to Clause 48, 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, pursuant to Clause 49 and 50, 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.

60.4 Correction of Certificates

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous certificate which shall have been issued by him and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

60.5 Statement at Completion

Not later than 84 days after the issue of the Taking-Over Certificate in respect of the whole of the Works, the Contractor shall submit to the Engineer a Statement at Completion with supporting documents showing in detail, in the form approved by the Engineer:

- (a) the final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate,
- (b) any further sums which the Contractor considers to be due, and
- (c) an estimate of amounts which the Contractor considers will become due to him under the Contract.

The estimated amounts shall be shown separately in such Statement at Completion. The Engineer shall verify payment in accordance with Sub-Clause 60.2.

60.6 **Final Statement**

Not later than 56 days after the issue of the Defects Liability Certificate pursuant to Sub-Clause 62.1, the Contractor shall submit to the Engineer for consideration a draft final statement with supporting documents showing in detail, in the form approved by the Engineer:

- (a) the value of all work done in accordance with the Contract, and
- (b) any further sums which the Contractor considers to be due to him under the Contract.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purposes of these Conditions referred to as the "Final Statement").

If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer an Interim Payment Certificate for those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled in accordance with Clause 67.

60.7 **Discharge**

Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 60.8 has been made and the performance security referred to in Sub-Clause 10.1, if any, has been returned to the Contractor.

60.8 **Final Payment Certificate**

Within 30 days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating:

(a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and

(b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled other than under Clause 47, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

60.9 **Cessation of Employer's Liability**

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking-Over Certificate in respect of the whole of the Works) in the Statement at Completion referred to in Sub-Clause 60.5.

60.10 **Time for Payment**

The amount due to the Contractor under any Interim Payment Certificate or final payment issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate or final payment has been delivered to the Employer, provided the work is satisfactory.

61.1 **Approval only by Defects Liability Certificate**

Only the Defects Liability Certificate, referred to in Clause 62, shall be deemed to constitute approval of the Works.

62.1 **Defects Liability Certificate**

The Contract shall not be considered as completed until a Defects Liability Certificate shall have been signed by the Engineer and delivered to the Employer, with a copy to the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects therein to the Engineer's satisfaction. The Defects Liability Certificate shall be given by the Engineer within 30 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different Sections or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to Clause 49 and 50, have been completed to the satisfaction of the Engineer. Provided that the issue of the Defects Liability Certificate shall not be a condition precedent to payment to

the Contractor of the second portion of the Retention Money in accordance with the conditions set out in Sub-Clause 60.3.

62.2 **Unfulfilled Obligations**

Notwithstanding the issue of the Defects Liability Certificate the Contractor and the Employer shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the Defects Liability Certificate which remains unperformed at the time of such Defects Liability Certificate is issued and, for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties to the Contract.

Remedies

63.1 **Default of Contractor**

If the Contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors, or agrees to carry out the Contract under a committee of inspection of his creditors, or if a receiver, administrator, trustee or liquidator is appointed over any substantial part of his assets, or if, under any law or regulation relating to reorganization, arrangement or readjustment of debts, proceedings are commenced against the Contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security interest over a substantial part of the assets of the Contractor, or if any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law has a substantially similar effect to any of the foregoing acts or events, or if the Contractor has contravened Sub-Clause 3.1, or has an execution levied on his goods, or Contract, if the Engineer certifies to the Employer, with a copy to the Contractor, that, in his opinion, the Contractor:

- (a) has repudiated the Contract, or
- (b) without reasonable excuse has failed
 - (i) to commence the Works in accordance with Sub-Clause 41.1,
 - (ii) to proceed with the Works, or any Section thereof, within 30 days after receiving notice pursuant to Sub-Clause 46.1,
- (c) has failed to comply with a notice issued pursuant to Sub-Clause 37.4 or an instruction issued pursuant to Sub-Clause 39.1 within 30 days after having received it
- (d) despite previous warning from the Engineer, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract, or

(e) has contravened Sub-Clause 4.1, then the Employer may, after giving 14 days' notice to the Contractor, enter upon the Site and the Works and terminate the employment of the Contractor without thereby releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and authorities conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor's Equipment, Temporary Works and materials as he or they may think proper.

63.2 **Valuation at Date of Termination**

The Engineer shall, as soon as may be practicable after any such entry and termination by the Employer, fix and determine ex parte, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify:

- (a) what amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and
- (b) the value of any of the said unused or partially used materials, any Contractor's Equipment and any Temporary Works.

63.3 **Payment after Termination**

If the Employer terminates the Contractor's employment under this Clause, he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defects Liability Period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

63.4 **Assignment of Benefit of Agreement**

Unless prohibited by law, the Contractor shall, if so instructed by the Engineer within 14 days of such entry and termination referred to in Sub-Clause 63.1, assign to the Employer the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

64.1 **Urgent Remedial Work**

If, by reason of any accident, or failure, or other event occurring to, in, or in connection with the Works, or any part thereof, either during the execution of the Works, or during the Defects Liability Period, any remedial or other work is, in the opinion of the Engineer, urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work, the Employer shall be entitled to employ and pay other persons to carry out such work as the Engineer may consider necessary. If the work or repair so done by the Employer is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto 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 monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided that the Engineer shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof.

Special Risks

65.1 No Liability for Special Risks

The Contractor shall be under no liability whatsoever in consequence of any of the special risks referred to in Sub-Clause 65.2, whether by way of indemnity or otherwise, for or in respect of:

- (a) destruction of or damage to the Works, save to work condemned under the provisions of Clause 39 prior to the occurrence of any of the said special risks,
- (b) destruction of or damage to property, whether of the Employer or third parties, or
- (c) injury or loss of life.

65.2 Special Risks

The Special Risks are:

- (a) the risks defined under paragraphs (a), (c), (d) and (e) of Sub-Clause 20.4, and
- (b) the risks defined under paragraph (b) of Sub-Clause 20.4 insofar as these relate to the country in which the Works are to be executed.

65.3 Damage to Works by Special Risks

If the Works or any materials or Plant on or near or in transit to the Site, or any of the Contractor's Equipment, sustain destruction or damage by reason of any of the said special risks, the Contractor shall be entitled to payment in accordance with the Contract for any Permanent Works duly executed and for any materials or Plant so destroyed or damaged and, so far as may be required by the Engineer or as may be necessary for the completion of the Works, to payment for:

- (a) rectifying any such destruction or damage to the Works, and
- (b) replacing or rectifying such materials or Contractor's Equipment,

and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 (which shall in the case of the cost of replacement of Contractor's Equipment include the fair market value thereof as determined by the Engineer) and shall notify the Contractor accordingly, with a copy to the Employer.

65.4 **Projectile, Missile**

Destruction, damage, injury or loss of life caused by the explosion or impact, whenever and wherever occurring, of any mine, bomb, shell, grenade, or other projectile, missile, munition, or explosive of war, outside the reasonable control of the contractor, shall be deemed to be a consequence of the said special risks, provided the same is not in consequence of any lack of diligence on the part of Contractor.

65.5 **Increased Costs arising from Special Risks**

Save to the extent that the Contractor is entitled to payment under any other provision of the Contract, the Employer shall repay to the Contractor any costs of the execution of the Work (other than such as may be attributable to the cost of reconstructing work condemned under the provisions of Clause 39 prior to the occurrence of any special risk) which are howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the Contractor shall, as soon as any such cost comes to his knowledge, forthwith notify the Engineer thereof. The Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect thereof which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer.

65.6 **Outbreak of War**

If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and until the Contract is terminated under the provisions of this Clause, continue to use his best endeavour to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

65.7 **Removal of Contractor's Equipment on Termination**

If the Contract is terminated under the provisions of Sub-Clause 65.6, the Contractor shall, with all reasonable dispatch, remove from the Site all Contractor's Equipment and shall give similar facilities to his Subcontractors to do so.

65.8 **Payment if Contract Terminated**

If the Contract is terminated as aforesaid, the Contractor shall be paid by the Employer, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

- (a) the amounts payable in respect of any preliminary items referred to in the Bill of Quantities, so far as the work or service comprised therein has been carried out or performed, and a proper portion of any such items which have been partially carried out or performed;
- (b) the cost of materials, Plant or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials, Plant or goods becoming the property of the Employer upon such payments being made by him;
- (c) a sum being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works insofar as such expenditure has not been covered by any other payments referred to in this Sub-Clause;
- (d) any additional sum payable under the provisions of Sub-Clauses 65.3 and 65.5;
- (e) such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, of removal of Contractor's Equipment under Sub-Clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to other destination, at no greater cost; and
- (f) the reasonable cost of repatriation of all the Contractor's staff and workmen employed on or in connection with the Works at the time of such termination.

Provided that against any payment due from the Employer under this Sub-Clause, the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of Contractor's Equipment, materials and Plant and any other sums which, at the date of termination, were recoverable by the Employer from the Contractor under the terms of Contract. Any sums payable under this Sub-Clause shall, after due consultation with the Employer and the Contractor, be determined by the Engineer who shall notify the Contractor accordingly, with a copy to the Employer.

Release from Performance

66.1 **Payment in Event of Release from Performance**

If any circumstance outside the control of both parties arises after the issue of the Letter of Acceptance which renders it impossible or unlawful for either party to fulfill his or their contractual obligations, or under the law governing the Contract the parties are released from further performance, then the parties shall be discharged from the Contract, except as to their rights under this Clause and Clause 67 and without prejudice to the rights of either party in respect of any antecedent breach of the Contract, and the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been payable under Clause 65 if the Contract had been terminated under the provisions of Clause 65.

Settlement of Disputes

67.1 Engineer's Decision

If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the eighty-fourth day after the day on which he received such reference the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Works with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided, in an amicable settlement or an arbitral award.

If either the Employer or the Contractor be dissatisfied with any decision of the Engineer, or if the Engineer fails to give notice of his decision on or before

the eighty-fourth day on which he received the reference, then either the Employer or the Contractor may, on or before the seventieth day after the day on which he received notice of such decision, or on or before the seventieth day after the day on which the said period of 84 days expired, as the case may be, give notice to the other party, with a copy for information to the Engineer, of his intention to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 67.4, no arbitration in respect thereof may be commenced unless such notice is given.

If the Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notice of intention to commence arbitration

as to such dispute has been given by either the Employer or the Contractor on or before the seventieth day after the day on which the parties received notice as to such decision from the Engineer, the said decision shall become final and binding upon the Employer and the Contractor. However, the Blacklisting regime given in section 17-A of PPRA Act, 2009 and rule 21 of PPR-14 read with Schedule appended with the PPR-14 shall have an over-riding effect and shall be applicable in letter and spirit.

67.2 Amicable Settlement

Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 67.1, the parties shall attempt to settle such dispute amicably before the commencement of arbitration. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of intention to commence arbitration of such dispute was given, even if no attempt at amicable settlement thereof has been made.

67.3 Arbitration

Any dispute in respect of which:

- (a) the decision, if any, of the Engineer has not become final and binding pursuant to Sub-Clause 67.1, and
- (b) amicable settlement has not been reached within the period stated in Sub-Clause 67.2,

shall be finally settled, unless otherwise specified in the Contract, under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed under such Rules. The said arbitrator/s shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Engineer related to the dispute.

Neither party shall be limited in the proceedings before such arbitrator/s to the evidence or arguments put before the Engineer for the purpose of obtaining his said decision pursuant to Sub-Clause 67.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator/s on any matter whatsoever relevant to the dispute.

Arbitration may be commenced prior to or after completion of the Works, provided that the obligations of the Employer, the Engineer and the Contractor shall not be altered by reason of the arbitration being conducted during the progress of the Works.

67.4 Failure to Comply with Engineer's Decision

Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 67.1 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 67.3. The provisions of Sub-Clause 67.1 and 67.2 shall not apply to any such reference.

Notices

68.1 Notice to Contractor

All certificates, notices or instructions to be given to the Contractor by the Employer or the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or such other address as the Contractor shall nominate for that purpose.

68.2 Notice to Employer and Engineer

Any notice to be given to the Employer or to the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in Part II of these Conditions.

68.3 Change of Address

Either party may change a nominated address to another address in the country, where the Works are being executed by prior notice to the other party, with a copy to the Engineer, and the Engineer may do so by prior notice to both parties.

Default of Employer

69.1 Default of Employer

In the event of the Employer:

(a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 30 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, provided work is satisfactory and the Contractor has not indulged in corrupt or fraudulent practices as defined in rule 2 of PPR-14,

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

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

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

the Contractor may resort to the dispute resolution mechanism given in clauses 67.1 to 67.3 above.

69.2 Removal of Contractor's Equipment

Upon the expiry of the 14 days' notice referred to in Sub-Clause 69.1, the Contractor shall, notwithstanding the provisions of Sub-Clause 54.1, with all

reasonable dispatch, remove from the Site all Contractor's Equipment brought by him thereon.

69.3 **Payment on Termination**

In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of Clause 65, but, in addition to the payments specified in Sub-Clause 65.8, the Employer shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination.

69.4 **Contractor's Entitlement to Suspend Work**

Without prejudice to the Contractor's entitlement to interest under Sub-Clause 60.10, if any, the Contractor may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 30 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, after giving 30 days' prior notice to the Employer, with a copy to the Engineer, suspend work or reduce the rate of work; provided the previously done work is satisfactory and the Contractor has not indulged in Corrupt practices as given in rule 2 of PPR-14.

If the Contractor suspends work or reduces the rate of work in accordance with the provisions of this Sub-Clause and thereby suffers delay or incurs costs the Engineer shall, after due consultation with the Employer and the Contractor, determine:

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

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

69.5 **Resumption of Work**

Where the Contractor suspends work or reduces the rate of work, having given notice in accordance with Sub-Clause 69.4, and the Employer subsequently pays the amount due, including interest pursuant to Sub-Clause 60.10, the Contractor's entitlement under Sub-Clause 69.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

Changes in Cost and Legislation

70.1 **Increase or Decrease of Cost**

There shall be added to or deducted from the Contract Price such sums in respect of rise or fall in the cost of labour and/or materials or any other matters affecting

the cost of the execution of the Works as may be determined in accordance with part II of these Conditions.

70.2 **Subsequent Legislation**

If, after the date for submission of tenders for the Contract there occur in the country- in which the Works are being, or are to be, executed- any changes to National or Provincial Statutes, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or bye-law which causes additional or reduced cost to the Contractor, other than under Sub-Clause 70.1, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Currency and Rates of Exchange

71.1 **Currency Restrictions**

If, after the date for submission of tenders for the Contract, the Government or authorized agency of the Government of the country in which the Works are being or are to be executed imposes currency restrictions and/or transfer of currency restrictions in relation to the currency or currencies in which the Contract Price is to be paid, the Employer shall reimburse any loss or damage to the Contractor arising therefrom, without prejudice to the right of the Contractor to exercise any other rights or remedies to which he is entitled in such event. As a principle, payments in foreign currency are not allowed. In exceptional circumstances, payments may only be allowed if all codal formalities have been fulfilled and approval of the Finance department has been obtained and such provision is given in the SCC.

72.1 **Rates of Exchange**

Where the Contract provides for payment in whole or in part to be made to the Contractor in foreign currency or currencies, such payment shall not be subject to variations in the rate or rates of exchange between such specified foreign currency or currencies and the currency of the country in which the Works are to be executed.

72.2 **Currency Proportions**

Where the Employer has required the Tender to be expressed in a single currency but with payment to be made in more than one currency and the Contractor has stated the proportions or amounts of other currency or currencies in which he requires payment to be made, the rate or rates of exchange applicable for calculating the payment of such proportions or amounts shall, unless otherwise stated in Part II of these Conditions, be those prevailing, as determined by the Central Bank of the country in which the Works are to be executed, on the date for

the submission of tenders for the Contract, as has been notified to the Contractor by the Employer prior to the submission of tenders or as provided for in the Tender.

72.3 Currencies of Payment for Provisional Sums

Where the Contract provides for payment in more than one currency, the proportions or amounts to be paid in foreign currencies in respect of Provisional Sums shall be determined in accordance with the principles set forth in Sub-Clauses 72.1 and 72.2 as and when these sums are utilized in whole or in part in accordance with the provisions of Clauses 58 and 59.

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PART II - SPECIAL CONDITIONS OF CONTRACT

(Mandatory Provisions not to be Amended / Substituted except as instructed by PEC)

1.1 Definitions

(a) (i) The Employer is: *Urban Sector Planning and Management Services Unit Pvt Limited (The Urban Unit)*

(a) (iv) The Engineer is: Designated engineer will be notified by the CEO Urban Unit

(insert name of the Firm/Company/Person nominated as Engineer alongwith his full address), 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 Engineers is to formulate his certifications/recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

The following paragraph is added:

(a) (vi) “Bidder or Tenderer” means any person or persons, company, corporation, firm or Joint venture submitting a Bid or Tender.

(b) (v) The following is added at the end of the paragraph:

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

The following paragraph is added:

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

(e) (i) The 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 there from as may be made and remedying of any defects therein in accordance with the provisions of the Contract.

2.1 Engineer's Duties and Authority

With reference to Sub-Clause 2.1(b), the following provisions shall also apply:
The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses. The Employer may further vary according to need of the project;

(i) Consenting to the sub-letting of any part of the Works under Sub-Clause 4.1 “Subcontracting”.

- (ii) Certifying additional cost determined under Sub-Clauses 12.2 “Not Foreseeable Physical Obstructions or conditions”
- (iii) Any action under Clause 10 “Performance Security” and Clauses 21,23,24 & 25 “ Insurance” of sorts.
- (iv) Any action under Clause 40 “Suspension”
- (v) Any action under Clause 44 “Extension of Time for Completion”
- (vi) Any action under Clause 47 “Liquidated Damages for Delay” or payment of Bonus for Early Completion of Works (SCC Sub-Clause 47.3)
- (vii) Issuance of “Taking over Certificate” under Clause 48.
- (viii) Issuing a Variation Order under Clause 51 except:
 - a) in an emergency* situation, as stated here below, or
 - b) if such variation would increase the Contract Price by the amount stated in the Appendix-A to Bid.
- (ix) Fixing rates or prices under Clause 52.
- (x) Extra payment as a result of Contractor’s claims Clause
- (xi) Release of Retention Money to the Contractor under Sub-Clause 60.3 “Payment of Retention Money”.
- (xii) Issuance of “Final Payment Certificate” under Sub-Clause 60.8.
- (xiii) Issuance of “Defect Liability Certificate” under Sub-Clause 62.1.
- (xiv) Any change in the ratios of Contract currency proportions and payments thereof under clause 72 “Currency and Rate of Exchange”.

(Note: Employer may further vary according to need of the project)

* (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.)

2.2 Engineer’s Representative

Add the following paragraph:

The Employer shall ensure that the Engineer's Representative is a professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976).

The following Sub-Clauses 2.7 and 2.8 are added:

2.7 Engineer Not Liable

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

2.8 Replacement of the Engineer

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

5.1 Language(s) and Law

- (a) The Contract Documents shall be drawn up in the English language.
- (b) The Contract shall be subjected to the Laws of Islamic Republic of Pakistan

5.2 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 Special 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) The Specifications; and
- (11) (any other).

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.

The following Sub-Clauses 6.6 and 6.7 are added

6.6 Shop Drawings

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

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.

6.7 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. A set shall be provided to the Employer as well. The price of such Drawings shall be deemed to be included in the Contract Price.

10.1 Performance Security

The Contractor shall provide Performance Security to the Employer in the prescribed form. The said Security shall be furnished or caused to be furnished by the Contractor within 30 days after the receipt of the Letter of Acceptance or the Award of the Contract. The Performance Security shall be of an amount equal to 5% of the Contract Price stated in the Letter of Acceptance. Such Security shall, at the option of the bidder, be in the form of either (a) bank guarantee from any Scheduled Bank in Pakistan or (b) bank guarantee from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan. The said bank guarantee shall be irrevocable, unconditional without recourse, on-demand bank guarantee from scheduled bank in favor of the employer.

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor.

The following Sub-Clause 10.4 is added:

10.4 Performance Security Binding on Variations and Changes

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

14.1 Programme to be Submitted

The programme shall be submitted within 7 days from the date of receipt of Letter of Acceptance, which shall be in the form of:

- i) a CPM identifying the critical path/activities.

14.3 Cash Flow Estimate to be Submitted

The detailed Cash Flow Estimate shall be submitted within 21 days from the date of receipt of Letter of Acceptance

The following Sub-Clause 14.5 is added:

14.5 Detailed Programme and Monthly Progress Report

- a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer, the Employer and the Administrative Department, the detailed programme for the following:
 - (1) Execution of Works;
 - (2) Labour Employment;
 - (3) Local Material Procurement;
 - (4) Material Imports, if any; and
 - (5) Other details as required by the Engineer.
- (b) During the period of the Contract, the Contractor shall submit to the Engineer, the Employer and the Administrative Department, not later than the 8th day of the following month, 10 copies each of Monthly Progress Reports covering with a copy to the employer:
 - (1) A Construction Schedule indicating the monthly progress in percentage;
 - (2) Description of all work carried out since the last report;
 - (3) Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
 - (4) Monthly summary of daily job record;
 - (5) Photographs to illustrate progress; and
 - (6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.
- (c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer, the Employer and the Administrative Department, as and when requested. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment. The Progress will be updated on the specified MIS system of the Employer.

The following Sub-Clauses 15.2 and 15.3 are added:

15.2 Language Ability of Contractor's Representative

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

15.3 Contractor's Representative

The Contractor's authorised representative and his other professional engineers working at Site shall register themselves with the Pakistan Engineering Council.

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

The following Sub-Clauses 16.3 and 16.4 are added:

16.3 Language Ability of Superintending Staff of Contractor

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

16.4 Employment of Local Personnel

The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour from sources within Pakistan.

The following Sub-Clauses 19.3 and 19.4 are added:

19.3 Safety Precautions

In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorise or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

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

19.4 Lighting Work at Night

In the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed

satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

20.4 Employer's Risks

The Employer's risks are:

- (a) insofar as they directly affect the execution of the Works in Pakistan:
 - (i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
 - (ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
 - (iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
 - (iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
 - (v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;
- (b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;
- (c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; [For all those projects where funding is available, the Design Consultants shall be made responsible for any design faults. It shall be ensured that the Design Consultants remain available for Top Supervision and rectification of any subsequent faults/ issues till the successful completion of the project/ closing of the contract including defect liability period if any];
- (d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:
 - (i) could not have reasonably foreseen, or
 - (ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:
 - (a) prevent loss or damage to physical property from occurring by taking appropriate measures, or
 - (b) insure against.

21.1 Insurance of Works and Contractor's Equipment

(Employer may vary this Sub-Clause 21.1 (b))

21.4 Exclusions

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

The following Sub-Clause 25.5 is added:

25.5 Insurance Company

The Contractor shall be obliged to place all insurances relating to the Contract (including, but not limited to, the insurances referred to in Clauses 21, 23 and 24) with either Government's State Life Insurance Company or National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Costs of such insurances shall be borne by the Contractor.

The following Sub-Clause 31.3 is added:

31.3 Co-operation with other Contractors

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

The following Sub-Clauses 34.2 to 34.12 are added:

34.2 Rates of Wages and Conditions of Labour

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

34.3 Employment of Persons in the Service of Others

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

34.4 Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be

handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

34.5 Health and Safety

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

34.6 Epidemics

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

34.7 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.

34.8 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labour.

34.9 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.

34.10 Festivals and Religious Customs

The Contractor shall in all dealings with his staff and labour have due regard to all recognised festivals, days of rest and religious and other customs.

34.11 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same.

34.12 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the provisions of this Clause.

The following Sub-Clauses 35.2 and 35.3 are added:

35.2 Records of Safety and Health

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

35.3 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:

36.6 Use of Pakistani Materials and Services

The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services, available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.

41.1 Commencement of Works

The Contractor shall commence the Works on Site within the period named in Appendix-A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

The following Sub-Clause 47.3 is added:

47.3 Bonus for Early Completion of Works

No bonus shall be paid for early completion of works.

48.2 Taking Over of Sections or Parts

For the purposes of para (a) of this Sub-Clause, separate Times for Completion shall be provided in the Appendix-A to Bid "Special Stipulations".

51.2 Instructions for Variations

At the end of the first sentence, after the word "Engineer", the words "in writing" are added.

52.1 Valuation of Variations

In the tenth line, after the words "Engineer shall" the following is added:
Within a period not exceeding one-eighth of the completion time subject to a minimum of 56 days from the date of disagreement whichever is later.

53.4 Failure to Comply

This Sub-Clause is deleted in its entirety.

54.3 Customs Clearance

(Employer may vary this Sub-Clause)

54.5 Conditions of Hire of Contractor's Equipment

The following paragraph is added:

The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.

The following Sub-Clauses 59.4 & 59.5 are added:

59.4 Payments to Nominated Subcontractors

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

59.5 Certification of Payments & Nominated Subcontractors

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

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

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

60.1 Monthly Statements

In the first line after the word “shall”, the following is added:

“on the basis of the joint measurement of work done under Clause 56.1,”

In Para (c) the words “the Appendix to Tender” are deleted and substituted with the words “Sub-Clause 60.11 (a)(6) hereof”.

(in case Clause 60.11 is applicable)

60.2 Monthly Payments

In the first line, “28” is substituted by “30”.

60.10 Time for Payment

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 47, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate or the Final Certificate as has been jointly verified by Employer and Contractor, provided that the work is satisfactory and the Contractor has not indulged in Corrupt Practices as defined in Section 2 of the PPRA Act 2009; and provided further that the provisions of the donor documents shall prevail in case of foreign funded projects. In the event of the failure of the Employer to make payment within the times stated, the provisions w.r.t. dispute resolution may be invoked.

The following Sub-Clause 60.11 is added:

60.11 Secured Advance on Materials (Not Applicable)

a) The Contractor shall be entitled to receive from the Employer Secured Advance against an indemnity bond acceptable to the Employer of such sum as the Engineer may consider proper in respect of non-perishable materials brought at the Site but not yet incorporated in the Permanent Works provided that:

(1) The materials are in accordance with the Specifications for the Permanent Works;

- (2) Such materials have been delivered to the Site and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer but at the risk and cost of the Contractor;
 - (3) The Contractor's records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records shall be available for inspection by the Engineer;
 - (4) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of materials and providing evidence of ownership and payment therefor;
 - (5) Ownership of such materials shall be deemed to vest in the Employer and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Employer; and
 - (6) The sum payable for such materials on Site shall not exceed 75 % of the (i) landed cost of imported materials, or (ii) ex-factory / ex-warehouse price of locally manufactured or produced materials, or (iii) market price of other materials.
- (b) The recovery of Secured Advance paid to the Contractor under the above provisions shall be effected from the monthly payments on actual consumption basis.

60.12 Financial Assistance to Contractor

The contractor will be paid 10% of the contract price as Mobilization Advance against the submission by the contractor of a mobilization advance bank guarantee for the full amount of the advance. The said bank guarantee shall be irrevocable, unconditional without recourse, on-demand bank guarantee in favor of the employer.

Financial assistance shall be made available to the Contractor by the Employer by adopting any one of the following three Alternatives, upon submission by the Contractor of a Mobilization Advance Guarantee for the full amount of the Advance in the specified form from a Scheduled Bank in Pakistan:

(Appropriate alternative only to be retained)

Alternative One: Mobilization Advance

- (a) An interest-free Mobilization Advance up to 10 % of the Contract Price stated in the Letter of Acceptance. The mobilization advance will be paid after furnishing of a mobilization advance bank guarantee. The said bank guarantee shall be irrevocable, unconditional without recourse, on-demand bank guarantee from scheduled bank in favor of the employer.
- (b) This Advance shall be recovered in equal instalments; first instalment at the expiry of third month after the date of payment of first part of Advance and the last instalment two months before the date of completion of the Works as per Clause 43 hereof.

Alternative Two: Mobilization/ Demobilization Cost (Not Applicable)

Mobilization Cost shall be paid to the Contractor as a part of the priced Bill of Quantities. This cost shall not exceed 10 % of the Tender Price and shall be paid to the Contractor as follows:

- (i) 80 % of the Mobilization Cost shall be paid for mobilization at Site. This payment shall be in three stages as follows:
- Stage I: 20 % of Mobilization Cost upon obtaining and furnishing of Performance Security and insurance policies and construction of camp and housing facilities as required under the Contract;
- Stage II: 30 % of Mobilization Cost upon providing & installing preliminary requirements of Contractor's Equipment, materials and temporary structures for the commencement of Works to the satisfaction of the Engineer and achieving 3 % value of the Works (excluding payment under Stage-I);
- Stage III: 30 % of Mobilization Cost upon providing balance Contractor's Equipment to complete full requirement for the entire work and after achievement of progress to the extent of 6 % value of the Works (excluding payments under Stages I and II); and
- (ii) 20 % of Mobilization Cost shall be paid for operation and maintenance of the constructed facilities and for demobilization as per schedule of payment to be submitted by the Contractor in accordance with Clause 57.2 and approved by the Engineer.

Alternative Three: Materials Supplied by Employer (**Not Applicable**)

The Employer shall supply to the Contractor materials, like cement, steel, bitumen or any other material whichever deemed necessary to complete the project; and the cost thereof shall be recovered from the Contractor through monthly statements on the basis of actual consumption.

The list of materials, quantities and rates to be charged to the Contractor shall be provided along with Appendix-A to Bid “Special Stipulations”.

(Employer may opt either “Secured Advance on Materials” or “Financial Assistance to Contractor”)

63.1 Default of Contractor

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

Provided further that in addition to the action taken by the Employer against the Contractor under this Clause, the Employer may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time.

65.2 Special Risks

The text is deleted and substituted with the following:

The Special Risks are the risks defined under Sub-Clause 20.4 sub paragraphs (a) (i) to (a) (v).

67.3 Arbitration

In the sixth to eight lines, the words “shall be finally settled appointed under such Rules” are deleted and substituted with the following:

shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force.

The following paragraph is added:

The place of arbitration shall be Lahore, Pakistan.

68.1 Notice to Contractor

The following paragraph is added:

For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance or award of Contract, 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.

68.2 Notice to Employer and Engineer

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

- a) The Employer : *Urban Sector Planning and Management Services Unit Pvt Limited (The Urban Unit)*
- b) The Engineer: *As notified by CEO Urban Sector Planning and Management Services Unit Pvt Limited (The Urban Unit)*

70.1 Increase or Decrease of Cost (*Not Applicable, Price is Fixed*)

Sub-Clause 70.1 is deleted in its entirety, and the price of the contract is fixed. The following is not applicable:

The amounts payable to the Contractor, pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labor, materials, and other inputs to the Works, by applying to such amount the formula prescribed in this Sub-Clause.

(a) Other Changes in Cost

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

(b) Adjustment Formula

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

$$P_n = A + b \frac{L_n}{L_o} + c \frac{M_n}{M_o} + d \frac{E_n}{E_o} + \dots$$

Where:

P_n is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Paragraph 60.1 (a), and with Paragraphs 60.1 (b) and (e), where any variations and daywork are not otherwise subject to adjustment;

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

b, c, d, etc., are weightages or coefficients representing the estimated proportion of each cost element (labour, cement and reinforcing steel etc.) in the Works or Sections thereof, net of Provisional Sums and Prime Cost; the sum of A, b, c, d, etc., shall be one;

L_n , M_n , E_n , etc., are the current cost indices or reference prices of the cost elements for month "n", determined pursuant to Sub-Clause 70.1(d), applicable to each cost element; and

L_o , M_o , E_o , etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 70.1(d).

(c) 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.

(d) Base, Current, and Provisional Indices

The base cost indices or prices shall be those prevailing on the day 30 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 30 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.

(e) Adjustment after Completion

If the Contractor fails to complete the Works within the Time for Completion prescribed under Clause 43, adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for completion, or the current indices or prices, whichever is more favorable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.

(f) Weightages

The weightages for each of the factors of cost given in 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.

The following Sub-Clauses 73.1, 73.2, 74.1, 75.1, 76.1, 77.1 and 78.1 are added:

73.1 Payment of all taxes/ rates/ fees: Income Tax, Sales tax etc.

The Contractor, Subcontractors and their employees shall be responsible for payment of all applicable (federal & provincial) taxes/ rates/ fees: income tax, sales tax and other taxes/ rates/ fees etc. arising out of the Contract and the rates and prices stated in the Contract shall be deemed to cover all such expenses till the closing of contract, including the defect liability period if any.

73.2 Customs Duty & Taxes

(Employer may incorporate provisions where applicable)

The Contractor shall be responsible for payment of all applicable Custom Duties and Taxes

74.1 Integrity Pact

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

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

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

75.1 Termination of Contract for Employer's Convenience

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

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

76.1 Liability of Contractor

The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labour laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or assigns and the labour employed by them.

77.1 Joint and Several Liability

If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

78.1 Details to be Confidential

The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Engineer whose award shall be final.

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**SPECIFICATIONS-
SPECIAL PROVISIONS**

NOT APPLICABLE



The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



RAINWATER HARVESTING PROJECT FOR MURREE DISTRICT

TECHNICAL SPECIFICATIONS

NOVEMBER, 2024



SPECIFICATIONS OF PLUMBING WORKS

SECTION 15410

PLUMBING PIPING

1.1 GENERAL

1.2 SCOPE OF SECTION

- A. This technical specification establishes the minimum requirements for the equipment to be incorporated into the above ground Soil, Waste, Rainwater and Hot and Cold water services plumbing pipework.
- B. It also establishes the quality of materials and workmanship to be used in the supply and installation of the systems.

1.3 WORK INCLUDED

- A. Provision of all labour, materials and the performance of all operations necessary for the supply and installation of pipework and fittings of the above ground Soil, Waste, Rainwater and Hot and Cold water services systems as specified herein and as detailed on the Drawings.
- B. Co-ordination: The Contractor shall ensure that the soil and waste systems are fully compatible with all trades, particularly those of the Civil, Mechanical and Electrical services, for successful installation and operation.
- C. Submittals: The Contractor shall submit to the Engineer for review and approval, all calculations and drawings for the equipment proposed and associated builder's works to show that the plant as installed will meet all the specified criteria.

No works shall commence on the site until the design has received the approval of the Engineer.

1.4 QUALITY ASSURANCE

- A. Manufacturers: The contractor shall only propose the use of materials produced by firms who have been regularly engaged in the manufacture of plumbing pipework systems and whose products have proved satisfactory in similar service for not less than 10 years.
- B. Installer: Firms proposed for the installation of the plumbing pipework systems shall have been regularly engaged for at least 5 years in the installation of plants of a similar type, quality and scope as is required for this project.

1.5 APPLICABLE CODES AND STANDARDS



- A. The plumbing pipework shall comply fully with the latest relevant British/American and Standards in all respects.
- B. The following are the most commonly used and relevant British/American and Standards associated with Soil and Waste Systems. However the Contractor shall ensure that all applicable British/American Standards are complied with, whether listed here or not.

- BS 1387 - Galvanized steel medium and heavy duty.
- BS: 1740 - Wrought steel pipe fittings.
- BS 2494 - Elastomeric joint rings for pipe work and pipelines.
- BS 2779 - Pipe threads. For tubes and fittings where pressure-tight joints are not made on the threads
- BS: 3380 - Wastes (excluding skeleton sink wastes) and bath overflows.
- BS: 3505 - Specification for uPVC pressure pipes.
- BS 3605 - Austenitic stainless steel pipes and tubes for pressure purposes.
- BS: 3943 - Plastic waste traps.
- BS: 3974 - Pipe supports. (Part 1 & 2) BS 4346 - Joints and fittings for use with uPVC pressure pipes.
- BS 4346 - Joints and fittings for use with uPVC pressure pipes.
- BS 4368 - Compression coupling for tubes.
- BS: 4514 - Unplasticized PVC soil and ventilating pipes, fittings and accessories.
- BS: 4660 - Unplasticized PVC underground drainpipe and fittings.
- BS: 4991 - Specification for Propylene Copolymer Pressure Pipe.
- BS 5114 - Performance requirements for joints and compression fittings for use with polyethylene pipes.
- BS: 5254 - Polypropylene waste pipe and fittings.
- BS: 5255 - Plastic waste pipe and fittings.
- BS: 5481 - Unplasticized PVC pipes and fittings for gravity sewers.
- BS: 5572 - Sanitary pipework.
- BS: 6087 - Flexible joints for grey or ductile cast iron drainpipes and fittings and for discharge and ventilating pipes and fittings.
- BS: 6367 - Drainage of roofs and paved areas.
- BS 6700 - Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.
- BS: 8000 - Part 13 - Above ground drainage and sanitary appliances.
- BS: EN 545 - Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods.
- BS: EN 598 - Ductile iron pipes, fittings accessories and their joints for sewerage applications Requirements and test methods.
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ASTM B88 - Specification for Seamless Copper Water Tube.
 ASTM B306 - Specification for Copper Drainage Tube (DWV)
 ANSI B16.22 - Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings
 ANSI B16.29 - Wrought Copper and Copper Alloy Solder - Joint Drainage Fittings
 ANSI A135 - Specifications for Electric Resistance Welded Steel Pipe
 ASTM A53 - Pipe, steel, Black and not dipped, zinc – coated welded and seamless.
 UPC - Uniform Plumbing Code.

1.6 SUBMITTALS

- A. Drawings - refer to Section 15010
- B. Products - submit full manufacturer data for every item.

1.7 OPERATION AND MAINTENANCE DATA

- A. Comply with Section 15010.

1.8 WARRANTY

- A. Provide 12-month warranty in accordance with contract conditions

2.1 PART 2 PRODUCTS

2.2 PIPES AND FITTINGS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE: -

Service	Material
Main soil, waste and vent Pipes and Rain water pipes	Un-plasticized polyvinyl chloride (uPVC) Type-B as per BS 3505
Branch waste and vent pipes	Un-plasticized polyvinyl chloride (uPVC) Type-B as per BS 3505
Water Line from Tube well to UGWT	uPVC Class B as per BS 3505
Water Line from KWB's External Line to UGWT	uPVC Class B as per BS 3505
Cold and Hot Water Supply	PPRC PN 20 As per DIN 8077-8078
Condensate drains	Unplasticized polyvinyl chloride (uPVC) Concealed location & G.I. at Roof level and Mechanical room.

2.3 MATERIALS

A.



1. Unplasticized Polyvinyl Chloride (uPVC) pipework and fittings for Soil, Waste and Vent.
2. Pipework shall be installed in uPVC pipes confirming to ISO 3633 and EN1329 Sanitary drainage above / under ground or in the wall applications.
3. Jointing of pipework and fittings shall be by the use of solvent weld sockets carried out in accordance with the manufacturer instructions. Solvent weld cement shall be of a type approved by the manufacturer of the pipework being jointed. Or with rubber ring socket Joints (ISO 4633) and all accessories.
4. Additional ring seal joints shall be provided as necessary to account for expansion and contraction.

B. Polypropylene Pipe work and Fittings.

1. Polypropylene PPRC (Green) pipework for hot and cold water supply as per DIN 8077- 8088 for pipes and DIN 16962 for fittings (polyfusion welded joints) inside the Building including all specials.

C. Galvanized Steel pipework (GS)

1. Galvanized steel pipework shall be to ASTM A53 grade A schedule 40.
2. Jointing of pipes shall be by flanged connection. Screwed joints shall not be used.
3. As an alternative to flanged connections Victaulic grooved couplings with EPDM seals may be used.

3.1 EXECUTION

3.2 SOIL, WASTE AND RAINWATER PIPEWORK

A. WORKMANSHIP

1. Materials and workmanship shall be of best quality and executed in accordance with the Specification, drawings and manufacturers recommendations.
 2. Where any pipe is required to be shortened it shall be cut off square and cleanly with an approved pipe-cutting machine.
 3. Where special joints or jointing materials are shown for pipes of any materials, they shall be of an approved type and manufacture, and the joint shall be made in accordance with the manufacturer's instructions, or as directed.
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4. Responsibility shall be assumed to identify and install all necessary expansion couplings and fire sleeves throughout the installations.
 5. All plant, pipes and fittings etc shall be thoroughly cleaned of all foreign matter before installation. Each section of the installation shall be clean and free from any obstructions whatsoever before proceeding with the next section of the installation.
 6. Flexible joints are to be provided wherever pipes cross expansion joints.
 7. All soil, waste, vent and rainwater pipes shall be to the sizes and positions indicated on the drawings to take the discharge from the branch waste and vent pipes, sanitary fittings and equipment adjacent thereto.
 8. On completion the whole of the work is to be handed over in a sound and clean condition. In the event of any pipe being fractured from any cause whatsoever after having been (to all appearances) properly installed, responsibility shall be assumed in every instance and any such defective pipes shall be replaced for approval.
 9. All pipework shall be erected to present a neat and orderly appearance, arranged parallel to or at right-angles to the structural members of the buildings, giving maximum headroom and shall not obstruct windows or doorways. Pipework shall be erected such that there is a minimum clearance of 75 mm to finished floor level and a minimum clearance of 25 mm to finished wall faces.
 10. Slopes of long-run drainage pipes (gravity) shall be as per design drawings and minimum of:

3" dia	1.33%
4" dia	1.00%
6" dia	0.67%
8" dia	0.57%
- B. The discharge pipework shall be so installed as to minimize the risk of blockage. Access covers and/or rod ding eyes are to be positioned such as to enable maintenance equipment to be inserted into the system(s) to permit cleaning or clearing of all sections of the system(s).
- The pipe work system and fittings are to be installed so that broken or defective parts can be easily removed and replaced.
- The discharge pipe work shall ensure that there is no leakage of contaminated water or foul air into any building.
- C. The work shall be set out and responsibility assumed for the accuracy of the same and the position of all fittings shall be approved by the Client's representative. When first setting to any work, consideration must be given to the work of other trades.
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- D. Responsibility shall be assumed for leaving all unfinished works in a safe condition during the progress of the works.

All materials & equipment are to be installed and protected in such manner as to be adequately covered against damage and deterioration, and during the execution of the work the open ends of all pipe work shall be temporarily plugged off by means of blank ends and compression caps respectively.

- E. Vent pipe roof termination

1. Discharge stacks complete with domical cages shall terminate not less than 300 mm above the roof, 900 mm above and not less than 3000 mm, measured horizontally from any window or air conditioner.
2. Where the stack passes through floors, ceilings and roofs, the openings are to be perfectly sealed-off by proprietary fittings. They shall terminate with neoprene aluminum weathering slate, weathering collar; and a balloon grating on 180° bend.

- F. All branch waste pipes to a range of fittings shall have an access provided on the pipe in an accessible position at the end of the run.

- G. All pipework shall be supported in accordance with the manufacturer recommendations. Pipe hangers and brackets shall be in accordance with section 15412 of this specification.

- H. Sleeves shall be provided where pipes pass through walls or floors. Pipe sleeves shall be compatible with the pipes they protect; non-combustible and 1 ½ times the diameter of the pipe. Void between pipe and pipe sleeve shall be packed with mineral wool and sealed with approved mastic sealant.

- I. Where plastic pipes 50mm diameter and larger pass through fire compartment walls, floors or ceiling cavity barriers they shall be fitted with intumescent collars having the same fire resistance rating as the fire barrier they pass through. Intumescent collars shall be as Nullifier B150 pipe collars or approved equal.

- J. All pipefitting shall be of the same colour as the pipework used.

- K. All vertical soil and waste pipes shall have access doors on each floor fitted above the spillover level of fittings served. Where pipes are installed in ducts or built into walls access doors shall be provided in the duct wall or wall for access to the access door. The type and finish of the access shall be to suit the location and to the approval of the Architect.

- L. Connection to sanitary fittings

All outlets shall be trapped and provided with accessible and adequate means of removal and cleaning. The traps shall be designed to be self-cleaning all surfaces and joints are to be smooth.



1. All traps with outlets for pipes up to and including 50 mm shall have a minimum water seal of 75 mm.
2. Traps with outlets for pipes of over 50 mm shall have a minimum water seal of 50 mm.

The waste pipes to the various sanitary fittings shall be of the following minimum sizes:

Wash basins	50-mm diameter
Sinks	50 mm diameter
WC's	110 mm diameter
Floor gullies	75-mm diameter

- M. Condensate drains shall be provided from all fan coil units, packaged units etc. piped to the nearest floor drain, other suitable drain point or as indicated on drawings.
- N. Drain pipes from fire protection system water test points shall be piped to the nearest suitable drain lines or as indicated on drawings.
- O. Self siphon age tests

The contractor shall undertake tests for self-siphon age and induced siphon age in branch discharge pipes by filling each appliance to over flowing and then discharging by removing the plugs and discharging the W.C(s) at the upstream end of the discharge pipe. All seals are to remain in the traps. The numbers of sanitary appliances to be discharged for this performance test are enumerated below:

Type of Use	Number of appliances of each kind on the stack	Number of appliances to be discharged simultaneously		
		WC	Wash basin	Kitchen sink
Domestic	1 to 9	1	1	1
	24 to 24	1	1	2
Congested	1 to 24	1	1	
	5 to 9	1	2	
	10 to 13	2	2	
	14 to 26	2	3	
	27 to 39	3	4	
	40 to 50	3	5	



P. Testing and commissioning

1. All tests requested by Local Municipality on the entire installation shall be carried out, and all necessary appliance and equipment for this purpose shall be supplied.
 2. Provision shall be made to carry out any test requested at any time during the progress of the works or after their completion.
 3. Whilst phased testing may be carried out (which may or may not have been witnessed) the contractor shall be required to demonstrate the water tightness, alignment, and level and cleanliness of the whole installation seven days prior to the installation being handed over.
 4. This requirement shall be discharged by the applying a full running water test to the whole installation as described below and by the drawing through of a drain profile, which will be provided, to the required detail.
 5. All tests shall be carried out in the presence of the Client's representative, and a minimum of 48 hours notice shall be given of readiness to test any section of the installation. Test Certificates shall be submitted to the person witnessing the test for their signature of approval, to the effect that the system satisfies the requirements of this Specification.
 6. All sections of works must be pretested to satisfy that the system will pass the required test, prior to carrying out the main test.
 7. The Test Certificate shall be required to be completed for all sections of the installation.
 8. After erection and immediately prior to sealing in, all rainwater, main soil, waste, vent and branch soil, waste pipes, shall be checked throughout for obstructions and finally tested for soundness.
 9. The above ground sanitation and rainwater pipe installation shall be subjected to two air tests, one of 75 mm water gauge for a minimum period of 15 minutes prior to connection of sanitary fittings and building in of pipework, and a second air test on completion of the system with all traps and WC's connected when the test pressure shall be 45 mm water gauge for a minimum period of 15 minutes.
 10. At start of testing, sanitation and Rainwater Pipework shall be checked for alignment and stability; mechanical joints shall be re-torquing where necessary.
 11. Access doors shall be removed, felt washers greased and doors replaced.
 12. The whole system shall be ridded through with an appropriately sized disc type plus the allowance shall also be made for testing to the Local Authority requirements and for carrying out separate and independent tests if required.
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13. The provision shall also be made for obtaining an acceptance test certificate from the Local Authority on completion of the works. The test for the Local Authority shall be allowed for as an addition to the tests required under this specification.

1.01 HOT AND COLD WATER SERVICES PIPEWORK

A. Product handling

1. All products shall be delivered in manufacturer's original protective packaging. All products shall be inspected at time of delivery for damage and for compliance with Specifications. Any products that are found to be damaged or not in accordance with the Specifications shall immediately be repaired or removed from the site and replaced. Repairs shall not be undertaken before the Engineer's review of Contractor's proposed action.
2. All products shall be handled and stored as recommended by the manufacturer to prevent damage and deterioration. The Contractor shall supply handling equipment such as lifting beams, reinforced canvas slings, protective padding, struts, cradles, etc., required to handle the products without damaging hardware or linings and coatings.
3. Products shall be protected against damage and the ambient conditions both during transport, site storage and immediately up to the time products are installed. Precautions shall be taken to protect the product from mechanical damage and the effects of sunlight and heat, until the backfilling operations have been completed. All site storage areas shall be shaded.

B. Installation of pipework

1. Pipework from the water meter to the inside of the buildings where running below ground level shall be Polyethylene (P.E) and the distribution within Buildings shall be Polypropylene (PPRC pipes, appropriate for the working pressure. The installation of Polypropylene pipe works (PPRC pipes) should strictly comply with respective approved manufacturer recommendations or DIN 1988, part2.

Joints in buried pipework shall be kept to the absolute minimum. Marker tapes with embedded metal strip shall be laid 150 mm above the pipework. If valves are required, they are to be in a valve chamber with the surface box lettered to indicate what service is below them.

2. The underground pipework shall be laid in 200 mm of sand or stone free bedding material and wherever possible in straight lines to uniform gradients. The clearance between the pipework and footings of the buildings is not to be less than 200 mm. If less, the pipes shall be installed in a flexible sleeve.
 3. All pipework shall run vertically or at an inclination of 1° to the horizontal to enable the whole system to be drained off either through the system or through a valve discharging externally with an air gap to prevent contamination by backflow.
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When the pipework is drained down, air is to be allowed into the system to prevent failure or damage to the hot water cylinder. A manual air inlet valve shall be fitted to the high point in the system to achieve this.

4. Where pipes are run chased into walls, floors, etc., all pipework shall be insulated.
 5. All pipework shall be erected to present a neat and orderly appearance, arranged parallel to or at right-angles to the structural members of the buildings, giving maximum headroom and shall not obstruct windows or doorways. Pipes shall bend round piers, projections and into recesses forming part of the structural works whether so indicated on the drawings or not. Pipework shall be erected such that there is a minimum clearance of 75 mm to the finished floor level and at least 25 mm to the finished wall faces.
 6. All fittings shall, as far as practicable, be the same size as the tubes and pipes connected to them. Bushed outlets will only be accepted if the required outlet size of a fitting is not of standard manufacturer. Eccentric bushings and square tees shall be used where concentric bushing and pitcher tees might cause air to be trapped in the system. Elsewhere, square tees shall be confined to dead-leg branches of domestic hot water supply systems and on cold-water branches to fitting or ranges of fittings.
 7. Elbows shall be used, where practicable, in preference to bends. Square elbows will not be permitted.
 8. Pipework shall follow the contours of walls and shall be graded to ensure venting and draining. The clearance between pipework (or the insulation) and the wall and any other fixtures shall be not less than 20 mm.
 9. Purpose-made sets or springs may be used where it is necessary to deviate from a straight run.
 10. Sets or springs in tubes of 50-mm size and above shall be fire-made and tubes shall remain circular after setting.
 11. Eccentric reducing sockets shall be used where changes of bore are made in runs of nominally horizontal pipework to facilitate air venting and draining.
 12. Tubes shall be reamed after cutting and shall be free from burrs, rust scale and other defects and shall be thoroughly cleaned before erection. Open ends left during the progress of work shall be temporarily closed with purpose-made metal or plastic plugs or caps, or blank metal flanges.
 - 13 Where pipework passes through walls, floors or ceilings, sleeves shall be provided. Pipework passing through flooring shall be provided with approved type floor and ceiling plates fastened securely to the pipe. The sleeves to be made of the same metal as the pipe.
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13. All entry and exit holes to or from a building for pipework services shall be sealed and plugged. For service conditions below 60°C the sealant shall be mastic compound, above this temperature it shall be silicon rubber. Where the pipework enters the building through a large hole or duct, a mild steel blanking plate not less than 6 mm thick shall be built into the walls of the hole or duct. The service pipes shall pass through clearance sockets welded to the plate and the space between pipe exterior and socket interior shall be sealed and plugged.
 14. Pipework of 75 mm size and larger subject to expansion and contraction and hung from supports shall be suspended on swivel hangers unless otherwise agreed.
 15. Hangers for horizontal pipework shall be supported in accordance with the requirements of Section 15412-Support, Hangers and Brackets.
 16. Piping that is insulated shall be secured by clips that allow sufficient space behind the back of the pipe for the pipe insulation to be properly installed.
 17. All pipework shall be installed so that the vertical distance between the discharge point and overflow level of the receiving appliance shall not be less than 25 mm for taps and/or fittings up to and including 20 mm and 70 mm for those over 20 mm to prevent contamination as result of backflow of water.
 18. A 15-mm diameter washout pipe, discharging outside the building shall be provided at ground floor level to drain the system. The top of the outlet is to be in excess of 70 mm from the ground or receiver.
 19. Double check valve assemblies or other suitable backflow preventer shall be installed on cold water makeup to HVAC equipment and wherever equipment is supplied that may allow backflow.
 20. Water hammer arrestors shall be provided on horizontal piping to fixtures and equipment having quick closing valves or flush valves and as indicated on the drawings.
 21. Where drinking water and non-potable water supply points are installed, they shall be clearly marked to provide ready identification. Every drinking water point shall be segregated from fire fighting water supply points. Every drinking water pipe shall be readily distinguishable from other pipes. Drinking water hoses and flexible pipes shall be marked to prevent them being used for cleaning purposes.
 22. Double check valve assemblies or other suitable backflow preventer shall be installed on cold water makeup to HVAC equipment and wherever equipment is served that may allow backflow.
 23. Water hammer arrestors shall be provided on horizontal piping to fixtures and equipment having quick closing valves or flush valves and as indicated on the drawings.
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C. Storage

1. All pipework shall be stored on purpose made pipe racks of welded construction and of sufficient strength to support the entire weight of the materials without any noticeable deformation. The racks shall be such that all pipework is clear of the ground.
2. All black steel pipework shall be given one coat of red oxide paint immediately after delivery and prior to storage. The open ends of the pipework shall be blanked off with purpose made or manufactured plugs.
3. Pipework fittings shall be stored within a well-lit container made compartmented racks or shelves. The fittings shall be separated by means of their type and size and laid out in an orderly manner for ease of identification.

D. System testing

1. The Contractor shall ensure that all pipework is watertight to the satisfaction of the Engineer and shall supply all pressure gauges, meters, hoses, pumps and other temporary supports, equipment and manpower necessary for carrying out pressure tests.
2. The Contractor shall, during testing, check the satisfactory operation of each valve installed under the Contract.
3. Before filling or pressure testing is started the Contractor shall re-check pipes and valves for cleanliness and shall re-check the operation of valves. The open ends of the pipes shall normally be stopped off by blank flanges or capped ends additionally secured where necessary by temporary struts and wedges.
4. Potable water system shall be tested with water to 1.5 times the normal system working pressure or 6 bar whichever is greater while uncovered but adequately anchored. The testing shall be carried out in sections if necessary. If a section should fail the test, the Contractor shall trace and repair all leaks and defects and retest the section before any further pipes or section of adjacent pipework are laid.
5. The system shall be filled with potable water and all air expelled. After the system has been completely filled, the pressure shall be steadily and gradually increased until the test pressure has been reached. If any loss is recorded, repairs shall be made and the test re-run.
6. Written records of every test clearly identifying the tested system together with time of test and name of testing Engineer in tabulated format shall be submitted for review by the Engineer upon completion of the test.

E. Flushing and disinfection

1. All visible dirt and debris shall be removed from the tank and pipes.
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2. The tank and distributing pipes shall be filled with clean, potable water and then drained until empty of all water.
3. The tank shall be filled with clean potable water and supply closed.
4. A measured quantity of sodium hypochlorite solution of a known strength shall be added to the water in the tank to give a free residual chlorine concentration of 50mg/L (50ppm) in the water.
5. The tank shall be left to stand for 1 hour.
6. Each draw off fitting shall be successively opened working progressively away from the tank.
7. Each tap and draw off fitting shall be closed when the water discharged smells of chlorine.
8. The tank shall not be allowed to become empty during this operation. If necessary it shall be refilled and chlorinated as above.
9. The cistern and pipes shall then remain charged for a further 1-hour.
10. The tap furthest from the cistern shall be opened and the level of free residual chlorine in the water discharged from the tap measured. If the concentration of free residual chlorine is less than 30mg/L (30 ppm) the disinfecting process shall be repeated.
11. Finally, the tank and pipes shall remain charged for at least 16 hours and then thoroughly flushed out with clean, potable water until the free residual chlorine concentration at the taps is no greater than 21 mg/L (21ppm).

END OF SECTION 15410



SECTION 15411

PLUMBING VALVES

PART 1 GENERAL

1.01 SCOPE OF SECTION

- A. This technical specification establishes the type and quality of materials, and the standard of workmanship to be used in the supply and installation of valves.

1.02 WORK INCLUDED

- A. The work includes the provision of all labour; materials and the performance of all operations in connection with the supply and installation of valves as specified herein and where referred to on the Drawings.
- B. Co-ordination: The contractor shall be responsible for the full co-ordination of the work of all trades.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of valves whose products have been in satisfactory use in similar applications for not less than 10 years.
- B. Installer: Firms regularly engaged and qualified in the installation of valves with at least 5 years successful installation experience on projects of a similar nature.

1.04 APPLICABLE CODES AND STANDARDS

- A. The valves and all associated materials shall comply fully with the latest relevant British Standards in all respects.

The following are the most commonly used and relevant British Standards associated with valves and associated materials. However, the Contractor shall ensure that all applicable British Standards are complied with, whether listed here or not.

BS: 21 - Specification for Pipe Threads for Tubes and Fittings where Pressure Tight Joints are made on the Threads.

BS: 4504 - Circular Flanges for Pipes, Valves and Fittings (PN designated).

BS: 5150 - Specification for cast iron gate valves.

BS: 5151 - Cast Iron Gate (Parallel Slide) Valves.

BS: 5152 - Cast Iron Globe and Globe Stop and Check Valves for general purposes.

BS: 2879 - Draining taps (screw down pattern).



- BS: 5153 - Cast Iron Check Valves for general purposes.
- BS: 5154 - Copper Alloy Globe, Globe Stop and Check, Check and Gate Valves.
- BS: 5155 - Butterfly valves.
- BS: 5156 - Diaphragm Valves.
- BS: 6683 - Guide to Installation and Use of Valves.

1.05 SUBMITTALS

- A. Drawings - refer to Section 15010
- B. Products - submit full manufacturer data for every item.

1.06 OPERATION AND MAINTENANCE DATA

- A. Comply with Section 15010.

1.07 WARRANTY

- A. Provide 12 month warranty in accordance with contract conditions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Valves, cocks, air vents and pipework specialties shall be provided where indicated on the Drawings and at all positions necessary for the proper working, regulation, control and maintenance of the installation with the approval for the Engineer.
- B. All valves and cocks shall be suitable for the temperatures, working and test pressures applicable to each system.
- C. All valves cocks vents and specialties must be fitted in such a manner that they are accessible for operation and maintenance.
- D. All valves, cocks, vents and specialties installed for the work specified in this Contract shall be of the manufacturer specified hereafter or equal and approved by the Engineer.

2.02 VALVES

A. BRASS BALL / GATE VALVE

Valves to be class 125, made of brass with special seal for PPR hot water connection, inlet: soldered socket, outlet: union with drain.

Make: KITZ or approved equal.



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B. BACK FLOW PREVENTOR

Back flow Preventor brass check valve class 125 suitable for vertical or horizontal installation. Seat, Cone and cone pressure spring of bronze including all accessories required for connection with piping.

Make: KITZ or approved equal.

C. AIR RELEASE VALVE

Air release valve to be of threaded ends, automatic type with manual drain plugs, cast iron body, aluminum cover, EPDM seat, suitable to be mounted on wall.

D. SAFETY VALVES

Brass body safety relief valve for pressure and temperature, with stainless steel spring (adjustable) suitable for installation on hot water storage tanks and heaters.

PART 3 EXECUTIONS

3.01 STORAGE

- A. All valves shall be stored within a well lit container on purpose made compartmented racks or shelves, constructed in a similar manner to support the entire weight of materials without noticeable deformation.
- B. The valves shall be separated by means of their type and size and laid out in an orderly manner for ease of identification.
- C. Valves shall be supplied and stored with purpose made or manufactured plugs to prevent ingress of dirt.

3.02 GENERAL INSTALLATION

- A. Valves with screwed ends shall have a union installed adjacent to the valve for ease of dismantling.
- B. Where possible, valves shall be installed with the stem in the vertically upright position. However, all valves shall be installed in a manner such that they are readily accessible for ease of operation.
- C. Sufficient clearance shall be allowed for the application of thermal insulation, valve boxes, etc. and to ensure that full travel of the valve stem can be achieved.

3.03 ISOLATING VALVES

- A. Separate isolating valves shall be provided on all pipework services to each item of plant or equipment and on each main and sub main, except where flow measuring or regulating valves are required and these valves can be used for isolating purposes without affecting their measuring or regulating functions.

3.04 AIR VENTING DEVICES

- A. Air venting devices shall be installed at all system high points.
- B. Automatic air eliminators shall be complete with copper relief pipework, taken to within 1.5 m of the floor level with gunmetal isolating valve and extended to a position where any discharge will not damage building fabrics, decorations or the like.
- C. Air bottles shall be made from 50mm size tube. Each shall be a minimum of 150mm long, fitted with a cap and 8mm size air cock. Where an air bottle is fixed out of reach, a 15mm extension tube shall be run from the cap to within 1.5m of the floor level and terminating with a needle valve and hose union.

END OF SECTION 15411



SECTION - 1

EXCAVATION, TRENCHING AND BACKFILLING

1.1 SCOPE

The work covered by this section of the Technical Specifications consists of furnishing all plant, labour, equipment, appliances, and the materials for performing all operations in connection with excavation, trenching and back-filling for water supply, sewerage and 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.

1.2 SETTING OUT

The Contractor shall set out the works in accordance with the dimensions, lines and levels shown on the Drawings. Where no precise positions or levels are shown on the drawings, the works shall be set out by the Contractor to the positions and levels determined by the Engineer's Representative as the work proceeds.

1.3 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 of at no extra cost in a manner satisfactory to the Engineer. All trees and shrubs that are designated by the Engineer to remain shall be adequately protected and preserved in an approved manner.

1.4 EXCAVATION

1.4.1 *General*

All excavation of whatever substance encountered shall be performed to the depths indicated or as otherwise specified. During excavation, material suitable for back-filling shall be stockpiled in an orderly manner at a sufficient distance from the banks of the excavation to avoid overloading and to prevent sides from caving. All excavated material unsuitable for backfill shall be removed and placed at a location approved by the Engineer. Grading shall be done as may be necessary to prevent surface water from flowing into the trenches or other excavations, and any water accumulated therein shall be removed by pumping or by other approved methods. Unless otherwise indicated or approved by the



Engineer, excavation shall be open cut. For Contract purposes hereunder the earth excavation work has been classified into two categories, earth excavation in trenches and earth excavation for structures.

1.4.2 Earth Excavation in Trenches

Unless otherwise directed or permitted by the Engineer not more than 100 ft of any trench in advance of the end of the pipeline already laid shall be opened at any time. Trenches shall be excavated to the dimensions and depths shown on the drawings or ordered by the Engineer or in such a position or to such dimensions and depths as shall allow for the proper construction of the relevant structure or proper excavation of the relevant operation. Pipe trenches shall be excavated to give a clear width of 6 inches on either side of the pipe. Additional excavation shall be carried out to give ample space for making joints and, where necessary, for concrete bedding or surround.

The banks of the pipe trench shall be as nearly vertical as practicable. Bell holes and depressions for joints shall be dug after the trench bottom has been prepared. The pipe, except for joints, shall rest on the prepared bottom for its full length. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joints. Stones shall be removed to avoid point bearing. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe as determined by the Engineer is encountered in the bottom of the trench, such material shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, or other suitable approved granular material. Such replacement of unsuitable material will be paid for at the contract unit price for that item of work as shall be agreed upon, before execution of this work, with the Engineer.

Where the Contractor has excavated to depths in excess of the requirements, from his neglect or from causes within his control, he shall refill and compact the excess excavation with suitable material approved by the Engineer, upto corrected level, at his own expense.

Excavation of appurtenances shall be sufficient to leave at least 12 inches but not more than 24 inches between the outer surface and the embankment or timber that may be used to hold and protect the banks. Any over-depth excavation below such appurtenances that has not been directed by the Engineer, will be considered unauthorized and shall be refilled with compacted sand, gravel or concrete, as directed by the Engineer and at no additional cost to the Employer.

1.4.3 Earth Excavation for Structures

All earth excavation under this contract, which is not included under the classification of "Earth excavation in Trenches" shall be classified and paid for as earth excavation for structures.



The Contractor shall provide adequate timbering or shoring for excavations, should the sides and ends of any excavations give way the Contractor shall, at no extra cost, remove all disturbed ground. Any excavation carried outside the limits shown on drawings and specified herein as the payment limits, shall not be treated as excavated and shall not be paid for.

When foundation level or base of excavation is reached, the Engineer's representative will inspect the exposed ground and give directions as to what further excavation, if any, he considers necessary. The excavation should be done in such a manner, as to ensure that the work rests on a solid and perfectly clean foundation. If the Contractor allows any portion of such foundations to deteriorate due to exposure, he shall make good the foundation to the satisfaction of the Engineer without extra cost.

1.4.4 Replaced Soil under Foundations

1.4.4.1 Material

Selected well graded granular material shall be used for filling beneath the structural foundations. This material should meet the requirements of A-2-4 & A3 (AASHTO soil classification).

The suitability of the material shall be supported by adequate tests in the laboratory.

1.4.4.2 Equipment and Procedure

Suitable equipment shall be selected by the Contractor on the basis of field trials for compaction. The contractor shall indicate his planning to carry out compaction in his Method Statement for Engineer's approval before undertaking actual compaction. A test section would be required to select the most suitable equipment, layer thickness, moisture content, No. of passes etc.

1.4.4.3 Compaction Standard

The contractor shall place the material to be compacted in layers. Each layer shall be of specified thickness and shall be compacted by the optimum number of passes as explained in above section. Compaction less than 75% of relative density or 95% of Modified Proctor Density shall not be acceptable.

1.4.4.4 Quality Control



Every compacted layer shall be tested for quality of compaction by performing insitu density tests. Sand replacement method of density measurement shall be used. The evaluation of 75% relative density or 95% Modified Proctor Density shall be based on measurement of maximum, minimum and maximum Modified Proctor Densities in the laboratory. The frequency of this testing shall be instructed by the Engineer at the site.

1.5 PRECAUTIONARY AND REMEDIAL MEASURES

1.5.1 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 the Authority concerned and the 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 and the appropriate Authority with out additional cost.

1.5.2 Planking and Strutting

The Contractor shall provide at his own expense to the satisfaction of the Engineer all timbering, poling, shoring, strutting and other approved supports to the sides of all excavations, trenches and all other works in such a way as will be sufficient to secure them from falling and to prevent any movement. All responsibilities connected with this part of the work shall rest with the Contractor.

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

1.5.3 Dewatering

The Contractor shall build all drains and do ditching, pumping, well pointing, bailing, and all other work necessary to keep the excavation clear of ground water, sewage and storm water 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 procedure for dewatering of subsoil water from excavation for the purpose of construction of sewer lines and other structures shall be in accordance with the method given below:

- Dewatering of subsoil water from excavations of trenches and excavations for other structures shall be arranged by an adequate process of



wellpointing, bailing and/or pumping or by any other suitable method approved by the Engineer on the basis of the method (statement to be submitted by the Contractor).

- If well-points are used then the following requirements shall be met with. Well-pointing shall consist of bore holes, provided with necessary strainers, blind pipes and pumping machinery, and these shall be of suitable size and depth and shall be located on both sides of the trench and along the periphery of water level to a sufficient depth to keep the excavations clear of subsoil water during the process of construction.
- As a part of the work and at no extra cost, the Contractor shall provide all strainer pipes and other requisite material, and boring tools and plant, etc. for the well pointing and shall also provide pumping equipment as well as operating personnel, power, etc. Dewatering of subsoil water shall be continuous process round the clock during the progress of the work and until the finished work is safe, from injury to the complete satisfaction of the Engineer's representative and any interruption in continuous pumping and causing injury to the works done or under construction shall require the Contractor to repair or rebuild the works to the entire satisfaction of the Engineer's representative at no extra cost. No extra payment shall be made to the Contractor for the disposal of storm water and for dewatering in trenches and building structures less than 5 ft. depth.

1.5.4 Maintenance of Excavation

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

1.5.5 Surplus Materials

All surplus materials shall be disposed of 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 material from falling on the street or pavement.

1.5.6 Cutting Pavement

In cutting or breaking street surfacing, the Contractor shall not use equipment which will damage the adjacent pavement. Existing paved surfaces shall be cut back beyond the edge of trenches to form neat square cuts. The road ballast, brick pavement, and other materials shall be placed on one side and shall be preserved for reinstatement 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 which 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 the 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.

1.6 TRANSPORTATION OF MATERIAL

All carts, trucks or other vehicles used by the Contractor for transportation of the material shall be suitably constructed or lined not to permit any leakage/spillage of soil while the vehicles are on the move. These would be so loaded and arranged as not to spill on the site and public roads. Whenever any vehicle so used is found leaking/spilling and unsuitable, it shall be immediately withdrawn from the work on notification by the Engineer.

1.7 COMPACTED FILL AND BACKFILL

1.7.1 General

After the completion of water and sewer lines, foundations, walls and other structures below the elevation of the final grade, all voids shall be backfilled with suitable materials, as specified below.

1.7.2 Backfilling for Structures

Backfilling operations for structures shall be performed as part of the Contractor's work under the payment items for earth excavation and at no extra cost to the Owner. It would comprise returning and filling the selected excavated material around foundations, and at back of walls etc., upto finished levels shown on the Drawings or as required in layers not exceeding 6 inches, carefully rammed and consolidated (with addition of water if required) so as to achieve a minimum relative density of 90% of modified proctor test at optimum moisture content. No fill shall be made until the concrete foundations and footings etc., have been inspected and approved by the Engineer. Earth to be used for filling must be free of all the organic impurities, debris or any other foreign matter. Earth which contains more than 1% of salts particularly sulphates will not be used in filling.

1.7.3 Backfilling of Trenches

The trenches shall not be completely backfilled until all required pressure tests are performed and until the water lines as installed conform to the requirements of specifications. Where in the opinion of the Engineer, damage is likely to result from withdrawing sheeting, shoring, the same shall be left in place and cut



off at a level 1 ft. below ground surface. Sheeting left in place shall be paid for at the approved rate for that item of work. Trenches shall be backfilled to the ground surface with selected excavated material or other material that is suitable for proper compaction. Trenches improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted to the specified density. The surface shall be restored to its original or better condition. Pavement and base course disturbed by trenching operations shall be replaced.

1.7.4 Lower Portion of Trench

Backfill material below and around pipe shall be deposited in 6 inch maximum thickness layers and compacted with suitable hand tampers to 90% of maximum density until there is a cover of not less than 1 ft. over the pipe. The backfill material in this portion of trench shall consist of sandy clay or other approved materials free from stones and lumps.

1.7.5 Remainder of Trench

The remainder of the trench portion above pipe shall be backfilled with material that is free from stones larger than 6 inch in any dimension. Backfill material shall be compacted to achieve a minimum relative density of 90% of modified proctor test at optimum moisture content for cohesive soils and 95 percent of maximum density for others.

1.8 BORROW

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

1.9 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 or appurtenance. All damage due to settlement shall be repaired by and at the expense of the Contractor.

1.10 TESTING OF SOIL IN PLACE

The Engineer will make tests using the calibrated 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 Owner.



1.11 MEASUREMENT AND PAYMENT

1.11.1 Excavation and Backfilling

1.11.1.1 Method of Measurement

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

1.11.1.2 Basis of Payment

Payment for earth excavation and backfilling in trenches or structures will be made at the contract unit price per cubic ft.

The cost of dewatering, disposal of earth & earth & any shuttering or support required for excavation is included in the execution unit price.

Pay Item	Description	Unit
3.3	Excavation for structures and compacted backfill including dewatering & disposal of surplus material.	Cft.
1.2	Excavation for trenches and compacted backfill including dewatering & disposal of surplus material.	Cft.



SECTION - 2

CONCRETE

2.1 SCOPE

This section covers the manufacture, forming, transporting, placing, stripping of forms, finishing and curing of plain and reinforced normal concrete in the structures included herein.

2.2 SPECIFICATIONS

Concrete work shall conform to all requirements of ACI 301-72, (Revised 1975), Specifications for Structural Concrete for Buildings, except as modified by supplemental requirements below. The Contractor shall submit, for the approval of the Engineer, before commencement of any work, his Method Statement which would provide complete details of the procedures and equipment to be used for the satisfactory execution of the work. The approval of such Method Statement shall not relieve the Contractor of any of his responsibilities under the Contract.

2.3 COMPOSITION AND QUALITY

Concrete shall be composed of Portland cement, water, fine and coarse aggregates and any admixtures as and when specified. The concrete mixes will be designed by the Engineer who will determine the required quality of the concrete for the structures covered by these Specifications. The desired strength of concrete for various parts of the structures have been shown on the Drawings. Such concrete mixes shall not relieve the Contractor of the responsibilities to achieve the desired strength of concrete for various parts of structures as specified in the Technical Specifications or shown on the Drawing and to the full satisfaction of Engineer.

2.4 CEMENT

2.4.1 *General*

Cement shall be furnished in sacks or in bulk form as approved by the Engineer. Unless otherwise permitted, cement from not more than two plants shall be used and in general, the product from only one plant shall be used in any particular section of the work. No cement recovered through cleaning sacks shall be used.



2.4.2 Portland Cement

Portland cement shall be indigenous stuff unless otherwise approved by the Engineer.

Portland cement shall conform to latest British Standard 12:1971,

Specifications for Portland Cement or to ASTM Designation C150- 74, Standard Specifications for Portland Cement for Type I. Portland cement conforming to ASTM Designation C150-74, Type II or IV may also be used in certain parts of work as directed by the Engineer.

2.4.3 Tests

Cement shall be sampled at storage site and tested from time to time at the discretion of the Engineer in accordance with the ASTM Designation C150-74 or its equivalent British Standards. Expenses for such tests shall be borne by the Contractor. If the tests prove that the cement has become unsatisfactory, it shall be discarded and thrown as rejection as directed and to the full satisfaction of the Engineer. Cement which has been in storage at the project site longer than four months, shall not be used until retesting proves it to be satisfactory.

2.4.4 Storage

Cement shall be stored in dry, weather tight and properly ventilated structure. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and identification of each consignment. Sufficient cement from a single source shall be in storage at the work site to complete any lift of concrete stored. Adequate storage capacity shall be furnished to provide sufficient cement to meet the peak needs of the project. Cement in sacks shall be stored on a damp proof floor and shall not be piled to a height exceeding 6 feet.

The Contractor shall use cement in the approximate chronological order in which it is received at the site. All empty sacks shall be promptly disposed of as permitted and directed by the Engineer so as to avoid any confusion in use of quantity of cement.

Cement storage facilities shall be emptied and cleaned by the Contractor when so directed, however the interval between required cleaning normally will not be less than four months.

Suitable, accurate scale shall be provided by the Contractor for weighing the cement in stores and elsewhere on the work, if required, and he shall also furnish all necessary test weights.



2.4.5 *Delivery and Usage Record*

Accurate records of receipts of cement at site and its use in the work shall be kept by the Contractor. Copies of these records shall be supplied to the Engineer in such a form as he may require.

2.5 AGGREGATES

Materials used as aggregates shall be obtained from sources known e.g Margalla/Shahenabad/Sikhanwali to produce satisfactory results for the different classes of concrete. The use of aggregates from sources which have not been approved by the Engineer shall not be permitted.

2.5.1 *Fine Aggregate for Concrete*

Fine aggregate for all the classes of concrete shall be well graded natural sand, stone screenings or other inert material of similar characteristics or a combination of these. The whole of it shall be perfectly clean, free from coagulated lumps, soft and flaky particles, shale alkali, organic matter, loam mica and injurious amount of other deleterious substances. Maximum allowable content of silt and other deleterious inert substances is 5 percent by washing. Material derived from stone unsuitable for coarse aggregate shall not be used as fine aggregate. Fine aggregate derived from stone screenings shall be sharp, cubical, hard, dense and durable and shall be stacked on a platform so as to adequately protect it from dust and other admixtures.

Grading for the above specified fine aggregate shall be within the following limits, as determined by the Owner:

<u>Sieve Size</u>	<u>Percentage Passing (Dry Weight)</u>
3/8	inches 100
No. 4	95 to 100
No. 8	80 to 90
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

Fine aggregate for class D (1000 psi) concrete may be good quality bank run sand obtained from the River in vicinity. It shall be clean natural material graded from fine to coarse, free from lumps, clay, cinder, ashes, rubbish and other debris. It shall not contain more than 5 percent of material finer than No. 200 mesh screen, not more than 5 percent remaining on No. 4 sieve; all material shall pass through 3/8" screen.



2.5.2 Coarse Aggregate for Concrete

Coarse aggregate for the first 3 classes of concrete shall consist of quarried or crushed stone/river run gravel or inert material or a combination of these, with maximum size of 3/4 inch and shall be clean, hard durable, sound, cubical and well shaped, free from soft or friable matter, or thin elongated pieces, alkali, organic matter or injurious amounts of other deleterious substances. Deleterious inert matter shall not exceed 3 percent.

Grading for above specified coarse aggregate shall be within the following limits:

<u>Sieve Size</u>	<u>Percentage Passing (Dry Weight)</u>
1	inch
	100
3/4inch	90 to 100
1/2 inch	20 to 55
3/8 inch	0 to 10
#-4	0 to 5

Coarse aggregates for Class D (1000 psi) concrete shall be broken stone or river run gravel from dense hard stone, or boulders. The stone or gravel should not be porous or slaty it must be free from earth, sand or other foreign matters. The broken aggregate or gravel shall be of the prescribed size for the class D (1000 psi). The broken aggregate or gravel shall be of max. size 1 inch or 1 1/2 inches and not contain any thing which will pass through No.4 sieve.

2.5.3 Storage of Aggregate

Each class of aggregate is to be stored separately and the Contractor is to provide means of ensuring that aggregates are stored on a suitable hard clean surface or platform to prevent contamination from the ground.

2.5.4 Proportions of Coarse and Fine Aggregates

The nominal ratio of the Volume of coarse aggregate to the volume of fine aggregate shall be decided by compression test of concrete cubes or cylinders to be furnished by the Contractor but the Owner may order these ratios to be varied



slightly according to the grading of the aggregates by weight, if necessary, so as to produce required grading. Engineer can get the tests carried out at Contractor's cost.

At the beginning of the work and where there is any change in the coarse or fine aggregates or in their source of supply, the Contractor is to have a series of tests on cubes/cylinders made representative of and marked as to the aggregates and their grading and mix of concrete. Such cubes are to be tested in the laboratory under identical conditions, except for small variations in the relative proportions of the coarse and fine aggregates up and down from the best proportions derived from the sieve analysis. The cubes etc. are to be tested at 7 days.

2.5.5 Water

Water for washing aggregates and for mixing and curing concrete shall be clean and free from injurious amounts of oil, acid, alkali, salt, organic matter, or other deleterious substances as determined by standard tests selected by the Engineer. It shall meet the following chemical requirements:

Chlorides such as sodium chloride	Max 3000ppm
Sulphates such as sodium sulphate	Max 2000ppm
Impurities	Max 2000ppm
Metled Salt	Max 25000ppm

The water for curing concrete should not have pH value lower than 5 and shall not contain impurities which cause discoloration of concrete.

2.6 CONCRETE MIX REQUIREMENTS

2.6.1 Strength

The concrete shall be one of four different classes to be paid for at their respective unit prices designated. The numerical classifications refer to the approximate proportions of cement, fine aggregate and coarse aggregate, according to the common practice. However, the actual concrete mix requirement shall consist of proportioning and mixing for the following strengths when tested in the form 6" cubes, 3 for 7 days and 3 for 28 days test shall be made for each class of concrete. The cubes are to be made, cured, stored, transported and tests are to be carried out at a testing laboratory approved by the Engineer. All such tests shall be at the cost of the Contractor.



Concrete Class	Cylinder (Min) Compressive Strength Tested at 7 days	Cylinder (Min) Compressive Strength Tested at 28 days	Cube (Min) Compressive Strength Tested at 28 days	Tentative Ratio
A:	2000 psi	3000 psi	4000 psi	1:1-1/2:3
B:	1600 psi	2400 psi	3000 psi	1:2:4
C:	1000 psi	1600 psi	2000 psi	1:3:6
D:	No strength	800 psi	1000 psi	1:4:8
requirements				

2.7 WATER CEMENT RATIO

The water-cement ratio is the ratio of the weight of water in the mix to the weight of cement therein. Water content shall be sufficient to produce a workable mix of the specified strength but the total water content shall be governed by the following table:

Concrete Class	Maximum Permissible Total Water Demand (Imperial) Gallons per 112 pounds of cement
A:	6.0
B:	7.5
C:	8.0
D:	No requirements

2.7.1 Consistency

Proportions of ingredients shall vary to achieve the desired concrete consistencies when tested, conforming to the following slump requirements or as desired by the Engineer:

Use of Concrete	Minimum and Maximum Slump (inch)
_____	_____



Normally reinforced sections compacted by vibration, hand compacted mass concrete. 1 to 3

Heavily reinforced 2 to 4 concrete sections compacted by vibration, hand compacted concrete in normally reinforced slabs, beams, columns and walls.

In all cases, the proportions of aggregates for concrete shall be such as to produce mixes which will work readily into the corners and angles of the forms and around the reinforcement without permitting the segregation of materials or lamination. Uniformity in concrete consisting from batch to batch shall be ensured.

2.8 MEASUREMENT OF MATERIALS

The coarse and fine aggregate are to be weighed or accurately measured to the Engineer's satisfaction. In no event they are to be measured by the shovel or barrow.

2.9 MIXING METHODS

The concrete shall be mixed in an approved mechanically operated batch mixer. The mixer, its hopper and working platforms shall be protected from rain and wind.

The aggregates and cement shall be mixed together before adding water until the concrete is of even colour and consistency throughout. Dirt and other undesirable substances shall be excluded. Water shall not be added indiscriminately from a hose or can. All concrete shall be thoroughly mixed by a modern reliable batch mixer to produce maximum output of concrete necessary to complete the work within the specified time without reducing the required mixing time. Concrete shall be mixed in the concrete mixers for the duration required for uniform distribution of the ingredients to produce a homogeneous mass of consistent colour but for not less than 1 1/2 minutes. The mixer shall be operated by trained operators, who have previous experience of running and operation of concrete mixers.

At the conclusion of mixing, the mixer and all handling plants shall be thoroughly cleaned out before the concrete remaining in them has had time to set.



No concrete shall be mixed by hand without the Engineer's written consent, and such consent shall be given only for small quantities under special circumstances.

2.10 TEST OF CONCRETE

2.10.1 *Strength Test During the Work*

Strength tests of the concrete placed during the course of the work will be made by the Engineer in an approved laboratory at the Contractor's expenses. The Contractor shall assist the Engineer in obtaining, for control purposes, such number of cylinders or cubes as the Engineer may direct, but in general, three beams taken from each 2650 cu.ft. or fraction thereof, or from each days pour, whichever is less, of each class of concrete placed, shall govern. Test specimen will be made and cured by the Engineer in accordance with the applicable requirement of ASTM Designation C31-69, Standard Method of Making and Curing Concrete Compressive and Flexural Test Specimens in the Field.

Cubes and beams will be tested by the Engineer in accordance with the applicable requirements of ASTM Designation C39-72, Standard Method of Test for Compressive Strength of Cubical Concrete Specimens and ASTM Designation C78-64, Standard Method of Test for Flexural Strength of concrete (Using Simple Beam with Third Point Loading). The test result will be based on the average of the strength of the test specimens except that if one specimen in a set of three shows manifest evidence of improper sampling, moulding, or testing, the test result will be based on the average of the remaining two specimens. If two specimens out of a set of three show such defects, the results of the set will be discarded and average strength determined from test results of the other two sets. The standard age of test will be 28 days, but 7 day tests may be used at the discretion of the Engineer, based on the relation between the 7 days and 28 days strengths of the concrete as established by tests for the materials and proportions used. If the average of the strength test of three specimen cured under laboratory controls, for any portion of the work, falls below the minimum allowable compressive or flexural strength at 28 days required for the class of concrete used in that portion, the Engineer may change the proportions of the constituents of the concrete, as necessary to secure the required strength for the remaining portions of the work. If the average strength of the specimens cured under actual field conditions as specified herein before falls below the minimum allowable strength, the Engineer will make such changes in the conditions for temperature and moisture under which the concrete work is being placed and cured as may be necessary to secure the required strength.

2.11 CONVEYING OF CONCRETE

Concrete shall be conveyed from mixer to the place of final deposit as rapidly as practicable, by methods which will prevent segregation or loss of ingredients and



in accordance with latest edition of ACI Code Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

Any wet batch hopper through which the concrete passes shall be conical in shape. There shall be no vertical drop greater than 5 ft. except where suitable equipment is provided to prevent segregation and where specifically authorized. Belt conveyers, chutes, or other similar equipment will not be permitted either for conveying concrete except where the use of such equipment is approved in writing by the Engineer, in advance of any use. Each type or class of concrete shall be visually identified by placing a coloured tag or marker on the bucket as it leaves the mixing plant so that the concrete may be positively identified and placed in the structure forms in the desired position.

2.12 PLACING

2.12.1 General

Concrete placing shall follow the Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete, latest ACI Code requirement. No concrete shall be placed until all formwork, reinforcement, installation of parts to be embedded, bracing of forms and preparation of surface involved in the placing and the method of placement have been approved by the Engineer. Approval of the method of placement proposed will not relieve the Contractor of his responsibility for its adequacy and he shall remain solely responsible for the satisfactory construction of all work under the Contract.

Before concrete is placed, all surfaces upon or against which concrete is to be placed shall be free from standing water, mud, debris or loose material. All surfaces of form and embedded material that have become encrusted with dried mortar or grout from concrete previously placed shall be cleaned of all such mortar or grout before the surrounding or adjacent concrete is placed. The surfaces of absorptive material against or upon which concrete is to be placed shall be moistened thoroughly so that the moisture will not be drawn from the freshly placed concrete. Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting the materials to its final position in the forms. The depositing of concrete shall be regulated so that the concrete may be effectively compacted with a minimum of lateral movement into horizontal layers approximately 1.5 ft. in thickness. No concrete that has partially been hardened or contaminated by foreign materials shall be deposited in the structure, nor shall retamped concrete be used unless approved by the Engineer. The surfaces of construction joints shall be kept continuously wet for at least eighteen hours during the twenty four hours period prior to placing concrete except as otherwise directed by the Engineer. All free water shall be removed and the construction joint shall be completely surface dry prior to approval All concrete placing equipment and methods shall be subject to



approval. Concrete placement will not be permitted, when in the opinion of the Engineer weather conditions prevent proper placement and consolidation.

2.13 COMPACTING CONCRETE

All concrete, except that in blinding layers and in- situ-concrete in very small sections, shall be compacted by vibration. After any necessary hand spading, working and ramming into place, each layer of concrete shall be compacted with mechanical immersion vibrators of types approved by the Engineer.

The immersion vibrators shall produce a vibration frequency of not less than 6000 impulses per minute. Under no circumstances shall the immersion vibrators be allowed to come into contact with reinforcement or shuttering. Immersion vibrators shall penetrate vertically for a few inches into any previous unset layer in order to establish a satisfactory bond, but no concrete shall be vibrated in such a manner as to cause injury to concrete (already set or otherwise) in other parts of works. Care shall be taken to keep the vibrators vertical, to insert them at regular intervals and withdraw them slowly to prevent the formation of voids, so that the entire mass of the concrete is properly compacted. Haphazard or random penetration of the vibrators without sufficient depth of insertion shall be avoided. A sufficient number of vibrators shall be used to ensure compaction of each batch of concrete before the next batch is delivered. At least one extra vibrator shall be in hand for emergency use.

Vibration shall be supplemented by hand punning with approved small-diameter smooth steel rods with rounded ends in order to achieve complete compaction around reinforcement and other embedded fittings and a completely dense mortar finish against the shuttering.

Excessive vibration shall be avoided and vibration shall not be continued after a good surface finish, without free water, has been achieved. Vibration and punning shall be just sufficient to produce a dense, homogeneous concrete properly filling the moulds and free from air voids, segregation, bleeding, honey combing and other imperfections. Only highly skilled operators and workmen, subject to constant supervision, shall be employed in vibrating and punning concrete.

2.13.1 *Time Interval between Mixing and Placing*

Concrete mixed in stationary mixers and transported by non-agitating equipment shall be placed within thirty minutes after it has been mixed, unless otherwise authorized. When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be completed within 1 1/2 hours after introduction of the cement to the aggregates. The concrete shall be placed within 20 minutes after it has been discharged. In



all cases, concrete shall be placed and compacted well within the initial setting time.

2.14 CONCRETE FINISHES

Concrete finishes shall be made in accordance with the provision of ACI 301-8 or as directed by the Engineer

Workmanship in shuttering and concreting shall be such that concrete work shall normally require retouching and the surfaces being dense, watertight and where steel shuttering has been used, perfect and smooth. Should there be faults in these respects, the Contractor shall cut out and replace the whole of the lift concerned or such amount as the Engineer decides, or make good if permitted by the Engineer and to his approval. Concrete which is honey-combed or otherwise shows voids shall invariably be cut out and replaced in an approved manner as suggested by the Engineer.

Any making good shall be carried out immediately after striking the shuttering and shall be restricted to light rubbing down with wet carborundum or the approved correction of minor blemishes. In no circumstances shall surfaces be made good with cement or washes or rendering.

Exposed concrete surfacing not requiring shuttering and not subsequently to be given extra finishes shall be given perfectly dense smooth finish with a wooden float.

Where concrete slabs, ducts, bases or machine plinths will themselves form the finished floor surface the concrete shall be troweled immediately after the first laying process only just sufficiently to give a level surface. Thereafter, when the concrete has stiffened to a condition such that a hard compacted surface can be obtained without bringing up laitance, a final surface troweling shall be given with a steel float to produce a smooth finish.

2.15 CONCRETE AND WEATHER

No concrete shall be placed when the atmospheric temperature is below 15 degree centigrade without the written permission of the Engineer. When directed by the Engineer the Contractor shall provide adequate means for maintaining a temperature of not less than 20 degree centigrade for 3 days or 15 degree centigrade for five days after placing the concrete.

If Rapid-Hardening Portland Cement is used, the period may be reduced as directed by the Engineer.



The Contractor shall supply such heating apparatus as stoves salamanders or steam equipment and the necessary fuel. When dry heat is used, means of maintaining atmospheric moisture shall be provided. All aggregates and mixing water shall be heated to temperature of at least 20 degree centigrade, but not more than 75 degree centigrade, the aggregates may be heated by either steam or dry heat, if permitted by the Engineer the torch method of heating mixed aggregate shall be such as to heat the mass uniformly and avoid spots which will burn the materials. The temperature of the concrete shall be not less than 10 degree centigrade at time of placing in the forms.

In case of extremely low temperature, the Engineer may, at his discretion, raise the minimum limiting temperature of water, aggregates and mixed concrete. When the shade temperature is above 32 degree centigrade, special precautions shall be observed during concreting to the satisfaction of the Engineer. Concreting will be permitted when it is not raining. Thermometer shall be kept at the Site by the Contractor.

2.16 CURING OF CONCRETE

Unless otherwise specified or ordered by the Engineer all concrete shall be cured by water. It shall be kept wet continuously for at least fourteen days after placement. It shall be covered with water saturated material like gunny bags, canvas, clean sand, matting, etc. or any other improved method duly approved by the Engineer.

In order that tensile stresses on the cooling of concrete shall be kept to a minimum, all materials shall be as cool as practicable when mixed and placed. To this end, aggregates shall be covered, coarse aggregates shall be cooled with water and mixing plant etc., water storage tanks and pipelines shall be covered or insulated from the effects of the sun. The temperature of concrete on placing shall in no case exceed 32 degree Centigrade.

Concrete shall be placed only against surfaces which are damp and no such work shall be started until arrangements for keeping the shuttering continuously cool and wet are in place. Shuttering and exposed faces of concrete and mortar shall be covered by at least 3 thicknesses of approved stout hessian kept continuously cool and wet by an efficient and comprehensive system of sprinklers and diffused jets of water, with appropriate temporary drainage arrangements, for at least 14 days after placing.

As an alternative to continuous curing with water after stripping of shuttering a proprietary membranes method of curing may be used provided that it is used strictly in accordance with the manufacturer's instructions, is coloured to show its presence, contains no bituminous substance, does not prejudice the appearance of permanently exposed concrete surfaces and is in all other respects to the approval of the Engineer. Wherever practicable, both faces of concrete structures shall be appropriately treated in order to prevent tensile stresses due to



differential shrinkage or temperature across the section. Further more, the Contractor shall continue to provide facilities for covering and/or keeping wet such exposed surfaces of the Work as are, in the opinion of the Engineer liable at any time to be damaged by weather.

At no time shall any further work involving concrete proceed until the Contractor has satisfied the Engineer that all such work previously carried out is being protected and cured in accordance with this clause.

2.17 CONCRETE IN EXCAVATION AND FILLING

Before concrete is placed in or against any excavation or filling, the surface of such earthwork shall have been compacted and shall be free from running and standing water, oil and other deleterious matter. Loose earth and other material shall be removed. The excavation or filling shall be damp but not wet and special precautions shall be taken to prevent groundwater from damaging unset concrete or causing movement of the concrete.

Immediately after the excavation or filling has been trimmed and prepared as above, the exposed foundation shall be protected by a blinding layer or "No-fines" concrete or of cement mortar or other protection as shown on the Drawings or ordered by the Engineer. Such blinding layers and coatings shall be thoroughly cleaned and moistened before further concrete work is placed thereon.

Reinforced concrete shall not be cast against an unprotected face of earth or any other material liable to become loose or to slip; the greatest possible care shall be taken to avoid falls of material on to the concrete, by leaving the timbering in place (if permitted) or by removing the timbering in small depths and lengths at a time and by any other approved means. If any such falls occur, all soiled concrete shall be removed and replaced at Contractor's own cost.

2.18 SHUTTERING

The Contractor shall submit, for the approval of the Engineer full proposals and design calculations for all shuttering and proposals for the period of time to elapse before each item of the shuttering is struck. Notwithstanding the approval of the Engineer to any actual shuttering or proposals for its striking, the Contractor shall retain complete responsibility for its adequacy as to the provisions of this clause and for any consequences of the striking being premature or harmful. In general the minimum time for the removal of form work shall be as under:

Form Work	Removal Time	Normal Weather above 15°C
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a)	Form work of vertical surfaces such as Beams side walls and columns	4 days	2 days
b)	Slabs, props left under	10 days	5 days
c)	Props to slab	14 days	10 days
d)	Beam soffits, prop left under	14 days	7 days
c)	Removal of props to Beams	21 days	21 days

Shuttering shall be designed with easily sealed access hatches for inspection purposes and for removal of water and deleterious materials, and with connections to facilitate striking without damaging the concrete. Shuttering for soffits of slabs shall be erected with an upward camber of 1/4" for each 10 feet of

span. When props are to be left in position under slabs the shuttering shall be made and removed in such a way that the props are not disturbed in any way.

A tolerance of plus or minus 1/8 inch in line or level will normally be permitted after erection of the shuttering which shall nevertheless be sufficiently strong, stiff and rigidly braced against loads due to the wet concrete and vibration and against constructional loads, to remain true to the line and level accepted before concreting. It shall be sufficiently watertight to ensure that there shall occur no "fine" or escape of mortar at joints or of liquid from the concrete.

All exterior angles for concrete work not permanently buried in the ground shall be given 3/4" x 3/4" chamfers unless otherwise indicated on the Drawings.

Timber for shuttering shall be well seasoned, free from loose knots, splits, projecting nails and the like and from any adhering foreign matter.

Steel shuttering shall be used to produce a fair face concrete with only a faint but consistent pattern of plate marks on exposed concrete surfaces. The shuttering shall be assembled from wrought tongued and grooved boarding, true and tightly fitted with joints as necessary, the whole surface and all edges being rendered smooth before and after oiling. Bearing in mind the quality of the finish required, wrought, plain-edged and butt-joint boarding may replace the tongued and grooved boarding or purpose-made steel-faced shutters of first-class quality may be used, solely at the discretion of the Engineer.



Rough shuttering shall be used for surfaces to be buried in the ground and shall be assembled from sawn boards with smooth and true edges or from approved steel shutters. In either case all joints shall be suitably filled.

The inside faces of all shuttering shall be treated with an approved material to prevent adhesion of the concrete, all such materials being kept clear of the reinforcement and other items to be embedded.

Shuttering shall be struck by static force alone without shock and vibration causing any damage to the concrete. Shuttering being reused shall be thoroughly repaired and cleaned before re-assembly.

2.19 WATER STOPPER'S

2.19.1 Scope

The work to be done under this item consists of providing and installing PVC/Metal water stops as shown on the Drawings or as directed by the Engineer.

2.19.1 (a) Polyvinylchloride Water Stopper

Polyvinylchloride waterstops shall be extruded from an elastomeric plastic compound, the basic resin of which shall be polyvinylchloride (PVC) The compound shall contain such additional resins, plasticizers, stabilizers or other materials needed to ensure that when the material is compounded and extruded to the shapes and dimensions shown, it will have physical characteristics when tested by the U.S. Corps of Engineers Tested Method specified below:

Physical	No of		USCE
Characteristics	Specimens	Requirement	Test
	Tested		Method



Tensile strength using die III, not less than			
Ultimate elongation using die III, not less than	5	1750 psi	568
Low temperature brittleness, no sign of failure such as cracking or chipping at	5	350%	573
Stiffness in flexure, 1/2 inch span, not less than	5	-35°F	570
	3	400 psi	571

Installation

The PVC Water stops shall be laid in continuous lengths. Splices in the continuity or at the intersections of runs of PVC water stops shall be performed by heat sealing the adjacent surfaces in accordance with the manufacturer's recommendations or as directed by the Engineer. A thermostatically controlled electric source of heat shall be used to make all splices. The correct temperature at which splices should be made will differ with the material used but should be sufficient to melt but not char the plastic. After splicing, a remolding iron with ribs and corrugations to match the pattern of the waterstop shall be used to reform the ribs at the splice. The continuity of the characteristic components of the cross section of the waterstop design (ribs, tubular center axis, protrusions, and the like) shall be maintained across the splice.

2.19.1 (b) Metal Waterstops

Copper, stainless steel and steel waterstops shall be installed in joints at the locations shown on the Drawings. The thickness, shape, dimensions and splicing of metal waterstops shall be as shown on the Drawings or as approved by the Engineer.

2.20 TERRAZZO WORK



2.20.1 *Scope*

The work to be done under this item consists of providing terrazzo finish inside the water tanks and at any other place shown on the Drawings. The subgrade shall comprise of (i) cement plaster (ii) cement concrete.

2.20.2 *Material*

Marble Chips of the specified grade, and colour shall be of approved quality obtained from quarries in Pakistan. Before any material is purchased, the Contractor shall submit to the Engineer for approved samples in duplicate. The material used in the work shall correspond with the approved samples, in quality, colour texture and finishes etc.

2.20.3 *Subgrade*

The subgrade under terrazzo top shall be 3000 psi cement concrete or 1:2 cement sand plaster of the thickness specified on the Drawings. The subgrade shall be constructed in accordance with the applicable stipulations and requirements, Cement Plaster of the Specifications. The subgrade surface shall be kept wet for proper adhesion of terrazzo topping, which shall be laid when the subgrade has still not hardened.

2.20.4 *Topping*

Terrazzo top finishing of thickness as shown on the Drawings or the Finishing Schedule shall consist of marble chips and cement mixed in ratio of 1:2 (one part grey cement and 2 parts chips of approved grading and shade with admixture of approved pigment). Terrazzo topping shall be laid true to the pattern as given on the Drawings or as directed by the Engineer. The terrazzo topping shall be well compacted and all voids and dips made good.

2.20.5 *Final Finish*

Smooth Finish: After 48 hours of laying the terrazzo topping requiring smooth finishes shall be grinded with No.80 Carborundum stone until the marble chips are evenly exposed.

After the first grinding neat coat of suitably coloured cement slurry be applied to repair the pores if any, formed during the course of grinding and cured for 24 hours. The second and the third grinding shall be suitably carried out with



grinding stone ranging from No. 80 to 240 respectively. Electric grinders shall be used to ensure that the grinding is adequate.

The surface after all chips have been evenly exposed will be cured for one week and left undisturbed for another week. After this period the surface shall be cleaned of dirt and dust by rubbing gently with pumice stone with sufficient water. If this treatment is not successful in removal of the white scum or other materials and hardened deposits, the floor shall be lightly rubbed with grinding stone while washing soda solution is being used. It would then be treated with oxalic acid (1:10) solution using felt or an old blanket. After oxalic acid treatment the surface shall be cleaned and washed with plenty of water and dried.

2.21 STEEL REINFORCEMENT

2.21.1 Scope

The work to be done under these items shall include furnish, cut, bend, and place all steel reinforcement as indicated on the Drawings or otherwise required. All reinforcement when surrounding concrete is placed shall be free from loose, flaky rust, and scale, and free from oil grease or other coating which might destroy or reduce its bond with the concrete. All placing shall be in accordance with Drawings furnished or approved. The use of reinforcement for the transmission of current for welding will not be permitted. All reinforcement, including dowels, remaining exposed in the work shall be suitably protected until embedded in concrete.

2.21.2 Cutting and Bending

Steel reinforcement may be mill or field cut and bent. All bending shall be in accordance with standard approved practice and by approved machine methods. When bending is required, it shall be performed prior to embedding the bars in the concrete. In all such cases, the bars shall be cold bent. Bending or straightening of bars partially embedded in set concrete shall not be permitted except in isolated cases where corrective action or a field change is required and is specifically approved by the Engineer.

2.21.3 Quality

Concrete reinforcement bars shall be of following quality:

Intermediate grade Steel: It shall be deformed bars conforming to ASTM 615-81(a,b) grade 40/ grade 60 or equivalent having a minimum yield strength of 40,000 psi/ 60,000 psi. The Contractor shall provide labour, materials, arrange



measuring and testing facilities to ascertain quality, weight or quantity of steel at his own expense, No steel shall be incorporated in the Works without prior approval of the Engineer.

2.21.4 Spacing of Bars

The spacing of bars shall be as shown on the Drawings or as directed by the Engineer. The variation from indicated spacing, provided that the total area of reinforcement is in accordance with the Drawings, shall not be more than 1 inch.

2.21.5 Relation of Bars to Concrete Surface

The cover of all main reinforcement shall conform to the dimensions shown on the Drawings. The protective covering shall not be less than, and shall not exceed more than 1/4" from the values specified on the Drawings, indicate the clear distance from the edge of the main reinforcement to the concrete surface. The concrete covering of stirrups spacer bars, and similar secondary reinforcement may be reduced by the diameter of such bars.

2.21.6 Splicing

Except as otherwise shown on the Drawings or specified herein, all splices, lengths of laps, splice locations, placement and embedment of reinforcement shall conform to the applicable requirements of American Concrete Institute 318- 77, Building Code Requirements for Reinforced Concrete. All splices and locations of laps in reinforcement shall be as shown on the Drawings or as directed by the Engineer. Additional bar splices shall be provided as required, subject to approval of the Engineer. Lapped ends of bars may be placed in contact and securely wired or may be separated sufficiently to permit the embedment of the entire surface of each bars by butt-welding or by approved mechanical methods such as the Cadweld splice or other type splice using positive connectors shall be adopted where indicated or directed by the Engineer. Butt welding of reinforcing bars, where indicated or directed shall conform to the requirements of American Welding Society's Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections, D.12.1. Concrete shall be protected from heat during welding operations.

2.21.7 Supports

All reinforcement shall be secured in place by use of metal or concrete supports, spacers, or ties, as approved by the Engineer. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concreting operation. The supports shall be used in such a manner that they will



discoloration or deterioration of the concrete. Concrete supports shall be manufactured of the same concrete mix as used in the structure to be concreted.

2.22 MEASUREMENT AND PAYMENT

Measurement and payment for concrete, reinforcement, precast concrete, PVC water stop and Terazzo/Mosaic work will be made in accordance with the provisions of this clause specified hereinafter.

2.22.1 Method of Measurement

Concrete will be measured for the number of cubic feet acceptably placed complete in all respects as per Drawings and in strict accordance with this section of specification.

Measurement for steel reinforcement will be made of number of Tons of reinforcing steel acceptably placed on the basis of the lengths of bars installed in accordance with the approved Drawings or bar schedules or as directed, converted to weight for the size of bars listed by the use of unit weights per linear foot as follows:

<u>Bar Size</u>	<u>Unit Weight lbs. per foot</u>
1/4"	0.167
3/8"	0.376
1/2"	0.668
5/8"	1.043
3/4"	1.502
7/8"	2.044
1"	2.670
1 1/8"	3.775
1 1/4"	4.172
1 3/8"	5.049

Steel in laps and embedments indicated on the Drawings or as required by the Engineer will be paid for at the steel unit price. No measurement for payment will be made for the steel consumed in providing supports and for the additional steel in laps which are authorised for the convenience of the Contractor.

Polyvinylechloride water stop of the size and gauge as shown on the Drawings will be measured for the number of linear feet acceptably placed in the work. In computing the quantities, no allowance will be made for laps.

Measurement for terrazzo/mosaic work will be made in square feet as shown on the Drawings.



2.22.2 *Basis of Payment*

Payment will be made in accordance with the unit prices in the Bill of Quantities for the various items in accordance with the specifications and shall constitute full compensation for furnishing all materials, shuttering, equipment and labour and for performing all operation necessary to complete the work.

BOQ Item	Description	Unit
2.1	Provide and lay concrete	Cft.
2.2	Furnish and Fix Reinforcing Steel	Tons
2.3	Furnish and Install Water Stop	
	(i) PVC	Lft.
	(ii) Stainless Steel	Lft.
2.4	Provide and Lay Terrazzo/Mosaic Work	Sft.



SECTION - 3

BRICK AND CEMENT CONCRETE BLOCK WORK

3.1 SCOPE

This section consists of construction of brick/ cement concrete block work walls of any thickness with first class hand-mould and/or machine pressed bricks/cement concrete blocks with the specified ratio of cement mortar in foundation, plinth superstructure or for any other structure as directed by the Engineer, or shown in the Bid Schedule. The Contractor shall furnish all materials and all other requirements to produce finished brick/block work. Brick/block work and materials for brick/block work shall be in strict accordance with this section of the specifications and applicable drawings and subject to the terms and conditions of the Contract.

3.2 MATERIALS

3.2.1 *Portland Cement*

Portland cement shall conform to the stipulations and requirements set forth in Section "CONCRETE".

3.2.2 *Mortar Sand*

Sand for mortar used in construction of brickwork/blockwork required under these Specifications shall be furnished by the Contractor in accordance with the provisions and in conformity with the stipulations and requirements of ASTM Designation C144-70 or latest revision and shall have a fineness modulus between 1.6 to 2.5.

3.2.3 *Water*

The water used in the preparation of mortar shall be free from objectionable quantities of silt, organic matter, alkali salts and other impurities and it will be tested in accordance with BS-3148 and approved by the Engineer at the Contractor's cost.

3.2.4 *Aggregate*



Aggregates for mortar shall comply with the requirements of ASTM C144. Sand that has been in contact with seawater shall not be used unless it has been thoroughly washed to the satisfaction of the Engineer.

3.2.5 Additives

Additives where used, shall be proprietary products used in the proportions and manner recommended by the manufacturer. The additives shall in no way adversely affect the mortar strength or contain chemicals, which may be harmful to other building materials. To add gypsum to cement is strictly forbidden.

3.3 MORTAR AND GROUT

Materials for mortar, sand binding agent and water shall be mixed by volume for at least 3 minutes with the minimum amount of water to produce a correctly mixed mortar or grout of workable consistency in a mechanical batch mixer. For small jobs, hand mixing may be permitted, the ingredients being mixed with sufficient water to produce a correctly mixed workable mortar. Mortar used in masonry construction shall conform to ASTM C-270 standard.

Mortars shall be mixed in batches, which can be used within a period before the setting process commences. Once a mix begins drying off, it shall be rejected. No ingredients shall be added to it once the setting process has begun. Mortar shall not be retained for more than 30 minutes and shall be constantly worked over with hoe or shovel until used.

3.4 MORTAR BATCHING

Methods or equipment used for mixing mortar shall be such as will accurately determine and control the amount of each separate ingredient entering into the mortar and shall be subject to the approval of the Engineer. If a mixer is used it shall be of approved design and the mixing time after the ingredients are in the mixer, except for the full amount of water, shall not be less than two minutes.

Mortar shall be mixed only in sufficient quantities for immediate use and all mortar not used within 30 minutes after addition of water to the mix shall be wasted. Retampering of mortar shall not be allowed. Mixing pans and troughs shall be thoroughly cleaned and washed at the end of each day's work.

3.5 SCAFFOLDING

Contractor shall provide safe scaffolding of adequate strength for use of workmen at all levels and heights at his own expense. Scaffolding which is unsafe in the opinion of the Engineer shall not be used until it has strengthened and made safe for use of workmen. Cost of scaffolding etc., shall be included by the Contractor in the unit rate for masonry items.



Damage to masonry from scaffolding or from any other object shall be repaired by the Contractor at his own cost.

3.6. JOINTING

Jointing is the forming of joints as work proceeds. Joints shall be as follows:

3.6.1 Exterior exposed joints shall be tightly formed to a weather joint with the point of the trowel.

3.6.2 Interior exposed joints shall be tightly formed to a concave joints.

3.6.3 Joints which are subsequently covered with plaster or other finish materials shall be struck flush.

3.7 BRICKS

The bricks used shall be of standard size (9"x4.5"x3") first class well burnt, uniform in shape, size, texture, colour and should produce a ringing sound when struck. The bricks shall be free from flaws, cracks, chips, stone nodules of lime or kan-kar or any other blemishes. The brick shall not absorb more than one sixth of its weight when soaked in water for one hour. Compressive strength shall not be less than of 1400 psi. Bricks over burnt, under burnt vitrified and irregular shall not be used. Bricks of uniform size shall be used throughout the work and source of supply shall not be diversified.

3.7.1 *Soaking*

Before use all bricks shall be soaked in clean water in tanks or pits for at-least two hours.

3.7.2 *Laying of Bricks*

All brickwork shall be skillfully laid with level courses, uniform joints, square corners, plumb verticals and true surfaces except when otherwise shown on the Drawings or directed by the Engineer. Brickwork will be of best standard of workmanship obtainable and objectionable offsets in the brickwork shall be avoided. Smoothest practicable finished surface of the brickwork shall be ensured. Unless otherwise specified bricks shall be laid in English Bond with frogs (Manufacturer's marks) upward.



All horizontal joints shall be parallel and truly level. Vertical joints in alternate courses shall come directly over one another. Thickness of joints unless otherwise specified shall not be less than 1/4 of an inch and not more than 3/8 of an inch. The height of 4 courses and 3 joints as laid shall not exceed by more than 1 inch the height of 4 bricks as piled one upon the other.

3.7.3 *Curing*

All brick work involving use of cement shall be cured by water curing or other acceptable methods. The Engineer shall approve all methods and operations of the Contractor in curing different portions of work.

When curing by water brickwork shall be kept wet for at least 14 days by covering with water saturated materials or by a system of perforated pipes, mechanical sprinklers, porous hose, ponding or by any other approved method which will keep all surfaces to be cured continuously wet. Water used for curing shall meet the requirements given in Clause 3.2 of these specifications.

3.8 BLOCKS

Cement, aggregates and water for concrete blocks shall conform to the requirements as specified in the section for plain and reinforced concrete or as approved by the Engineer.

3.8.1 *Concrete Block Making*

3.8.1.1 The solid and hollow blocks as and where used by planning, shall be machine moulded. The block making machines shall be of the standard approved by the Engineer. They shall be operated according to the instructions laid down by the manufactures.

3.8.1.2 The blocks shall be continuously water cured by sprinkling water for a minimum of 10 days and covered between sprinkling operations with 4 mils thick polyethylene sheeting. After the 10 days water curing period the blocks shall be air dried. Under no circumstances will blocks be used in the work until they are completely dry. During curing period no surfaces of the block will be allowed to dry.

3.8.1.3 Cured concrete blocks shall be stored off the ground, stacked on level platforms, which allow air circulation under stacked units. Units shall be covered and protected against wetting.

3.8.1.4 Care shall be exercised in the handling of all concrete blocks. No damaged blocks shall be used in the work.



- 3.8.1.5** The blocks cast on different dates shall be stacked separately and must be labeled showing the date on which they were cast.

3.8.2 *Properties of Blocks*

- 3.8.2.1** All blocks shall be of size and shape required to complete the work shown in the Drawings or as instructed by the Engineer.
- 3.8.2.2** The cement, sand and coarse aggregate shall be volume batched and their proportion may be adjusted so as to provide the concrete of the required strength when tested and shall be mixed in a concrete mixer.
- 3.8.2.3** All blocks shall conform to ASTM C 145 standard. The compressive strength based on gross area shall be minimum 8.30 MPa for an average of 3 blocks and minimum 7.0 MPa for lowest individual blocks with 28 days after casting Cement Concrete Solid Blocks.
- 3.8.2.4** The Contractor shall provide test certificates show in the average minimum crushing strength of the blocks prior to the commencement of the construction. Further test certificates shall be provided as required by the Engineer, to ensure that all batches of block strengths are to be determined in accordance with ASTM C-140 Standard.
- 3.8.2.5** The test shall be carried out by a laboratory approved by the Engineer. Evidence shall be produced that the block manufacturer has an efficient method of quality control. The Engineer will require to test samples of blocks periodically and the Contractor shall make necessary arrangements accordingly. The method of sampling for all test shall be in accordance with ASTM C-140.
- 3.8.2.6** All properties or specifications of blocks, not explain in these Specifications or ASTM C 145 shall comply with the requirements of PS 419, as directed by the Engineer.

3.8.3 *Soluble Salt Content*

For exposed block work, the contents by weight percent of soluble sulphate, calcium, magnesium, potassium and sodium radicals, shall not exceed 0.30, 0.10, 0.30, 0.03 percent respectively when ascertained in accordance with BS 3921, at the cost of the Contractor.

3.8.4 *Erection*

- 3.8.4.1** Block shall be laid true to line, level and laid in accurately spaced courses in stretcher bond with vertical joints of each course located at centre of units in alternate courses below. Vertical joints shall be buttered in the entire height of blocks.



Each course shall be bonded. Courses of block shall be kept plumb throughout and corner reveals shall be true and in plumb.

Standard with of mortar joints for both horizontal and vertical joints shall be 7/16 inch (maximum). Mortar joints in wall shall have full mortar coverage on vertical and horizontal faces between the blocks. Mortar joints on wall including struck joints, shall be thoroughly compacted and pressed tight against the edges of the blocks with proper tools. Blocks terminating against soffits of beam or slab construction shall be wedged tight with wedges and the joints shall be packed solidly with mortar between the top of the block and the bottom of slab or beam. Control expansion joints shall e kept free from mortar or other debris.

Unless otherwise shown on the drawings or specified by the Engineer, the spaces around door frames and other material or built in items shall be solidly filled with mortar. Spaces around the door and window hold fasts shall be filled in with Class C concrete. Work required to be built in with masonry including door frame anchors, wall plugs, dovetail anchors and accessories shall be built in as the erection progresses.

3.8.4.2 The block work shall be carried out in a uniform manner and no portion shall be carried more than one metre above the adjoining one at any times. All masonry shall be kept strictly true and square and the whole properly bonded together and levelled round each floor.

3.8.4.3 Sleeves, Chases, holes, sinking and mortices for other trades shall be correctly located and formed to the sizes as required by the relevant trades. Chiselling of completed walls or the formation of holes shall only be carried out with the approval of the Engineer.

3.8.4.4 Walls of blocks indicated as being non-load bearing shall be constructed on insitu concrete floor slab unit after the floor formwork is struck and the concrete has obtained sufficient strength to support their weight. Tothing into load- bearing walls shall not be permitted.

3.8.4.5 All bolts, anchors, ties, pipe sleeves, flushing metal attachments lintels and the like required to be built into the work shall be correctly inserted and executed as the work proceeds.

3.8.4.6 Walls or partitions abutting concrete columns or walls shall be securely anchored and tied with metal anchors or ties at not more than 18 inches vertical centres. Wall ties cast in with concrete shall be bent down after the removal of form work and shall be securely jointed into the mortar beds of walling.

3.8.5 *Curing and Repairs*



3.8.5.1 All block masonry shall be water cured and shall be kept wet for at least seven days, by an approved method, which will keep all surfaces to be cured continuously wet. Water used for curing shall meet the requirements of specifications for water used in the manufacture of blocks.

3.8.5.2 Tolerances

All block work shall be erected plumb and true to line and level with the maximum variation in any storey height or any length of wall being one mm in one metre. The maximum tolerance in the length, height or width of any single masonry wall shall be $\pm 1/8$ inch.

3.8.5.3 If, after the completion of any block masonry work, the block is not in alignment or level, or does not, conform to the lines and grades shown on the Drawings or shows a defective surface, it shall be removed and replaced by the Contractor at his expense unless the Engineer grants permission, in writing, to patch or replace the defective area.

3.9 MEASUREMENT AND PAYMENT

3.9.1 *Material (Brick and cement concrete block work)*

Measurement and payment for brick/cement concrete block work shall be made in accordance with the provisions given hereafter.

3.9.1.1 Method of Measurement

Measurement for brick/block work shall include number of cubic ft. of brick/block work provided within the limits as shown on the Drawings or as directed by the Engineer.

3.9.1.2 Basis of Payment

Payment for brick/block work shall be made at the contract unit price per cubic feet. Payment shall constitute full compensation for furnishing all materials, equipment and labour including all incidentals necessary to complete the work:



Pay Item	Description	Unit
3.1	Provide and Lay Brick Masonry with cement sand mortar in foundation and super structures.	Cft.
3.2	Provide and Lay Block Masonry with cement sand mortar in foundation and super structures.	Cft.



SECTION - 4

SURFACE RENDERING

4.1 SCOPE

The work covered by this part of the Specifications consists of supplying all materials, labour, equipment, appliances in performing all operations required for doing the work of cement plastering, pointing, and white washing in accordance with the herein stated requirements except when specifically modified by the Engineer.

4.2 CEMENT PLASTER

4.2.1 *General*

The work to be carried out under this item shall consist of providing 1/2" thick plaster in grey cement as specified below. The work shall be carried out in accordance with applicable requirements of British Code of practice 211:1966 or latest revision.

4.2.2 *Materials*

4.2.2.1 Cement

All cement required for incorporation in this Section shall conform to the applicable requirements of Section "CONCRETE"

4.2.2.2 Sand

The sand shall be of medium to coarse grain and having a fineness modulus varying between 1.10 to 1.50 obtained from an approved quarry e.g. Lawrencepur/Local. The material shall be free from clay, vegetable matters and other impurities. Sand bearing clay shall be washed at the discretion of the Engineer.

4.2.2.3 Water

Water required for cement sand paste and curing purposes shall conform to applicable requirements of Section "CONCRETE"



4.2.3 Mortar Composition

Mortar for plastering shall consist of one part of Portland cement to 3 parts of sand by volume.

4.2.4 Material Batching

Material batching for preparation of mortar shall conform to stipulations and requirements set for in the Section "BRICK AND CEMENT CONCRETE BLOCK WORK".

4.2.5 Application of Plaster

The surface on which plaster is to be applied shall in case of brick work, be properly raked and wetted before application of plaster. Plaster shall be applied in a thickness of 1/2". If the specified thickness is more than 1/2" then plaster shall be applied in two coats viz rendering coat and the final coat. Plaster shall be carried out to the full length of the wall or to the natural points. Vertical or horizontal joints which show themselves shall not be allowed. Rendering coat shall be roughened with waving lines drawn by wire brushes to provide bond for the final coat and it shall be properly moistened before application of subsequent coat. The final coat shall be finished with floats to provide smooth and uniform surface. All arises shall be straight and either truly horizontal or perpendicular and finished with 1/8" radius. Defective finishes if any shall be cut out and re-plastered at the expense of the Contractor. Plaster after finishes shall be kept moist for about 10 days to the satisfaction of Engineer.

4.3 POINTING

4.3.1 Surface Preparation

The joints of brickwork which is to be pointed shall be raked out with a hook to a depth of 1/2". The raking shall be done while the mortar is still green and not later than 48 hours of time of laying. After raking, the brick work is brushed to remove all loose dust from the joints and thoroughly washed with water, all putlog holes shall be filled up before pointing as the scaffolding for masonry has been taken down. The work shall be watered for 24 hours before pointing is done.



4.3.2 Materials

4.3.2.1 Cement

All cement required for incorporation in this section shall conform to the applicable requirements of Section "CONCRETE".

4.3.2.2 Sand

The sand required for incorporation in this Section shall conform to the applicable requirements of "CEMENT PLASTER" as per Clause 4.2.

4.3.2.3 Water

Water required for cement sand paste and curing purposes shall conform to applicable requirements of Section "CONCRETE".

4.3.3 Mortar Composition

Unless otherwise specified, the mortar shall be mixed by volume. The ratio of Cement Sand shall be as specified in the BOQ.

4.3.4 Material Batching

Material batching for preparation of mortar shall conform to stipulations and requirements set forth in Section "BRICK WORK".

4.3.5 Precautions

Before starting work of pointing the following precautions shall be taken.

- i) Fine aggregate i.e. sand shall be washed before use.
- ii) It shall be ensured that all joints are properly raked.
- iii) The surface to be pointed shall be kept moist but excessive moisture shall be avoided.
- iv) e scaffolding for pointing shall always be provided double.



4.3.6 Type of Pointing

Unless otherwise specified, the following types of pointing shall be done.

4.3.6.1 Deep or Struck Cement Pointing

This type of pointing shall be done to all un-plastered faces of brickwork where the brickwork is liable to be affected by dampness and saltpeter, such as in the plinths of buildings. The mortar shall be filled in the joints flush with masonry or brickwork with a pointing trowel and then pressed with proper pointing tools. Lining with a spike on a mass of mortar shall not be allowed.

4.3.6.2 Flush Cement Pointing

This type of pointing shall be done at all brickwork with exposed face, when the finish of the face is not important or when a flush floor surface is required or when the floor or brickwork is subject to wear or to the effects of dampness and saltpeter. The mortar shall be filled and pressed into the joints with a jointing trowel, and finished off level with the edges of the bricks to give the smoothest possible appearance to the work.

4.3.7 Pointing Tools

The pointing tools for horizontal joint shall be such as to form weathered and struck joints; and for vertical joint, triangles, so as to make a (v) notch. Care shall be taken not to develop a cutting edge in the tools since the idea is to compress the green mortar into the joints and not to cut it away.

4.3.8 Edges of Bricks

The mortar shall not be spread irregularly over the edges and corners of the bricks which shall be left clearly visible. The practice of smearing mortar over defects in bricks, to hide them shall not be allowed and shall render the whole brickwork liable to be rejected.

4.3.9 Washing after Pointing

After pointing, the face of the work shall be cleared off all surplus mortar sticking to the face. No washing shall be done till the pointing has set.



4.3.10 Protection during curing.

After completion, pointing shall be kept for 10 days and shall be protected during that period from extreme fluctuations of temperature and weather

All defects detected during curing or afterwards shall be treated at the Contractor's expenses according to directions of the Engineer.

4.4 PAINTING

The following codes and standards shall be followed wherever relevant and applicable and/or directed by the Engineer.

BS 242-66	Linseed Oil.
BS 245-76	Specification for mineral solvents (white spirit and related hydrocarbon solvents) for paints and other purposes.
BS 2523-83	Lead-based priming paint BS 2569-64/45
Sprayed metal coatings.	
BS 2992-70	Painters and decorators brushes.
BS CP. 3012-72	Cleaning and preparation of metal surfaces.
BS 4800-81	Paint colours for building purposes.
BS 5082-74	Water-thinned priming paints for wood.
BS 5358-76	Specifications for low-lead solvent-thinned priming paint for woodwork.
BS 6150-82	Code of practice for painting of buildings.

4.4.1 *White or Colour Washing*

The whitewash shall be made from pure fat lime brought to site of work in the form of un-slaked lime. Water shall be added to this lime in a container until the mixture is of consistency cream and allowed to rest until cracks shall appear on its surface (48-72 hours). After screening through coarse cloth, gum at the rate of 4 oz. boiled with 10 oz. of rice shall be added to each cubic feet of white wash. The colour pigment if required shall be added and mixed with white wash and stirred to give the required shade. Enough quantity shall be prepared in one go so as to meet the requirement of one complete room.

4.4.2 *Weather Resistant Paint*



4.4.2.1 Selection of Paints Concrete and Masonry

Cement based paints or one of the three common types of the exterior latex paints (polyvinyl acetate, styrene-butadiene and acrylic) of ICI/Burger make or equivalent shall be used whichever specified. Approved quality cement based or weather resistant emulsion paints shall be used as directed by the Engineer.

4.4.2.2 Primers

Concrete and Masonry

Boiled linseed oil or silicone water repellent primers ICI/Burger make or equivalent shall be used on concrete and masonry surfaces. Before application of paint, concrete and masonry surface should be allowed to dry for at least 3 weeks after cessation of curing.

4.4.2.3 Fillers

Concrete and Masonry

Paste of zinc oxide and varnish thinned with turpentine shall be used as filler on masonry and concrete.

4.4.2.4 Sealers

Concrete and Masonry

Water-insoluble and water-repellent substances dissolved in solvent such as petroleum naphtha or the special clear silicone compounds shall be used to seal masonry surfaces.

4.4.2.5 Thinners

Concrete and Masonry



Thinners such as turpentine, mineral spirit, water, xylene and linseed oil of approved quality shall only be used in accordance with the manufacturers' instructions and with prior approval of the engineer.

4.4.2.6 Brushes

All brushes used for painting work shall conform to B.S 2992 or equivalent American Standards.

4.4.3 *Preparation of Surface*

All loose material and dirt on the surface shall be removed with a brush. Holes and irregularities of surface shall be repaired with lime putty, and the surface shall be allowed to dry before applying whitewash or colour wash and weather resistant paint. All greasy spots shall be given a coat of rice, water and sand. Surfaces discolored by smoke shall be washed with a mixture of wood ashes and water or yellow earth before being white-washed or painted.

4.4.4 *Application*

Three coats of white or colour wash shall be applied on the prepared surface with a brush. Paint or finish to any surface shall be applied when ambient temperature is 10 degree centigrade or above and less than 43 degree centigrade unless other wise recommended by the manufacturer. No painting shall be done above 90% relative humidity. Drop cloths shall be placed to adequately protect all finished work.

All paint and coating materials shall be in thoroughly mixed condition at the time of application. All work shall be done in a workman-like manner, leaving the finished surface free from drips, ridges, waves, laps and brush marks. All paints shall be applied under dry and dust free conditions.

All primary paint shall be applied by brushing. The first coat of paint shall be applied immediately after cleaning.

4.5 MEASUREMENT AND PAYMENT

4.5.1 *Cement Plaster*

Measurement and payment for cement plaster shall be made in accordance with the provisions given hereafter.



4.5.1.1 Method of Measurement

Measurement shall be made of cement plastering for the actual area in square foot in accordance with this section of Specification or as directed by the Engineer.

4.5.1.2 Basis of Payment

Payment shall be made for the number of square foot of surface area cement plastered at the contract unit price per square foot and shall constitute full compensation for furnishing all materials, equipment and labour including all incidentals necessary to complete the work in strict accordance with this Section of Specification.

Pay Item	Description	Unit
4-1	Provide and apply ½” thick 1:3 Cement Sand Plaster for ceiling.	Sq.ft.
4-2	Provide and apply ½” thick 1:4 Cement Sand Plaster for walls.	Sq.ft.

4.5.2 Pointing

Measurement and payment for cement pointing shall be made in accordance with the provisions given hereafter.

4.5.2.1 Method of Measurement

Measurement will be made of cement pointing for the actual area in sq.ft in accordance with this section of Specification or as directed by the Engineer.

4.5.2.2 Basis of Payment

Payment shall be made for the number of square feet of surface area cement pointed at the contract unit price per square feet and shall constitute full compensation for furnishing all materials, equipment and labour including all incidentals necessary to complete the work in strict accordance with this section of specification.

Pay Item	Description	Unit
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4-3

Provide and apply Cement Sand mortar

- i) Flush pointing Sq.ft
- ii) Struck pointing Sq.ft

4.5.3 *Painting*

Measurement and payment for white washing and weather resistant paint shall be made in accordance with the provisions given hereafter.

4.5.3.1 Method of Measurement

The measurement shall be made in sq.ft of the actual surfaces completed and approved.

4.5.3.2 Basis of Payment

Payment shall be made for number of square feet of the actual surface painted measured as provided above at the Contract unit price per square feet for the respective item and shall constitute full compensation for all materials, equipment, labour, including all incidentals necessary to complete the work.

Pay Item	Description	Unit
4.3	Provide and apply white wash.	Sq.ft.
4.4	Provide and apply weather resistant paint.	Sq.ft.
4.3	Provide and apply vinyl emulsion paint.	Sq.ft.
4.4	Provide and apply enamel paint.	Sq.ft.



SECTION - 6

ROOF INSULATION

6.1 SCOPE

The work consists of insulation with brick tiles of sizes 9"x4" x 1 1/2" or any other approved size laid in cement mortar (1:3) over rammed mud laid to grade as shown on drawings after applying two coats of bitumen on the R.C.C. roof slab surface at 30/25 lbs, respectively for first and second coats at specified heat and laying 20 lbs. polythene sheet complete in all respects.

6.2 MATERIALS

The brick tiles shall comply with the standards set in "Section Bricks" except for their thickness and strength. The cement, sand and water shall meet the requirements as given in Section "CONCRETE".

Bitumen shall be PB3 or PB4

The clay for making mud shall be clean, free of all organic and other injurious matters.

6.3 APPLICATION

6.3.1 *Bitumen Painting*

Bitumen heated to the specified temperature and applied on R.C.C. roof slab cleaned and dried surface including sanding at 1 1/2 cu.ft per hundred sq.ft. of surface.

6.3.2 *Laying Mud*

The clay shall be mixed with reasonable quantity of water and thoroughly kneaded to form a thick paste to which copped straw at the rate of 10 lbs. per cu.ft of mud shall be added. It shall be laid and thumped with wooden trowels to form the slope as shown on the drawings.

6.3.3 *Laying of Tiles*

The brick tiles shall be laid in cement mortar (1:3) in fall/slope as shown on drawings.

6.3.4 *Pointing*



The brick tiles shall then be flush pointed in cement mortar (1:2)

6.3.5 Curing

The tiles laid shall be cured properly for ten days.

6.4 MEASUREMENT AND PAYMENT

6.4.1 *Roof Insulation*

Measurement and payment for roof insulation shall be made in accordance with the provisions given hereafter.

6.4.1.1 Method of Measurement

The measurement of the roof insulation shall be made in actual area acceptably laid in square feet complete in all respects as per relevant drawing or as directed by the Engineer.

6.4.1.2 Basis of Payment

Payment for roof insulation work shall be made for the number of the sq.ft measured of roof insulation provided above at the Contract Unit Price per sq.ft. It includes the cost of bitumen, mud laying, laying of tiles & pointing and shall constitute full compensation for providing and furnishing all materials, equipment, labour and all incidentals necessary to complete the work in accordance with the specifications for B.O.Q. items.

Pay Item	Description	Unit
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6.1	Provide and Lay Roof insulation earth and tile roofing as per drawing	Sft.
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SECTION - 7

FLOORING

7.1 SCOPE

The work covered in this Section consists of furnishing all plant, labour and material etc., and of performing all operations in connection with making cement concrete floor in conformity with lines and dimensions shown on the Drawings and in strict accordance with these specifications.

7.2 MATERIALS

Cement, sand and aggregate shall conform to the requirement of relevant clauses in section "CONCRETE"

7.3 BASE FOR FLOORING

The base for flooring shall be laid down when the earth filling has been done up to the specified level in a layer of 6 inches and has been properly watered and consolidated and correctly leveled.

A layer of sand about 4" thick shall be laid and rammed after having saturated so that a 4" layer is reduced to about 3" after compaction.

Portland cement concrete of Class C (2000 psi) shall be laid in one operation in a uniform layer of specified thickness, absolutely true and parallel to the required level of the finished surface. Concrete shall be cured for at least 7 days before any topping is laid. Before laying the surface shall be washed and scrubbed with wire brushes so that the concrete in the base and the topping are well bounded.

7.4 CEMENT CONCRETE FLOORING

Before laying the topping, the surface of the base shall be divided into symmetrical panels by glass strips. The size of panels, unless otherwise specified, shall not exceed 3 ft. square and concrete shall be placed in alternative panels. The top of the glass strips shall be adjusted to the specified level of the finished floor surface.

Cement concrete floor shall consist of laying a topping of cement concrete of Class B (3000 psi) of specified thickness over the prepared and finished base as or roughed surface of floor slabs.



Placing operation shall be specifically timed. No sooner the concrete has been evenly spread in a panel, then it shall be beaten for about 5 to 10 minutes with "wooden thapies" (about 5 lbs. weight).

Immediately after consolidation, the surface shall be leveled with a wooden trowel. Excessive trowelling in the early stages shall be avoided. The surface shall be tested with a straight edge to detect undulations, which, if found, shall be eliminated. The finer stuff in the concrete which has come to the surface with the stroking shall be quickly but carefully smoothen with the steel trowel. When the concrete has hardened sufficiently, trowelling shall be done with steel trowel. No dry cement or a mixture of dry cement shall be sprinkled on the surface for hardening the surface.

7.5 BRICK FLOORING

The work covered by this item consists of furnishing and laying 4 inch sand over prepared earth to required slope and grade. 3 inch thick layer of Class D (1000 psi) concrete is laid over it and 4.5 inch thick brick on edge are laid in 1:3 cement sand mortar. These joints of these bricks are struck at the top by flush pointing.

7.5.1 *Method of Construction*

The method consists of placing bricks on edge for flooring in 1:3 cement sand mortar over 4 inch sand and 3inch Class D (1000 psi) concrete and striking the joints of bricks with flush pointing and laid over thoroughly consolidated bottom by ramming and watering before laying this floor.

7.6 CURING

The concrete flooring properly laid shall be cured for 7 days.

7.7 MEASUREMENT AND PAYMENT

7.7.1 *Flooring Material*

Measurement and payment for concrete flooring, brick flooring and compacted sand fill will be made in accordance with the provisions given hereafter.



7.7.1.1 Method of Measurement

Measurement will be made for the number of square feet of flooring acceptably placed complete in all respects as per drawings and in strict accordance with this section of specification or as directed by the Engineer.

7.7.1.2 Basis of Payment

Payment will be made for the number of square feet of flooring measured as above at the Contract Unit Price per square feet and shall constitute full compensation for all work including earth and sand filling, glass strips, concrete, brick on edge and all other incidentals to complete the work.

Pay Item	Description	Unit
7.1	Provide and Lay compacted 3" sand fill and Cement Concrete Floors using 1/4" thick glass strips for panel.	Sft.
7.2	Provide and Lay compacted 4" sand fill and brick on edge flooring laid over 3 inch thick glass class D concrete.	Sft.
7.3	Provide and Lay dry brick or stone ballast 1-1/2" to 2" gauge under floor.	Cft.
7.4	Provide and Lay PCC class B (300 psi) floor 1-1/2" thick in ground floor laid over dry brick.	Sft
7.4	Provide and Lay floors of 1 inch thick floor of chip tile 12" x 12" x 1" in grey cement over 1" cement mortar 1:4.	Sft



SECTION - 8

METAL WORKS

8.1 SCOPE

This Section of specification consists of furnishing all plant, labour, equipment and materials in performing all operations in connection with providing and fixing metal works such as shutter, brackets etc. All metal gutters including painting shall be according to the Schedule specified on drawings and manufactured by a firm to be approved by the Engineer. They shall be handled with care, shall be staked on edge on level bearers and be supported evenly against a wall or vertical bearers, under cover.

8.2 CONTRACTOR TO FIX

The Contractor shall fix the windows, doors & rolling shutters as described. He shall be responsible for storing windows etc., and carrying to their respective positions, assembling composites, bedding and jointing with Matic at the mullions and transoms, fixing lugs and screws to frames, placing in the openings and bedding with cement and pointing externally with mastic.

8.3 BUILDING IN

Where applicable metal gutters etc., shall be built in, set to designed slope and geometry. When screwing up lugs or fixing screws, care shall be taken to ensure that shape etc. are not distorted.

8.4 FIXING INTO PREPARED OPENINGS

Gutters etc., to be fixed into prepared slope and alignments and have at least 1/8 inch tolerance all round. Supporting frames shall be chalked with mastic cement of an approved make.

8.5 FABRICATION OF GUTTERS

Shape:

The steel section shall be thoroughly straightened in the shape by methods that will not injure it before being laid off or worked in any way.

Cutting and Forming:



All members shall be so cut and formed that they can be accurately assembled without being unduly cracked strained or forced into position.

Jointing:

The jointing of the different parts of the members of mild steel shall be carried out by welding process in conformity with the requirements of American Welding Society for such joints. Welding points shall be made quite smooth by filling them and making smooth.

Galvanizing:

If required all exterior doors, frames, anchors, reinforcing and related items shall be fabricated from hot dipped galvanized steel, conforming to BS 729 Part 1. Following fabrication, touch up all welds with liquid Zinc. Window frames and ventilators shall be hot dipped galvanized after fabrication conforming to BS 729 Part 1. Following fabrication, touch up all welds with liquid Zinc.

8.6 PUTTY

The putty shall be of a type specially prepared for use with metal work in tropical conditions.

8.7 PROTECTION OF FITTINGS

Fittings shall be wrapped and protected from damage until all rough trades have been completed.

8.8 FABRICATION OF ROLLING SHUTTERS

8.8.1 Gutter

The gutter shall be fabricated using standard galvanized corrugated segments of the required length according to size of the shutter and of 20 gauge thickness. These segments shall be inter linked properly to allow rotation for smooth rolling up and down.

8.8.2 Supporting Frame for Gutter

The supporting frame shall be of standard mild steel. Steel section strong enough to support the load of the gutter with minimum deflection. This support shall have adequate supports at the ends fabricated from mild steel plates. Gutter shall have bracket supports at regular interval based upon the actual site conditions.



However, due to space limitation for mounting, the same may be adjusted as per site conditions.

8.8.6 Cover

The cover shall be fabricated from 22 SWG gauge mild steel sheet of uniform shape and size without deformations.

8.10 PAINTING PREPARATION OF THE METAL WORK

Iron and steel surfaces shall be cleaned by means of solvents approved methods. Cleaned surfaces shall be primed as soon as practicable after cleaning.

8.11 PAINT APPLICATION

Unless otherwise specified or instructed the Contractor shall apply paints as follows:

8.11.1 Internal Surfaces of Steel Work

2 coats Zinc Chrome primer
2 under coats
1 glass finish coat

8.11.2 External Surfaces of Steel Work

2 Coats Zinc Chrome Primer
1 aluminium bitumastic under coat
1 aluminium bitumastic finish coat.

All painting coats upto and including the first undercoats, shall be applied under cover at “WORKS” before dispatch to the Site. (The second undercoat and the finishing coat shall be applied after erection on Site). Extreme care shall be taken to protect paint coats during transit.

8.12 PAINT

The paints for any painting sequence shall be mutually compatible and of the same approved manufacture. All paints shall be supplied in small sealed containers each not exceeding one gallon capacity.



8.13 WIRE GAUGE

Unless otherwise specified the wire gauze shall be of best quality as approved by the Engineer uniformly woven wire webbing of 12 x 12 meshes to 645 mm (one sq.inch) made from 22 gauge galvanized iron wire. All panel shall be in one piece and no joints shall be allowed in the gauge.

Wire gauge shall be fixed as shown on the drawings or as directed by the Engineer. The gauze shall remain right to the full width and without any sag.

8.14 MEASUREMENT AND PAYMENT

8.14.1 Gutters

Measurement and payment for steel gutters shall be in accordance with the provisions given hereafter.

8.14.1.1 Method of Measurement

The quantity to be paid for under this item shall be paid as per the actual length covered along slopy roofs complete in all respects as per relevant drawings or as directed by the Engineer.

8.14.1.2 Basis of Payment

Payment shall be made for the actual linear length of the steel gutters doors, as provided above at the Contract Unit Price per RFT. for all supply of items and means of fixing, cutting, shaping, priming, painting as necessary and all other operations required for the complete erection and commissioning to the full satisfaction of the Engineer for the item:

Pay Item	Description	Unit
8.1	Provide, Install and paint Complete Steel gutter, brackets, painting etc.	Rft.



SECTION - 9

MISCELLANEOUS

9.1 SCOPE

The work covered by this section of the specifications consists of furnishing all plants, labour, equipment and materials and of performing all operations in connection with the miscellaneous items in strict accordance with this section of the specifications and the applicable drawings or as directed by the Engineer.

9.2 MATERIALS AND CONSTRUCTION

9.2.1 *Steel Work*

Structural steel work shall comply in all respects with B.S. 449. Steel for rolled sections shall comply in all respects with B.S. 16. Welding of steel work shall comply with B.S. 1856. High strength bolted connection shall comply with B.S. 3294.

9.2.2 *Steel Ladder/Stairs*

Steel access ladders shall comply with B.S 4211 unless otherwise stated. Stringers shall be rectangular section measuring 2-1/2 inches by 1/2 inches spaced 15 inches apart and rungs shall be 3/4 inch diameter spaced at 12 inches centre. Hoops shall be of circular pattern and shall be bolted to the stringers so as to be removable. Ladders shall be painted with black enamel paint of an approved make.

Steel stairs shall be as shown on the Drawings or as directed by the Engineer.

9.2.3 *Brick Pavement*

Bricks for pavement in the water works areas shall comply with the requirements of Section-3 of the technical specifications. Excavation and compacted backfill shall be in accordance with the requirements of Section-1 of the Technical Specifications. Bricks joints shall be sand grouted. Pavement shall be constructed in accordance with the Drawings or as directed by the Engineer.

9.2.4 *Level Indicator*

Level indicators shall be installed in accordance with the applicable drawings and as directed by the Engineer. The contractor shall be responsible for manufacturing and fixing of all components involved to make it a complete working unit.



9.2.5 *Lightening Arrester*

Lightening Arrester including all associated copper strip shall be installed strictly in accordance with the applicable drawings and as directed by the Engineer. The Contractor shall be responsible for providing and fixing all copper strips and other components to make it a complete working unit.

9.2.6 **Water Storage Tank**

1) The water tanks must comply with Pakistan Standards and Quality Control Authority (PSQCA) specifications for plastic storage tanks (PS: 4991-2004) and be made from virgin, food-grade polyethylene, UV-stabilized to prevent degradation. The tanks, with capacities ranging from 300 - 500 Gallons, must be rotomolded in a single piece with uniform wall thickness and free from defects.

2) They should have a cylindrical, vertical design with a domed top and flat bottom, a tightly fitting lockable lid, at least one inlet and one outlet with threaded connections, a vent or overflow outlet, and provision for a level indicator. The tanks must also have a designated area for affixing a custom monogram or logo sticker as specified by the client.

3) Each tank must withstand hydrostatic pressure without deformation and be leak-proof, certified for storing potable water, and come with documentation proving compliance with food-grade standards.

4) Reputable manufacturers like Dura or Popular should supply the tanks, which must have a minimum 5-year warranty against manufacturing defects. Clear installation and maintenance instructions, along with labels indicating the manufacturer's name, capacity, material grade, and date of manufacture, must be included. Suppliers must provide compliance certificates, technical datasheets, and warranty documents with the delivery. Reference image of the tank with logo is attached in the section below.

9.2.7 Toilet Fixtures and Plumbing Works

Toilet fixtures and plumbing works as approved by the Engineer shall be fixed according to standard drawings. The Contractor shall be responsible for proper fixing of the plumbing works strictly in accordance with engineering practice. This work include complete items to make the system functional.



9.2.8 Water Filter

1) The water filtration system must comply with Pakistan Standards and Quality Control Authority (PSQCA) specifications and applicable ISO standards, specifically ISO 9001:2015 for quality management and ISO 14001:2015 for environmental management. The system should be a three- stage ultrafiltration (UF) type designed for kitchen use with removable and replaceable filters. The first stage must include a 5-micron sediment filter to remove large particles and sediments, the second stage must have a granular activated carbon (GAC) filter to remove chlorine, odors, and organic compounds, and the third stage should use a UF membrane with a pore size of 0.01 microns to remove bacteria and viruses, ensuring the water is potable. The filtration system must be made from food-grade, BPA-free materials compliant with FDA standards. It should be designed for easy installation and maintenance, with each filter stage easily accessible for replacement.

2) The system should feature a compact design suitable for under-sink installation, with inlet and outlet connections compatible with standard plumbing fittings. It must be capable of handling a minimum flow rate of 1.5 liters per minute and operate effectively at water pressures between 1.5 and 4.0 bar. The system should include a user-friendly indicator for filter replacement and come with clear instructions for installation, use, and maintenance. Reputable manufacturers with proven track records should supply the filtration systems. Suppliers must provide compliance certificates, technical datasheets, and warranty documents, ensuring the system meets all required safety and performance criteria. The system must come with a minimum 2-year warranty against manufacturing defects.

9.2.9 Septic Tank

The work shall consist of furnishing all plant, labour equipment, appliances and materials and in performing all operations in connection with construction of Septic Tank including excavation, brick/block work, plastering, concreting, inlet and outlet pipes, manhole covers etc. in accordance with these specifications in the relevant sections and in reasonably close conformity with the lines, grades and dimensions shown in the drawings or directed by the Engineer.

9.2.10 Float Switches

The float valve is constructed from stainless steel materials such as SS201, SS304, or SS316, ensuring durability and corrosion resistance suitable for various applications. It features a 2-way configuration with the float lever positioned downwards for optimal operation. The valve is designed to handle media including potable water, diesel, and kerosene, making it versatile for



different fluid types. It accommodates connection sizes ranging from 1/2” to 4” and includes a float with a diameter of 200 mm to regulate fluid levels effectively. The valve is rated for a maximum design temperature of 60°C and can withstand pressures up to 8 Kg/cm². Its horizontal mounting position allows for efficient installation and operation in diverse industrial and commercial settings, ensuring reliable performance and long-term durability.

9.2.11 Water Quality Sensors

The water quality sensors for installation on water tanks must measure Electrical Conductivity (EC), pH, and Total Dissolved Solids (TDS) with precision. The EC sensor should cover a range of 0 – 200,000 µS/cm, with ±1% accuracy across three auto-range scales. The TDS sensor should measure from 0 – 100,000 mg/L (ppm), with ±1% accuracy over two auto-range scales. The pH sensor should operate within a range of 0 – 14 pH units, with ±0.1 pH accuracy. These sensors are crucial for continuous monitoring to ensure water quality meets safety standards, with clear documentation for installation and calibration procedures provided.

9.2.12 Testing, Commissioning and Finishing

- 1) After the installation phase is completed, the contractor is obligated to conduct comprehensive field tests on all equipment, materials, and systems under the supervision of the client or their authorized representative. The Contractor is responsible for procuring and utilizing all necessary tools, instruments, test equipment, materials, and personnel essential for the thorough execution of the testing procedures. All test results must be meticulously recorded and presented to the Client, endorsed by the Contractor's testing engineer.
- 2) Additionally, the Contractor must seek prior approval from the Client before initiating any testing activities. Testing may also be conducted at accredited testing laboratories such as PCSIR, UET Lahore, or other competent public sector facilities that conform to both local and international material testing standards. These provisions ensure that all installed components meet specified performance criteria and regulatory requirements
- 3) Finishing works constitute an integral component of the project and shall be executed in accordance with site-specific requirements. Such works may include, but are not limited to, the painting of facades, walls, and/or roofs of the structures. All finishing works are subject to the approval of the Procuring Agency
- 4) The contractor is liable for the upgradation and/or repair of damages occurred to the public and private properties/assets during the installation of the rainwater harvesting system. The upgradation will include but not limited to paint works, civil works, wood works and/or as deemed appropriate by the representative of the procuring agency.



5) The Contractor will ensure to display the project logo/monogram with paint or as recommended by the Procuring Agency on the water collection tanks were identified by the Procuring Agency. The design must include a QR code, which when scanned, provides information about the project and safe water use practices for potable and non-potable rainwater usage applications and other education material. The design of the project logo/monogram and information displayed on QR code is subject to approval of the Procuring Agency.

6) The Contractor shall install a Project Information Plate of stainless steel or equivalent material, with dimensions of at least 12" x 18", featuring the project title and logo and other related information engraved and/or imprinted as specified by the procuring agency. The contractor shall seek approval from the procuring agency for the design, dimensions, pasting mechanism and material of the information plate prior to its manufacturing and installation. Reference Image is attached in the section below.

9.2.13 Water Meter

1) Water meters shall be supplied by approved manufacturers such as KSB, or other equivalent and approved manufacturers, and must comply with relevant international and local standards (e.g., ISO 4064, AWWA C700, etc.).

2) The water meter body shall be made of high-quality materials such as brass, bronze, or stainless steel, suitable for potable water applications. The components including impellers, seals and glass should be durable, made of corrosion free material and of high quality and grade.

3) Water meters shall be available in different sizes as per the size of pipe adopted for the rainwater harvesting system, including but not limited to 1/2-inch, 3/4-inch, 1 inch, or as per the project requirements.

4) Water meters must have an accuracy class of at least Class 1 or Class 2. The starting flow rate, minimum flow rate, and maximum flow rate should conform to the standards specified for the size of the meter. Functional tests, pressure tests, and accuracy tests must be conducted to ensure proper operation. A minimum warranty period of one year from the date of commissioning should be provided.

9.3 MEASUREMENT AND PAYMENT

9.3.1 *Miscellaneous Items*

Measurement and payment for miscellaneous items will be made in accordance with the provisions of this clause specified hereinafter.



9.3.1.1 Method of Measurement

Rolled Section Steel will be measured by the length in linear ft. for the work satisfactorily completed as shown in the Drawings or as directed by the Engineer.

Steel ladder/stairs will be measured by the length in linear ft. for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Brick Pavement will be measured by the area in square foot for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Level indicators shall be measured by the number for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Lightening Arrester shall be measured by the number for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Disinfection of overhead water tanks will be measured by the number for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Malleable cast iron rungs shall be measured by the number for the work satisfactorily provided & laid as shown on the drawing or as directed by the Engineer.

Manhole covers shall be measured by the number for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Air vents shall be measured by the number for the work satisfactorily completed as shown on the Drawings or as directed by the Engineer.

Concrete service ducts shall be measured by the number of linear foot of duct satisfactorily provided & laid as shown on the drawing or as directed by the Engineer.

Mild steel bar screen and galvanized mild steel grating shall be measured by the area in the square ft. for the work satisfactorily provided & installed as shown on the drawings or as directed by the Engineer.

No measurement for fixtures along with plumbing works will be made. Lump sum will be the basis for payment.



Measurement will be made for each item of fan and accessories all acceptably supplied and installed by the contractor as a complete unit.

Septic Tank along with items as shown in the drawing shall be measured by the number for the work satisfactorily completed as directed by the Engineer.

Penstock gate along with complete assembly and fixation as shown in the drawing shall be measured by the number for the work satisfactorily completed as shown on the drawing or as directed by the Engineer.

9.3.1.2 Basis of Payment

Payment will be made in accordance with the unit prices in the Bill of Quantities of the various items in accordance with the specifications and shall constitute full compensation for furnishing all materials, equipment and labour and for performing all operations necessary to complete the work.

Pay Item	Description	Unit
1	Provide, fix and paint rolled steel section.	Lft.
2	Provide and lay brick pavement as shown on drawings or as directed by the Engineer.	Sft.
3	Provide and fix level indicator complete in all respects as per drawings and specifications or as directed by the Engineer.	No.
4	Provide and fix lightening arrester, copper earth strips and all other accessories complete in all respects as per drawings or as approved by the Engineer.	No.



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5	Clean, test and disinfect overhead water tank.	No.
6	Provide and lay underground concrete service ducts of types as shown on the drawings or as directed by the Engineer.	Lft.
7	Provide and fix all toilet fixtures along with plumbing works complete with all accessories fittings, manhole chambers, gully traps, as shown in drawings or as directed by the Engineer	Lump sum
8	Construction of septic tank complete in all respects as per drawings and specifications.	No.



ENVIRONMENTAL MANAGEMENT PLAN FOR HOUSEHOLD RWH SYSTEM

TABLE 1: ENVIRONMENT & SOCIAL MANAGEMENT PLAN

Proposed Scheme Activities	Potential Impacts	Mitigation Measures	Implementing Responsibility	Monitoring Responsibility
A. PRE-INSTALLATION PHASE				
<p>Prior Intimation to the HH <i>(about the installation, date, duration, and possible disruption during the Installation) and take consent</i></p>	<ul style="list-style-type: none"> • Avoid nuisance to the house members • Temporary disruptions to water supply (or other) services • A sense of intrusion or privacy issues • Conflicts due to miscommunications, delays in agreed work timelines, disruptions, etc. 	<ul style="list-style-type: none"> • Conduct preinstallation meetings with the households and provide advance notice of the particular activities so that household members can make alternative arrangements if needed. • Inform household members well in advance of any planned disruptions to water or other essential services. Provide details on the expected duration and impact of the disruption. • Inform them about possible noiserelated issues, specifically if elderly, or disabled persons are at the house or in the neighborhood. 	<p>Contractor</p>	<p>Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p>PMU Murree <i>(periodic)</i></p>



		<ul style="list-style-type: none">• Establish a mechanism for household members to provide feedback or express concerns during the preconstruction phase. Addressing concerns promptly can help mitigate negative perceptions.		
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B. INSTALLATION PHASE

<p>Digging/ Trenching/ Dismantling</p>	<p><u>Environmental Issues:</u></p> <ul style="list-style-type: none"> • Noise: The installation process may generate noise, which could disturb household members. • Dust: Dust which may affect visibility • Debris: Solid waste may be generated during the installation work • Localized Soil Erosion: Small-scale digging or trenching while installing tanks can cause soil to loosen, potentially leading to minor erosion. 	<ul style="list-style-type: none"> • Plan noisy activities during hours when household members are least likely to be disturbed. (Discuss in pre-installation phase) • Inform household members in advance about the timing of noisy activities, and the extent of impact, so they can plan around them if needed. • Ensure that all tools and equipment are well-maintained, as poorly maintained tools can be noisier. 	<p align="center">Contractor</p>	<p align="center">Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p align="center">PMU Murree <i>(periodic)</i></p>
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	<p>Disturbance to Plants/lawns: The installation work might disturb existing vegetation, such as garden plants or lawns, which can affect the aesthetics and stability of the soil in the immediate area.</p> <p><u>Social Issues:</u></p> <ul style="list-style-type: none"> • Injury: Minor injuries to labor • Nuisance: Temporary dissatisfaction or possible grievances of household residents. • Inaccessibility: Parts of the household may be temporarily inaccessible during installation, causing inconvenience to residents. • Safety: Safety hazards to the resident population. 	<ul style="list-style-type: none"> • Break up noisy work into shorter sessions to give household members breaks from the noise (if the impact is higher). • In the case of schools and public buildings, choose off-timing to avoid any negative impacts. • Sprinkling of water at project sites to avoid dust-related issues. • Removal of excess matter/ debris from the site immediately. • Collect all waste materials, including plastics and packaging, and dispose of them properly. • Take simple measures like covering exposed soil with tarps or mulch can prevent minor erosion. • Provision of personal protective equipment, such as earmuffs, masks, etc. to household residents and workers. • Adequate safety precautions such as helmets, safety shoes, gloves, etc. 		
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		<p>should be provided to the labor</p> <ul style="list-style-type: none">• Emergency contact numbers will be displayed• A first aid kit will be arranged.• Clearly demarcate the areas where work will be conducted to limit the presence of workers in private or sensitive parts of the home.		
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<p>Implementation of Installation of Rainwater Harvesting Units Work</p>	<p><u>Environmental Issues</u></p> <ul style="list-style-type: none"> • Potential contamination if the system is not maintained properly • Spillage if the system is not properly designed <p><u>Social Issues</u></p> <ul style="list-style-type: none"> • Poor design results in extra space utilization. • Poor design results in area blockage and poor esthetics. 	<ul style="list-style-type: none"> • Ensure that the roof is made of nontoxic material. • Design the RWH plant in such a way as to avoid harmful substances entering into the tank (e.g. sieve, etc.) • Design overflow mechanisms to direct excess water to recharge pits or gardens. • Design the RWH plant in such a way as to handle peak flow also includes leaf screens • Storage tank must be food-grade materials, UVresistant, and sealed to prevent contamination. • Multiple filtration stages to remove debris, sediments, and pathogens. • Pipes and pumps to distribute harvested water to various points of use. 	<p>Contractor</p>	<p>Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p>PMU Murree <i>(periodic)</i></p>
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<p>Oil Paint on Rooftops</p>	<ul style="list-style-type: none"> • Harmful fumes (VOCs) and bad odor for a short period • Spills or Drips • Waste and disposal related Issues 	<ul style="list-style-type: none"> • Prefer oil-based paints with low VOC content to reduce harmful emissions. • Ensure workers use appropriate PPE, including masks, gloves, and protective clothing. • Cover the roof and surrounding areas with drop cloths or tarps to catch any paint drips before they reach the surface or to prevent them from entering the rainwater harvesting system. • Train workers to use careful application techniques to minimize drips, such as not overloading brushes or rollers with paint and applying paint evenly. • Have emergency arrangements for absorbent materials clean-up tools for immediately clean up any spills or drips. • Store paint cans securely with lids tightly sealed to prevent accidental spills. • Properly dispose off empty boxes of paints, cleanup 	<p>Contractor</p>	<p>Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p>PMU Murree <i>(periodic)</i></p>
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		materials/absorbent pads/rags carefully.		
Vehicle Movements for Material Transport	<ul style="list-style-type: none"> The presence of a vehicle or loader in a narrow street can block traffic, causing congestion and making it difficult for other vehicles and pedestrians to pass. It may also restrict access to nearby homes or businesses temporarily and in some cases. Unloading materials might create hazards, such as falling objects or obstructed walkways. 	<ul style="list-style-type: none"> Schedule deliveries during off-peak hours when traffic is minimal to reduce congestion. Alternative routes should be provided. ensuring safe movement and unloading. Vehicle maintenance will be ensured. Sprinkling of water at project sites Materials will be procured from the nearest supplier, that meets the design and cost criteria of the project. 	Contractor	<p>Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p>PMU Murree <i>(periodic)</i></p>
Privacy issues	The privacy of the residents may be disturbed.	<ul style="list-style-type: none"> Ensure that all workers are briefed on the importance of respecting household privacy and minimizing their presence in non-work areas. Ensure that they understand the importance of discretion and professional conduct while on the property. Avoid any activities during nighttime 	Contractor	<p>Resident Supervision Consultant <i>(Regular Monitoring)</i></p> <p>PMU Murree <i>(periodic)</i></p>



The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



PROJECT

Rooftop Rainwater Harvesting In Murree District

DRAWINGS

NOVEMBER, 2024

FOOD GRADE RAINWATER STORAGE TANK DETAIL				
NO.	MARLAS	CAPACITY (GALLONS)	DIA	HEIGHT
1	3	300	44"	49.5"

SIZING OF FIRST-FLUSH DIVERTER						
AREA OF PLOT	TOTAL AREA	EFFECTIVE AREA	REQUIRED VOLUME	DIA	LENGTH	VOLUME AVAILABLE
Marla	sft	sft	gallons	Inch	feet	gallons
3	817	572	4.8	4	9	4.9

NOTE:

- Tanks dimension may vary as per individual brands and subject to approval of client and/or Engineer Incharge.
- Tank Pedestal Height may vary as per site.
- Roof dimensions may vary as per site requirements and subject to detailed design by the contracting firm.
- Detailed designs of Rainwater Harvesting Systems for individual households subject to approval of client and/or Engineer Incharge.
- Gutter sizing has been based upon the design manual of Development Technology Unit, University of Warwick
- Contractor shall prepare the shop drawings as per actual site conditions and will submit the drawing for consultant's approval prior to execution.

CLIENT:
URBAN SECTOR PLANNING AND MANAGEMENT SERVICES UNIT (PVT.) LTD.



SPONSORING AGENCY:



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PROJECT:
MURREE
ROOFTOP RAINWATER HARVESTING IN MC MURREE

NOTES:
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REVISIONS:

No.	DESCRIPTION	DATE

(TENDER DRAWING)

3-MARLA HOUSE

DRAWING TITLE:

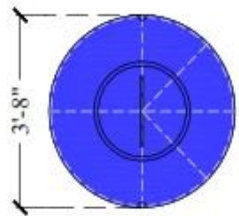
GENERAL NOTES

DRAWN BY: Mr. Z **DATE:** AUG, 2024

CHECKED BY: Engr. W.A

DRAWING NO: 0000/000/02-PH **REV:**

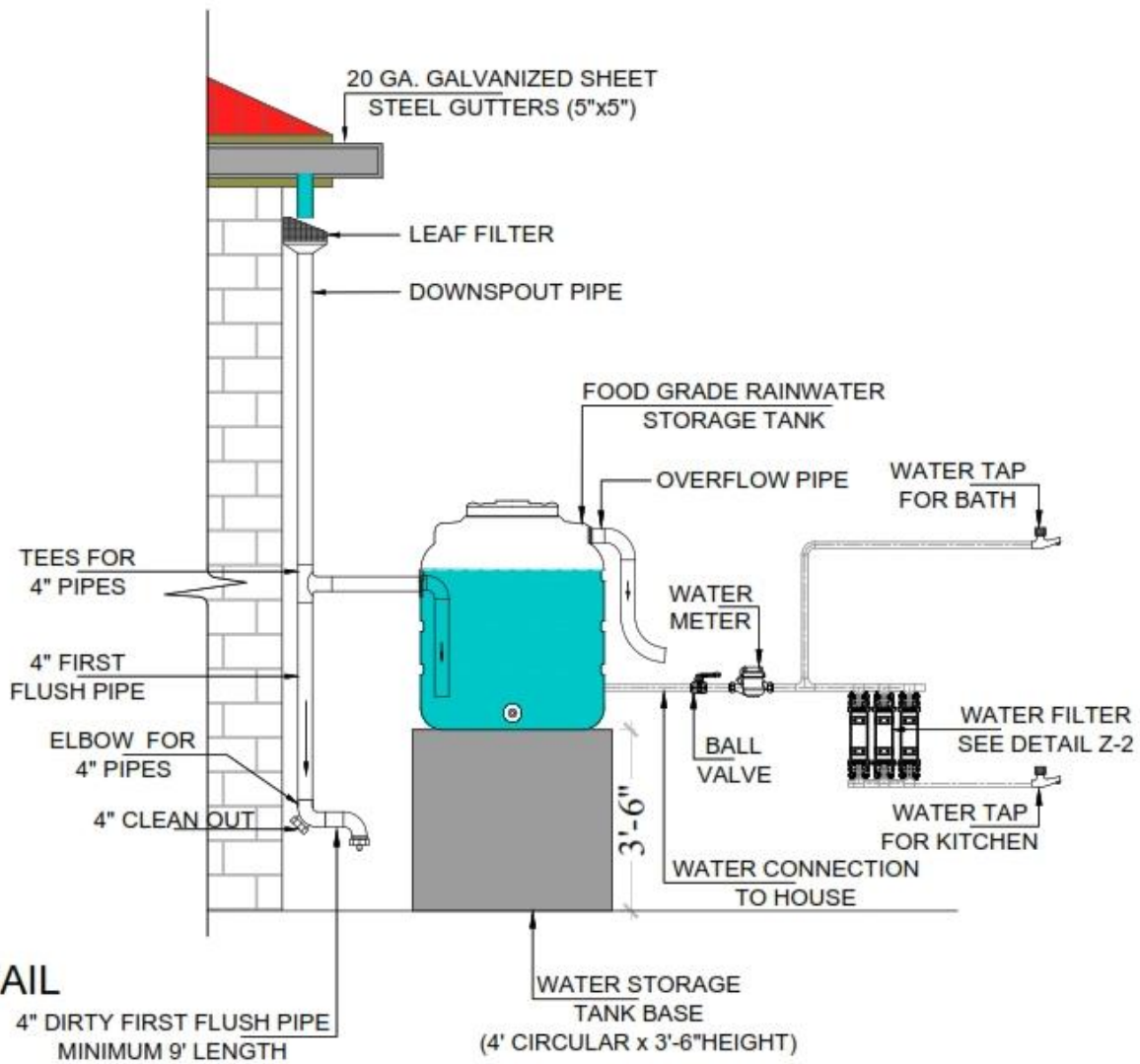
SCALE (A3): **SHEET:**



STORAGE TANK DETAIL

4" DIRTY FIRST FLUSH PIPE
MINIMUM 9' LENGTH

WATER STORAGE
TANK BASE
(4' CIRCULAR x 3'-6" HEIGHT)



CLIENT:
URBAN SECTOR PLANNING
AND MANAGEMENT
SERVICES UNIT (PVT.) LTD.



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PROJECT:
MURREE
ROOFTOP RAINWATER
HARVESTING IN MC MURREE

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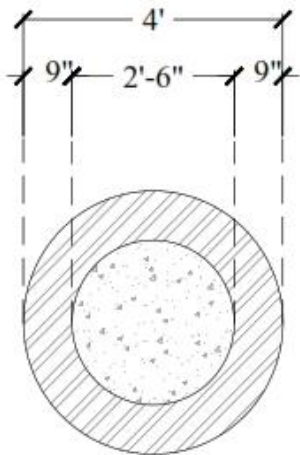
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(TENDER DRAWING)

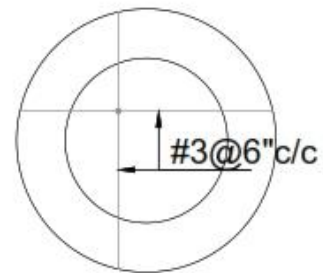
3-MARLA HOUSE

DRAWING TITLE:
STORAGE TANK PLAN FILLING
AND HOUSE CONNECTION DETAIL

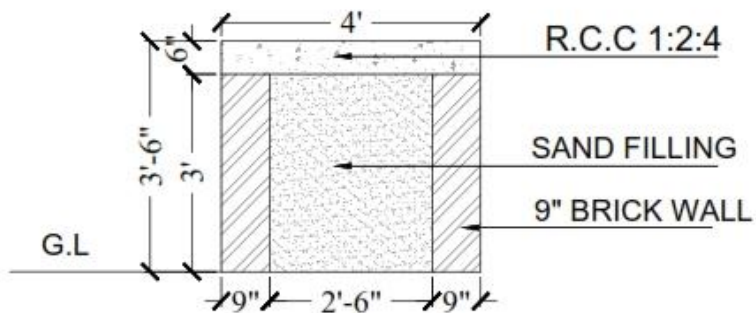
DRAWN BY: Mr. Z	DATE: AUG. 2024
CHECKED BY: Engr. W.A	
DRAWING NO: 0006/000/03-PH	REV:
SCALE (A3):	SHEET:



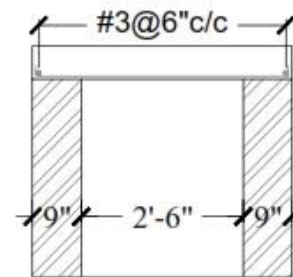
PLAN



PLAN



SECTION
FOUNDATION DETAIL



SECTION
REINFORCEMENT DETAIL

CLIENT:
URBAN SECTOR PLANNING
AND MANAGEMENT
SERVICES UNIT (PVT.) LTD.



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PROJECT:
MURREE
ROOFTOP RAINWATER
HARVESTING IN MC MURREE

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REVISIONS:

No.	DESCRIPTION	DATE

(TENDER DRAWING)

3-MARLA HOUSE

DRAWING TITLE:
TANK BASE FOUNDATION AND
REINFORCEMENT DETAILS

DRAWN BY: Mr. Z	DATE: AUG, 2024
CHECKED BY: Engr. W.A	
DRAWING NO: 0000/000/04-PH	REV:
SCALE (A3):	SHEET:

FOOD GRADE RAINWATER STORAGE TANK DETAIL				
NO.	MARLAS	CAPACITY (GALLONS)	DIA	HEIGHT
1	4	500	48"	68"

SIZING OF FIRST-FLUSH DIVERTER						
AREA OF PLOT	TOTAL AREA	EFFECTIVE AREA	REQUIRED VOLUME	DIA	LENGTH	VOLUME AVAILABLE
Marla	sft	sft	gallons	Inch	feet	gallons
4	1089	762	6.4	4	12	6.5

NOTE:

- Tanks dimension may vary as per individual brands and subject to approval of client and/or Engineer Incharge.
- Tank Pedestal Height may vary as per site.
- Roof dimensions may vary as per site requirements and subject to detailed design by the contracting firm.
- Detailed designs of Rainwater Harvesting Systems for individual households subject to approval of client and/or Engineer Incharge.
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PROJECT:
MURREE
ROOFTOP RAINWATER
HARVESTING IN MC MURREE

NOTES:
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4-MARLA HOUSE

DRAWING TITLE:

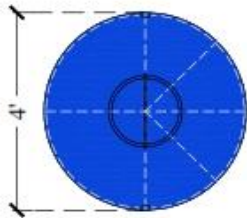
GENERAL NOTES

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SCALE (A3):	SHEET:

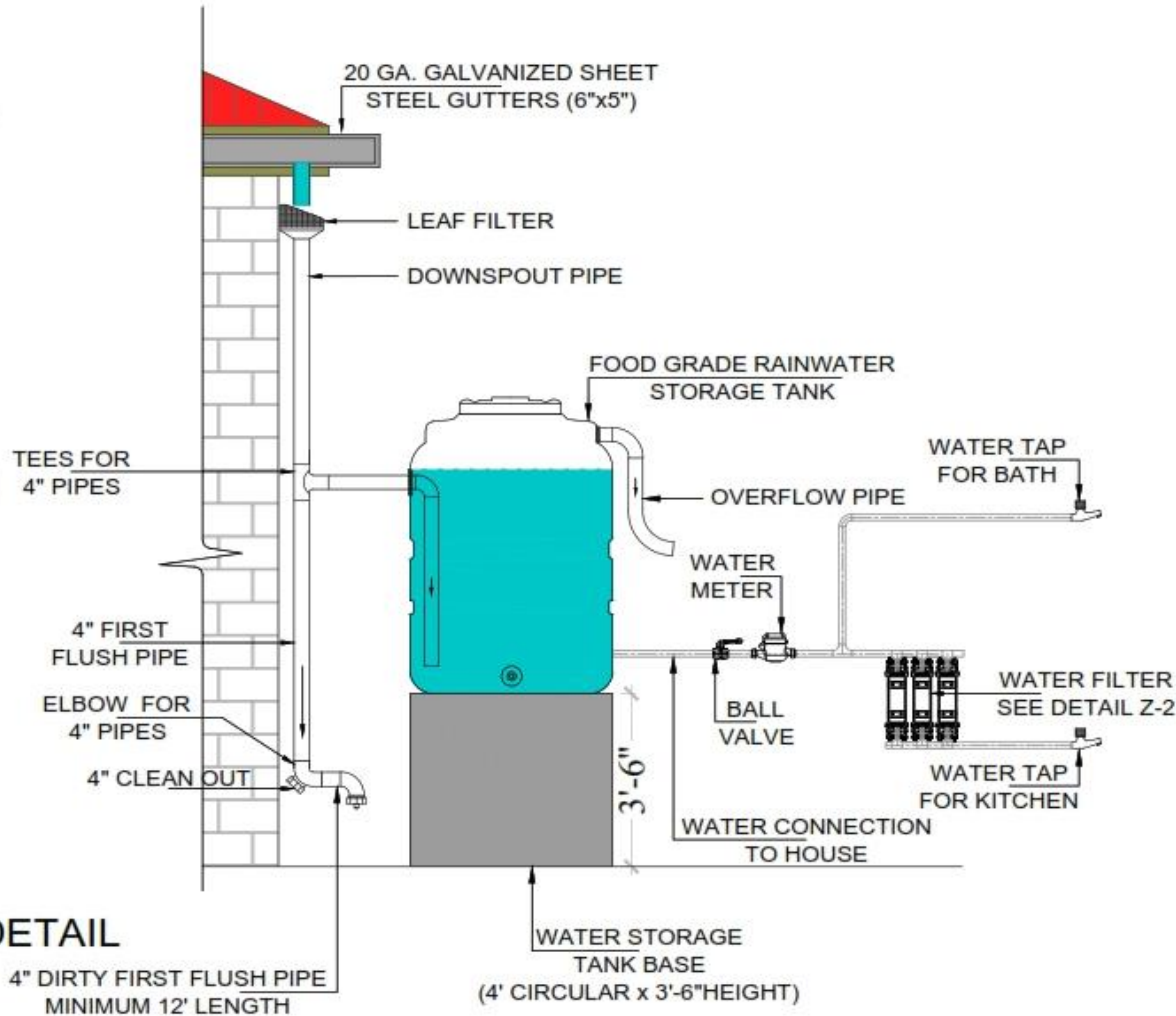
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ELEVATION



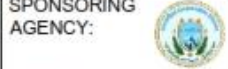
PLAN STORAGE TANK DETAIL



CLIENT:
URBAN SECTOR PLANNING
AND MANAGEMENT
SERVICES UNIT (PVT.) LTD.



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Local Government
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Department



CONSULTANTS:
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Tel: (91) 932 284 1141, 284 1142
Fax: (91) 932 284 1143
E-mail: info@g3e.com
www.g3e.com

PROJECT:



ROOFTOP RAINWATER
HARVESTING IN MC MURREE

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4-MARLA HOUSE

DRAWING TITLE:
STORAGE TANK PLAN FILLING
AND HOUSE CONNECTION DETAIL

DRAWN BY: Mr. Z	DATE: AUG, 2024
CHECKED BY: Engr. W.A	
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FOOD GRADE RAINWATER STORAGE TANK DETAIL				
NO.	MARLAS	CAPACITY (GALLONS)	DIA	HEIGHT
1	5	500	48"	68"

SIZING OF FIRST-FLUSH DIVERTER						
AREA OF PLOT	TOTAL AREA	EFFECTIVE AREA	REQUIRED VOLUME	DIA	LENGTH	VOLUME AVAILABLE
Marla	sft	sft	gallons	Inch	feet	gallons
5	1361	749	6.2	4	12	6.5

NOTE:

- Tanks dimension may vary as per individual brands and subject to approval of client and/or Engineer Incharge.
- Tank Pedestal Height may vary as per site.
- Roof dimensions may vary as per site requirements and subject to detailed design by the contracting firm.
- Detailed designs of Rainwater Harvesting Systems for individual households subject to approval of client and/or Engineer Incharge.
- Gutter sizing has been based upon the design manual of Development Technology Unit, University of Warwick
- Contractor shall prepare the shop drawings as per actual site conditions and will submit the drawing for consultant's approval prior to execution.

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PROJECT:
MURREE
ROOFTOP RAINWATER
HARVESTING IN MC MURREE

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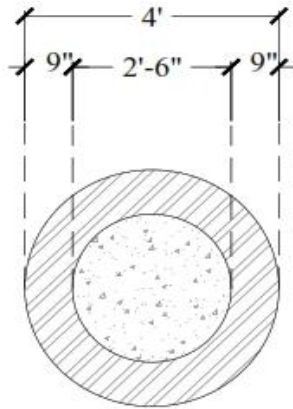
(TENDER DRAWING)

5-MARLA HOUSE

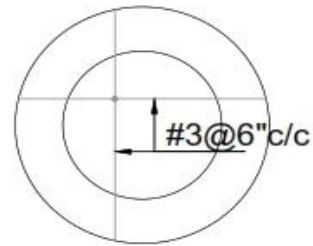
DRAWING TITLE:
GENERAL NOTES

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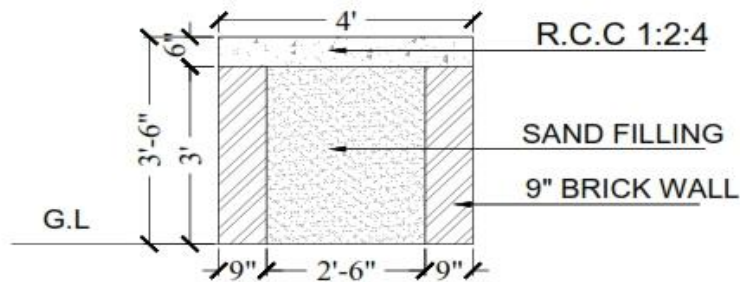
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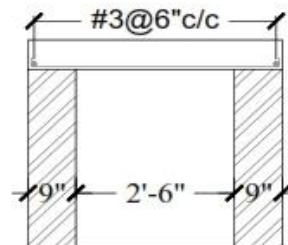
PLAN



PLAN



SECTION
FOUNDATION DETAIL



SECTION
REINFORCEMENT DETAIL

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PROJECT:
MURREE
ROOFTOP RAINWATER
HARVESTING IN MC MURREE

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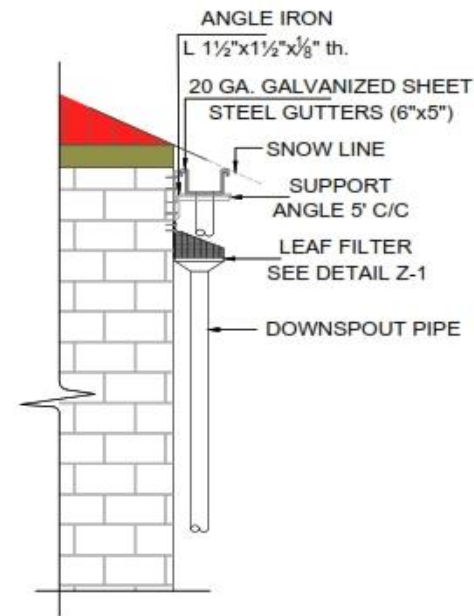
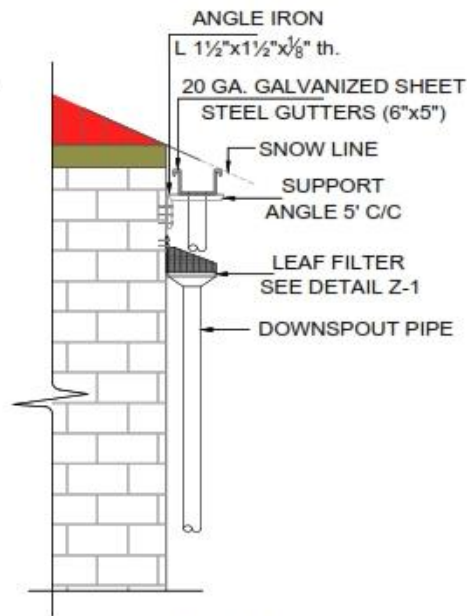
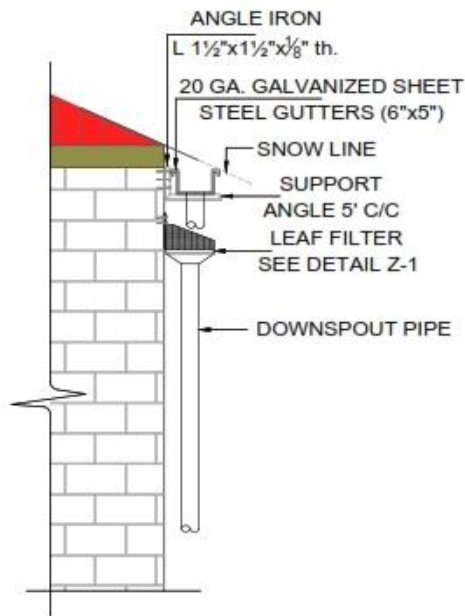
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5-MARLA HOUSE

DRAWING TITLE:
TANK BASE FOUNDATION AND
REINFORCEMENT DETAILS

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SCALE (A3):	SHEET:



SECTION Z-1



LEAF FILTER DETAIL Z-1

Plain Gauge 20 G.I sheet
A double mesh steel net was also provided with thickness of 2mm wire and 1 inch box width by length.

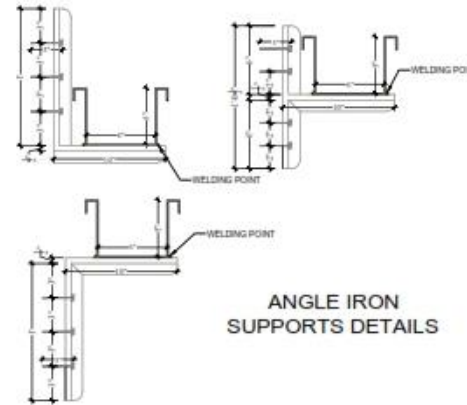


WATER FILTER DETAIL Z-2

Providing and fixing CP heavy duty brass Ball valve with CP handle of specified diameter.

Made of Faisal / Senex / Master best quality.

The Diameter of valve used was (3/4").

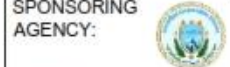


ANGLE IRON SUPPORTS DETAILS

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Local Government
& Community Development
Department

CONSULTANTS:
G3 ENGINEERING
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House No. 57, 58, 59, 60, Lahore, Pakistan
Tel: (92) 42 3561151, 3561152
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E-mail: info@g3e.com
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PROJECT:
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5-MARLA HOUSE

DRAWING TITLE:
MISCELLANEOUS DETAILS

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SCALE (A3):	SHEET:

SCALE (A3):

SCALE (A3):	

SCALE (A3):	