Ravi Urban Development Authority

RAVI RIVERFRONT URBAN DEVELOPMENT PROJECT

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

MAY 2024

BIDDING DOCUMENTS – VOLUME I

- Instructions to Bidders (ITB)
- Bidding Data Sheet
- Form of Bid and Appendices to Bid
- Form of Bid Security
- Form of Performance Security
- Form of Contract Agreement
- Form of Mobilization Advance Guarantee
- General Conditions of Contract, Part-I (GCC)
- Particluar Conditions of Contract, Part-II (PCC)

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INVITATION FOR BIDS

INVITATION FOR BIDS (IFB)

Ravi Urban Development Authority (RUDA) in collaboration with LWMC intends to undertake the civil works for Rehabilitation of Mehmood Booti Dumpsite. And thereafter this dumpsite is likely to be converted into Urban Forest and Solar Park. Primarily, the purpose of this project is to improve environment and minimize unpleasant odour by installing the closure cap, leachate control & treatment system, gas collection & flaring system.
RUDA therefore invites the sealed bids through single stage two envelope procedure from the eligible Contractors as detailed here below;

Sr. No.	Name	Pre-Bid Meeting Date	Bid Submission Deadline	Amount of Bid Security in PKR
1.	Rehabilitation of Mehmood Booti Dumpsite	27-05-24 (11:00 AM)	07-06-24 (11:00 AM)	35,000,000

Conditions:

1. Bidding procedure shall be in accordance with RUDA procurement regulations 2022.
2. Bidding is open to all eligible Bidders. Each bidder shall submit only one bid either by himself, or as a partner in a joint venture.
3. Interested Bidders may obtain further information, and inspect and acquire the Bidding Documents from the Office of the Executive Director Engineering, RUDA, situated at RUDA Sub-Office Gate # 14, National Hockey Stadium, Lahore.
4. Pre-Bid Meeting shall take place in Committee Room of RUDA Sub-Office Gate # 14, National Hockey Stadium, Lahore at the above-mentioned dates.
5. All bids must be accompanied by a Bid Security of the amount mentioned above, in PKR. 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 favour of the Employer valid for a period 28 days beyond the Bid Validity date.
6. A complete set of Bidding Documents may be purchased by an interested bidder on submission of a written application to the above office and upon payment of a non-refundable fee of Rs. 20,000/- in the form of bank draft only.
7. The bid submission deadline for the Contract Packages is tabulated above. The bids shall be opened at 11:30 AM on the same day, in the presence of bidders' representatives who choose to attend at the same address.
8. The bids must be submitted / delivered to the address mentioned below by above mentioned submission deadlines.

Executive Director, Engineering Wing,
Ravi Urban Development Authority (RUDA)
RUDA Sub-Office Gate 14, National Hockey Stadium, Block E 2, Gulberg III,
Postal Code 54770, Lahore
042-99233229

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

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

A. GENERAL

IB.1 Scope of Bid

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

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

IB.2 Source of Funds

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

IB.3 Eligible Bidders

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

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

IB.4 One Bid per Bidder

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

IB.5 Cost of Bidding

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

IB.6 Site Visit

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

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

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

7.1 The Bidding Documents, in addition to invitation 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. Bidding Data Sheet.
3. General Conditions of Contract, Part-I (GCC).
4. Particular Conditions of Contract, Part-II (PCC).
5. Specifications – Special Provisions.
6. Specifications – Technical Provisions.
7. Form of Bid & Appendices to Bid.
8. Bill of Quantities (Appendix-D to Bid).
9. Form of Contract Agreement.
10. Forms of Performance Security and Mobilization Advance Guarantee
11. Drawings.

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

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier than 28 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

IB.9 Amendment of Bidding Documents

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

9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to IB 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing 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 Bidding Data Sheet and Particular Conditions of Contract. Supporting documents and printed literature furnished by the bidders may be in any other language provided the same are accompanied by an accurate translation of the relevant parts in the bid language, in which case, for purposes of evaluation of the bid, the translation in bid language shall prevail.

IB.11 Documents Comprising the Bid

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

11.2 Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together with a copy of the proposed agreement. The role to be played by each partner to be specified therein. Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:

(a) In case of a successful bid, the Form of JV Agreement shall be signed so as to be legally binding on all partners within 7 days of the receipt of letter of acceptance failing which the contract and the letter of acceptance shall stand void and redundant.

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

(c) The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of JV Agreement and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;

(d) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the

authorization mentioned under Sub-Para (b) above as well as in the Form of Bid and in the Form of JV Agreement (in case of a successful bid); and

(e) A copy of JV agreement shall be submitted before signing of the Contract, stating the conditions under which JV will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. The JV Agreement shall be made part of the contract. No amendments / modifications whatsoever in the 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 including a statement of work methods, equipment, personnel, schedule and any other information as stipulated Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

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

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

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder. Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

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

IB.13 Currencies of Bid and Payment

13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. The proportion of the

Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a currency or currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid.

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

IB.14 Bid Validity

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

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

IB.15 Bid Security

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

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

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

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

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

15.6 The Bid Security may be forfeited:

(a) If the bidder withdraws his bid except as provided in IB 22.1;

(b) If the bidder does not accept the correction of his Bid Price pursuant to IB 27.2 hereof; or

(c) In the case of successful bidder, if he fails within the specified time limit to:

(i) Furnish the required Performance Security;

(ii) Sign the Contract Agreement, or

(iii) Furnish the required JV agreement within 7 days of the receipt of letter of Acceptance.

IB.16 Alternate Proposals by Bidder

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

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

IB.17 Pre-Bid Meeting

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

17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than seven (7) days before the proposed pre-bid meeting.

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

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

IB.18 Format and Signing of Bid

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

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

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

18.4 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in Bidding Data Sheet against IB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID". In addition, the Bidder shall submit two (2) copies of the Bid and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

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

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

18.7 Bidders shall indicate in the space provided in the Letter of Technical and Price 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 shall be separately sealed and put in separate envelopes and marked as such.

(b) The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in IB 19.2 hereof.

(c) The technical bid should comprise of documents listed in IB11.1 (A) & the price bid should comprise of documents listed in IB 11.1 (B) which shall be placed in separate envelopes in accordance with IB 11.1.

19.2 The inner and outer envelopes shall:

(a) Be addressed to the Employer at the address provided in the Bidding Data Sheet;

(b) Bear the name and identification number of the contract as defined in the Bidding Data Sheet; and

(c) Provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data Sheet.

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

19.4 If the outer envelope is not sealed and marked 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 Bidding Data Sheet.

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

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

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

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

IB.21 Late Bids

21. (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 PROCEDUR

IB.23 Bid Opening

23.1 The Employer will open the Technical Bids in public at the address, date and time specified in the Bidding Data Sheet in the presence of Bidders` designated representatives and anyone who choose to attend. The Price Bids will remain unopened and will be 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 Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with IB 23.1. No envelope shall be substituted unless the corresponding Substitution Notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

23.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding Modification Notice contains a valid authorization to request 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. Price Bids, both Original and Modification, will remain unopened in accordance with IB 23.1. The Bidders' representatives who are present shall be requested to sign the record. The

omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

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

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

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

Preliminary Examination of Technical Bids

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

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

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

23.8 At the end of the evaluation of the Technical Bids, the Employer will invite only those bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids.

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

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

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

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

(a) The name of the Bidder;

(b) Whether there is a modification or substitution;

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

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

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

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

IB.24 Process to be Confidential

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

IB.25 Clarification of Bids

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

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

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is 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. A material deviation or reservation is one (i) which affect in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; (iii) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids. Only substantially responsive bid shall be considered for further evaluation.

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

IB.27 Correction of Errors

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

(a) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and

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

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

IB.28 Evaluation and Comparison of Bids

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

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

(a) Making any correction for errors pursuant to Clause IB.27;

(b) Excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

(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 Reject all Bids

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

IB.31 Notification of Award

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

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

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

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

IB.32 Performance Security

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

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

IB.33 Signing of Contract Agreement

33.1 Within 14 days from the date of furnishing 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 Pakistan Engineering Council (PEC). Upon such reference, PEC in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including blacklisting 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. 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

BIDDING DATA SHEET

Bidding Data Sheet

1.1 Name and address of the Employer:

Ravi Urban Development Authority (RUDA)
151 Abubakar Block, Garden Town, Lahore, Pakistan

1.1 Name of the Project: Rehabilitation of Mehmood Booti Dumpsite.

Summary of the Works: Rehabilitation of Mehmood Booti Dumpsite including but not limited to Gas recovery system, Leachate collection & treatment, Closure Cap, Allied buildings & infrastructures etc.,

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

Source of Financing: RUDA's own resources (Self Financing)

3.1 Eligible Bidders:

Sub-paragraph (a) of IB 3.1 is deleted and following sub-paragraphs are added:

a. Duly licensed by the Pakistan Engineering Council (PEC) as per the criteria requirement specified in Appendix - N.

b. Is neither associated, nor has been associated, directly or indirectly, with the Consultants or any other entity that has prepared the design, specifications and other documents for the Project or being proposed for any position in the Project Management.

c. A Bidder having a conflict of interest will be declared as non-responsive if the applicant has a close business relationship with the Employer's professional personnel, who directly or indirectly involved in any part of: (i) the preparation of the bidding documents for the Works, (ii) the Bid evaluation or (iii) the supervision of such Works.

d. Incorporated with Security and Exchange Commission of Pakistan or Registrar of Firms as the case may be. [NTN Verification along with requisite Affidavit of sole-proprietorship in case of Sole-Proprietor.]

e. Registered with active status from Tax Authorities.

f. Not blacklisted by the Employer or any procuring agency in Pakistan.

g. Foreign firm, not registered in Pakistan, shall only participate as member of Joint Venture with firm having country of origin as Pakistan in compliance with PEC Construction and Operation Engineering Works Byelaws and shall have the nationality of an eligible country. Foreign firm shall be deemed to have the nationality of a country if the foreign firm is a national of that country;

or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country.

6.3 The following text as 6.3 is added after IB 6.2:

The bidder or his authorized representative shall visit and inspect the site of the Works including the areas and surroundings to be used for Contractor's Camp, on his own responsibility and at his own expense, and obtain all the information from his own sources, which may be necessary for preparing the Bid. The Employer may assist but will not take any responsibility for the supply or correctness of the information.

The Bidder shall, before submitting his Bid, satisfy himself in all respects including the following:

a) The existing facilities in the vicinity of the Site of Work, the hydrological and climatological conditions, the form and nature of the Site of Work.
b) The quantities and nature of the work and materials necessary for completion of the Works.
c) The means of access to the Site of the Work and exit from the Site.
d) The available accommodation on land for Contractor's Camp within or outside the Site of Work.
e) All necessary information as to risks, contingencies and other circumstance, which may influence or affect the tender:
f) The type and nature of soil existing in area of Work.
g) The existing condition at Site.

Each Bidder shall also enquire and satisfy himself as to the source, the quantity of supply, sufficiency of and the means of obtaining and transporting all plant, material, labour, fuel water, electricity and other matters or things required for on in connection with the Works.

In preparing the Bid, Bidders shall also consider his obligation to adequately store all materials and maintain existing facilities and all temporary Works during the period of their usage.

The Bidder must make local inquires as to the physical conditions prevailing at the site and obtain his own information on all matters and things that may in any way influence him in making a Bid and fixing the rates in the Bill of Quantities. He must also satisfy himself as to the risks, obligations and responsibilities to be undertaken in accordance the Contract to be entered into by him should his Bid be accepted.

The Bidders shall make his own investigations, enquiries and assessments, on all matters, of all conditions of existing constructions at the site and its vicinity, to his satisfaction before submitting his bid.

8.1 Time limit for clarification:

The time limit of "28 days" stated in IB 8.1 is replaced with "3 days".

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)	Special Stipulations (as filled by the Employer)	(appendix –A)
(f)	Proposed Construction Schedule	(appendix –E)
(g)	Method of Performing the Work	(appendix –F)
(h)	Availability of Critical Equipment	(appendix –G)
(i)	Construction Camp and Housing Facilities	(appendix –H)
(j)	List of Sub-contractors (as required)	(appendix –I)
(k)	Organization Chart for Supervisory Staff	(appendix –K)
(l)	Integrity Pact	(appendix –L)
(m)	Financial Competence and Access to financial Resources	(appendix –M)
(n)	Qualification and Experience	(appendix –N)

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

(a)	Letter of Price Bid	
(b)	Foreign Currency Requirements	(appendix –B)
(c)	Price Adjustment under Clause 70	(appendix –C)
(d)	Bill of Quantities	(appendix –D)
(e)	Estimated Progress Payments	(appendix –J)

11.2 Following sub-paragraph (f) is added:

Maximum number of joint venture partners shall be “three (03)”. The lead partner of the joint venture (i.e., partner-in-charge) must have financial share of more than 50 % under the JV Agreement.

12.2 Add the following paragraph at the end of IB 12.2:

The bidder, by the act of submitting a bid, acknowledges that he has inspected the Site of Works and determined the general characteristics and conditions. The Employer will not assume any responsibility for information, interpretations and deductions the bidder may make from the information furnished by the Employer. No verbal agreement or conversation with any officer, employee or agent of the Employer either

before, during or after the execution of the Contract, shall effect or modify any of the terms or obligations contained in the Contract.

12.3 Add the following paragraph at the end of IB 12.3:

The attention of the Bidder is drawn to the fact that local regulations require special formalities to be complied with in connection with the ordering, purchasing and importing of materials from outside Pakistan. Bidder will be deemed to have obtained full information about all such matters and to have allowed in his Bid for all delays, additional costs and financing charges that may arise directly or indirectly there from. Any neglect or failures on the part of the Bidder to obtain reliable information on the spot or elsewhere upon the foregoing or any other matters affecting the execution and completion of the Works, the rates, total amount and the Contract shall not relieve the Bidder whose Bid is accepted from any risks or liabilities or from the responsibility of completing and handing over the works.
The rates and prices set down by the Bidders against all the items in the Bill of Quantities are to be the full inclusive value of the finished work described there under and shall be deemed to include all costs of performing the Works including all taxes and duties, profits and costs of accepting the general risks, liabilities and obligations of every kind set forth or implied in the Contract.

13.1 Text under IB 13.1 is deleted in entirety and replaced with following:

The bid price shall be quoted by the bidder entirely in Pak rupees. All payments under the Contract shall be made in Pak rupees only.

14.1 Period of Bid Validity:

120 days after the date of Bid Submission deadline.

15.1 Amount of Bid Security:

As specified in Invitation for Bids.

16 Alternate Proposals by Bidder

IB 16 is deleted in its entirety. The Bidders shall not be permitted to offer Alternative Proposal(s).

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

Venue: As specified in Invitation for Bids.

Date & Time: As specified in Invitation for Bids.

18.4 Number of copies of the Bid to be completed and returned:
One original and two hard copies

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

Same as address provided in the Invitation for Bids

19.2(b) Name and Number of the Contract:
(1) Rehabilitation of Mehmood Booti Dumpsite

20.1(a) Deadline for submission of bids:

As stated in the Invitation for Bids

23.1 Venue, time, and date of Bid opening:

As stated in the Invitation for Bids

32.1 Text “28 days” stated in the first paragraph of IB 32.1 is deleted and replaced with “7 days”

32.1 Standard form and amount of Performance Security:

The Performance Security shall be equal to an amount of 10% of the Contract Price stated in the Letter of Acceptance in the favor of the Employer. Such Security shall be in the form provided in the Bidding Documents of either unconditional, irrevocable (a) Bank Guarantee from any Scheduled Bank of Pakistan acceptable to the Employer or (b) Bank Guarantee from a bank located outside Pakistan duly counter – guaranteed by a Scheduled Bank of Pakistan, or (c) an insurance bond from an insurance company having at least AA rating from PACRA/JCR acceptable to the Employer valid for a period till 28 days after the date of issue of Defect Liability Certificate.

37 Arrangement of Water and Other Sources
Add the following IB. 37.1 is added after IB.36:

37.1 It would be the sole responsibility of the Bidders to arrange water and other sources for construction of Works. The Employer would not be responsible for any arrangement of water or other construction materials.

Add the following IB. 38.1 is added after IB.37:

38.1 The Ravi Urban Development Authority (RUDA) Procurement Regulations 2022 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.

LETTERS OF TECHNICAL BID/ PRICE BID, AND APPENDICES TO BID

Letter of Technical Bid

Date: .....

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

(c) Our Bid consisting of the Technical Bid and the Price 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 Bidding Data Sheet, which is valid (at least) 28 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, other than alternative offers submitted in accordance with IB16 (as applicable).

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

Name .....

In the capacity of .....

Signed .....

.....

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

Date .....

Address……..

Letter of Price Bid

Date: .....

Bid Reference 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 Bidding 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…….

Appendix-A to Bid

Special Stipulations

Clause

Conditions of Contract

1.	Engineer's Authority to issue Variation in emergency	2.1	2% of the Contract Price stated in the Letter of Acceptance.
2	Variation	2.1(b) (viii)(b)	No approval is required by the engineer if the amount needed is up to or less than Rs.500,000.00 (Five Hundred thousand only)
3.	Law applicable	5.1(b)	The law to be applied is the law of Islamic Republic of Pakistan.
4.	Amount of Performance Security	10.1	The Performance Security shall be equal to an amount of 10% of the Contract Price stated in the Letter of Acceptance in the favor of the Employer. Such Security shall be in the form provided in the Bidding Documents of either unconditional, irrevocable (a) Bank Guarantee from any Scheduled Bank of Pakistan acceptable to the Employer or (b) Bank Guarantee from a bank located outside Pakistan duly counter – guaranteed by a Scheduled Bank of Pakistan, or (c) an insurance bond from an insurance company having at least AA rating from PACRA/JCR acceptable to the Employer valid for a period till 28 days after the date of issue of Defect Liability Certificate.
5.	Time for Furnishing Programme	14.1	Within 21 Calendar days from the date of receipt of Letter of Acceptance.
6.	Minimum amount of Third Party Insurance	23.2	Rs. 2.0 million per occurrence with number of occurrences unlimited.
7.	Time for Commencement	41.1	Within 14 days from the date of receipt of Engineer's Notice to Commence
8.	Time for Completion	43.1, 48.2	365 days from the date of receipt of Engineer's Notice to Commence. Not Applicable
9.	a) Amount of Liquidated Damages	47.1	0.1 % of the Contract Price stated in the Letter of Acceptance for each day of delay in completion of the Works subject to a maximum of 10% of Contract Price stated in the Letter of Acceptance.
	b) Amount of Bonus	47.3	Not Applicable
11.	Defects Liability Period	49.1	365 Days from the effective date of Taking Over Certificate.
12.	Percentage of Retention Money	60.2	10 % of the amount of Interim Payment Certificate.
13.	Limit of Retention Money	60.2	5 % of Contract Price stated in the Letter of Acceptance.
14.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	PKR Fifty (50) Million
15.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer.	60.10	42 calendar days.

15.	Mobilization Advance (Interest Free)	60.12	Interest free Mobilization advance equivalent to ten (10) % of the Contract Price stated in the Letter of Acceptance in single installments, against bank guarantee from a scheduled bank in Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a scheduled bank in Pakistan.

Appendix-B to Bid

Foreign Currency Requirements

Not Applicable

Appendix-C to Bid

Price Adjustment Under Clause 70 of Conditions of Contract

$$Pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \ldots\ldots\ldots\ldots\ldots$$

where,

"Pn" is the Price Adjustment factor for the work carried out in the period "n".

"A" is a constant or the Non-Adjustable Portion of the Price Adjustment Factor specified in Appendix-C to Bid, representing the Non-Adjustable Portion of the Contract Price.

"b, c, d....." are Coefficients or weightages for each specified element of adjustment in the Contract. The sum of A, b, c, d, etc., shall be one.

"Lo, Mo, Eo....." are the Base Date Prices/Indices for the specified (adjustable) elements.

"Ln, Mn, En....." are the Current Date Prices/Indices of the specified (adjustable) elements for the period "n".

If "P" is the amount payable (prior to adjustment) at the rates entered in the Price Schedule of the work carried out in period "n" then, Adjusted amount payable to the Contractor for the work carried out in the period "n" shall be equal to Pn*P.

Cost Element	Description	Weightages*	Applicable index
1	2	3	4
(i)	Fixed Portion	0.45	-
(ii)	Local Labour	[0.05 – 0.15] [weightage to be inserted by bidder]	the index shall the minimum wage for unskilled labor as published in the Bulletin under Intercity Prices of construction input and labor wages for Lahore
(iii)	Cement –in bags	[0 – 0.05] [weightage to be inserted by bidder]	the index shall be the cost of one bag of cement as published in the Bulletin under Intercity Prices of construction input and Labor wages for Lahore
(iv)	Reinforcing Steel	[0 – 0.10] [weightage to be inserted by bidder]	the index shall be the cost of one tonne of MS Reinforcing Steel ½ inch round bars as published in the Bulletin under "Intercity Prices of Construction Input and Labor Wages for Lahore
(v)	High Speed Diesel (HSD)	[0.10 – 0.20] [weightage to be inserted by bidder]	the index shall be the cost of High Speed Diesel (HSD) as fixed by Oil and Gas Regulatory Authority (OGRA) for Lahore
(vi)	Aggregates	[0.10 – 0.15] [weightage to be inserted by bidder]	the index shall be the cost of hundred cubic feet of Bajri as published in the Bulletin under Intercity Prices of construction input and Labor wages for Lahore
(vii)	Bricks	[0 – 0.05] [weightage to be inserted by bidder]	the index shall be the cost of thousand number Bricks New 1st Class as published in the Bulletin under Intercity Prices of construction input and labor wages for Lahore
	Total	1.000	

Notes:

(i) Indices for "(ii)" to "(vii)" are taken from the Government of Pakistan Federal Bureau of Statistics, Monthly Statistical Bulletin except for (v) which is taken from Oil and

Gas Regulatory Authority (OGRA) for Islamabad. The base cost indices or prices shall be those applying 28 days prior to the latest day for submission of bids. Current indices or prices shall be those applying 28 days prior to the last day of the billing period.

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

(iii) Financial compensation for the elements classified as above shall not be considered again due to provision of subsequent legislation, if separately specified in the Contract.

*****The bidder shall provide weightages for cost elements from serial no (ii) onwards from within the provided range such that the sum of all weightages under column 3 shall be equal to 1.

Appendix-D to Bid

Bill of Quantities

Refer to Volume 2 (Bill of Quantities)

Appendix-E to Bid

Proposed Construction Schedule

Pursuant to Clause 43 "Time for Completion" of the Conditions of Contract Part–I, the Work shall be completed on or before the date stated in Appendix–A to the Bid. The Bidder shall provide as Appendix–E to his Bid a Construction Schedule in bar chart form showing the sequence of work items and the period of time during which he proposes to complete each work item along with a resource histogram in such a manner that his proposal for completion of the whole of the work and parts of the work may meet The Employer's completion targets noted below. Pursuant to Clause 14.1 of COC part II the Bidder is also required to submit the construction schedule on Critical Path. The above construction schedule should separately reflect detailed mobilization activities, like establishing site office, camps, installation of plants, mobilization of equipment's preliminary survey etc. (Attach sheets as required):

Description	**Time for Completion**
a) Whole Works	12 months

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.

Appendix-G to Bid

List of Major Equipment – Related Items

The Bidder to provide details of the required equipment specified in Appendix-N using the following forms:

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. Rented						
c. Lease						

Appendix-H to Bid

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).
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.

Appendix-I to Bid

List of Subcontractors

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

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

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

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 (Million PKR.)**
1	**2**
1st Quarter	
2nd Quarter	
3rd Quarter	
4th Quarter	
Bid Price	

Appendix-K to Bid

Organization Chart for The Supervisory Staff and Labour

The Bidder to provide details of the required key personnel specified in Appendix-N using the following forms:

Form PER – 1: Proposed Personnel

Bidder should provide the details of the proposed personnel and their experience record in the relevant Information Forms below for each candidate:

1.	Project Manager
	Name
2.	Site Engineer (Civil-01)
	Name
3.	Site Engineer (Civil-02)
	Name
4.	Design Engineer
	Name
5.	Material Engineer
	Name
6.	Supervisor (Civil-01)
	Name
7.	Supervisor (Civil-02)
	Name
8.	Supervisor (E&M)
	Name
9.	Quantity Surveyor
	Name
10.	Surveyor - 01
	Name

11.	Surveyor - 02
	Name

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below. Use one form for each position.

Position		
Personnel information	**Name**	**Date of birth**
	Professional qualifications	
Present employment	**Name of employer**	
	Address of employer	
	Telephone	**Contact (manager / personnel officer)**
	Fax	**E-mail**
	Job title	**Years with present employer**

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the present project.

From	**To**	**Company/Project/Position/Relevant Technical and Management Experience**

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 Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GoP through any corrupt business practice.

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

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

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

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

Name of Employer: ……	Name of Contractor: ……
Signature: ……..	Signature: ……
[Seal]	[Seal]

Appendix-M to Bid

Financial Competence and Access to Financial Resources

Not Used

Appendix-N to Bid

Qualification and Experience

1 Eligibility Criteria & Requirements:

Sr. No	Criteria	Requirement	Compliance Requirement				Documentation Submission Requirements
			Single Entity	Joint Venture			
				All Members Combined	Each Member	One Member	
1	PEC Registration	Registration with Pakistan Engineering Council in Category C-1 or above with specialized codes in CE-01, CE-09, CE-10.	Must meet requirement	Must meet requirement of specialized codes in CE-01, CE-09, CE-10	Each Member must be registered with PEC	Lead Member must be registered with PEC in Category C-1 or above with specialized codes in CE-01, CE-09 & CE-10. In case of JV with foreign Firm, the local firm must meet the criteria requirement.	PEC Valid Registration License/Certificate
2	Non Blacklisting	The bidder must not be blacklisted by Employer or any other procuring agency in Pakistan.	Must meet requirement	Must meet requirement	Must meet requirement	Must meet requirement	Affidavit on Non-Judicial Stamp Paper against non-blacklisting
3	Company/ Firm Registration	Incorporation with Security and Exchange Commission of Pakistan or Registrar of Firms as the case may be [NTN Verification along with requisite Affidavit of sole-proprietorship in case of Sole-Proprietor.]	Must meet requirement	Must meet requirement	Must meet requirement	Must meet requirement	Certificate from SECP/ Registrar of Firms/ NTN Verification along with requisite affidavit
4	Registration with Tax Authorities	Registration and active status with Tax Authorities in Pakistan	Must meet requirement	Must meet requirement	Must meet requirement	Must meet requirement	Certificate and current status from Tax Authorities
5	Conflict of Interest	No conflict of Interest as per IB.3	Must meet requirement	Must meet requirement	Must meet requirement	Must meet requirement	Affidavit on Non-Judicial Stamp Paper

Sr. No	Criteria	Requirement	Compliance Requirement				Documentation Submission Requirements
			Single Entity	Joint Venture			
				All Members Combined	Each Member	One Member	
							against no conflict of interest
6	One Bidder per Bid	Each Bidder shall submit only one Bid either by himself, or as a partner in a joint venture.	Must meet requirement	Must meet requirement	Must meet requirement	Must meet requirement	
7	Eligible Country	Foreign firm participating in the JV shall have the nationality of an eligible country	N/A	N/A	N/A	Foreign firm participating in the JV must meet requirement	Completed attached Form for Bidder Information

The Bidder must meet the Eligibility Criteria & Requirement to be declared responsive.

Form for Bidder Information

All individual firms and each partner of a joint venture submitting the bids are required to complete the information in following form. Nationality information is also to be provided for foreign firms who are forming part of the Joint Ventures as required under the PEC Bye-Laws as a Joint Venture.

1	Name of Firm	
2	Head Office Address	
3	Telephone	Contact Person: Name: Title:
4	Fax	Telex
5	Place of incorporation/Registration	Year of incorporation/ registration

2 Detailed Qualification Criteria & Requirements

The Bidders to be substantially responsive must score at least 65 marks overall and minimum 60 % score in each category as specified below:

Sr. No.	Category	Weightage/Marks	Minimum Required Score
1.	Working Experience	40	24
2.	Personnel Capabilities	20	12
3.	Equipment Capabilities	15	09
4.	Financial Soundness	25	15
5.	Overall	**100**	**65**

Note: The qualifications of other firms such as the bidder's subsidiaries, parent entities, affiliates or subcontractors (except specialized subcontractor permitted under sub-criteria (b) of Contracts of Similar Nature and Complexity) shall not be permitted.

2.1 Working Experience (Total 40 Marks)

Credit Marks for working experience shall be awarded on the basis of following qualifications:

Sr. No.	Criteria	Requirement	Maximum Points	Documentation Submission Requirements
	Contracts of Similar Nature and Complexity			
1	Contracts of Similar Nature and Complexity	a) Number of successfully executed infrastructure sector contracts each of value of at least PKR **1,000** million, completed after January 01, 2017. Note: In case the bidder is a Joint Venture, the working experience of leader of the Joint Venture shall be evaluated.	20 marks for two or more contracts. 10 marks for one contract.	Completed attached Form For Contracts of Similar Nature and Complexity. The bidder must submit Project Award Letter, Work Orders or Contract Agreement & completion Certificates and other documents necessary for confirming scope of works. The bidder must submit joint venture agreement in case of projects completed as a partner of joint venture clearly showing scope of works and percentage share of all partners of joint venture. To comply with the criteria, the share of bidder under the joint venture for similar works must be equal or exceeding the qualification criteria and requirement.
		b) Number of successfully executed contract completed after January 01, 2017, involving any one of the following components: 1 Installation of Geogrid/Geomembrane/Geotextile (minimum value of PKR 50 million or 500,000 SFT); 2 Waste water/leachate treatment system (minimum value of PKR 10 million); or 3 Installation of gas wells/gas collection system (minimum value of PKR 10 million) Note: Works stated under this criteria requirement are specialized works for which the Employer permits specialized subcontractor. The bidder may propose a specialized subcontractor for such specialized works and accordingly specialized subcontractor's experience shall be considered for bidder's evaluation under this criteria requirement.	20 marks for one or more contracts	
		Sub-total:	**40 marks**	

Sr. No.	Criteria	Requirement	Maximum Points	Documentation Submission Requirements
	Contracts of Similar Nature and Complexity			
Note; In case of contracts executed by the bidder in form of JV or subcontractor, the role of the bidder based on scope and financial share shall be considered to evaluate the criteria requirement.				

2.2 Personnel Capabilities (Total 20 Marks)

Credit Marks shall be granted on the basis of the following criteria for Personnel.

Sr. No.	Personnel	Required Number	Maximum Marks	Criteria for Evaluation	Documentation Submission Requirements
1	Project Manager • BSc Civil Engineering • registration with PEC as Professional Engineer • At least 15 years' of professional experience • at least one assignment of similar nature works	01	06 marks	Marks for personnel shall be pro-rated. No marks will be awarded for personnel not fully meeting any of the corresponding criteria requirement.	Details of each personnel to be provided on specified format under Appendix-K of the Bidding Documents Documentary evidence of relevant PEC registration and qualification (copy of degree/ diploma)
2	Site Engineer (Civil) • BSc Civil Engineering • registration with PEC as Registered Engineer • At least 08 years' of professional experience at least one assignment of similar nature works	02	04 marks (02 marks each)		
3	Design Engineer • BSc Civil/Mechanical/Environmental Engineering • registration with PEC as Registered Engineer • At least 08 years' of professional experience • at least one assignment of design of leachate collection and treatment, gas collection system or any other WASH component	01	02 marks		
4	Material Engineer • BSc Civil/ Geological Engineering • registration with PEC as Registered Engineer • At least 08 years' of professional experience • at least 5 years' experience at similar role in infrastructure works	01	02 marks		
5	Supervisor (Civil) • Diploma in Civil (DAE) • at least 5 years' experience at similar role in infrastructure works	02	02 marks (01 marks each)		

6	Supervisor (E&M) • Diploma in Mechanical/Electrical (DAE) • at least 5 years' experience at similar role in infrastructure works	01	01 mark		
7	Quantity Surveyor • Diploma in Civil (DAE) • at least 5 years' experience at similar role in infrastructure works	01	01 mark		
8	Surveyor • Diploma in Civil (DAE) • at least 5 years' experience at similar role in infrastructure works	02	02 marks (01 marks each)		
		Sub-total:	**20 marks**		
Note; • In case the bidder is a Joint Venture, the personnel capabilities of all members combined shall be evaluated.					

2.3 Equipment Capabilities (Total 15 Marks)

Credit Marks shall be granted on the basis of the following criteria for various kinds of equipment relevant to the Contract.

Sr. No.	Equipment Type and Characteristics	Equipment Available	Maximum Marks	Criteria for Evaluation	Documentation Submission Requirements
1	Chain Excavators	02	05 marks (2.5 for each)	Marks for an equipment type shall be pro-rated	Details of each equipment to be provided on specified format under Appendix-G of the Bidding Documents Evidence of ownership, lease agreement or rental agreement of the corresponding equipment
2	Dumpers	02	04 marks (2 for each)		
3	Concrete Mixers	02	02 marks (1 for each)		
4	Sheep foot Rollers	02	02 marks (1 for each)		
5	Graders	02	02 marks (1 for each)		
		Sub-total:	**15 marks**		
Note; • In case the bidder is a Joint Venture, the equipment capabilities of all members combined shall be evaluated.					

2.3 Financial Soundness (Total 25 Marks)

Credit Marks shall be awarded on the basis of the following criteria:

Sr. No.	Description	Maximum Marks	Criteria for Evaluation	Documentation Submission Requirements
i)	The available Source of Finance (Credit Line + Working Capital), to meet the cash flow requirement, which is a combination of working capital and supported by available credit line, if any, from a bank(s) for smooth execution and completion of the Contract.	12.5 marks	Full Marks are given in case Financial Resources are Rs.500 million or more. For Financial Resources less than Rs. 500 million, following weightage shall be used: 12.5 * (A/500) A= Financial Resources For Financial Resources less than Rs. 250 million, no marks shall be awarded.	Provide details on specified form for Financial Resources Audited financial statement for last year Letter from the Bank regrading availability of credit line facility, if any
ii)	Average Annual Construction Turnover in last 3 years, evaluated through the bidder's, Audited financial statements for the last three (03) years.	12.5 marks	Full Marks are given if the average Annual Construction Turnover for last three years is equal to or more than Rs. 1,600 million. For the average Annual Construction Turnover for last three years less than Rs. 1,600 million following weightage shall be used: (A/1,600) x 12.5 A= Average Annual Turnover in last three years. No Marks shall be given in case average Annual Construction Turnover for last three years is less than Rs. 800 million.	Provide details on specified form for Annual Construction Turnover Audited financial statements for the last three (03) years.
	Sub-total:	**25 marks**		

Note;

- In case the bidder is a Joint Venture, the financial soundness of all members combined shall be evaluated.

The Bidder must meet the Qualification Criteria & Requirement to be declared responsive.

Form for Contracts of Similar Nature and Complexity

Name of Bidder, partner of a joint venture or specialized sub-contractor

Use a separate sheet for each contract.

1	Name of Contract
	Country
2	Name of Employer
3	Employer Address ----------
4	Nature of works and special features relevant to the contract ----------
5	Contract Role (Tick One) (a) Sole Contractor (b) Sub- Contractor (c) Partner in a Joint Venture
6	Value of the total contract (in specified currencies) at completion, for current contract Currency……. ….Currency…… Currency……
7	Contract cost at completion in Pak/Rs……
8	Date of Award……
9	Date of Completion……..
10	Contract Duration (Years and Months) _____Years _____Months
11	Specified Requirements----------

Form for Financial Resources

Source of financing	Amount (Pak Rs. or equivalent)
1.Contract Specific Credit Lines (s)	
2. Working Capital	

Note: In case of Joint Venture, each member shall provide separate form.

Form for Annual Construction Turnover

Annual Construction Turnover		
Year	**Turnover (in actual currency)**	**Equivalent Rupees in Million.**

Note: In case of Joint Venture, each member shall provide separate form.

FORMS

BID SECURITY

PERFORMANCE SECURITY

CONTRACT AGREEMENT

MOBILIZATION ADVANCE GUARANTEE/BOND

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, to the Employer, conditioned as under:

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

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

(3) that in the event of failure of the successful Bidder to execute the proposed Contract Agreement for such work and furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to Clause 15.6 of the Instruction to Bidders for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within twenty eight (28) days of his being requested to do so, a Performance Security with good and sufficient surety, as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Surety shall forthwith pay the 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)

_____
Guarantor (Bank)

Witness:

1. _____ Signature _____

_____ Name _____
Corporate Secretary (Seal)

Title _____

2. _____

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

FORM OF PERFORMANCE SECURITY
(Bank Guarantee/Insurance Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address:_____
(Scheduled Bank in Pakistan/Insurance Company)
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.

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.

_____
Guarantor (Bank/Insurance Company)

Witness:

1. _____ Signature _____

_____ Name _____
Corporate Secretary (Seal)

Title _____

2. _____

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

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____day of_____(month) 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;
   (d) Special Stipulations (Appendix-A to Bid);
   (e) The Particular Conditions of Contract – Part II;
   (f) The General Conditions – Part I;
   (g) The priced Bill of Quantities (Appendix-D to Bid);
   (h) The completed Appendices to Bid (B, C, E to L);
   (i) The Drawings;
   (j) The Specifications;
   (k) The Joint Venture Agreement (in case of JV)

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

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

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

Signature of the Contactor	Signature of Employer
_____	_____
(Seal)	(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:

_____

(Name, Title and Address)

Witness:

_____

(Name, Title and Address)

MOBILIZATION ADVANCE GUARANTEE
(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.

GUARANTOR

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

WITNESS

1. _____
   _____
   Corporate Secretary (Seal)

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

CONDITIONS OF CONTRACT

PART I: GENERAL CONDITIONS

FIDIC

4th Edition 1987
Reprinted 1988 with Editorial Amendments
Reprinted 1992 with Further Amendments

(To be procured by the Contractor)

Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat– International Federation of Consulting Engineers
Secretariat Switzerland

International Federation of Consulting Engineers (FIDIC)
FIDIC Bookshop – Box- 311 – CH – 1215 Geneva 15 Switzerland
Fax: +41 22 799 49 054
Telephone: +41 22 799 49 01
E-mail: fidic@fidic.org
www.fidic.org

PART II: PARTICULAR CONDITIONS OF CONTRACT

1.1 Definitions

(a) (i) The Employer is Ravi Urban Development Authority (RUDA) 151 Abubakar Block, Garden Town, Lahore, Pakistan

(a) (iv) The Engineer is to be notified later, 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 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 therefrom 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:

(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-Clause 12.2 "Not Foreseeable Physical Obstructions or Conditions".

(iii) Any action under Clause 10 "Performance Security" and Clauses 21,23,24 & 25 "Insurance" of sorts.

(iv) Any action under Clause 40 "Suspension".

(v) Any action under Clause 44 "Extension of Time for Completion".

(vi) Any action under Clause 47 "Liquidated Damages for Delay" or Payment of Bonus for Early Completion of Works (PCC 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 less than 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 under Clause 53.

(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

The following paragraph is added:

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.

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 subject to the Laws of Islamic Republic of Pakistan.

5.2 Priority of Contract Documents

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

a) The Contract Agreement (if completed);
b) The Letter of Acceptance;
c) The Completed Form of Bid;
d) Special Stipulations – Appendix A to Bid;
e) The Particular Conditions of Contract - Part II;
f) The General Conditions – Part I;
g) The priced Bill of Quantities – Appendix D to Bid
h) The Drawings;
i) The Specifications
j) The completed Appendices to Bid (B, C, E to L); and
k) Any other documents forming part of the Contract

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.

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. The price of such Drawings shall be deemed to be included in the Contract Price.

The following Sub-Clause 8.3 is added:

8.3 Specialists Suppliers

Where the Works required the incorporation of proprietary articles manufactured by the specialist suppliers, The Contractor shall be fully responsible for the outcome in the use of such proprietary articles and for such design and specification executed by the specialist suppliers.

10.1 Performance Security

The text is deleted and substituted with the following:

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 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be of an amount equal to 10% 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 or (c) an insurance bond from an insurance company having at least AA rating from PACRA/JCR acceptable to the Employer valid for a period till 28 days after the date of issue of Defect Liability Certificate.

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor.
The following Sub-Clause10.4 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

(a) The Contractor shall submit to the Engineer detailed program for the following, within 21 Calander days from the date of receipt of Letter of Acceptance:

1) Base line schedule with resource and cost loaded in Primavera P6 (.xer file format)
2) Execution of Works;
3) Resource Employment;
4) Local Material Procurement;
5) Material Imports, if any;
6) Equipment Deployment Plan; and
7) Other details as required by the Engineer

(b) The Submitted Construction Schedule shall be

1) Developed and presented on Project Management Software Primavera Project Planner P6 or later.
2) Developed on the basis of Work Breakdown Structure provided or approved by The Engineer/Employer.
3) Detailed up to level 4 or as required by The Engineer/Employer.
4) Appropriate quantity of direct resources (material, labour, equipment) should be allocated to all activities and showed in submitted construction schedule. Labour resource should be divided according to related trades (e.g. Mason, Operator, helper etc.) Contractor should make sure that no resource is being overallocated.
5) BOQ amount should be loaded to each construction activity. Earned Value Management Reporting to be ensured accordingly.
6) Identifying the critical path activities, showing all works including temporary works, the relation between early and late starting dates for each activity until completion, which will be the same as the specified Project end date.

(c) Program should be submitted (both hard and soft copy) strictly following the guidelines and format specified in this section.

The following is added at the end of 14.2

14.2 Revised Programme

If at any time, it should appear to the Employer and or/ The Engineer that the actual Progress of the works does not conform to the program of the Works to which approval has been given under Sub Clause 14.1, the Contractor shall produce, at the request of Employer or /the Engineer a revised Program of works showing the modifications to such program necessary to ensure completion of the Works within the Time of completion. The Contractor shall produce any such revised program of works to the Employer and/or the Engineer within seven 7 days of being requested to do so by the Employer and/or the Engineer. The revised programme or works thus

produced shall subject to review and approval of the Engineer. The Contractor shall on a monthly basis annotate a copy of his current program of works to indicate progress achieved during the month and provide a copy thereof to the Employer and/or the Engineer within seven 7 days of the end of the month to which the annotated program of works refers.

In the event of delays, the Contractor shall describe the action to be taken by him to overcome the adverse conditions and to maintain the planned construction Program. If in the opinion of the Employer and or/ the Engineer the Contractor falls behind the progress program, the Contractor shall take steps as necessary to improve the progress and shall submit for review and approval of the Employer and/ or the Engineer revised programs to demonstrate that the Milestones will be achieved all without additional cost to the Employer and without affecting the Employer's right to recover all cost in accordance with the Contract.

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 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 not later than the 8th day of the following month, 10 copies each of Monthly Progress Reports covering:

(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.
(7) Financial Management
(8) Environmental Management Health & Safety
(9) Completion of Works and Contract Closure
(10) Photographs to illustrate Progress
(11) Drone Video Progress Documentary

(12) Time Lapse & Real Time Web Based Progress Centre

(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 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 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 Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement.

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:

Delete the text and substitute with the following:

(a) insofar as they directly affect the execution of the Works in Pakistan:

(i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the 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; and

(d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:

(i) could not have reasonably foreseen, or
(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:
(a) prevent loss or damage to physical property from occurring by taking appropriate measures, or
(b) insure against.

21.4 Exclusions

The text is deleted and substituted with the following:

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 National Insurance Company of Pakistan or any other insurance company having at least AA rating from PACRA/JCR 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 neighbourhood 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 text is deleted and substituted with the following:

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

Not Applicable

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.

54.5 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-Cause 60.11 (a)(6) hereof".

60.2 Monthly Payments

In the first line, "28" is substituted by "14".

60.10 Time for Payment

The text is deleted and substituted with the following:

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 42 days after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 60 days after such Final Payment Certificate has been jointly verified by Employer and Contractor. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor compensation at the rate specified in Appendix A to Tender. The provisions of this Sub-Clause are without prejudice to the Contractors entitlement under Clause 69

The following Sub-Clause 60.11 and 60.12 are added:

60.11 Secured Advance on Materials

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 following non-perishable materials brought at the Site but not yet incorporated in the Permanent Works
   i. Geo-membrane
   ii. Geotextile
   iii. UF 10-1000 high temperature flare system
   iv. Leachate treatment enclosed containerized system
   v. Any other non-perishable items of plant and material to be supplied from outside of Pakistan for incorporation into the 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 affected from the monthly payments on actual consumption basis.

60.12 Financial Assistance to Contractor

The Employer shall make an advance payment, as an interest-free loan for mobilization, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment shall be in the amount of ten percent (10%) of the Contract Price stated in the Letter of Acceptance, less Provisional Sums. The payment shall be made in single instalments.

The Engineer shall issue an Interim Payment Certificate after (a) the Employer receives an acceptable Performance Security in accordance with Sub-Clause 10.1, (b) execution of the Form of Contract Agreement by the Parties hereto, (c) the Employer receives an acceptable bank guarantee, for the amount equal to the amount of the advance payment, from a scheduled bank of Pakistan or foreign bank counter guaranteed by a scheduled bank in Pakistan, in the form set out herein, and (d) the Engineer receives Contractor's application for Interim Payment Certificate.

The bank guarantee shall be valid until the advance payment under such guarantees has been recovered and/or repaid by the Contractor, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the

Payment Certificates. If the terms of the guarantees specify the date on which the guarantor's obligations expire (the "expiry date"), and the advance payment has not been repaid by that date, 28 days prior to the expiry date, the Contractor shall extend the period of guarantee accordingly, until the advance payment has been repaid

The total Mobilization Advance payment shall be repaid/recovered through percentage deductions from Payment Certificates. Unless other percentage are stated in the Appendix A to Tender:

(a) deductions shall commence in the next Payment Certificate in which the total of all certified interim payments (excluding the advance payment and deductions, and retention money) exceeds fifteen percent (15%) of the amount stated in the Letter of Acceptance less Provisional Sums.

(b) deductions shall be made at the rate of twenty five percent (20%) of the amount of each Payment Certificate (excluding the advance payment and deductions, and retention money) until such time as the advance payment has been completely repaid.

The completion of recovery shall be attained when progress of work reaches to eighty percent (80%) of the Contract Price stated in the Letter of Acceptance less Provisional Sums.

If the advance payment has not been completely repaid prior to the issue of Taking-Over Certificate for the Works or prior to termination under the Contract, the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

63.1 Default of Contractor

In sub clause (63.1), the following paragraph (f) is added after paragraph (e):

"(f) has been involved in Corrupt, Fraudulent, Collusive or Coercive Practices.

For the purposes of this Sub-Clause:

(i) "Corrupt practice" means the offering, giving, receiving, or soiiciting, directly or indirectly, of anything of value to influence the action of any party in the procurement process or the execution of a contract.

(ii) "Fraudulent practice" means a misrepresentation or omission of facts in order to influence a procurement process or the execution of a contract.

(iii) "Collusive practices" means a scheme or arrangement between two or more bidders, with or without the knowledge of the Borrower, designed to influence the action of any party in procurement process or the execution of a contract".

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

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 take necessary action under and RUDA Procurement Regulations 2022 (amended from time to time) and 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, 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 :
Ravi Urban Development Authority (RUDA)
151 Abubakar Block, Garden Town, Lahore, Pakistan

b) The Engineer: To be notified later

70.1 Increase or Decrease of Cost

Sub-Clause 70.1 is deleted in its entirety, and substituted with the following:

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:-

$$Pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \ldots\ldots\ldots\ldots$$

Where:

Pn is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Paragraph 60.1 (a), 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;

Ln, Mn, En, 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

Lo, Mo, Eo, 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 28 days prior to

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

(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, 73.3, 74.1, 75.1, 76.1, 77.1and 78.1 are added:

73.1 Payment of Income Tax

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

73.2 Customs Duty & Taxes

The prices tendered by the Contractor shall include all import license fees, custom duties, excise duties, sales taxes, surcharges, business taxes, income and other taxes that are levied according to the laws and regulations of Pakistan on the Contractor's Equipment, material and supplies (both permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in the country on profits made by him in respect of the Contract

73.3 Advance Income Tax

All payments (gross) as payable to the Contractor will be subject to Withholding Tax / Advance Tax at prescribed rate, at the time of payment. The deduction of advance income tax from the gross payable bill amounts shall be made in accordance with prevalent income tax laws of the Government of Pakistan. These deductions shall be

deposited in the Government Treasury by the Employer to the account of the Contractor within prescribed period.

The Employer shall within 28 days of making any such deduction provide to the Contractor a certificate of tax deduction and deposit into the Government Treasury.

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.

SPECIFICATIONS - SPECIAL PROVISIONS

Refer Volume 3 of Bidding Documents for Specifications-Special Provisions

SPECIFICATIONS - TECHNICAL PROVISIONS

Refer Volume 3 of Bidding Documents for Specifications-Technical Provisions

DRAWINGS

Refer Volume 4 of Bidding Documents for Drawings

Ravi Urban Development Authority

RAVI RIVERFRONT URBAN DEVELOPMENT PROJECT

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

MAY 2024

BILL OF QUANTITIES (BOQs) – VOLUME II

VOLUME II – BOQs

BILL OF QUANTITIES

A. Preamble

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

2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract.

3. The rates and prices entered in the priced Bill of Quantities shall, except in so far as it is, otherwise provided under the Contract include all costs of Contractor's plant, labor, supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract Furthermore, all duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder

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 summarized in the Bill of Quantities. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the priced Bill of Quantities.

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.

8. Abbreviation used in the Bill of Quantities and the meanings thereof are listed below:

AASHTO	- American Association of State Highway and Transportation Officials
ASTM	- American Society for Testing Materials
BS	- British Standard
CFT	- Cubic Feet
COC	- Condition of Contract

CM/Cu.M.	- Cubic Meter
EO	- Extra
EPA	- Environmental Protection Agency
EMP	- Environmental Management Plan
HDPE	- High Density Poly Ethylene
Hp	- Horse Power
Hr	- Hour
Kg	- Kilogram
LS	- Lump Sum
M/RM/LM	- Meter
Min	- Minutes
Mm	- Millimeter
MS	- Mild Steel
N. S	- Non-Schedule
N/A	- Not Applicable
Each/ No.	- Number
RC	- Reinforced Concrete
RCC	- Reinforced Cement Concrete
Rs.	- Pakistani Rupees
SFT	- Square Feet
SP	- Special Provisions
SM/sq.m	- Square Meter
Ton	- Metric Tonne (1,000 kg)
UHD	- Ultra High Definition

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

ABSTRACT OF COST

Sr. No	Description	Amount (Rs.)
1	General Items Bill	
2	Levelling and Grading	
3	Leachate Collection and Treatment	
4	Gas Recovery System	
5	Closure Cap	
6	Allied Buildings and Infrastructures	
	Total Cost (Rs.)	
	Add 5% (PRA charges)	
	Grand Total	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (Rs.)
1.	**GENERAL ITEMS BILL**	
1.1	Time Lapse and Real Time Web-based Progress	
1.2	EMP	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE
BILL OF QUANTITIES

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
Bill No. 1.1	**Time lapse and real time web-based progress** (Provide time lapse & Real time web-based progress including complete high resolution drone cameras video documentary on monthly basis)					
1	**Progress Center** 4G UHD Camera System - Completely Independent Systems including installation and configuration. **Inclusive of:** - Progress center - Remote viewing of PC/Smart Phone via app - Live image update - 30 days timelapse video generation - 4K output resolution	N. S	12	Month		
2	**Drone Capture** Minimum shoots: 15	N. S	12	Month		
3	**Video Reporting** Monthly compilation of timelapse / drone footage	N. S	12	Month		
4	**Final Compiled Video** **Inclusive of**: - Editing, Packaging & Delivery of Images &HD - Video editing - Delivery via Wetransfer	N. S	1	Nos.		

				Subtotal 1.1:		
Bill No. 1.2	**EMP**					
1	Medical screening for workers (HIV screening, CBC, Hep. BsAg, HCV antibodies, LFTs, RFTs, etc.)	N. S	200	Persons		
2	Tarpaulins (High Quality water proof PVC)	N. S	750	Sft		
3	Handling of hazardous material (Store all hazardous materials properly, separate incompatibles, and store in ventilated, dry, cool areas)	N. S	12	Month		
4	Handling of solid waste (storage, collection, transportation, treatment, utilization, processing, and final disposal of solid wastes)	N. S	12	Months		
5	DCP Fire extinguishers (6 kg) in case of fire (The material of the cylinder is steel. The extinguishing agent is mono ammonium phosphate and ammonium sulfate powder and the discharge time of the agent is 13 seconds)	N. S	12	Nos.		
6	CO2 Fire extinguishers (6 kg discharge time of the agent is 13 seconds).	N. S	12	Nos.		
7	Fire alarm (Signal Transmission: Wired Alarm, Working Principle: Manual Alarm Button)	N. S	3	Nos.		
8	Special Measures for Covid-19 (corona test, quarantine expense in case of corona measures to be taken announced by local government / provincial government, Hand sanitizers)	N. S	1200	Monthly		

9	Ear plugs (corded Reusable silicon Earplugs)	N. S	300	Each		
10	Helmets (PE shell with vents Lining; material: Plastic Chin strap included; Adjust head size by ratchet knob)	N. S	200	Each		
11	Safety shoes (Renowned brand)	N. S	200	Each		
12	Protective goggles (Anti-fog, Anti scratch Poly-carbonate Scratch and impact resistant, side protection sheet)	N. S	200	Each		
13	Cotton Gloves (made up of nylon, polyurethane with ironclad)	N. S	200	Dozen		
14	Gloves (made up of nylon, polyurethane with ironclad)	N. S	2400	Each		
15	Respirators	N. S	20	Nos		
16	Dust Masks	N. S	2500	Each		
17	First Aid Kit (pain killers, eye wash solution, antibiotic ointment, thermometer, plasters, sterile gauze dressings, sterile eye dressings, triangular bandages, crepe rolled bandages, safety pins, disposable sterile gloves and tweezers)	N. S	60	Each		
18	Air Quality Monitoring, as per the parameters and methodology defined by Punjab EPA (Monthly)	N. S	12	Monthly		
19	Groundwater Quality Testing as per all the parameters and methodology defined by Punjab EPA (Monthly)	N. S	12	Monthly		

20	Surface Water Quality Testing as per all the parameters and methodology defined by Punjab EPA (Monthly)	N. S	8	Monthly		
21	Site Environmental Specialist	N. S	1	Monthly		
22	Noise level monitoring as per the methodology defined by Punjab EPA (Monthly)	N. S	36	Monthly		
23	Internal Environmental Auditing	N. S	1	No.		
24	Environmental Training	N. S	1	No.		
25	Environmental Reporting and Review	N. S	1	No.		
					Subtotal 1.2:	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (Rs.)
2	**LEVELLING AND GRADING**	
2.1	Dressing and levelling to designed section, etc. complete; Ordinary or hard soil	
2.2	Dressing of earthwork (done by machinery or otherwise and left undressed) to designed section.	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

Bill of Quantities

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
2.1	Dressing and levelling to designed section, etc. complete; Ordinary or hard soil	3/18 - a	18,480,000	Cft		
					Subtotal 2.1:	
2.2	Dressing of earthwork (done by machinery or otherwise and left undressed) to designed section.	3/20 - b	739,200	Sft		
					Subtotal 2.2:	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (Rs.)
3	**LEACHATE COLLECTION AND TREATMENT**	
3.1	Leachate Collection System	
3.2	Construction of Sumps	
3.3	Leachate Removal System (From Sumps to Treatment Unit)	
3.4	Leachate Treatment System	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE
BILL OF QUANTITIES

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
3.1	**Leachate Collection System**					
a	Design, supply, installation, leveling, joining and laying of 30 cm dia HDPE perforated leachate collection pipe as per drawing and specification and direction of project engineer. The pipe will be wraped with a 250 gsm geotextile. An alternate design for leachate collection can also be provided by the contractor for approval from the engineer.	P. S	1	No.		
					Subtotal 3.1:	
3.2	**Construction of Sumps**					
a	Earth work excavation in open cutting for sewers and manholes as shown in drawing including shuttering of wooden vertical planks, struts and beams, dressing to correct section and dimension according to templates and levels and removing surface water in all types of soil except shingle, gravel and rock. i) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	3/42 i	7,766	Cft		
b	Geosynthetic Clay Liner (Bentonite GCL) GCL liner will be installed in the bottom of the cell and side slopes as indicated in design and drawings. Supply of GCL material with a permeability of 1x10^-11. Supply of GCL material as per specifications and quantity required and approved by the project design engineer. The installation and QA/QC will be as per design and direction of project engineer. Project engineer must follow QA/QC manual.	N. S	16,872	Sft		
c	Install HDPE liner 1.5 mm thick over the geo Synthetic clay liner the scope of work will include supply, installation and welding of the panels as specify in QA/QC manual utilizing approved equipment for welding of HDPE. The vacuum testing as per testing manual is included in scope of work.	N. S	16,872	Sft		
d	A protective Geotextile 250 GSM will be installed over the HDPE liner layer at the top surface and side slopes. The scope of work will include supply of geotextile and installation together with double stitching the panels utilizing mobile stitching machine.	N. S	16,872	Sft		
e	A drainage layer 2m thick comprising of Pit run washed gravel or crushed stones 6.35mm to 100 mm	N. S	8,002	Cft		

	thick. The crushed stone will not contain any stone dust. The Pit Run gravel should not contain any clay content.					
f	A protective Geotextile 250 GSM will be installed under the target pad (4mx4m)	N. S	344	Sft		
					Subtotal 3.2:	
3.3	**Leachate Removal System (From sumps to treatment unit)**					
a	Installation of leachate collection from sumps and removal including civil works, and installation of stainless-steel screen, carbon steel pipe, inner and outer HDPE pipe as per design and specifications. The contractor will follow the design and drawings. The contractor may submit its own design of well screen for approval by the engineer.	N. S	2	Tasks		
b	Leachate Suction Pump. Procurement, installation and commissioning of submergible leachate collection pump.	N. S	2	No.		
					Subtotal 3.3:	
3.4	**Leachate Treatment System**					
a	Design and Installation of leachate treatment enclosed containerized system. It also includes allied works (construction of storage tanks, piping network, and civil work for foundation etc. as per drawing complete in all respect to the satisfaction of the engineer).	N. S	1	No.		
					Subtotal 3.4:	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (Rs.)
4	**GAS RECOVRY SYSTEM**	
4.1	Gas Recovery System	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE
BILL OF QUANTITIES

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
4.1	**GAS RECOVERY SYSTEM**					
1	Drilling of (72 No) borehole, 18"-24" dia. up to the maximum depth of 25m in overburden material or up to natural soil level by hydraulic auger pilling machine.	N. S	3,937	Rft.		
2	Provision and installation of HDPE Main Gas Wells (Vertical) 200mm x 6mtr	N. S	5,906	Rft.		
3	Provision and installation of Well Head as per design drawing and to the satisfaction of the engineer.	N. S	72	Nos.		
4	Supply and installation of 63mm HDPE dia pipe (SDR-17) from gas wells to manifold in rolls of 100m	N. S	3,247	Rft.		
5	Supply and installation of HDPE Manifold 180mm x 6mtr	N. S	13,189	Rft.		
6	Provision and installation of HDPE Ring main 315mm x 12mtr	N. S	8,596	Rft.		
7	Filter material around the gas wells comprising of crushed stones half inch to quarter inch without any stone dust and clay. Permeably washed crushed stone should be used.	N. S	35,315	Cft.		
8	**High Temperature Flare System**					
a	Installation, testing and commissioning of UF10-1000 High Temperature Flare To Supply ex works Fully Compliant Skid Mounted Flare Stack including: • Automated combustion control • 1000 deg C @ 0.3 sec retention time • Integrated Safety systems • Latest PLC controlled operation • Compatible with SCADA control • Leading cyclonic burner technology • Flash back protected flame arrestor • Pneumatic slam shut operation • Stainless steel pipework • Control panel • Compressor panel • Pilot line with flame arrester • ATEX Gas Booster Including local and digital monitoring (Digital flow transmitter, digital pressure transmitter, and digital vacuum	N. S	1	Nos.		

	transmitter), security, control panels, remote access, automation, analysis, condensate pot, pump pack, booster, remote operation, and weather control, complete in all respects to the satisfaction of the engineer. It also includes allied works (civil, including foundation, and piping network etc.) It also includes allied works (civil, including foundation, and piping network etc.)					
b	Accessories and Spare Parts 1. UV Sensor 2. Ignition Electrode 3. Plug Cap 4. Ignition Transformer 5. Thermocouple 6. Panel Lamps 7. Relays 8. HT Lead 9. Pressure Guage 10. Vacuum Guage 11. Louvre Motor (@ 05% of the UFC 10-1000 High Temperature Flare's cost)	N. S	1	Nos.		
					Subtotal 4.1:	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (RS)
5	**CLOSURE CAP**	
5.1	Installation of Closure Cap	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE
BILL OF QUANTITIES

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
5.1	**INSTALLATION OF CLOSURE CAP**					
1	Earthwork in ordinary soil for embankments lead up to 100 ft. (30 m), including ploughing and mixing with blade grade or disc harrow or other suitable equipment, and compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects: -iii)85% maximum modified AASHO dry density. (Carriage 30 Km).	3/05-iii & 17	3,500,000	Cft.		
2	Providing and laying of protective Geotextile 250 GSM over the leveling soil layer at the top surface and side slopes. The scope of work will include supply of geotextile and installation together with double stitching the panels utilizing mobile stitching machine.	N. S	1,350,000	Sft.		
3	Providing and laying HDPE liner 1.5 mm thick over the protective geotextile the scope of work will include supply, installation and welding of the panels by utilizing approved equipment for welding of HDPE. The vacuum testing is included in scope of work.	N. S	1,350,000	Sft.		
4	Providing and laying of protective Geotextile 250 GSM over the HDPE liner layer at the top surface and side slopes. The scope of work will include supply of geotextile and installation together with double stitching the panels utilizing mobile stitching machine.	N. S	1,350,000	Sft.		
5	Providing and laying Sub-base Course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of Sub-base Material to required depth, grade to achieve 100% maximum modified AASHO dry density, including carriage of all materials lead 180 km. (From Dina) Pit run or bed run gravel.	18/03-a i	667,882	Cft.		
6	Providing and laying of a protective Geotextile layer of 250 GSM on top drainage layer, so that the soil layer above the drainage layer does not block the drainage layer.	N. S	1,350,000	Sft.		
					Subtotal 5.1:	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

BILL OF QUANTITIES

SUMMARY

Sr. No	Description	Total Cost (RS)
6	**ALLIED BUILDINGS AND INFRASTRUCTURE**	
6.1	Stone Pitching for Storm Water	
6.2	Stairs and Parking Area	
6.3	Pathways	
6.4	Building	
6.5	Brick Masonry Boundary Wall	
6.6	RCC Boundary Wall	
6.7	Construction of Entrance Gate (Civil Work, Electric Works, Public Health Works)	
6.8	Drilling, Boring & Installation of 0.1 Cusec Capacity Pump	
	Total Rs.	

REHABILITATION OF MEHMOOD BOOTI DUMPSITE
BILL OF QUANTITIES

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
6.1	**STONE PITCHING FOR STORM WATER**					
1	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (in ordinary) soil.	3/21-2 iii	187,738	Cft		
2	Providing and laying stone pitching, for top layer only.	16/29				
	One slope.		19,006	Cft		
	One slope.		30,157	Cft		
	One level		8,026	Cft		
	One level		11,544	Cft		
	One level		16,895	Cft		
3	Grouting stone pitching or apron, etc. in: -cement, sand mortar 1:8	16/32				
	One slope.		38,013	Sft		
	One slope.		60,313	Sft		
	One level		16,052	Sft		
	One level		23,087	Sft		
	One level		33,789	Sft		
					Sub Total 6.1:	

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
6.2	**STAIRS AND PARKING AREA**					
1	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (in ordinary) soil.	3/21-2 iii	15,642	Cft		
2	Cement concrete plain including placing, compacting, finishing and curing complete including screening and washing of stone aggregate 1:4:8	6/5i	75,742	Cft		
3	Pacca brick work other than building up to 10ft. (3 m) height i) cement, sand mortar: - Ratio 1:3	7/7-i	19,151	Cft		
4	Cement concrete plain including placing, compacting, finishing and curing complete	6/5f	3,466	Cft		

	including screening and washing of stone aggregate 1:2:4					
5	Providing and laying Sub-base Course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of Sub-base Material to required depth, grade to achieve 100% maximum modified AASHO dry density, including carriage of all materials lead	18/03-aii	25,029	Cft		
6	Providing and laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope. complete in all respect (50% Grey / 50% Colored) b) 60-mm thick	10/42-b	50,059	P. Sft.		
7	Providing and fixing precast Edge Kerb Stone (4"to 6" thick), of 3500 PSI Compressive Strength, embedded in PCC 1:2:4 over lean concrete 1:4:8 etc. complete in all respect. With Painting 18" high	6/52-bii	1,785	Rft		
					Sub Total 6.2:	
Sr. No	**Description**	**Item Ref.**	**Qty.**	**Unit**	**Unit Rate (Rs.)**	**Total Cost (Rs.)**
6.3	**PATHWAYS**					
1	Providing and laying Sub-base Course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of Sub-base Material to required depth, grade to achieve 100% maximum modified AASHO dry density, including carriage of all materials lead		133,045	Cft		
2	Providing and laying stone pitching for top layer and on level (on Shoulder)		139,425	Cft		
					Sub Total 6.3:	
Sr. No	**Description**	**Item Ref.**	**Qty.**	**Unit**	**Unit Rate (Rs.)**	**Total Cost (Rs.)**
6.4	**BUILDING**					
1	Construction of Gazebo					
	Covered Area 20 x 20 Sft Rate of Construction Rs. 8000/Sft (3 No)		1,200	Sft		
2	Construction of Office Building					
	Covered Area 41 x 22 Sft Rate of Construction Rs. 6,500/Sft		902	Sft		
3	Construction of Bath Rooms 3 No					

	Covered Area 16.75 x 13.25 Sft Rate of Construction Rs. 5500/Sft		666	Sft		
					Sub Total 6.4:	
Sr. No	**Description**	**Item Ref.**	**Qty.**	**Unit**	**Unit Rate (Rs.)**	**Total Cost (Rs.)**
6.5	**BRICK MASONARY BOUNDARY WALL**					
	Earthwork (Excavation & Embankment					
1	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (1.5 m) 1) By Manual. ii) in ordinary soil.	3/21 1ii	226,800	Cft		
2	Filling, watering and ramming earth under floors: -i) with surplus earth from foundation, etc.	3/15 i	74,844	Cft		
	Concrete					
3	Providing and laying sub-base course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of sub-base material to required depth, camber, grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to site of work except gravel and aggregate.	18/3aii +1/1	85,050	Cft		
4	Supplying and filling sand under floor; or plugging in wells.	10/3.	85,050	Cft		
5	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth (1:6:12)	6/3 d	5,906	Cft		
6	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, mould, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc. and other structural members other than those mentioned in 6(a) (i)&(ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- 3) Type C (nominal mix 1: 2: 4)	6/6 aiii2	15,947	Cft		
7	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labor charges for binding of steel reinforcement (also includes removal of rust from bars): -	6/12c	12,558	Kg		

8	Providing and laying damp proof course of cement concrete 1:2: 4(using cement, sand and shingle), including bitumen coating: - (a) with one coat bitumen and one coat polythene sheet 500 gauge.	6/36 aii	13,500	Sft		
	Brick Work					
9	Pacca brick work in foundation and plinth in: - i) Cement, sand mortar: - Ratio 1:4	7/7 i	113,884	Cft		
	Surface Rendering					
10	Cement plaster 1:4 up to 20' (6.00 m) height: - c) ¾" (20 mm) thick	11/9 c	105,241	Sft		
	Painting and Varnishing					
11	Providing and applying weather shield paint of approved quality on external surface of building including preparation of surface, application of primer completes in all respect i) 1st coat + ii) 2nd coat	13/33 a	105,241	Sft		
	Iron Work					
12	Providing and fixing barbed wire fencing on compound wall, consisting of 1½"x1½"x3/16" (40x40x5mm) angle iron post 3' (900 mm) long, 4' (1200 mm) apart embedded in cement concrete 1:4:8 base of size 6"x6"x9" (150x150x225 mm) and 4 rows of barbed wire, including binding wire, painting posts, etc. complete in all respects.	25/50	4,725	Rft		
	Miscellaneous					
13	Spraying termite proofing by using liquid FMC/ Biflex/ Terminix Exin/ Ms Hextar or equivalent @ specified suspensi on concentrate (SC), Mixing Ability-HEXTAR with Ratio (1:250) = 540Sft or equivalent approved liquid applying with shower and certificate will be provided by the contractor for 10-years complete in all respect. as approved by the Engineer In charge.	26/43	103,950	Sft		
					Sub Total 6.5:	

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
6.6	**RCC BOUNDARY WALL**					
	Earthwork (Excavation & Embankment)					
1	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (1.5 m) 1) By Manual. ii) in ordinary soil.	3/21 1ii	225,391	Cft		
2	Filling, watering and ramming earth under floors: -i) with surplus earth from foundation, etc.	3/15 i	74,379	Cft		
	Concrete					

3	Providing and laying sub-base course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of sub-base material to required depth, camber, grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to site of work except gravel and aggregate.	18/3aii +1/1	84,522	Cft		
4	Supplying and filling sand under floor; or plugging in wells.	10/3.	84,522	Cft		
5	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth (1:6:12)	6/3 d	6,365	Cft		
6	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and other structural members other than those mentioned in 6(a) (i)&(ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- 3) Type C (nominal mix 1: 2: 4)	6/6 aiii2	36,133	Cft		
7	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-(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:- (3) (c) Type C (nominal mix 1: 2: 4)	6/6 a(i) 3	47,779	Cft		
8	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):-	6/12c	157,246	Kg		
9	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect. ii) 10" wide 10 mm thick	6/31 A	2,940	Rft		
	Brick Work					
10	Pacca brick work in foundation and plinth in: - i) Cement, sand mortar: - Ratio 1:4	7/7 i	15,268	Cft		

	Surface Rendering					
11	Cement plaster 1:4 up to 20' (6.00 m) height: - c) ¾" (20 mm) thick	11/9 c	76,067	Sft		
12	**Painting and Varnishing**					
13	Providing and applying weather shield paint of approved quality on external surface of building including preparation of surface, application of primer completes in all respect: i) 1st coat + ii) 2nd coat	13/33 a	76,067	Sft		
	Iron Work					
14	Providing and fixing barbed wire fencing on compound wall, consisting of 1½"x1½"x3/16" (40x40x5mm) angle iron post 3' (900 mm) long, 4' (1200 mm) apart embedded in cement concrete 1:4:8 base of size 6"x6"x9" (150x150x225 mm) and 4 rows of barbed wire, including binding wire, painting posts, etc. complete in all respects.	25/50	2,714	Rft		
	Miscellaneous					
15	Spraying termite proofing by using liquid FMC/ Biflex/ Terminex Exin/ Ms Hextar or equivalent @ specified suspensi on concenterate (SC), Mixing Ability-HEXTAR with Ratio (1:250) = 540Sft or equivalent approved liquid applying with shower and certificate will be provided by the contractor for 10-years complete in all respect. as approved by the Engineer In charge.	26/43	71,602	Sft		
					Sub Total 6.6:	

Sr. No	**Description**	**Item Ref.**	**Qty.**	**Unit**	**Unit Rate (Rs.)**	**Total Cost (Rs.)**
6.7	**CONSTRUCTION OF ENTRANCE GATE (CIVIL WORK, ELECTRIC WORKS, PUBLIC HEALTH WORKS)**					
1	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (1.5 m) 1) By Manual. ii) in ordinary soil.	3/21 (1-ii)	12,275	Cft		
2	Providing and laying sub-base course of stone product of approved quality and grade, including placing, mixing, spreading and compaction of sub-base material to required depth, camber, grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to site of work except gravel and aggregate.	18/3aii+1/1	4,457	Cft		

3	Supplying and filling sand under floor; or plugging in wells 50% Sand and 50% Subbase	10/3.	4,457	Cft		
4	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth (1:4:8)	6/3 b	431	Cft		
5	Filling, watering and ramming earth under floors with surplus earth from foundation, etc.	3/15i	6,444	Cft		
6	Filling, watering and ramming earth under floors with with new earth excavated from outside, lead up 12 km with compaction up to 90% maximum modified AASHO dry density complete in all respects as approved by the Engineer In charge.	3/15ii+17/3abcd	1,823	Cft		
7	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, mould, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- 3) Type C (nominal mix 1: 2: 4)	6/6 a iii 3 c	1,548	Cft		
8	(a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects: - 3) Type C (nominal mix 1: 2: 4)	6/6 aiii 3 c	446	Cft		
9	(a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects: - 3) Type C (nominal mix 1: 2: 4)	6/6 aiii 3 c	12	Cft		
10	Pacca brick work in Foundation with cement sand mortar Ratio 1:6	7/4i	305	Cft		
11	Providing and laying damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating with one coat bitumen and one coat polythene sheet 500gauge 1½" thick (40 mm)	6/36ai	86	Sft		
12	Providing and laying vertical damp proof course with cement sand plaster and bitumen coating: - (a) with one coat of bitumen and one coat of polythene sheet 500 gauge:	6/38aiib	230	Sft		

	ii) Ratio 1:3 b) ¾ " thick (20mm)					
13	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 (nominal mix 1: 2: 4)	6/6 ai 3 c	5,338	Cft		
14	Pacca brick work in Ground Floor cement sand mortar 1:4	7/ 5 i	1,252	Cft		
15	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labor charges for binding of steel reinforcement (also includes removal of rust from bars deformed bar (Grade-60)	6/12c	25,702	Kg		
16	Cement plaster 1:4 upto 20' (6.00 m) height: -¾" (20 mm) thick	11/9 c	3,395	Sft		
17	Cement plaster 1:4 up to 20' (6.00 m) height: -¾" (20 mm) thick	11/9 c	2,583	Sft		
18	Cement plaster 3/8" (10 mm) thick under soffit of R.C.C. roof slabs only, up to 20' height. (1:3)	11/10 c	1,796	Sft		
19	Single layer of tiles 9"x4½"x1½" (225x113x40 mm) laid over 4"(100 mm) earth and 1" (25 mm) mud plaster without Bhoosa, grouted with cement sand 1:3 on top of RCC roof slab, provided with 34 lbs. per %Sft. or 1.72 Kg/Sq.m bitumen coating sand blinded i/c polythene sheet 500 gauge.	9/5 +26/37ii	306	Sft		
20	P/F 1-1/2" thick solid flush door comprising of 2.5 mm thick Deodar/Ash/Oak ply with grooves, compressed over 2.5 mm thick commercial ply over 1" thick packing wood in style and rails under proper pressure i/c the cost of nails, tower bolt, handles, glue, sawing charges and lacquer polishing to show the grains of ply properly, sand papering and 3/8" thick matching wooden lipping as approved and directed by the Engineer In charge.	12/52	74	Sft		
21	Small iron work, such as gusset plates, knees, bends stirrups, straps, rings, etc. including cutting, drilling, riveting, handling, assembling and fixing; Erection and fitting in position iron trusses, staging of water tanks, etc.	25/9+25/11	1,575	Kg		
22	Providing and fixing mild steel chowkat of doors, windows, C.window, etc. including holdfast, making and threading holes for hinges, etc. complete:- a) M.S. angle iron 1½"x 1½"x ¼" (40x40x6 mm) welded with M.S. flat 2"x ¼" (50 mm x 6 mm).	12/15 a	147	Sft		
23	Supply and filling sand under floors	10/3.	153	Cft		

24	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth: - (d) Ratio 1: 6:12	6/3 d	102	Cft		
25	Providing and fitting all types of glazed aluminum windows of anodized bronze color partly fixed and partly sliding using deluxe sections of approved manufacturer having frame size of 100 x 30 mm (4"x1 1/4") and leaf frame sections of 50 x 20 mm (2"x¾"), all of 1.6mm thickness including 5 mm thick imported tinted glass with rubber gasket using approved standard latches, hardware etc., as approved by the Engineer in-charge.	25/52	38	Sft		
26	Providing and fixing heavy duty 3 mm thick SS Plate, die-cast metal automatic hydraulic operated door stopper (Concealed floor hinge) embedded in floor i/c the cost of Top pivot hinge, hardware, cutting of floor and making it good complete in all respect as approved and directed by the Engineer In charge	12/68	4	Each		
27	Providing and fixing Aluminum Fly screen comprising of Fiber / Aluminum wire gauze (Malaysian) fixed in aluminum frame of approved manufacturer bronze Color / powder coated of size 1-1/2"x1/2" and 1.6mm thick with rubber gasket i/c cost of Hardware's as approved and directed by the engineer in charge. complete in all respect.	25/53	40	Sft		
28	Supply & apply Priming coat of chalk under distemper, 03 coats of distempering on new surface complete in all respect	11/22, 23aiii	10,902	Sft		
29	Providing and laying superb quality Ceramic tile floors of Master brand of specified size, Glossy/Matt/Texture of approved Color and Shade as per approved design with adhesive bond, over 3/4" thick (1;2) cement sand plaster i/c the cost of sealer for finishing the joints i/c cutting grinding complete in all respects and as approved and directed by the Engineer In charge. i) 12"x18"/12"x24"/10"x24"/8"x24"/12"x36"	10/25i	76	Sft		
30	Providing and laying superb quality Ceramic tiles dado of Master brand of specified size, Glossy/Matt/Texture skirting/dado of approved Color and Shade with adhesive bond over 1/2"thick (1:2) cement plaster i/c the cost of sealer for finishing the joints i/c cutting grinding complete in all respects as approved and directed by the Engineer In charge. i) 12"x18"/12"x24"/10"x24"/8"x24"/12"x36"	10/26i	323	Sft		
31	Providing and laying superb quality Porcelain glazed tiles flooring of MASTER brand of specified size in approved design, Color and Shade with adhesive/bond over 3/4"thick (1:3) cement plaster i/c the cost of sealer for finishing the joints i/c cutting grinding complete in all	10/43 aii	134	Sft		

	respect as approved and directed by the Engineer In charge. a) Full body Glazed tiles (ii) 600mm x600 mm					
32	Providing and laying superb quality Porcelain glazed tiles of Master brand, skirting/dado of specified size, Color and Shade with adhesive/bond over 1/2"thick (1:2) cement plaster i/c the cost of and sealer for finishing the joints, cutting grinding complete in all respect as approved and directed by the Engineer In charge. a) Full body Glazed Tile (ii) 600mm x600 mm	10/43 aii	21	Sft		
33	Preparing surface and applying Graffito Weather Coating (Co-polymer emulsion) of approved color & shade with weather resistant pigment, highly water repellant with Metallic Spatula having top class finish by smoothing with a plastic Spatula, on a base coat (Primer) over well cleaned plastered surface complete in all respect as approved and directed by the Engineer In charge.	11/39	5,425	Sft		
34	Khuras on roof 2'x2'x6" (600 x 600 x 150 mm)	9/44	2	No		
35	Cast iron rain water downpipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.: -	9/20a	24	Rft		
36	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting	9/21	2	No		
37	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	9/22	2	No		
38	Spraying anti termite proofing by using liquid FMC Biflex 2.5%EC Mixing Ratio 1:50=137-Sft or using liquid MIRAGE Ali Akbar/RANGERS Auriga 5% SC Mixing Ability-HEXTAR Ratio 1:110=205-Sft or any other equivalent approved liquid applying with shower and certificate will be provided by the contractor for 10-years complete in all respect .as approved by the Engineer In charge.	26/43	765	Sft		
39	Providing and fixing false ceiling comprises of Gypsum board laminated sheet of size 2'x2'/2'x3'/ 3'x3'of specified design and thickness i/c cost of fixtures i.e. galvanized angle 1" x 1" at wall sides, galvanized tee 1¼" x 1"and 1 ½" x 1" both at 4' c/c (made of Taiwan CKM or equivalent), hanging with G.I/Copper wire 16 SWG, G.I hook, Rawal Plug etc.: complete in all respects as approved and directed by the Engineer In charge. iv). 12mm Thick	9/48 iv	291	Sft		
40	Electric work					
41	Public Health Works					
					Sub Total 6.7:	

Sr. No	Description	Item Ref.	Qty.	Unit	Unit Rate (Rs.)	Total Cost (Rs.)
6.8	**DRILLING, BORING & INSTALLATION OF 0.1 CUSEC CAPACITY PUMP**					
1	Direct Rotary/Reverse Rotary drilling of bore for tubewells, in all types of soil except shingle, gravel and rock: - from ground level to 250 ft. (75 m) below ground level: - i) 15" to 18" (375 to 450 mm) i/d	23-5-a i	250.00	Ft		
2	Direct Rotary/Reverse Rotary drilling of bore for tubewells, in all types of soil except shingle, gravel and rock: - exceeding 250 ft. (75 m) depth below ground level: -i) 15" to 18" (375 to 450 mm) i/d	23-5-b i	600.00	Ft		
3	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate): Ratio 1: 2: 4	6-5-f	32.00	Cft		
4	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- (nominal mix 1: 1½: 3)	6-6-a iii 2	65.00	Cft		
5	Providing and installing P.V.C. Bail/End plug, in tubewell bore hole: 8" i/d (200 mm) B.S.S. Class `B'	23-14-a-v	1.00	Each		
6	Providing and installing Fiberglass reinforced Polypropylene (FRP) strainer of specific wall thickness having slot size of 0.9 mm to 1.00 mm in Tubewell borehole i/c the cost of male/female coupling with Nylone Strip, studs complete in all respect as approved and directed by the Engineer Incharge.8" inch dia	23-13 -v	142.00	Ft		
7	Providing and installing P.V.C. blind pipe, B.S.S. Class `B', in tubewell bore hole, including sockets and solvents and jointing with strainer, etc. complete. 12" i/d (300 mm)	23-16-g	708.00	Ft		
8	Providing, laying, testing and commissioning of POLYPROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe made of (Dadex /Popular/ Beta / BBJ) with specified pressure	23/47-a iii	15.00	Ft		

	rating PN (PRESSURE NOMINAL) and conforming to DIN 8077-8078 code i/c cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer In charge. (Internal / External Diameters mentioned). PN-16 pipe (For Tap) 1") 32 mm					
9	Testing and developing of tubewell of size 6" (150 mm) i/d and above continuously upto 1.5 cs. Discharge	23/18 i	72.00	Per Hour		
10	Shrouding with graded pea gravel 3/8" to 1/8" (10 to 3 mm), around tubewell in bore hole.	23/19.	350.00	Cft		
11	Fabrication of heavy steel work, with angle, tees, flat iron round iron and sheet iron for making trusses, girders, tanks, etc., including cutting, drilling, refitting, handling, assembling and fixing, but excluding erection in position. (For Supply & installation of 1/2" i/d thick M.S Cap for 12" housing pipe)	25/10.	60.00	Kg		
12	Erection and fitting in position iron trusses, staging of water tanks, etc.	25/11.	60.00	Kg		
13	Providing strong substantially built box of deodar wood 4'x2½'x9" (1200x750x225 mm), with compartments, lock and locking arrangement, for preserving samples of strata from bore hole.	23/7.	1.00	Each		
14	Providing and fixing, air valve 2½ (65mm) dia of B.S.S. quality and weight (complete with jointing material). Double	23/34-b.	1.00	Each		
15	Providing and fixing heavy duty Gate valve of specified diameter and material for pressure rating PN-16 mde of Crane (USA), Hatersly (UK) or Scon (Pakistan) i/c the cost of all accessory's flanges, nut/bolt and gas kit where required complete in all respect as approved and directed by the Engineer In charge. 6" dia	23/52-b.	1.00	Each		
16	Providing and fixing heavy duty Check valve of specified diameter and material for pressure rating PN-16 made of Crane (USA), Hatersly (UK) or Scon (Pakistan) i/c the cost of all accessory's flanges, nut/bolt and gas kit where required complete in all respect as approved and directed by the Engineer Incharge.6" dia	23/54-b	1	Each		
17	Taking of water samples (2 bottles each) at the end of the pumping test. Full chemical and bacteriological analysis, of water samples according to Pakistani standard.	N. S	2	Each		
18	Pumping set submersible, with AC electric motor driven, 400 V, 3 phase, 50 ~ 60 Hz, complete in all respects with pump, motor, cable, pipes, motor control unit, pump capacity 0.1 cusec (10.1 M.C per Hour) including valves, Minimum 290 M head, pump power rating maximum 30HP with DPRP dryer and protection, motor efficiency IE2,	N. S	1	Job		

	insulation class 'F', enclosure characteristics IP-68, supply and fixing.					
19	Water Supply Pump Room	N. S	1	No		
20	Water Distribution Network	N. S	1	No		
					Sub Total 6.8:	

Ravi Urban Development Authority

RAVI RIVERFRONT URBAN DEVELOPMENT PROJECT

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

MAY 2024

SPECIFICATIONS – VOLUME III

- SPECIAL PROVISIONS
- TECHNICAL SPECIFICATIONS
- ENVIRONMENTAL MANAGEMENT PLAN (EMP)

VOLUME III – SPECIFICATIONS

SPECIAL PROVISIONS

Contents

1. GENERAL

The Ravi Urban Development Authority (RUDA) intends to rehabilitate the Mehmood Booti Dumpsite using scientific and environmentally sustainable methods. Mehmood Booti, the oldest disposal site in Lahore, falls within the jurisdiction of RUDA near the Ring Road. Since 1997, it has been utilized as an open dumping site. Covering an area of 42 acres beside the Ring Road Lahore, the Mehmood Booti dumpsite has accumulated approximately 13 million tons of waste until its official closure in 2017.

2. DESCRIPTION OF THE WORKS

The works included in this Contract are as follows but not limited to these items only:

- Levelling and Grading
- Leachate Collection and Treatment
- Gas Recovery System
- Capping / Closure Layer
- Allied Buildings and Infrastructures (Storm Water Drain, Stairs and Parking Area, Pathways, Office Building, Toe Wall / Retaining and Boundary Wall, Main Gate, Water Supply System)

3. SITE OF WORKS

The Employer will give to the Contractor possession of as much of the area designated and defined as the Site and shown on the drawings as may be required to implement the Works, but subject to any restrictions set out in the Contract, when the Engineer's Notice to Commence work is given.

4. SETTING OUT

Setting out data and control points for the rehabilitation related work will be provided by the Engineer following the 'Notice to Commence' but in any case, prior to start of work.

5. CLIMATOLOGICAL DATA

Lahore features a five-season semi-arid climate with five seasons: foggy winter (30 Nov – 15 Feb) with few western disturbances causing rain; pleasant spring (16 Feb – 15 April); summer (15 April – 30 June) with dust, rain storms and heat wave periods; rainy monsoon (1 July – 16 September); and dry autumn (16 September –14 November).

The hottest month is June, where average highs routinely exceed 40 °C (104.0 °F). The wettest month is July, with heavy rainfalls and evening thunderstorms with the possibility of cloudburst. The coolest month is January with dense fog.

The city's record high temperature was 50.4 °C (122.7 °F), recorded on 5 June 2003. On 10 June 2007, a temperature of 48 °C (118 °F) was recorded; The lowest temperature recorded in Lahore is –2.2 °C, recorded on 17 January 1935.

6. UTILITIES

The Contractor shall directly enquire from the utility companies about availability of connections of electric power supply and telephone lines for his use at the Site. In case of non-availability of electric power supply from national grid to meet his requirements, the Contractor shall provide at his own cost electric power generators as necessary for supply of power for the various parts of the Works including his camps, offices, stores, workshops, laboratory and other installations as well as for the Engineer's Site office provided under Sub-Clause 16.1. The Contractor shall bear all costs for constructing, operating and maintaining the generation system, including the standby generation system, and distribution system including providing diesel, oil or other consumables and all services and necessary attendance to ensure uninterrupted power supply at all times.

The Contractor shall make his own investigations and arrangements for supply of water of acceptable quality for construction requirements and safe drinking water for his staff and workmen and for the staff of the Engineer.

No separate payment will be made to the Contractor for works performed under this Clause and the costs thereof shall be deemed to be included in the rates and prices of the various items in the Bill of Quantities.

7. EXTENT OF WORK

The Contractor shall be responsible for levelling and grading of the site. Any depressions shall be filled by the contractor and compacted to the Engineer's satisfaction with no additional cost. The contractor shall construct the Works in accordance with the Drawings and Specifications and as directed by the Engineer. The Contractor shall procure, furnish, provide and arrange all the necessary construction materials, equipment, transportation, fuel, electric power, water and services; be responsible for the construction and maintenance of the construction camps, offices, workshops and access roads that he may require, and perform all other work necessary for completion of the Works described herein, in complete conformity with the Contract.

8. DRAWINGS

8.1 Bidding Drawings

The Drawings provided at end of Bid Documents and hereinafter referred to as Bid Drawings show the scope of the work to be performed by the Contractor. The Bid Drawings shall not be used as a basis for fabrication or construction, but may be used as the basis for planning, scheduling and placing preliminary orders for materials, subject to corrections based on future issue of Construction Drawings. Any other Drawings if issued through Addenda, before opening of Tenders, shall become part of the Bid Drawings.

8.2 Construction Drawings

After award of Contract, Bidding Drawings will be replaced by Drawings issued by the Engineer for Construction, with such modifications as may be necessary. The Drawings Issued for Construction will include Bid Drawings re-issued, Bidding Drawings modified and additional Drawings as required to develop in greater detail the construction required and shall be referred to

hereinafter as "Construction Drawings". The Construction Drawings that show changes from the Tender Drawings and Specifications, will be reviewed by the Engineer for determination of adjustments, if any, of the Contract Price in accordance with the provisions of Clause 51.1, Variations, of the Conditions of Contract. The work shall be executed in conformity with the Construction Drawings.

The Engineer and Contractor shall jointly prepare a schedule for issuance of Drawings Issued for Construction of the various parts of the Works based on a list of drawings provided by the Engineer.

8.3 Checking Drawings

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

9. RIGHT TO CHANGE

The Engineer may find it desirable to change location, alignment, dimensions or design of one or more of the features of the Works to conform to the newly disclosed conditions. Toward this end, the Engineer reserves the right to make such reasonable changes, and the Contractor's operations shall be conducted so as to accommodate any such changes in the Works.

10. DRAWINGS AND DATA TO BE FURNISHED BY THE EMPLOYER / ENGINEER

10.1 Procedure for Submittal of Contractor's Drawings

All drawings showing construction details shall be provided by the Employer / Engineer.

10.2 Other Drawings

Other drawings additional to those referred to hereinabove required by the Specifications showing proposed methods of constructing Temporary Works shall also be submitted to the Engineer for approval.

10.3 Ownership of Drawings

All the drawings, details, bills of materials and any other information or documents furnished by the Engineer shall become the property of the Employer/Engineer.

11. CONSTRUCTION PROGRAMME

11.1 General

The program of work submitted by the Contractor in accordance with Sub-Clause 14.1 "Programme to be submitted" of the General Conditions of the Contract shall be supplemented by submittal of a detailed schedule based on a computerized system, Primavera Enterprise for

Engineering & Construction (P6) software or equivalent, covering all construction activities and furnished to the Engineer on paper and a soft copy on the following dates:

- **Construction Schedule:** Along with the Bid Documents.
- **Baseline Schedule:** within 21 days after receipt of Letter of Acceptance.
- **Revised Baseline Schedule:** After 3 months of the approval of Baseline Schedule and thereafter quarterly.
- **Recovery Schedule:** As and when required by the Engineer.

The Baseline Schedule, as approved by the Engineer in consultation with the Employer, will form an integral part of the Contract and will establish Contract completion dates for the various activities as mentioned in the Contract.

All schedules, project plans, progress updates and reports shall be in the form of readable computer printouts as well as in soft data format.

11.2 Requirements & Procedures

11.2.1 General Requirements

- The narrative report accompanying the submittal shall describe the construction methods; plant and equipment proposed to be used and shall explain the expected production rates that are the basis of the scheduled durations of different activities.
- Start Date of the Project.
- Dates on which different site possession will be required.
- General administrative items like, Performance guarantee, Mobilization Advance Guarantee, Insurance etc.
- Unique Activity ID, description and duration.
- Activities' earliest start and finish dates, latest start and finish dates.
- Critical path with listing of all activities on the path.
- Dates for Employer furnished material or equipment if any.
- Required dates of Drawings from the Engineer.
- Dates for submittals like Method Statements etc.
- Work Breakdown Structure (WBS) and activity codes.
- Definition of calendars with non-working days or periods i.e. planned closures, flood seasons etc.

- Loading of key resources.
- All activities with zero float
- Milestone dates.
- Network logic Diagram.
- List of constraints i.e. reason and type of constraint.
- Full S – Curve and Critical S – Curve (for critical activities only).
- Cost/ Resource Histograms.
- Planning assumptions and any external relationships
- Explain any discretionary dependencies.
- Appropriate quantity of direct resources (material, labour, equipment) should be allocated to all activities and showed in submitted construction schedule. Labour resource should be divided according to related trades (e.g. Mason, Operator, helper etc.) Contractor should make sure that no resource is being overallocated.
- BOQ amount should be loaded to each construction activity. Earned Value Management Reporting to be ensured accordingly

11.2.2 Construction Schedule

Construction Schedule will be submitted along with Bid Document and will be prepared in accordance with the Sub-Clause 11.2.1 hereof.

11.2.3 Baseline Schedule

Baseline Schedule to be submitted within 21 days after the letter of acceptance and will be prepared in accordance with the General Requirements mentioned under the Sub-clause 11.2.1 hereof. Start date will be the date of Notice to Commence.

11.2.4 Revised Baseline Schedule

Besides, the General Requirements mentioned above, following will be the additional requirements for or quarterly Baseline Schedule:

- The revised narrative report depicting the actual situation and submittal describing the construction methods, plant and equipment proposed to be used and shall explain the expected production rates that are the basis of the revision of scheduled durations of different activities.
- Start Date will be taken as Notice to Proceed.
- Change in strategy to achieve the target Completion Date describing the additional resources if required, change in sequence of activities etc.

- Actual start and finish dates.
- Incorporation of effects of all approved changes that have occurred during last three months i.e. any change order which will affect the Completion Date of the Project. Any change in Completion Date for milestones shall be on the basis of prior extension if any granted by the Engineer.
- Comparison with the target Baseline Schedule. The narrative of any deviation from the Baseline.

11.2.5 Recovery Schedule

The Recovery schedule will be submitted to the Engineer as and when required by the Engineer. If in the opinion of the Engineer any project milestone is likely to be missed, mitigation strategy for recovering the project will be submitted in the form of Recovery Schedule.

11.3 Explanation & Definitions of Different Terms

11.3.1 Activity Codes

Activity codes will include the following details

- Type of Structure
- Area / RDs
- Work Restrictions (Closure etc.)
- Responsibility if identified, in the Contract to be shared with an agency other than the Contractor.

11.3.2 Work Breakdown Structure

The Work Breakdown Structure (WBS) shall divide the project scope into hierarchical, manageable, definable packages of work that will clearly indicate the scope and budget for the element. The WBS elements shall clearly reflect project's purpose and objectives, functional/ performance design criteria, project scope, technical performance requirements, and other technical attributes. The WBS to be submitted by the contractor will be based on the following parameters:

- The WBS submitted by the contractor will include and be a part of the high level WBS provided by the Engineer.
- Each WBS element will represent a single tangible deliverable.
- Each WBS element will represent an aggregation of all subordinate WBS elements listed immediately below it.
- Each subordinate WBS element must belong to only one single parent (or superior) WBS element.

- The deliverables should be logically decomposed to the level that represents how they will be produced (designed, purchased, sub-contracted, fabricated). The partitioning of the deliverables from higher levels within the WBS to lower levels must be logically related
- Deliverables must be unique and distinct peers, and should be decomposed to the level of detail needed to plan and manage the work to obtain or create them.
- Deliverables should be clearly defined to eliminate duplication of effort within WBS elements, across organizations, or between individuals responsible for completing the work.
- Deliverables should be limited in size and definition for effective control – but not so small as to make cost of control excessive and not so large as to make the item unmanageable or the risk unacceptable.
- A coding scheme for WBS elements that clearly represents the hierarchical structure when viewed in text format will be used

11.4 Progress Measuring System

The Contractor will agree with the Engineer the Progress Measuring System after award of the Contract and before submission of Schedule as stated in sub-clause 14.1 of the condition of the contract.

11.4.1 Activity Definition

Activity definition will involve identifying and documenting the specific activities that must be performed to produce the deliverables and sub deliverables identified in the Work Breakdown Structure (WBS). Within the context of the process of Activity Definition, decomposition will include identifying and documenting a list of activities that will be performed on the project. It will be organized as an extension to the WBS and will not include any activities that are not required as part of the project scope. The adequate level of detail must be carefully planned for the intent of the schedule based on the following parameters:

- The list of activities should lead to the identification and achievement of major deliverables of the project, including project management.
- Cost, resource and duration estimates will be loaded for the activities.
- Progress Measurement Criteria and Activity Weights Definition will be devised for progress reporting.
- Each Activity will be assigned a unique Activity ID based on a coding structure. The coding structure logic will also be indicated and communicated to the Engineer.

11.4.2 Activity Sequencing

Activity sequencing will involve identifying and documenting interactivity logical relationships. Activities will be sequenced accurately to support development of a realistic and achievable

schedule. A project network diagram using Precedence Diagramming Method (PDM) will be utilized for showing dependencies between the activities.

11.4.3 Activity Duration Estimation

Activity durations will be estimated based on the work quantity, productivity and resources applied to the activity. Calendar dates will be utilized for all duration estimation with a minimum time unit of days. Calendars, constraints and assumptions will be documented and reported.

11.4.4 Schedule Development

The schedule will be developed to indicate the start and finish dates for project activities. The schedule developed will be iterated during the project according to the frequency of progress reporting. Critical Path Method (CPM) will be used for mathematical analysis of the schedule for calculation of Early and Late dates. As-Built construction schedules submitted by the Contractor periodically shall form the basis of evaluation of claim for Extension of Time, if any.

11.5 Reporting Requirements

11.5.1 Executive Summary

Briefly set out the key issues together with recommendations for actions to be taken relating to the reporting period. The following topics may be covered:

- Cash flow utilization: actual versus planned.
- Physical progress: main progress activities during the month vs planned milestones.
- Main risks, challenges, and issues encountered during the month.
- Main mitigation, preventive, or corrective measures envisaged and person(s) responsible to carry out such measures.

11.5.2 Contract Start-up Activities

- List all activities that should take place from the issuance of the letter of acceptance by the Employer to the selected bidder until 60 days after the commencement date, mentioning due date, actual date and responsibility.
- Mobilization Activities (planned date as per programme, actual date and remarks

11.5.3 Risk Management

- Include risk identification, risk assessment, and risk mitigation in a comprehensive Risk Register

11.5.4 Programme Monitoring

Including but not limited to the following

- Tabular form of progress – planned dates, actual dates, variances Graphical form – line graph illustrating actual verses planned progress
- Pie chart – overall progress (%), time elapsed, time remaining
- One month look ahead table with target dates
- A short paragraph commenting on the critical path and the progress recorded to date.
- Description of all work carried out since the last report;
- Earned Value Analysis

11.5.5 Change Management

Variation and Claim Register

11.5.6 Financial Management

- Payment Schedule
- Evolution of Contract Price

11.5.7 Environmental Management Health and Safety

Complete Compliance Report

11.5.8 Completion of Works and Contract Closure

List all activities with due date, actual date and responsibility

11.5.9 Photographs to illustrate progress

The caption shall be typed on each photograph

- Title of Project
- Identification of subject shown
- Station points of camera and direction of view
- Date & Time (automatically displayed on the photos)
- Name of Employer / Engineer and Contractor

11.6 Drone Video Progress Documentary

The contractor shall document the entire project development from various positions and capture a complete video documentary on monthly basis with high resolution drone cameras. Properly

identifying areas / segments of the project with a comprehensive progress video as required by the Engineer / Employer.

Drone Video Progress Documentary must be submitted on Monthly Basis as per satisfaction of The Engineer / Employer along with Monthly Progress Report on 8th Day of Each Month

11.7 Time Lapse & Realtime Web Based Progress Centre

The contractor shall document the entire project development and project assets from various static angles by placing several Time-lapse high-resolution cameras and setup an un-interrupted web-based progress center.

12. LAYOUT OF WORKS

12.1 Reference Points, Lines and Levels

The Engineer will provide a reference line or lines in the field with accompanying points and/or bench-marks to enable the Contractor to establish survey control points for construction.

12.2 Verifications

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

12.3 Primary Control Points

Based upon the Engineer's basic control, the Contractor shall provide his own primary control points, as needed for the Works, and shall preserve and maintain them until otherwise authorized.

The Contractor shall be responsible for maintaining all survey markers/monuments, and property corners. If any markers/monuments are disturbed or destroyed by the Contractor, the Contractor shall arrange, at his own cost, to retrace and replace them to the entire satisfaction of the Engineer. If a monument cannot be replaced in its original position, the Contractor shall install a witness corner. The Contractor shall complete and file monument reference cards on all monuments as per instructions of the Engineer.

12.4 Contractor's Surveyors

The Contractor shall provide experienced construction surveyor/s with adequate experience in the construction surveys similar in nature as required by this Contract.

12.5 Basic Control Monument

Based upon the Engineer's established basic control monuments the Contractor shall establish all lines and grades necessary to control the Works, and shall be responsible for all measurements that may be required for execution of the Works to the tolerance prescribed in Sub-Clause 12.7 below.

12.6 Surveys and Computations

The Contractor shall perform such surveys and computations as are necessary to determine quantities of work performed or placed during each progress payment period, and shall also perform all surveys required by the Engineer to determine final quantities of work in place. The Engineer will determine final quantities based on original ground levels determined by the Contractor and agreed by the Engineer.

The Contractor shall notify the Engineer at least 24 hours before performing a quantity survey unless specifically waived, quantity surveys shall be performed in the presence of and agreed by an authorized representative of the Engineer

12.7 Tolerance

Degree of accuracy for the survey works shall satisfy the following specified tolerances:

(a) Alignment of tangents and curves shall be within 0.1 foot for 1,000 feet i.e., an accuracy of 1:10,000.

(b) Structure points shall be set within 0.01-foot accuracy from point to point, except where tighter tolerances are required.

(c) Cross-section points shall be located within 0.10 foot, horizontally and 0.01 foot vertically.

(d) Permissible closing error for a levelling line meant for establishing Temporary Bench Mark (TBMs) shall not exceed 0.045 x $\sqrt{M}$ foot, where M is in miles. The permissible closing error shall be duly adjusted

12.8 Material and Equipment

The Contractor shall provide all materials, equipment and labour required for work.

13. STANDARDS AND SPECIFICATIONS

Except as otherwise provided by these Specifications or the Drawings all materials, equipment and fabrication and testing thereof shall conform to the latest applicable Standards and Specifications contained in the following list or to equivalent applicable Standards and Specifications. Copies of these Standards and Specifications may be purchased from the indicated agency, which publishes them:

-	American Society for Testing and Materials	ASTM
-	American Association of Highway & Transportation Officials	AASHTO
-	Unified Soil Classification System	USCS
-	American Concrete Institute	ACI

Where relevant Standards and Codes of Practice now quote metric units only, these are to be interpreted as required to the nearest equivalent imperial (foot/pound) unit for the purposes of this Contract.

All materials and workmanship not fully specified herein or covered by an approved Standard shall be of such a kind as is used in first class work and suitable to the climate in the Project Area.

If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above standards, he shall state the exact nature of the changes, the reason for making the change and shall submit complete specifications of the materials and equipment to the Engineer for approval.

14. ACCESS TO SITE

14.1 Right of Way for Access and Haul Routes

The Contractor shall be responsible for providing and maintaining access routes for the works. The Contractor shall bear all costs and charges for special or temporary rights of way required by him in connection with access to the site. The Contractor shall make his own investigations of the condition of available public or private roads and of clearances, restrictions, bridge load limits and other limitations that affect transportation and ingress and egress at the job sites. The repair and reinstatement of roadways, tracks and river embankments if damaged during operation shall be the responsibility of the Contractor without any additional cost to the Employer.

14.2 Restoration of Site

On completion of the Works, the Site shall be cleared by the Contractor. All residuals, debris etc shall be removed by the contractor and site should be handed over to the Client in neat and clean condition.

15. FACILITIES TO BE PROVIDED BY THE CONTRACTOR AT SITE

15.1 Contractor's Camp

Pursuant to the provisions of Sub-Clauses 34.4 to 34.7 of the Particular Conditions of Contract, The Contractor shall arrange Camp facilities in the nearby area of the Project.

15.2 Temporary Sanitary Facilities

The Contractor shall provide adequate temporary sanitary conveniences for the use of his employees and persons engaged on the work, including the Engineer and his employees. He shall ensure that his employees and labour make proper use of the latrines and do not foul the Site.

(b) In addition to toilet facilities, suitable and adequate washing facilities shall be provided.

(c) Sanitary facilities shall be located as directed or approved by the Engineer and shall be maintained in a clean and sanitary condition during the entire course of the work.

(d) The septic tank and/or temporary holding tank(s) shall be kept pumped out at such intervals that the tank(s) will not overflow and contaminate the ground, flowing streams or surface drainage.

(e) On completion of the Works, sanitary facilities shall be properly disinfected and all evidence of same including temporary buried tanks and foundations removed from the Site.

15.3 Medical Facilities

The Contractor shall arrange provision of adequate medical facilities for his employees.

Adequately equipped dispensary/ies with qualified and experienced staff shall be provided by the Contractor at his camps. In addition, suitably equipped first aid stations manned by trained staff shall be provided at strategic locations, to administer first aid treatment at all times free of charge to all persons on the Site, including personnel of the Engineer and the Employer. The nature, number and location of facilities furnished and the Contractor's staff for administering first-aid treatment shall meet the requirements of the Health Services of the Government of Pakistan.

15.4 Operation and Maintenance of the Camps and Facilities

For the purpose of operation and maintenance of the camps and facilities provided as above, the Contractor shall comply with all applicable provisions of the Pakistani Labour Laws and specifically to the following requirements:

(a) Camp areas shall be kept dry and free from dense vegetation. Measures shall be taken to control dust within the camp area, by water or oil spraying or other approved means.

(b) Any ponded water around a camp shall be sprayed weekly with oil or other approved anti-malaria liquid.

(c) The Contractor shall provide garbage collection and disposal services for his construction camps and the Engineer's office. Disposal shall be by burial (landfill) and/or incineration. Disposal area shall be located a sufficient distance away and downwind from camp facilities and offices so as not to create objectionable odours or health hazards. Equipment, methods of collection and disposal and location of disposal areas shall be submitted to the Engineer for approval.

(d) The interior walls and ceilings of buildings shall be lime washed or painted. The whole of the open spaces around the buildings shall be swept each day and all rubbish removed. The living areas shall be suitable for the climatic conditions. Roof height shall not be less than 10.5 ft. and adequate number of ceiling fans shall be provided.

(e) Adequate sanitary conveniences, including washing and bathing places shall be maintained at each of the camps. All sanitary fixtures, receptacles, toilet rooms, lavatories and wash rooms shall be cleaned and disinfected at least once every day

15.5 Drainage

The ground around the buildings shall be graded to slope away from building perimeters so as to provide adequate drainage and shall be thoroughly compacted. Excavated material shall be disposed of by filling in low areas or as otherwise directed by the Engineer.

15.6 Water Supply

The Contractor shall arrange for the water supply for his staff residences, labour camps, site offices, work yards, workshops, and various camp facilities. Construction of pumps, storage tanks, overhead tank, distribution system, and their proper running and maintenance shall be his responsibility. Water shall be supplied to the camps 24 hours a day. Adequate supply of water, cooled in summer, shall be ensured in camps and sites of work. Water samples shall be tested periodically to ensure that it is fit for human consumption.

15.7 Electricity Supply

The Contractor shall provide electricity required for the Works including labour camps, staff residences, offices including the Engineer's Site office and various camp facilities. The Contractor shall also provide sufficient standby electricity supply arrangements for his needs.

15.8 Utility Lines

The Contractor Shall conduct his operations, make necessary arrangements, take suitable precautions and perform all required work incidental to the protection of and avoidance of interference with power, telephone, water and other utilities within the areas of his operations in connection with the Contract. No separate payment shall be made for such incidental work. In case the utility lines are required to be relocated the Contractor shall arrange their relocation with the concerned departments and organizations.

15.9 Handing Over / Removal after Completion

Upon completion of the Works, these facilities with regard to Contractor's camps, labour and staff accommodation, site office, other installations and temporary buildings constructed and all facilities provided by the Contractor under this Clause shall be handed over to the Employer or if the Employer desires, the Contractor shall remove these facilities and the Site cleared and reinstated to the satisfaction of the Engineer.

15.10 Measurement and Payment

No separate payment will be made for the work included under the Clause SP-19; the cost thereof is deemed to be included in the rates and prices of other items entered in the Bill of Quantities.

16. PROVISION OF FACILITIES FOR THE ENGINEER / EMPLOYER

16.1 Site Office for the Employer / Engineer

The Contractor shall provide within 14 days after signing of Contract:

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

b) The Employer, The Engineer and The Engineer's Representative's office duly approved by The Engineer at suitable location along the route considering convenience and ease of access with the provision of following facilities / services:

i. Furnished with furniture, air-conditioning, heating, power, etc.

ii. Communication media including telephone, fax, internet devices, etc. (4 Nos.)

iii. Latest Model of Laptops 2 no. (01 no. for Client and 01 no. for consultants), Computers Desktop 2 no. (01 no. for Laboratory, 01 no. for office work), and printing & photocopy facilities (3-in-1 printers) (01 no. for Client and 01 no. for consultants)

16.2 Transportation

The Contractor shall within 14 days after signing of Contract provide vehicle on rental basis 04 Nos Cars 1300cc or more (02 for Employer, 01 for The Engineer, and 01 for the Consultant) not more than 02 years old model with driver, within one week (07 days) of signing the Contract. Contractor shall be responsible for POL (up to 300L for each vehicle) and maintenance of the vehicles till completion of Defects Liability Period.

16.3 Measurement and Payment

No separate payment will be made for the facilities provided under the Clause SP-16; the cost thereof is deemed to be included in the rates and prices of other items entered in the Bill of Quantities

17. SITE FACILITIES TO BE PROVIDED BY THE EMPLOYER

17.1 General

Without prejudice to the generality of the various clauses of the Contract and except for the facilities referred to hereinafter, particular attention is drawn to the obligations of the Contractor to make his own arrangements for providing, maintenance and furnishing of labour camps, staff residences, offices, workshops, stores watching and guarding thereof.

The Contractor shall submit his written demand of his requirements of land for his Site Facilities as herein specified, at least 28 days in advance

18. SAFETY MEASURE AT SITE

a) Pursuant to the provisions of Sub-Clause, for Safety Measures the Contractor shall observe high standards of safety for men and machines at all times and with regard to safety.

b) The Contractor shall take all possible measures to protect his personnel from harm. In case of any casualty or injury to any person due to the Contractor's operations, the Contractor shall ensure quality medical treatment and payment of due compensation.

c) The Contractor shall not permit casual observers to come close to the sites where excavation and other hazardous operations are being performed

19. ENVIRONMENTAL PROTECTION

The Contractor shall exercise care to protect the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of the Works. Except where clearing is required for the Permanent Works, approved construction roads and the Temporary Works, and for excavation operations, all trees and native vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. On completion of the Works, all work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operations, it shall be repaired, replanted, or otherwise corrected as directed by the Engineer at no additional cost to the Employer.

VOLUME III – SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Contents

1. LEVELLING AND GRADING

- Levelling activities will be conducted, and waste distribution across the site will be carried out, accompanied by compaction activities on the slopes.
- To ensure enduring stability, the grading process will include reshaping the sides of the waste heap to achieve a moderate slope of 1V:3H.
- The waste will be shaped in accordance with the drawings, with this specific slope configuration intentionally chosen to align with stability requirements and counter the instability resulting from the previous face angle of the waste.
- Optimization of the waste will be undertaken to enhance stability.
- Heavy equipment will be utilized for levelling and distribution activities.
- The sides of the waste will be gradually reformed using precision equipment to achieve the specified slope configuration.

2. LEACHATE COLLECTION AND TREATMENT SYSTEM

The leachate collection system involves the construction of two sumps, each with dimensions measuring 28m x 28m, designed for the gathering of leachate. The excavation process, conducted through open cutting for sewers and manholes, includes the use of wooden vertical planks, struts, and beams. This process encompasses dressing to the correct section and dimension based on templates and levels, excluding shingle, gravel, and rock soils.

The initial depth, ranging from 0 ft. to 7.0 ft. (0 to 2.10 m), will incorporate the installation of at least three HDPE pipes (200 mm, PN-10, SDR-17) to collect leachate emanating from the waste. The construction of the sumps adheres to the design drawings and aligns with the leachate flow direction. Each sump will feature a leachate extraction vertical riser pipe, totaling 4 m in length, with 2 m inside the sump and 2 m outside. A pump with a capacity of 0.17 cusecs will connect to the riser pipe for leachate extraction.

The sumps will be filled with gravel drainage media, and a target pad measuring 4m x 4m x 0.3m will be established at the base. A 150 mm thick slab will be laid on the sumps, and a geosynthetic clay liner (Bentonite GCL) with a permeability of 1x10^-11 will be installed at the bottom and side slopes as per design and drawings. The GCL material will comply with specifications approved by the project design engineer.

Following this, a 1.5 mm thick HDPE liner will be installed over the geosynthetic clay liner, including the supply, installation, and welding of the panels. Vacuum testing, as per the testing manual, is incorporated into the scope of work. A 250 GSM geotextile layer will be placed on the HDPE liner, and a protective geotextile (250 GSM) will cover the top surface and side slopes. This involves the supply and installation of geotextile, along with double stitching of the panels using a mobile stitching machine. Additionally, a 250 GSM geotextile will be installed on the gravel layer below the slab. The collected leachate will subsequently undergo treatment in the leachate treatment system.

2.1 Specifications of the Leachate Treatment System

Sr. No	Item	Description and Specifications
1	40FT Container anaerobic treatment system 36m3 (12 stages)	304 stainless steel reactors, include 40FT container, the system is composed of anaerobic system with biofilters filled.
2	40FT Container aerobic treatment system 36m3 (12 stages)	304 stainless steel reactors, include 40FT container, the system is mainly composed of aerobic system with aeration system
3	20ft brand new Container equipment room	For installation of biogas pump and base, flow meter, biogas generator set ect
4	PX-250L Biogas desulfurizer and dehydrator with biogas pump and base (Stainless steel material)	Suitable flow rate: less than 400m3 per day Interface caliber: ø50 (PVC flange) Application scope: Dehydration for medium and large size biogas plant Suitable to install indoor and outdoor
5	Red mud reinforced plastic gas storage bag 50m3	Size: Φ3.0*7M Thickness 1.2mm, 145KG
6	Pressure Release Valve	for gas storage bag
7	Biogas Pump-DFL30	380V, 0.55-1.1KW, 15M3/H, 10KPA
8	Ultrasonic biogas flow meter BF-3000b	Flow measurement range: 0.3-40m3/h (DN32) Flow measurement accuracy: 1.5 grade CH4 measurement range: 30-100% CH4measurement error:
9	Sound proof Biogas generator 10KW without CHP system with ATS (Automatic transfer switch)	Rated Power: 10/12.5 KW, Rated speed: 1500 RPM, Rated frequency: 50 Hz, Rated voltage: 415V, Phase: 3 phases, 4 wire, Voltage Stability: ≤± 1%, Voltage transient: ≤±20%, Voltage Stable time: ≤1.5 s, Voltage fluctuation ratio: ≤±0.5%, Current Stability: ≤5%, Current transient: ≤± 10%, Current Stable time: ≤5 s, Voltage fluctuation ratio: ≤0.5%, Dimensions: 190*100*140cm, weight:

3. GAS RECOVERY SYSTEM

The dumpsite gas, that is obtained as a result of biological decomposition of organic material in solid waste will be collected with gas collection wells. 72 gas collection wells will be installed in the dumpsite.

3.1 Transportation and Storage of HDPE Pipes

The terms below will be followed when transporting the material to the site and storing:

- Pipes must not be thrown or fell down causing sudden impact when loading, emptying the vehicles.

- While loading, transporting, unloading and stacking, hard- and sharp-edged items that can damage the pipe surface must not be used.
- Steel band or belt must be used while packaging the pipes.
- Stacking must be done over flat surface timbers without edges and the distance between timbers must not exceed 2 meters along the pipe
- Pipes must be placed carefully while placing them in the storage area, a flat, smooth floor must be provided to keep the pipes stable.
- The floor where pipes will be stored must be free of rock and other junctions, sharp items.
- Stone, rock or sharp items must not be thrown on the pipes.
- Pipes must not be left under direct sunlight for a long time. If this is the case, the pipes must be covered with an ultraviolet resistant cover.

3.2 Drilling and Boreholes

The terms below will be followed when drilling the boreholes

- Execution of 72 boreholes, 18”-24” dia. up to the maximum depth of 80 ft (or as directed by The Engineer) in overburden material or up to the natural soil level by hydraulic auger pilling machine.
- Total of 72 boreholes will be drilled.
- Video inspection of drilled boreholes.
- Preparation of ramp, point to point shifting and arrangements for loading unloading machine as per standard procedures.

3.3 Installation of Pipes

The terms below will be followed when installing the gas collection pipes.

- 63mm HDPE dia. pipe will be used from gas wells to manifolds.
- Manifolds will be 180mm x 6 m.
- HDPE ring main 315 mm x 12 m will be installed.
- Filter material around the gas wells comprising of crushed stones half inch to quarter inch without any stone dust clay. Washed crushed stone should be used.

3.4 Gas Flaring

The gas flare system shall be installed to flare the extracted gas from the dumpsite.

Specifications of the Gas Flare System;

- Automated combustion control
- 1000 deg C @ 0.3 sec retention time
- Integrated safety systems
- Latest PLC controlled operation

- Compatible with SCADA control
- Leading cyclonic burner technology
- Flash back protected flame arrestor
- Pneumatic slam shut operation
- Stainless steel pipework
- Control Panel
- Compressor Panel
- Pilot line with flame arrester
- ATEX Gas Booster

Other specifications of Gas Flare System

Sr. No	Description	Specification
01	Local Monitoring	To include a temperature gauge on the flare stack to give a local visual indication temperature
02	Digital Monitoring	Uniflow™ Digital Flow Transmitter. (for Unilog™) and or Flare Control
03		Unipress™ Digital Pressure Transmitter. (for Unilog™) and or Flare Control
04		Univac™ Digital Vacuum Transmitter (for Unilog™) and or Flare Control
05	Security	To install vandal proof cover over HMI and door controls
06	Control Panels	Upgraded to stainless steel 316L panels
07	Remote Accesss	Unilog™ a remote access module to allow the user to access the equipment status remotely. The plant can be accessed through any desktop, laptop or Smartphone. This pack also includes • Web based viewing • Remote alarm reset • Remote start stops • Email / text alert on alarm condition • Reports via email. The remote module has a GSM SIM card included with 10MB data. Compatible with all digital packs and gas analyser
08	Automation	Flare motorised control valve to enable spill control to flare. This allows full automation of the flare's turndown. Requires a 4-20ma control point from the customer
09	Analysis	Raw gas analyser for CH4, CO2, O2 Unigas 1™. (will send signals to Unilog if also required)
10	Condensate Pot	Stainless steel condensate pot • Internal knitmesh filter • Pressure Gauges • Condensate drain valve
11	Pump Pack	Unipump™ Pumped condensate system complete with Level Switch and Peristaltic Pump, strainer, valves and connecting pipe from flare Knock Out Pot

12	Booster	Acoustic Housing to reduce the noise of the booster to a fixed sound requirement. Acoustic cover reduces noise levels by up to 10DbA@1m
13	Remote Operation	This pack is for equipment that is on an unmanned site and includes • Programmable 7-Day 2 channel timer for sites with an inconsistent flare flow. • Auto start after mains failure • Warning Beacon • Warning alarm
14	Weather	Sun and rain canopy over the control panel including strip light

4. CLOSURE / CAPPING LAYER

4.1 Scope:

In order to prevent rainwater infiltration into the waste, a Closure/Capping layer will be implemented on the ground. The closure cap system will be systematically installed in the following sequence, commencing from the base:

- Existing daily cover over waste
- Leveling layer (0.9 m thick, aligned to designed lines and grades, utilizing common soil)
- Geotextile (1st layer - 250 GSM)
- HDPE Liner (1.5 mm)
- Geotextile (2nd layer - 250 GSM)
- Drainage layer (15 cm thick) employing pit run washed gravels or crushed stones
- Protective Geotextile (250 GSM)
- Grass and vegetation layer (0.9 m thick sweet soil layer to be laid with urban forest)

4.2 Geotextile

- The geotextile layers (250 GSM) will be installed as shown in the design drawing.
- Geotextile to be used in the area will be produced of Polyester fiber, nonwoven, resistant to ultraviolet, single layered, needle-punched geotextile
- Selected manufacturer hast to provide approved information regarding the material mechanical strength, chemical resistance and general solidity. The company producing Geotextile must have “ISO 9001:2000 Quality and Assurance Certificate in Geotextile Production
- In storage, rolls will be protected with opaque package isolating the material from dust, dirt, rain water, humidity and other atmospheric factors. Packages will not be opened until the mounting starts.
- In slopes and before anchoraging the roll and panels, geotextiles will be spread downwards according to the roll direction to provide constant stretching

- In case of heavy wind and while the mounting is done, material will be ballasted temporarily with sack or pneumatic. Temporary ballasts will be removed when the material is completely covered
- Cutting and combining the panels will be done using sufficient tools that will not damage the material on the floor and especially geo membrane
- While mounting, stone, gravel or other items that may jam between geotextile and the material below will be cleaned in order not to rupture the material
- When mounting is completed, a final check will be done to fix foreign material, stapler, stone and repair torn and holes before placing geotextile
- Panels will be combined by thermal spot welding or equivalent
- Overlap parts between geotextile panels must be at least 75mm long. Generally, horizontal welding in the slopes is not allowed except for patching or the approval of Control Organization in special cases. In these cases, overlap joint will be increased to 200mm.

Specifications of Geotextiles

Characteristic	Standard	Units		Nominal Value	Tolerance
Weight	UNE EN ISO 9864	g/m^2		250	-10%
Thickness	UNE EN ISO 9863-1	Mm	2 Kpa	2.60	-10%
Tensile Strength	UNE EN ISO 10319	kN/m	MD	18.5	-20%
			CD	16.6	-20%
Elongation at break	UNE EN ISO 10319	%	MD	60	+/- 20%
			CD	50	+/- 20%
CBR	UNE EN ISO 12236	KN		2.72	+/- 20%
Dynamic Perforation	UNE EN ISO 13433	mm		6	+/- 20%
Porometery	UNE EN ISO 12956	Micro meter		45	+/- 6%
Permeability	UNE EN ISO 11058	$l/m^2/s$		44.15	-10%
Effective protection	UNE EN 13719	kN/m^2		$16.58x10^3$	- 6%
Resistance of hydrolysis	UNE EN ISO 12447	Residual strength greater than or equal to 50	MD	55.39	
			CD	65.95	
Durability	UNE EN 12224	A coat within 24 hours after installation. Expected durability for a minimum of 25 years in natural soils with pH greater than 4 and less than 9 and temperature less than 25^0 C			

4.3 HDPE Liner

The application of an HDPE liner onto the geotextile layer is a crucial step in the process. The manufacturer of the HDPE Geomembrane is required to possess an "ISO 9001:2000 Quality and Assurance Certificate in Geomembrane Production." The flat geomembrane, with a thickness of 1.5 mm, will adhere to specified technical specifications, and the minimum values that must be met are outlined below. Welding of HDPE covers, produced in strips, will be conducted on-site; however, it is imperative that this process is executed with meticulous care and stringent control.

Specifications of HDPE Liner:

Properties	Unit	HDPE 1.5 mm	Test Method
Average Thickness	Mm	1.50	ASTM D 5199
Density	g/cm^3	>0.940	ASTM D 1505
Tensile Properties			
Yield Strength	kN/m	22	ASTM D 6693 Type IV
Break Strength	%	40	
Yield Elongation	kN/m	12	
Break Elongation	%	750	
Tear Resistance	N	175	ASTM D 1004
Stress Cracking (SP-NCTL)	N	480	ASTM D 4883
Carbon Black			
Carbon Black Content	%	2-3	ASTM D 4219
Carbon Black Dispersion	Category	1-2	
Oxidative Induction Time (O.I.T)	Min	>100	ASTM D 5721
Standard OIT	Min	>400	

Application of HDPE Liner:

- **Transport and Storage in the Area**
  - The liner should be packed and loaded suitably to avoid damage.
  - The liner shall be stored in the way that it will be protected against puncture, dirt, oil, water, mud, mechanical wear, extreme heat and other damages
- **Arrangement**
  - No equipment or tool will damage liner in transport or other reasons. The method used in opening the panels should not cause scratches or folds in liner, and damage the floor or geotextile laid below.
  - It should be protected against wind by applying appropriate loads (sand bags or similar loads, in a manner that they will not damage liner. In cases of strong wind, the risk of wind interfering under the panels by applying constant loads on the corners of panels).
  - None of the staff can smoke while working on liner, wear shoes that could damage liner or do other detrimental / damaging activities.
- **Area Sources**
  - HDPE covers can only be connected to each other with thermal methods. Reliable and experimented methods such as heated keyed welding that can provide appropriate

high-quality welding and is known for its long-term durability in the seams under the area conditions should be used.

- Approved welding method is fusion welding with automatic machine or extrusion welding. Welds should be arranged parallel to the hatter as much as possible. Rocks that are vertical to the hatter should be avoided and in parts that are geometrical, area sources should be decreased as much as possible. T sources in the ground cannot be closer than 1.5m to hatter toe. HDPE liner panels should be overlapped as much as 10 cm. for fusion welding and 7.5 cm. for extrusion welding
- Welding for HDPE liner covers will only be conducted by experienced staff that received required training. During welding and isolation processes, seam parts that connection is completed should be clean and dry.
- In order to provide complete and correct welding, restrictions caused by weather conditions should be considered.
- Welding done under +5C should only be conducted with special certificate and the approval of Control Organization. In cases of rain and high humidity, no welding should be conducted

- **Welding Equipment and Accessories**

Approved equipment for area sources is automatic fusion and extrusion welding machines and the equipment below should be present in the area.

- Automatic Welding Machine
- Extrusion Welding Machine
- High Speed Grinder (Grinding Tool)
- Hot Air Blower
- Vacuum Test Equipment
- Field tension meter and test sample cutting equipment for welding slid and skimming
- Air pressure test equipment
- Roll opening equipment
- Required electricity cables and other tools.

- **Vacuum Test**

Vacuum test equipment for single seam fusion sources and extrusion sources consists of these:

- A strong cabin, transparent monitoring window, a soft seal mounted on the lower part and a vacuum box consisting of vacuum motor.
- A plastic bucket and large brush.
- Foamy solution.

Contractor will provide the items below for the test.

- Excessive parts of the overlaps will be cut.
- Vacuum monitoring window, sealing surfaces will be cleaned, the parts that have the potential of leak will be checked.
- Top of the geomembrane will be wet with foamy solution in a 30 cm x 120 cm (in the size of a box) straight line.
- The box is placed on the wet part and pressed.
- Vacuum motor is operated and vacuum box is made to soak on geomembrane.
- It is checked for leaks.
- HDPE Liner is observed by examining foamy solution bubbles from monitoring window for 15 seconds.
- If no bubbles are observed in 15 seconds, vacuum motor is turned off and membrane is released. Box is brought 15cm to the tested part and to the adjacent part and process is repeated.
- All areas where bubbles are observed should be marked, fixed and tested again. In places where sources cannot be tested in this way, processes below are conducted depending on the decision of the Control Engineer:
- Before final application, the parts where the equipment can reach are tested.
- In case the source cannot be tested before the final application, welding is done in the supervision of the Control Engineer

- **Air Pressure Test**

The method below will be used in testing Double Seam Fusion Sources. Below are the equipment required for double seam Fusion Welds.

- An air pump mounted on a damper with a pressure chamber and capable of generating 25 – 30 psi (1.75 – 2.10 at) pressure to protect geomembrane.
- A sharp edged, splined needle or other pressure feed tool on which a manometer is mounted.

Implementer will follow the steps given below for the test.

- One end of the source to be tested is blocked.
- Needle or approved pressure feed tool is inserted from the blocked channel that is created by double seam fusion welding.
- Air is supplied by the pump to check if the air channel is completely clean.
- The other end of the channel is also blocked.
- 25–30 psi (1.75–2.10 at) of pressure is supplied by the air pump, valve is closed and pressure is held for 5 minutes after it is equalized for 2 minutes.
- If pressure loss exceeds 4 psi (0.28 at) or pressure does not stabilize, faulty part is found, repaired and tested again.
- Needle or approved pressure feed tool is removed, channel ends are opened

- **Repair Works**

  Faulty and defective sources will be repaired as specified in this specification.

  - Small holes can be repaired by applying extrusion welding.
  - If the hole is larger than 6 mm, it must be patched.
  - Ruptures will be repaired by patches. If the patch is on a hatter or a stress part and has a sharp edge, this will be rounded before patching and prevented from developing.
  - Large holes, defects caused by roughness and raw material disperse fail and contaminated parts will be patched.
  - HDPE surface to be patched, should be cleaned and rectified 10 minutes before the repair. It should not exceed 10% of the thickness. Welding should start from the part where rectifying starts and previous weld part should be overlapped at least 5 cm. In case an additional extrusion will be applied on an existing extrusion weld, old weld surface must be rectified. Patches must be in circle or elliptic form and exceed the defective part at least 15 cm. All patches must have the same thickness and form as geomembrane

Drainage Layer

- The Drainage Layer is a layer built for removing the rainwater from area, and it shall be placed on the geotextile.
- Drainage layer will be 30 cm thick.
- It will be used to allow free size aggregate (16/32 mm) to flow freely through the discharge layer that have perviousness coefficient more than 1x10-4 m/s and do not contain silt and clay.
- Particle size distribution of the material to be used for drainage layer must be 16/32 mm.
- Chemical/physical and mechanical stability of the material selected for drainage layer, must not have a bad effect on chemical and physical leachate characteristics and drainage efficiency because of applying mechanical load on storage area.
- Pitrun washed gravels or crushed stones should be used.

Tests and Controls

- **Material Tests**
  - Particle Size 16/32mm (at least 3 special sample)
  - Very small = %10 (at least 3 special sample)
  - Perviousness, kf= 1 x10- 4 m/s (at least 3 special sample)
  - Calcium carbonate percentage < %20 (at least 3 special sample)
- **Application Tests**
  - Planned laying thickness = 50cm

- Particle size (in compliance with DIN 18123) per 2000 m^2
- Very small (in compliance with DIN 4924) per 2000 m^2
- Sample receipt and thickness measurement, per 1000m^2
- Calcium carbonate percentage (in compliance with DIN18129) 3 special sample

Rainwater Drainage

- Each pathway will be equipped with 2' x 1' drains, with the drain at the lowest pathway widened to 3' x 1'.
- Slopes will be incorporated into the rainwater drains to facilitate the continuous flow of rainwater.
- Ditches must remain unobstructed in their designated direction.
- Stone pitches will be constructed.
- At the termination point of the ditch, rainwater will be discharged into the nearest sewerage system.
- The rainwater drains shall be constructed with a minimum slope of 1% to ensure effective drainage
- Regular inspections and maintenance checks shall be conducted to ensure the efficiency of the rainwater drainage system

5. BOUNDARY WALL

5.1 General

- Read all drawings in conjunction with architectural plumbing/sewerage, mechanical, electrical and any other relevant drawings.
- Notes given in these drawings are applicable to all drawings unless mentioned otherwise.
- All materials and workmanship shall confirm to the specification of the contract documents. In absence of any specifications, all materials, tests and workmanship shall confirm to relevant ASTM, ACI/B.S codes and shall be subject to approval of the Engineer.
- The contractor shall be responsible for the safety of the structures during the construction. He shall also verify all dimensions and levels before execution of work. Any discrepancy error are omission, if found, shall be brought to the notice of the Engineer for correction and approval.
- The contractor shall coordinate with architectural and all other discipline drawings for size and location of all structural members, floors, wall, opening, finishes, pipes etc.
- The contractor shall be responsible for the execution of the drawings. He shall submit his methodology for approval of the Engineer before any activity.
- The contractor shall submit shop drawings and bar bending schedule 21 days in advance for approval, to the Engineer before proceeding with the work.
- Termite control treatment shall be carried out as per specifications.

- All level and dimensions are in the milli meters unless otherwise noted.
- Do not scale the drawing pattern dimensions given on the drawing, shall govern.

All fabrication, painting, erection and quality control is to be done in accordance with the latest applicable ASI/AISC/British specification. Backfilling around foundation should be done simultaneously on both sides to avoid any lateral displacement. Backfilling under floors and around foundations shall be done in layers not exceeding 6" in thickness and compacted up to 95% modified proctor density

5.2 Excavation

- Excavation shall be made to the lines and levels shown on the drawing.
- The Engineer may change the extent or the level of the excavation during the progress of works.
- The contractor may use stable slopes other than those shown on the drawings with the prior approval of the Engineer.
- The contractor shall be responsible for the stability of the excavated area and shall keep the area in a sound and right condition.
- The termite control treatment shall be applied after excavation of the foundations on beds and side slops before concreting operation.
- Part of the excavated material as directed by the Engineer shall be placed in stock piles for backfilling. All other materials shall be disposed of in approved disposal area as directed by the Engineer.
- Any over excavated areas for the doubtful patches as directed by the Engineer shall be filled with lean concreate

5.3 Foundations

- The design of foundation is based on assumed bearing capacity of 0.5 TSF as the excavated bed of the foundation should be thoroughly compacted prior to the line blinding concrete in foundation.
- It is recommended to remove and replace fill material up to its extents.
- The engineering fill material should be at least A-3 or better material as per ASHTO soil classification. Engineering fill material placed beneath footings should be placed in horizontal layers having compacted thickness of not greater than 6" and uniformly compacted to achieve at least 95% of the maximum modified proctor density. Moreover, the subsurface stratum should be proof rule prior to the placement of engineering fill material.
- The foundation bed soil should be protected from ingress of water from any source by providing adequate surface drainage system and ensuring leak proof jointing of sewerage and water supply lines. Excessive and uncontrolled watering for curing and compaction of backfill material should be avoided

5.4 Reinforce Concrete

- Structural design is based on the national building code of Pakistan and American Concrete Institute code of the reinforced concrete, ACI 318.
- All structural concrete shall confirm to American Concrete Institute (ACI) requirements.
- The minimum work compressive cylinder strength of the lane concrete shall be 1000 PSI at 28 days.
- The minimum compressive concrete cylinder strength of the structure concrete for all structure members shall be 4000 PSI at 28 days. No concreting shall be carried out until permission is given in written

5.5 Reinforce Steel

- All reinforcing steel shall be deformed bars confirming to ASTM/A615 grade 60 having a minimum yield strength of 60000 PSI.
- Wherever possible full length of reinforcing bars shall be used to avoid unnecessary laps and wastage.
- Clear cover to reinforcement shall be

Srtuct. Element	Cover (inch)
Footings/Raft	2”
Beams (bottom)	1.5”
Beams (side)	1”
Columns	1.5”
Slabs	0.75”
Walls (inner face) Walls (outer face) In contact with earth	1” 2”

5.6 Concrete Construction

- All structural surface, against which earth is to be filled shall be coated with 2 coats of hot bitumen of 10/20 grade at the rate of 0.4 lb/ft2/coats.
- The contractor shall submit concrete pouring schedule for engineer’s approval. No concrete shall be placed until written permission is given by the engineer.
- During the construction, stacking of construction materials, bricks, etc, should be avoided on the slab panels.
- Before casting of any structural members, the contractor shall ensure that all embedded items for electrical, mechanical, plumbing, structural steel and other works are properly located and firmly secured in place

5.7 Construction Joints

- Joints not shown on the drawing, shall be so made and located as to the approval of the Engineer. They shall be located within the model third of the least impair the strength of the structure and shall need prior spans of slabs. Beams and joints in walls and columns shall be at the under/side of the floor, slabs or beams and at the top of footings or floor slabs.
- Joints shall be perpendicular to the main reinforcement. All reinforcing steel shall be continued across joints.
- Beams, garders, and haunches shall be placed monolithically as part of slab system unless otherwise shown in design drawing or specifications

6. GENERAL SPECIFICATIONS OF TUBEWELL

6.1 General

The works required under this contract shall comprise but not limited to drilling of tubewell, geophysical logging of bore hole, installation of blank and strainer pipes, filter pack, bentonite seal, slurry seal, development & testing of tubewell, measurement of discharge and water quality analysis tests.

Program of Work

The Contractor shall submit the realistic work program showing his plan to complete the works within time. The time table of the work is the essence of the contract.

Order of the Work

The Engineer will determine the order in which the work is to be carried out.

Machinery and Equipment

The Contractor shall be solely responsible for furnishing all the plants, equipment, instruments, appliances, accessories, materials, laborers, technicians etc. required to complete the works specified in the Bill of Quantities to the satisfaction of the Engineer.

Drillers and Supervisory Staff

The Contractor shall have qualified engineer with sufficient experienced of the related works in order to supervise drilling and related works at site

6.2 Mobilization and Demobilization

Mobilization

Mobilization for the Contractor shall include transportation of drilling rig and related equipment, materials and staff at the site of work.

Material inspection

The materials, which are to be supplied by the Contractor, must be inspected and approved for construction at the site(s). The Contractor shall be responsible for ensuring that the materials to be used in construction are suitable for this purpose, and are as per technical specifications and that there are no delays on site due to the quality and degree of preparation of the materials for borehole construction.

Demobilization

Demobilization from the site shall consist of the removal from the site of all the equipment and extra materials after completion of the work and leaving the site clear, clean and tidy to the satisfaction of the Engineer.

The transportation of the drilling rig, equipment and surplus materials to the contractor's store or other such place as the Contractor wishes, is to be transported at the Contractor's expense

6.3 Construction of Tubewell

Scope of Work

The scope of work shall comprise the following:

- Transport to site all necessary plant, laborers and materials to carry out the works;
- Preparation of site arrangements i.e. pit for storage of water, arrangement of water for drilling site.
- Drilling of borehole and collection of Lithological samples, and save in the polythene bags;
- Logging of bore hole
- Lowering of blank and slotted pipes;
- Placing of gravel shrouding material;
- Pouring of Cement sand slurry,
- Verticality of tubewell;
- Arrangement and Setting of D & T set;
- Development and testing of tubewell; by Rah heading process and
- Collection of water samples for chemical quality testing.

Location of the Borehole

The Engineer's representative shall indicate the actual location of the borehole at the site to the Contractor.

Drilling Procedures and Equipment

Drilling of the borehole shall be undertaken by Reverse rotary rig. Waste materials from the drilling operation shall be disposed of in a manner approved by the Engineer. The Contractor shall drill 12 to 15 diameters up to the depth as specified by the Engineer's representative at site or as

per project requirement mentioned in Bill of Quantities. The borehole should be sufficiently straight and plumb so that the tubewell casing and pump may be installed satisfactorily.

It shall be Contractor's responsibility to protect the hole against caving and sloughing; and stabilizing the unstable materials in the manner approved by the Engineer's representative.

If unsuitable material is encountered in drilling of the borehole, the contractor shall stabilize the material in a manner approved by the Engineer.

If in the opinion of the Engineer, it is necessary to discontinue work on any borehole because of caving ground or because of negligence on the part of the Contractor, the Contractor shall drill another bore hole at an alternative location designated by the Engineer. The Contractor will not be entitled to payment for any work done or materials furnished for holes abandoned as a result of his operation or negligence.

The litho logical samples are to be collected at every 5 feet depth or change of lithology whichever is less. The samples shall be kept in a sample box of the type as directed by the Engineer. Representative samples shall be kept in polythene or cloth bags with proper mark on the bag i.e. sample number, depth, formation, date etc.

The borehole shall not deviate from the vertical by more than ½ diameter of the borehole in the entire length of the borehole. In addition the pumping well shall be such that the pump assembly shall hang exactly vertical in the well casing, without the pump assembly fouling the well casing pipe.

Prior to commencement of the work at site the Contractor shall submit to the Engineer or his Representative, for his approval, a statement of the drilling equipment and drilling methods he proposes to adopt at the site.

Failure to Achieve Full Depth

If a bore hole is lost or abandoned by the Contractor for any reason whatsoever, before the required depth is achieved, the Contractor shall at his own expense drill a new bore hole up to such depth and in such a location as may be selected by the Engineer and shall drill a new bore hole until the required depth has been achieved

6.4 Construction of Tubewell, Development and Testing

General

Construction of tubewell shall include but not limited to, furnishing and installation of pipes, screens, fixtures to the required depth; furnishing and placing of gravel pack up to the specified depths in the annular space between the tubewell casing and borehole; Sand seal, cement sand slurry verticality of MS casing and development and testing of the tubewell. The Contractor will provide all the staff, technicians, drillers and furnishing of plants, machinery equipment, installation pumping unit, prime mover or source of power etc. required for drilling, installation and development and testing of tubewell. All the foregoing works shall be the entire responsibility of the Contractor. After completing all the works mentioned herein, the Contractor shall remove

all his machinery equipment, plants and waste materials and clear the site as per satisfaction of the Engineer.

Different components of casing pipes to be installed for the tubewell are defined as:

Pump Housing Casing: Blank length of pipe installed at the top of borehole to accommodate motor and pump assembly in the case of submersible motor / Vertical Turbine pumps.

Slotted Tubewell Casing: It consists of slotted casing for installation against water yielding formations.

Blank Tubewell Casing: It consists of blank casing sections for installation opposite non-water yielding formations.

Bail Plug: The bottom of the tubewell casing consisting of 10 feet long piece of blank casing pipe with a plug provided at the bottom.

Construction of Tubewell

i) Pump Housing Pipe shall be of PVC of designated diameters and wall thickness indicated in the drawings or BOQ. The housing pipe shall be installed to extend a minimum 3' above ground level in addition to the housing as specified by the final design below ground level.

ii) The length and size of the tubewell casing as specified by the Engineer's representative shall extend from bottom of the pump housing casing to the depth determined by the Engineer's representative. The tubewell casing shall consist of slotted sections of fiber glass for installation against water yielding formations, and fiberglass blank casing sections opposite non-water yielding formations, as directed by the Engineer's representative. The bottom of the tubewell casing shall be provided with Fiber Glass bail plug consisting of 10 feet long pipe as approved by the Engineer's representative. It is envisaged that the diameter of the tubewell casing including bail plug will be 8 inches.

iii) All borehole components shall be sufficiently robust to withstand transportation, storage, installation and the service conditions. The method of jointing the components shall be to the approval of the Engineer's Representative. The jointing system shall ensure that the inside of the bore hole is flush with no collars, bolts or other fitting protruding into casing or screen.

iv) Reducer for connecting housing pipe and well blind pipe at depths below ground level a transitional reducer shall be provided and made of the same material and of the same thickness as used for well casing specified above. The ends of the reducer shall be suitable for jointing to the pump housing and well blind pipe.

v) Bail Plug shall be of the PVC material and thickness as followed for well casing. Bail Plug shall be provided with a base plate, welded at one end of the pipe. A steel hook bent in the form of 'U' shall be bolted to the base plate to sustain a maximum suspended

length of well casing. Bail Plug shall be of 4 inches (100 mm) dia or as indicated in the drawing.

vi) Centralizers, almost equal to the size of borehole, shall be attached to the tubewell casing at about ten-meter interval so that the well casing is centered in the borehole.

vii) The Contractor shall install the entire pump housing casing and tubewell casing assembly straight, plumb and concentric in the drilled bore hole to permit the installation of the pump in such a manner that it will operate satisfactorily and without damage. The methods employed by the Contractor in the installation of the casing or in obtaining or correcting the verticality and straightness of the tubewell assembly shall be subject to the approval of the Engineer's representative. Any tubewell not meeting the straightness and verticality shall be abandoned and the Contractor has to drill a new hole at his own expense at an alternative location designated by the Engineer.

viii) A graded gravel shrouding material, not less than 3/8 to 1/8 inches around the casing, 1.00 mm to 4mm thick as per different limits of retaining / passing of sieves in at any point shall be placed around the annulus between well casing below pump housing of the pumping well and the borehole side.

ix) The Contractor may obtain gravel from Attock quarry source / location subject to the approval of the Engineer's representative provided that the gravel meets the requirements of the specifications. The Engineer will not be responsible for the amount of the material it will be necessary to waste in order to obtain the required amount of gravel of proper gradations.

x) The gravel shrouding shall be clean, washed, water worn, carbonate free, generally hard, well rounded and without thin or flat particles. The gravel supplied shall be subject to inspection and screening in the field to ensure proper gradation suitable to the formation.

xi) The grading of the gravel shrouding material and the well screen slot size shall be determined after the sieve analysis of the aquifer material or as directed by the Site Engineer. The Contractor shall maintain suitable US Standard sieves on site for determining the grades of aquifer material and the graded filter (gravel shrouding material). The gradations of shrouding material for 1.0 to 1.5 mm slot sizes of screen are given below:

US. Standard Sieve No.	**% Gravel passing for slot sizes given below in mm**		
	1.00	**1.25**	**1.50**
4	100	100	100
8	75-91	62-78	45-61
10	59-75	46-62	28-44

12	38-54	20-36	5-21
16	16-32	0-10	0

xii) Gravel shall be placed at constant rate using trimie pipes or similar devices to provide continuous and uniform gravel flow so as to minimize segregation of particle sizes. When trimie pipes or hoppers are used, gravel shall be introduced in the annular space between the casing and the edge of the hole at two points located 180^{o} apart. The trimie pipes shall be of suitable size and lowered to the bottom of the well and calculated quantity of the gravel shall be poured in the pipe through a funnel and the pipe shall be raised by 5 feet intervals.

xiii) The annulus between pump housing casing pipe and the borehole side shall be back-filled up to top of cement slurry with cement sand slurry with 1:2 ratios or as directed by the engineer. A seal of cement slurry/ bentonite seal 1.5-meter-thick shall be placed around annulus space at the junction of M/S Housing casing with fiberglass inside borehole.

xiv) Temporary casing, if used shall be carefully withdrawn in 5 to 10 feet interval. Placement of gravel shrouding, and gravel shall be introduced so that each stage of the hole above bottom of the casing is completely filled before the casing is withdrawn to the next stage.

Development and Testing

i) The development methods and procedures used for the development of the tubewell shall be established by the Contractor subject to approval of the Engineer' representative. The development and testing of tubewell shall be performed, pumping the tubewell with pump at 75%, 100%, 125% and 150% of designed capacity. The development of the tubewell shall be performed for a minimum of six hours by step pumping, backwashing, and surging the tubewell with a pump. The Contractor may notify the Engineer at any time following the completion of the six-hour pumping period that the tubewell is ready for testing.

ii) Upon completion of the development operation the tubewell shall be permitted to recover for a minimum period of one hour. After completion the well will be sounded. If the comparison of the depth by sounding and the length of the casing string indicate there is more than 5 feet of material in the tubewell, it shall be cleaned.

iii) Following the recovery period, the tubewell shall be pumped at 150 percent of rated capacity for a period of one hour (sand test). The water pumped shall at all-time be clear and free from turbidity. At the end of first five minutes of pumping, the sand content of the water shall be determined by using a 1000 mm Imhoff cone or another device approved by the Engineer. The sand content of the water at this time shall be less than 100 ppm. A second sand content determination shall be made 10 minutes after the start of pumping. The sand content at this time shall be less than 30 ppm. If the sand content tolerances are exceeded at this time, or at any subsequent time up to the time

of final acceptance of the installation, while pumping at the rate of 150 percent of design capacity or less, the development of the tubewell shall be considered incomplete and the Contractor shall resume development of the tubewell at his own expense until such time as the tubewell will produce water meeting the sand content tolerances. Sand content determinations, water level, and discharge measurements during the remainder of the one-hour sand test period shall be made as directed by the Engineer.

iv) When the one-hour sand test has been satisfactorily completed, the tubewell shall be further developed for three hours (re-development) at 150 % of the rated capacity of the tubewell by surging and backwashing with the test pump at five to ten-minute intervals.

v) Following the re-development period, the tubewell shall be pumped at 150 % of design capacity during which time the sand test shall be repeated. The specific capacity of the tubewell shall be determined from the water level measurements and flow rates obtained, during the pumping periods. If the specific capacity obtained from the second pump test is found to be more than 10 percent greater than that obtained in the first pump test, the development shall be considered to be incomplete and the Contractor shall resume development, at his own expense, until the tubewell is developed sufficiently to meet this requirement.

vi) Upon satisfactory completion of above one-hour pumping period the tubewell shall be permitted to recover for a minimum period of two hours.

vii) Upon the completion of this recovery period, a four-hour multiple step pump test shall be performed by pumping the tubewell for one hour at each of approximately four equal increments. The last increment shall be at 150 percent of rated capacity.

viii) Following this last increment of the step test, the tubewell shall be pumped at a rate of 150 percent of design capacity for a period of four hours.

ix) The Contractor shall furnish all necessary equipment for testing the tubewell, including a water lubricated or oil-lubricated test pump capable of delivering at least 150 % of the tubewell rated capacity at all stages of the tests, a valve for fine adjustment of the discharge, an electric measuring device to determine the draw down during each stage of the test, and Imhoff cones to measure sand content. If oil-lubricated test pumps are used, the Contractor shall exercise all reasonable precautions to keep the leakage of lubricating oil into the tubewell at a minimum and shall promptly remove all oil, which collects on the water surface in the tubewell by the addition of detergents or other suitable chemicals and pumping the emulsified oil from the tubewell. In the event the Contractor fails to keep the leakage of oil into the tubewell within acceptable limits or to promptly remove oil accumulations from the tubewell, the Engineer will order the use of oil lubricated test pumps discontinued, and the Contractor will be restricted to the use of water-lubricated pumps for testing of the tubewell. The actual depth for pump setting will be determined by the Engineer after the tubewell has been developed. Piping, gauges, orifices, meters, weir boxes or other measuring devices shall be furnished, installed and removed by the Contractor and shall remain his property. All measuring devices and testing equipment will be subject to approval by the Engineer.

x) Following is a summary of the development and testing procedure:

Development	**Development by air lift** **Development tool as directed by the Engineer.**	
	Sounding of well depth and removal of any accumulated material	
	Development by pumping.	4 hours
Testing	Recovery: Sounding of well depth and removal of any accumulated material	1 hour
	Pumping at 150% of rated capacity (sand test): Measurement of initial specific capacity.	1 hour
	Pumping at 150% of rated capacity (sand test): (re-development).	3 hours
	Pumping at 150% of rated capacity (repeat sand test): Measurement of second specific capacity.	1 hour
	Recovery: Sounding of well depth and removal of any accumulated material	2 hours
	Pumping (step-test at 35%, 70%, 105% and 150% of rated capacity). One hour each step.	4 hours
	Pumping at 150% of rated capacity (repeat sand test): Measurement of final specific capacity. Sounding of well depth and removal of any accumulated material	4 hours

Collection and Analysis of Water Sample

On completion of the test, Contractor will collect a ground water sample from tubewell and its chemical analysis for all drinking parameters including EC, TDS will be arranged from any reputed laboratory. The Contractor will also submit the chemical analysis result to the Engineer along with other data.

Data and Records

The Contractor shall keep accurate record of drilling history indicating drilling fluid losses, circulation losses (in case of straight rotary), time log, Lithological log of bore hole including description of all materials encountered and their depths in the bore hole. The fact that the Engineer's representative may be present and keeping a separate record shall not relieve the Contractor from this responsibility. In the case of defective or incomplete record the Contractor shall complete the record at his own expense. The Contractor shall keep all the data and records on forms, approved by the Engineer's representative. The Contractor shall hand over original of all data and records to the Engineer, and all such records shall become the property of the Employer.

Measurement and Payment

a) Measurement for drilling of borehole will be made of the actual depth of borehole drilled, measured from the original ground surface, for the depth of bore specified by the Engineer's representative. No measurement will be made for over drilling required because

of sloughing, caving ground, or for the Contractor's use of casing in advance facilitating the lowering of tubewell assembly as per design, the tubewell abandoned due to jammed tools, caving ground or negligence on the part of the Contractor or tubewell not constructed in accordance with all of the requirements of these specifications.

b) Payment will be made for the depth of bore hole as per unit price quoted in Bill of Quantities.

c) Measurement for furnishing and installation of casing will be made of the total length of each size, wall thickness, and type of casing actually installed in the tubewell. The measurement of length will be taken from the elevation of the tubewell casing to the bottom of the casing. Payment for bail plug will be made as per unit price quoted in the Bill of Quantities.

d) Measurement for payment will be made of the length of the annular space between casing and walls of the bore hole actually shrouded from top of the gravel shroud to the bottom of the hole as specified by the Engineer's representative; or on lump sum basis if quoted by the Contractor as such.

e) The Contractor will be paid for the actual length of gravel shrouding at the unit price per linear foot bid.

f) Payment for development and testing shall be made as per rate quoted in the bill of quantities

7. TIME-LAPSE AND REAL TIME PROGRESS MONITORING

7.1 Setting Up High Resolution Cameras

The contractor will put up a number of High-resolution QUANTAM Cameras to take live images with variable Time Lapses from various angles while positioned on fixed, established, and completed facilities throughout the site, examining the various project assets from multiple perspectives.

7.2 Real Time Web-Based Progress Centre & Feature Wall Setup

i) The contractor shall document the entire project development and project assets from various static angles by placing several Time lapse QUANTAM Cameras. capturing various assets/ activities. The cameras shall be programmed to take ultra-high-definition quality images (4K output resolution) every 30 minutes or so, which shall also stream live content from the static locations around the site looking at the projects. The Contractor shall establish a single panel / feature wall where management shall be able to see live images from all the Time lapse QUANTAM Cameras. A domain name, username and password shall be shared with RUDA for the access of all cameras, that RUDA can access using any computer, tablet or smart phone.

ii) The Quantum cameras shall live stream JPEG images and save RAW images directly every 30 minutes and RUDA should be able to use features such us: download, zoom, email, split screen comparison, calendar date/ image selection etc.

iii) Cameras should be zoomed and panned into the minutest of detail on the image selected. Cameras should be remotely adjusted (shooting intervals, image format, size & quality etc.).

iv) All images and videos accessed in the Progress Centre (web-based centre) with no limitation on the number of users to access the website concurrently. The screen resolution of the video output should be minimum 1980 X 1080i. Each image should be approximately 4272 X 2848 pixels in size (4K resolution).

7.3 Web Based Progress Centre

Web based progress centre should be included with following;

i) Progress Dashboard with Project Wise segregation.
ii) Option for Live Lapse
iii) Compare tool
iv) WhatsApp integration
v) 24 Hour Support
vi) API integration for progress wall setup
vii) Option for BIM integration
viii) Responsive, cross-platform access on desktop and mobile devices.
ix) Quick Switch feature to switch between different cameras or projects
x) Real Time Weather widget
xi) Live Time Lapse feature that generates a downloadable Time Lapse in a video-format (mp4)
xii) Multi Image Viewing and comparison
xiii) Mobile Apps on Google and Apple store with factor authentication, single dashboard, multiple project/camera view.
xiv) Mobile app shall be capable of Managing users, requesting configuration change, and contacting support
xv) Integration to display progress on RUDA Website / Application
xvi) All Time Lapse images, weekly, monthly as well as any time-to-time imagery and edits from construction photography etc. of the projects/assets should be available on a secure interactive web portal (Progress Centre) with Login URL for the RUDA team to be able to access, view, share and download anytime, anywhere, 24x7.

All data / information shall be proprietary right protected and shall be sole property of RUDA. Final data record shall be handed over to RUDA on conclusion of the contract.

xvii) Progress Centre would be a project collaboration interactive secured cloud-based web platform and a project monitoring tool developed in-house by the Contractor. RUDA shall receive a username and a password for their designated Admin user. The admin can then create unlimited number of RUDA users and assign privileges as required between various internal and external teams such as Engineering/Marketing/IT/CEO Office so on and so forth.

xviii) A detailed training session and manual will be provided by the Contractor on the usability of the Progress Centre

7.4 Built-in Solar Power and Internet Connection Cameras

i) Cameras should be specially designed and engineered to withstand the worst weather conditions that are faced on a day-to-day basis. The cameras shall run on solar energy, which allow the equipment to function without any power supply or cable connection (in case of adverse weather/ fog, the Contractor shall ensure that the cameras have appropriate battery life/ backup). The cameras should have a built-in 4G- sim card slot that serves as the internet connection for live image streaming and thus there are no requirements for any internet or Wi-Fi connection from the RUDA on site.

ii) The structures for placing cameras shall be provided by the contractor. The locations of such structures shall be decided by the Contractor with consultation of RUDA. Contractor's crew shall access the cameras as and when required for any maintenance purposes under intimation to RUDA.

iii) Ultra-High-definition sequence videos shall be created from the data captured from the time-lapse cameras and an UHD Edited Time Lapse video sequence from each camera will be provided at project completion and intervals agreed with RUDA, showing the progress of the construction assets. All materials will be shared on ultra-high definition that can be further used for progress meetings, PR and marketing activities

7.5 Drone Video Progress Documentary

i) The contractor shall document the entire project development from various positions and capture a complete video documentary on monthly basis with high resolution drone cameras.

ii) Properly identifying areas / segments of the project with a comprehensive progress video as required by the Client

7.6 Mobilization and Readiness

i) All Time Lapse Quantum Cameras and Drone Cameras should be ready and operational at the start of the project.

ii) Contractor would be responsible for the maintenance of the cameras and would make sure that cameras are working smoothly 24x7 during the entire project's duration

7.7 Security of Cameras

Contractor must ensure necessary insurance of Cameras and make necessary arrangement for security and safety of camera thereof.

7.8 Deliverable

a) Time Lapse & Real-Time Web Based Progress Centre:

The Contractor shall document the entire development and project assets from various static angles by placing several Time-Lapse High-Resolution Cameras and setup an un-interrupted web-based progress center.

b) Drone Video Progress Documentary:

The Contractor shall document the entire project development from various positions and capture a complete video documentary on monthly basis with high resolution drone cameras. Properly identifying areas / segments of the project with a comprehensive progress video as required by the Client / Consultant.

7.9 Measurement and Payment

Pursuant to Sub-Clause 60.2 of the General Condition of Contract, the Engineer shall, upon receiving monthly statement for said Works, certify to the Employer, the amount of payment to the Contractor at the quoted rate as given in the BOQ against this item which the Engineer considers due and payable in respect of such statement.

Ravi Urban Development Authority

Environmental Monitoring Plan

PLANNING AND DESIGN OF INTEGRATED SOLID WASTE MANAGEMENT SYSTEM FOR RUDA INCLUDING CONSTRUCTION OF ENGINEERED LANDFILL SITE AND REHABILITATION OF EXISTING LANDFILL SITE(S)

Mehmood Booti Landfill Site

Engineering Consultancy Services Punjab Pvt. Ltd.

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1. INTRODUCTION

1.1 BACKGROUND

Mehmood Booti dumping site is the oldest dumping site in Lahore. Established in 1998 and functionally closed in 2016, the site served for the dumping of city's solid waste for almost two decades. Due to this long-term waste accumulation in form of tremendous piles of waste, the site became a red-hot zone for obvious environmental damage. Leachate generation and GHG emission have contaminated the water and air to a great extent, observed and pointed even by international monitors. Ravi Urban Development Authority (RUDA), a Punjab Government's initiative, proposed a rehabilitation plan for this dump site in collaboration with Lahore Waste Management Company (LWMC) to reclaim and convert the site into a sustainable zone. Rehabilitation of Mehmood Booti Dumpsite comprises works such as lleveling and grading, rigorous closure capping consisting of various layers, containing a leachate collection system and a gas recovery system. Engineering Consultancy Services Punjab Pvt. Ltd. (ECSP) has been tasked to develop Environmental Management Plan (EMP) to provide guidelines for ensuring environmental safeguards for the project.

1.2 PURPOSE OF EMP

The EMP is a practical guide for consultants, contractors, and the proponent to effectively implement mitigation measures and monitor the project's environmental performance. Key needs addressed by the EMP:

- **Track actual environmental effects:** It ensures close attention to the environmental impact of construction and operation, preventing any discrepancies from predictions;
- **Control anticipated impacts:** By proactively managing expected impacts, we can keep them within predicted levels;
- **Proactively address anticipated impacts:** The EMP provides tools to identify and mitigate unforeseen impacts before they escalate.

1.3 OBJECTIVES OF EMP

The EMP is for the provision of environmental safeguards throughout the project. It implements the mitigation measures for various impacts during each phase, assesses their effectiveness, and suggests improvements if needed. The core objectives are:

- Reducing adverse environmental, social, and health impacts from project activities;
- Implementing ongoing environmental monitoring mechanisms to track progress;
- Regularly reviewing the EMP to optimize its effectiveness;
- Ensuring all the concerns and issues are addressed;
- Establishing a process for swift action in unforeseen environmental or social impacts.

1.4 SCOPE OF EMP

The scope of the EMP includes the following phases of the project:

1. Planning and Design Phase
2. Implementation and Construction Phase
3. Operation Phase.

All the activities performed during these phases will be monitored according to this EMP.

1.5 COMPONENTS OF EMP

These are the relative components of the Environmental Monitoring Program (EMP):

1. Environmental Mitigation Plan
2. Environmental Monitoring Plan
3. Institutional Framework and Administrative Requirements
4. Environmental and social training to raise awareness
5. EMP Cost

2. ENVIRONMENTAL CONDITIONS OF PROJECT SITE

2.1 OVERVIEW

The Mehmood Booti Landfill site provided a waste disposal site for the entire city. As the only licensed landfill in the vicinity, it receives a combination of Municipal Solid Waste (MSW), Commercial and Industrial waste (C&I) and Construction and Demolition waste (C&D). The site consists of a landfill and a transfer station to allow for separation of material and reduce traffic at the tip face. Waste from the Lahore city was collected via collection trucks and deposited at the landfill on daily and weekly basis. The dumping site is situated at the northern bank of Lahore Ring Road (L-20), west from the Lahore-Sialkot motorway (M-11). Urban zones of China scheme and Band Road are located south and southeast respectively to the dumping site. The coordinates of project location are (Latitude 31.6098, Longitude 74.3867).

2.2 SITE LOCATION

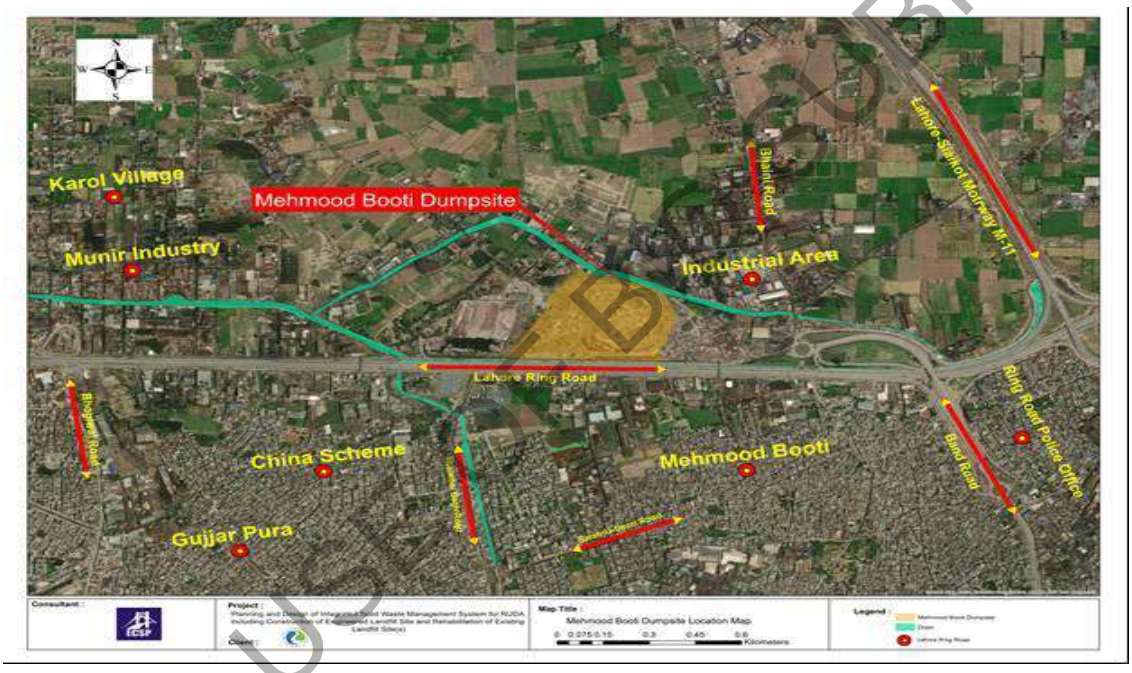


Figure 2-1: Location Map of Mehmood Booti Landfill Site

2.3 SITE TOPOGRAPHY

The revamping of Mehmood Booti landfill site is an important land rehabilitation and clean project in Lahore. The land is scattered on an area of 43 acres of dump site with irregular surface. There has been large accumulation of solid waste over last twenty-five years with many piles of garbage reaching heights well above 80 meters. Other garbage piles are also scattered unevenly at various heights. These garbage piles and lots are to be capped and this capping will result in the surface of the other project components.

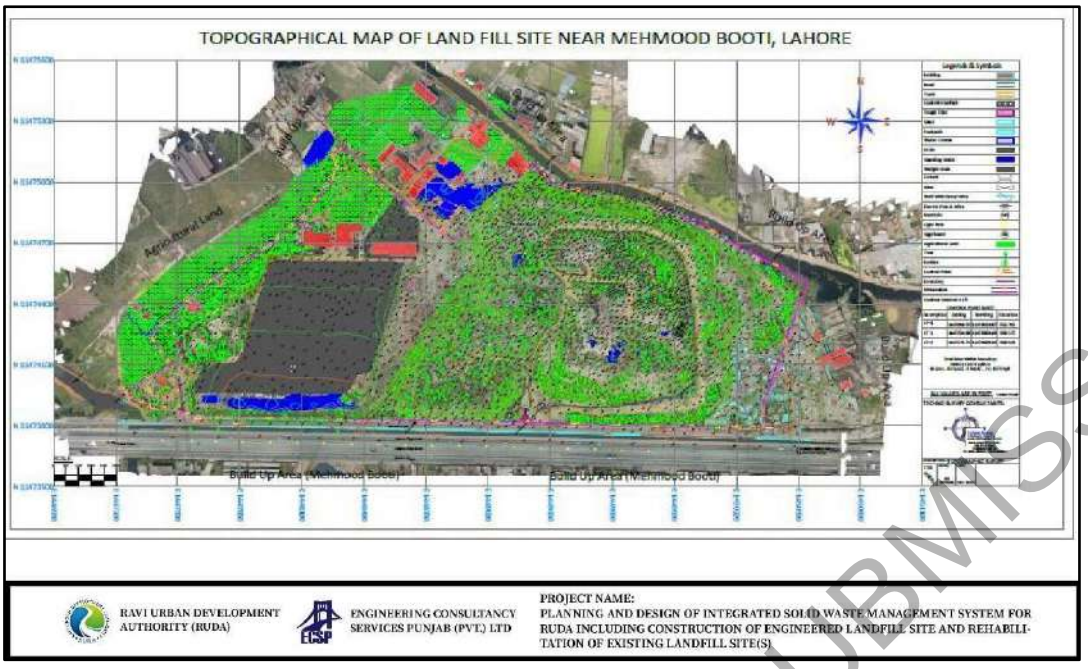


Figure 2-2 Topographical Map of Mehmood Booti

2.4 SEISMOLOGY

Lahore, the vibrant heart of Pakistan, rests on a geological tightrope. Nestled between the Indo-Gangetic plain and the rising Himalayas, the city sits within the influence of two major tectonic plates, the Indian and Eurasian. This dynamic setting places Lahore in a zone of moderate seismic activity, with a history of tremors and occasional earthquakes. The region around Lahore is crisscrossed by a network of ancient faults, remnants of past collisions between the continental plates. These faults, though largely inactive, can still generate occasional tremors, serving as a reminder of the underlying seismic forces at play. The 1974 earthquake, centered near Islamabad, caused tremors felt in Lahore, highlighting the city's vulnerability to events beyond its immediate borders. With its dense population and historical landmarks, Lahore cannot afford to be complacent. As the city continues to grow and modernize, incorporating earthquake-resistant construction practices and raising public awareness about emergency preparedness are crucial steps to mitigate the potential impact of future tremors and ensure the safety of its residents. By understanding the delicate relationship between geological forces and urban development, Lahore can navigate the seismic stage with grace and resilience, preserving its rich heritage while safeguarding its future.

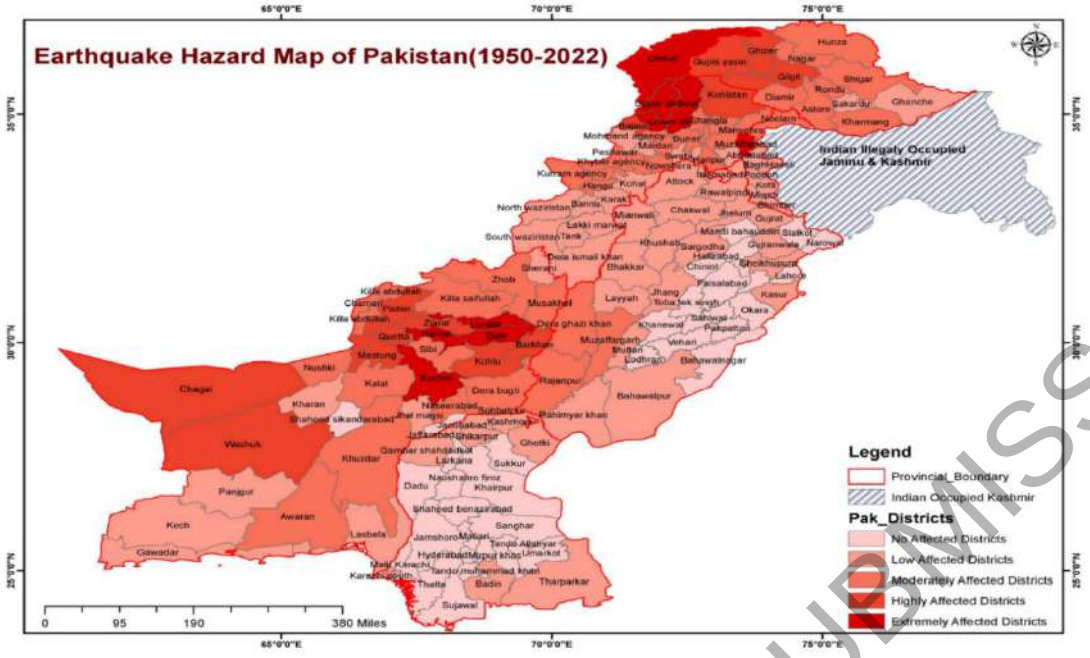


Figure 2-3: Seismology

2.5 HYDROLOGY

The study area forms the upper part of Punjab plain, which is a part of the Indo-Gangetic depression. This depression is of a synclinal nature. Synclinal depression is a fore deep downward of the Himalayan foreland of variable depth, converted into flat plains by simple process of alluvial deposition. The aquifer underlying the Study Area comprise unconfined alluvium with a thickness of about 1050 feet (rock has been encountered at depth 1050 ft in the deepest test bore hole drilled near Thokhar Niaz Bag in Punjab) as a part of regional groundwater investigation. Project area is part of the large inter alluvial upper Bari Doab, which is bounded by the Ravi River in northwest and the Sutlej River to the southeast. The Bari Doab along with other Doabs like Rachna, and Chaj form the vast alluvial plain of the upper Indus Plain in Punjab. The regional groundwater flow in the area is from northeast, the Jammu and Kashmir foothills towards the southwest along the general slope of the area. The aquifer behaves as a single homogeneous water body and the water table ranges from 15ft to 100 ft. After the introduction of controlled irrigation system, the water table started rising as a result of leakage/seepage from irrigation canals and infiltration from irrigation applications on crop fields. The area became water logged until about 1960 when a quasi-equilibrium state was reached. Link canals and tube-wells bridged the initial water gap, allowing annual crop intensity to surge from 70% to 140%. However, this intensive cultivation relies heavily on groundwater, putting ever-increasing stress on the region's aquifers. In Lahore City, a 130-foot-deep depression formed by the declining water table has partially blocked natural groundwater flow. This decline stems from excessive extraction to meet the water needs of a large population and numerous industries. Consequently, the city's water table continues to fall.

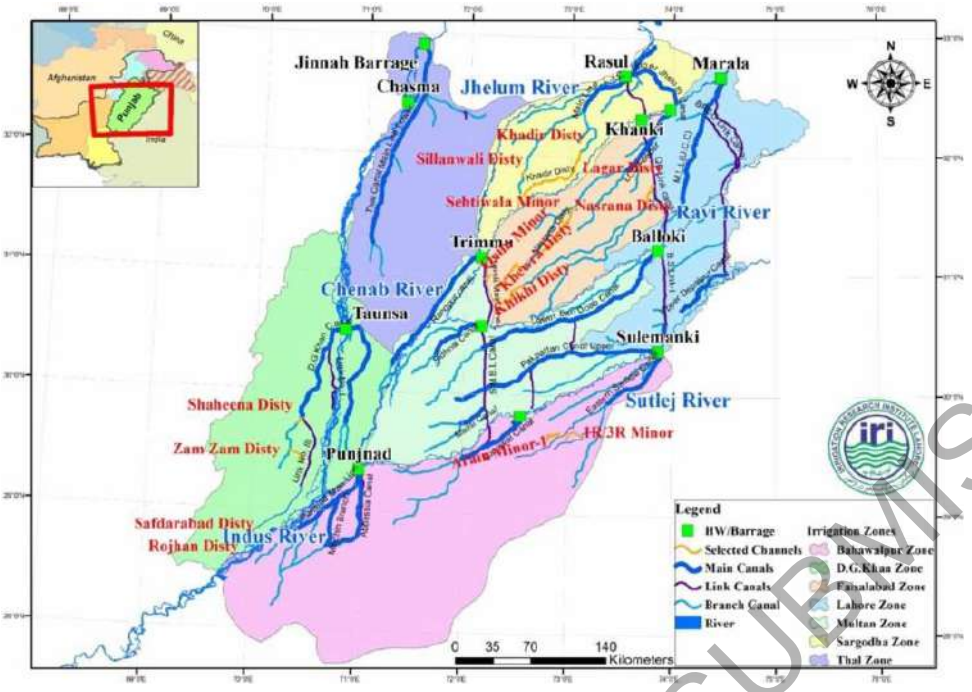


Figure 2-4: Rivers and Canal Network in Punjab, Pakistan

2.6 CLIMATE

The climate including air, temperature, precipitation, humidity and evaporation is an influencing factor, affecting the construction, engineering and operation aspects. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct solar radiation and precipitation must be considered. The project area has extreme climate: it has hot summer and cold winters. The summer starts from April and lasts till September. May, June, and July are the hottest months. The mean maximum and minimum temperature ranges from 40.4 ºC and 27.3 ºC respectively for these months. The winter seasons lasts from November to March. December, January and February are the coldest months. The mean maximum and mean minimum temperature ranges from 19.8ºC to 5.9ºC in January. Temperatures in the project area vary from 5.9 ºC to 40.4 ºC. Below is a summarized illustration of various parameters to evaluate Lahore's climate.

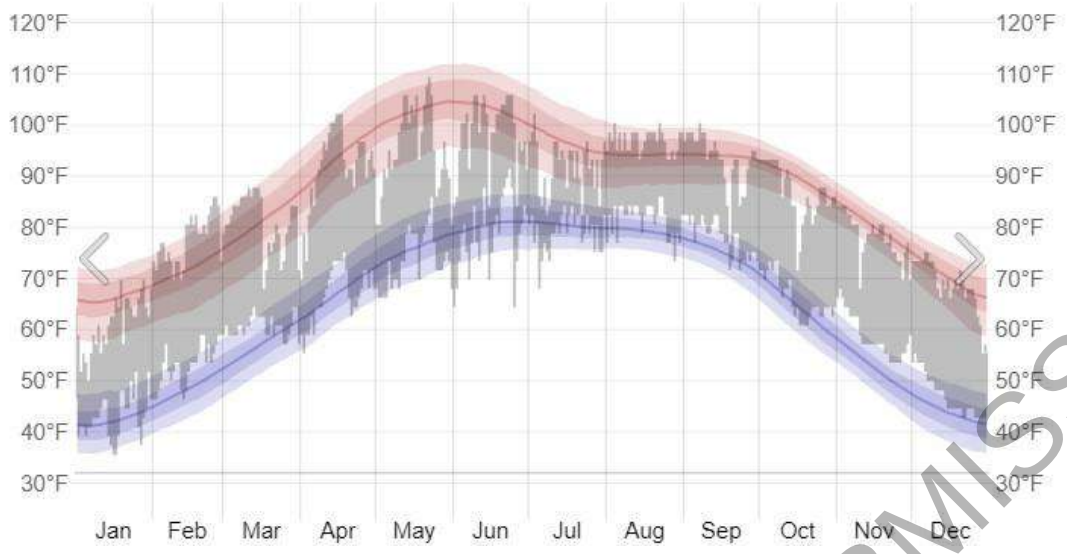


Figure 2-5: Average Monthly Temperature in Lahore (2023)

Figure 2-6: Humidity Comfort Levels in Lahore (2023)

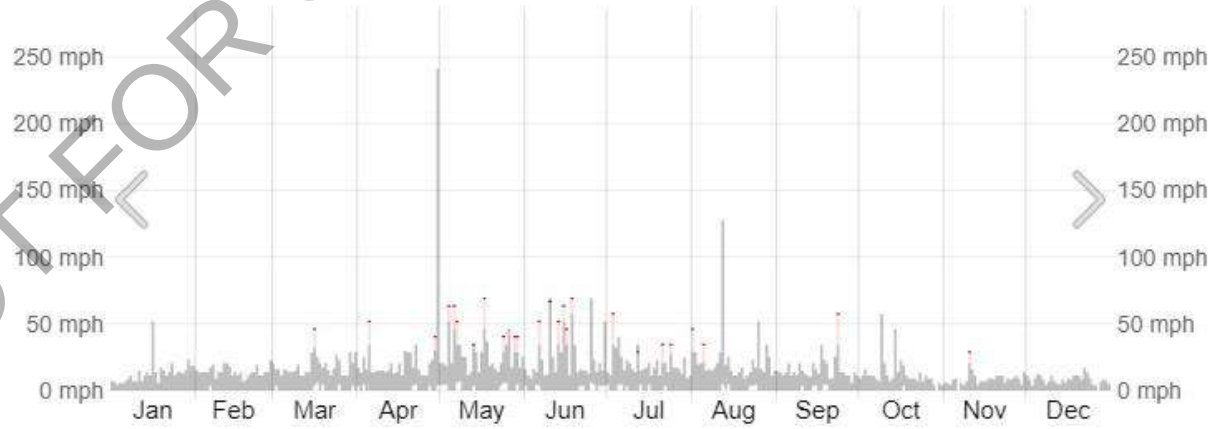


Figure 2-7: Average Wind Speed in Lahore (2023)

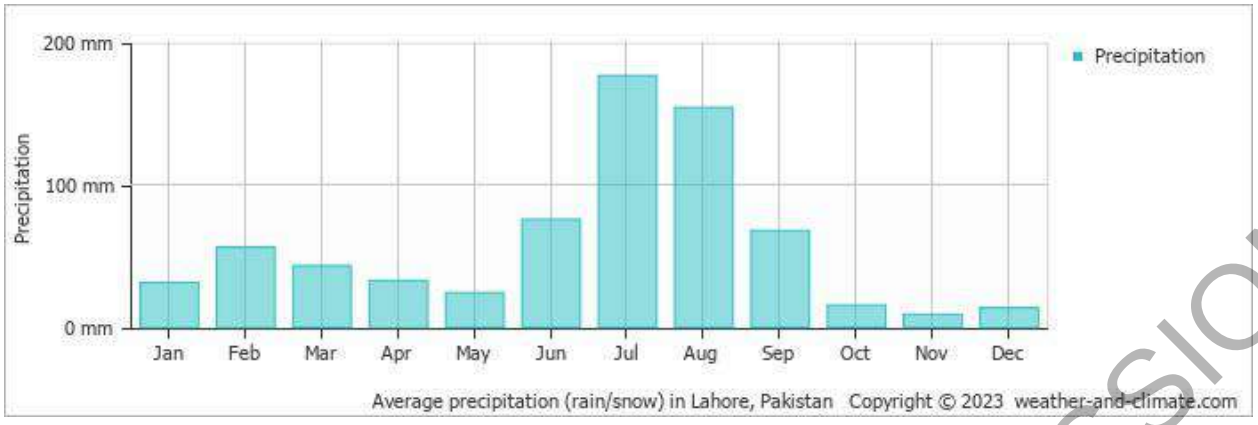


Figure 2-8: Average monthly Precipitation in Lahore (2023)

2.7 FAUNA and FLORA

This section provides an overview of the biological components of the project area. The study is categorized in *Flora* and *Fauna* and the details are in the following:

2.7.1 FAUNA

The project area has been a remote dumping site hence no prominent faunal species have been identified there. At present, only some local dogs, cats, rodents, and local birds including crows, sparrows and pigeons temporarily inhabit the project area. The project's construction and operation will not incur any harm or risk on the aforementioned species. They will be temporarily displaced during construction to avoid any unforeseen damage to them and will be again reinstated to inhabit. Once the project is completed, the urban forest will attract various local and migratory species, increasing the biodiversity of the area.

2.7.2 FLORA

Lahore, the vibrant cultural heart of Pakistan, boasts a surprisingly diverse array of floral species despite its urban landscape. Here's a glimpse into some of the city's botanical treasures, with their local and scientific names:

Table 2-1: Floral Species

Sr. No.	Specie Common Name	Specie Scientific Name
1	Gulmohar	*Delonix regia*
2	Gulnaar	*Punica granatum*
3	Chambeli	*Jasminum multiflorum*
4	Shamama	*Plumeria pudica*
5	Gul-e-Nisha	*Erythrina suberosa*
6	Bahaar	*Bauhinia variegata*
7	Gul-e-Afshan	*Canna indica*
8	Keekar	*Parkinsoniaaculeata*
9	Peepal	*Ficusrelegiosa*
10	Berri	*Diospyrosmelanoxylon*
11	Shehtoot	*Morus alba*
12	Sufeda	*Eucalyptus citriodora*
13	Bel	*Aeglemarmelos*
14	Gul-e-mast	*Daliniaindica*

2.8 ENVIRONMENTAL MONITORING

ENVIRONEMNTAL SERVICES PAKISTAN (PVT) LIMITED, a Pak-EPA and Punjab EPD certified laboratory, was engaged to carry out environmental monitoring of ground water quality, waste water (Leachate) quality, ambient air quality and noise levels in the project area. Detailed laboratory analysis reports of analysis results are annexed at **Annexure** of this report and some results related to the project area's environmental monitoring are given below:

2.8.1 WASTEWATER (LEACHATE) ANALYSIS

The waste water quality analysis (Leachate Analysis) was conducted on 02/12/2023 at two selected points falling in the project area vicinity.

Table 2-2: Leachate Analysis (From Septic Tank N:3497319.89, E:441505.57)

Sr. No.	Parameter	Concentration	Unit	Remarks
1	*pH*	7.0	-	Within Limits
2	*BOD_5 at 20˚C*	883	mg/L	Exceeding Limits
3	*COD*	2170	mg/L	Exceeding Limits
4	*Total Suspended Solids*	57	mg/L	Within Limits
5	*Total Alkalinity*	4303	mg/L	Within Limits
6	*Chloride*	1335	mg/L	Exceeding Limits
7	*Lead*	Not Detected	-	Within Limits

Table 2-3: Leachate Analysis (From Pond N:3497215.02, E:441691.70)

Sr. No.	Parameter	Concentration	Unit	Remarks
1	*pH*	7.2	-	Within Limits
2	*BOD_5 at 20˚C*	941	mg/L	Exceeding Limits
3	*COD*	2103	mg/L	Exceeding Limits
4	*Total Suspended Solids*	63	mg/L	Within Limits
5	*Total Alkalinity*	1556	mg/L	Within Limits
6	*Chloride*	1550	mg/L	Exceeding Limits
7	*Lead*	Not Detected	-	Within Limits

2.8.2 AMBIENT AIR QUALITY

Air Quality Assessment of the dumping site was conducted on 03/12/2023. According to the assessment, the air quality at the dumping site is deteriorated due to the increased concentrations of particulate matter ($PM_{2.5}$, PM_{10} and suspended). Following table depicts the results:

Table 2-4: Air Quality Mehmood Booti Landfill Site

Sr. No.	Parameter	Concentration	Unit	Remarks
1	*Carbon Monoxide (CO)*	3.5	mg/m^3	Within Limits
2	*Sulfur Dioxide*	71.2	µg/m^3	Within Limits
3	*Ozone (O_3)*	28.6	µg/m^3	Within Limits
4	*Oxides of Nitrogen (NO)*	23.8	µg/m^3	Within Limits
5	*Oxides of Nitrogen (NO_2)*	35.8	µg/m^3	Within Limits
6	*Particulate Matter ($PM_{2.5}$)*	61.1	µg/m^3	Exceeding Limits
7	*Particulate Matter (PM_{10})*	196	µg/m^3	Exceeding Limits
8	*Suspended Particulate Matter*	534	µg/m^3	Exceeding Limits
9	*Total Volatile Organic Compounds (TVOC)*	0.23	ppm	Within Limits

A 24-hour, hourly monitoring was carried to evaluate the air quality of the dumping site. Figure illustrates the hourly results of concentration measurements:

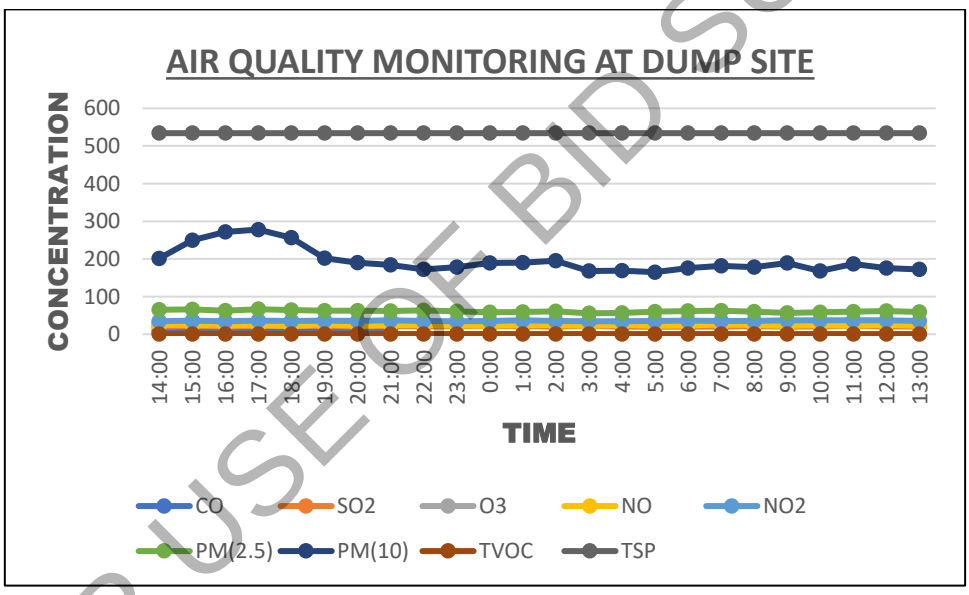


Figure 2-9: Air Quality Monitoring at Mehmood Booti Dumping Site

2.8.3 NOISE QUALITY

A 24-hour testing was conducted at the dumping site to evaluate noise levels on 02/12/2023. The results satisfy that the noise levels at the Mehmood Booti Dumping Site are under the PEQS limits which are 55 dBA for daytime hours and 45 dBA for night time hours. The day time average noise level turned out to be 42 dBA while night time average noise level remained 31 dBA. Below is the graphical representation of the monitoring results:

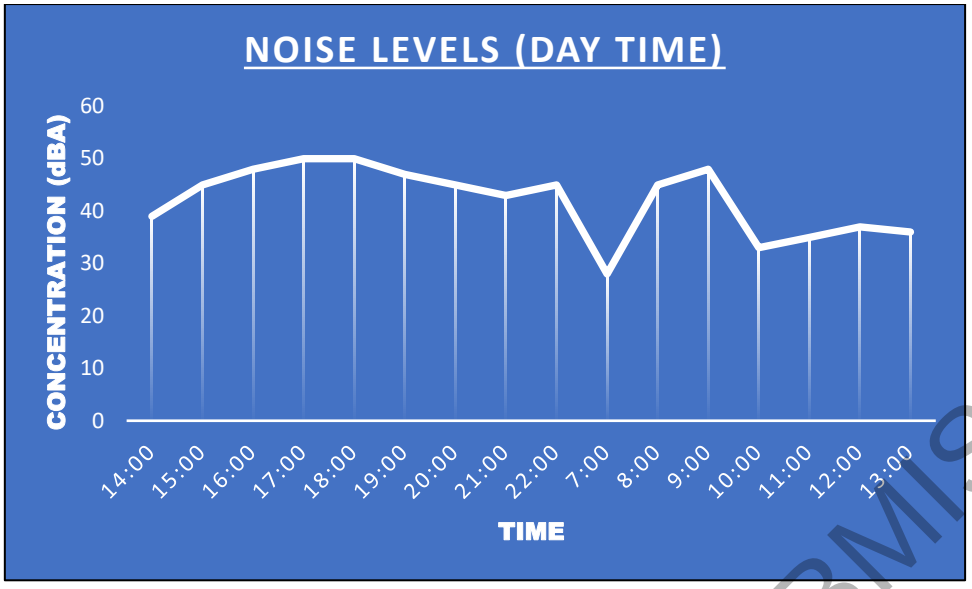


Figure 2-10: Noise Quality Monitoring at Mehmood Booti Dumping Site

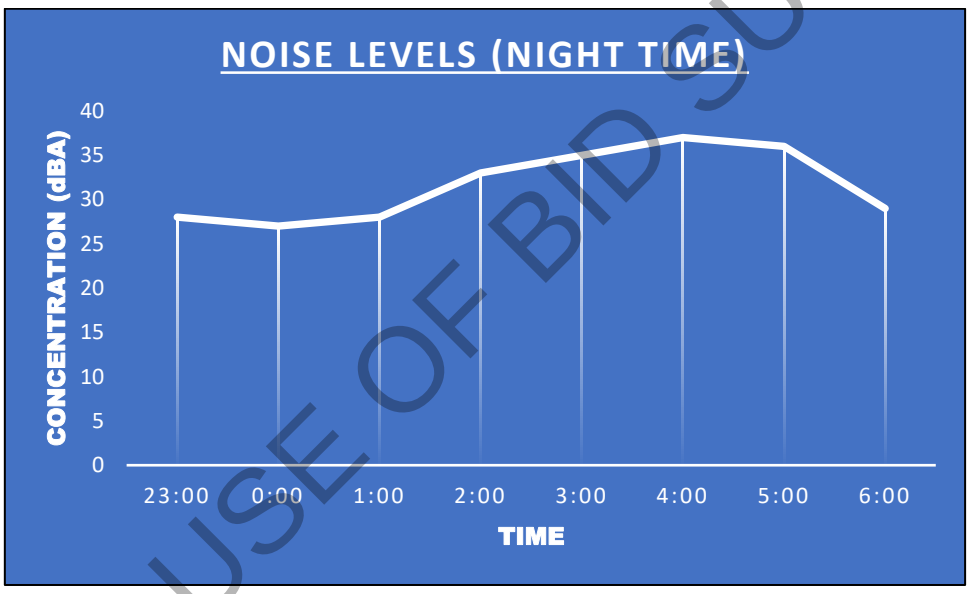


Figure 2-11: Noise Quality Monitoring at Mehmood Booti Dumping Site

3. LANDFILL CLOSURE PLAN

Landfill site will be closed via provision of layered caps above the waste piles in a systematic manner. Capping involves placing a cover over contaminated material such as landfill waste or contaminated soil. Such covers are called caps. Caps isolate the contaminants and keep them in place to avoid the spread of contamination. They prevent people and wildlife from making contact with contaminants. A cap isolates and prevents the spread of contamination in several ways. For example, it can:

- Stop rain and snowmelt from seeping through the material and carrying contaminants to the groundwater
- Keep storm water runoff from carrying contaminated material offsite or into lakes and streams
- Prevent wind from blowing contaminated material offsite
- Control releases of gas from wastes containing or producing “volatile” chemicals (those that evaporate)
- Keep people and wildlife from coming into contact with the hazardous material and tracking contaminants offsite

3.1 TYPES OF CAPS

Asphalt or concrete: A layer of these materials can serve as a parking lot or building slab foundation.

Vegetative layer: A top layer of soil planted with grass or other vegetation can help prevent soil erosion and make the area look more natural and attractive. An evapotranspiration or “ET” cover is a vegetative cap in which the plants and underlying soil keep rain and snowmelt from soaking down into the contaminated area.

Drainage layer: A layer of sand and gravel, often containing rows of slotted pipes, is built to collect and drain any water that makes it through the top layers of a cap.

Geomembrane: A sheet of strong plastic-like material is used to prevent downward drainage of water and upward escape of gases.

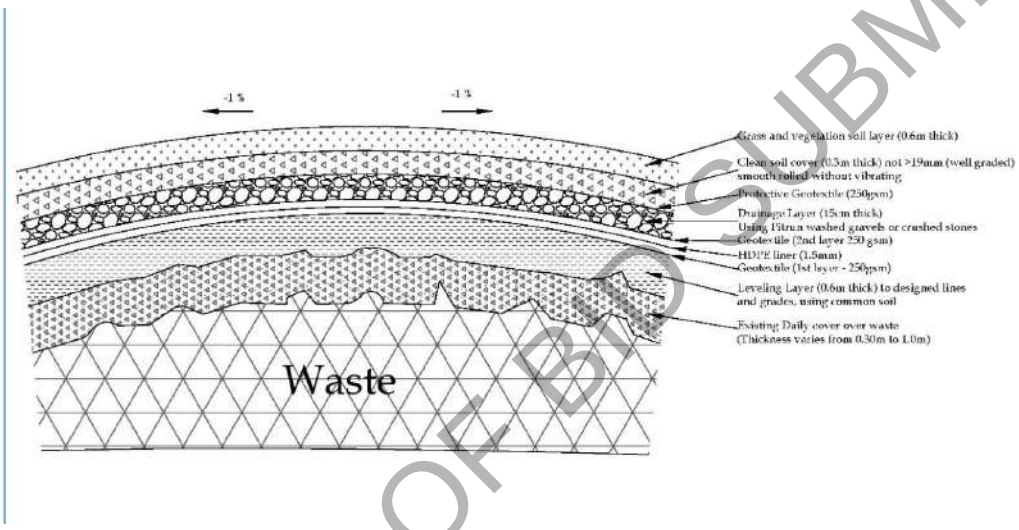
Clay: A layer of compacted clay also can help prevent the downward drainage of water.

3.2 CAPPING TECHNIQUE FOR THE MEHMOOD BOOTI LANDFILL SITE

Upon completion of the fill profile, a 1-meter-thick levelling soil layer will be applied. A protective geotextile layer will be placed on the levelling soil. Subsequently, a 1.5 mm thick HDPE liner will be positioned atop this levelling soil layer. Following this, an additional protective barrier in the form of a geotextile layer will be installed over the HDPE liner. To facilitate effective drainage, a dedicated drainage layer will be incorporated. Ensuring unimpeded drainage functionality, a second geotextile layer will be introduced above the drainage layer to prevent soil layers above from obstructing the drainage mechanism. Finally, a meticulous arrangement will be made, consisting of a cover of clean soil succeeded by a layer designed for plantation.

Details of the components of the closure layer are as follow:

- Leveling soil Layer 1-meter-thick common soil in the vicinity of project can be used.
- A protective Geotextile 250 GSM will be placed on the leveling soil layer at the top and side slope
- HDPE liner 1.5mm thick will be placed on the protective Geotextile
- A second layer of Geo textile protective layer 250 to 400 GSM will be installed over the HDPE liner.
- A drainage layer 30 cm thick comprises of well graded Pit run washed gravel or crushed stones 6.35mm to 100 mm thick. The crushed stone will not contain any stone dust a Pit Run gravel should not contain any clay content
- A third Geotextile layer of 250 GSM will be installed on top drainage layer, so that the soil layer above the drainage layer does not block the drainage layer
- Clean soil cover 1 meter thick available will be installed over the geotextile. The common soil or RAVI sand will be suitable material for soil layer



3.3 GAS RECOVERY SYSTEM

The proposed plan entails the recovery and utilization of landfill gas for energy generation. Upon the completion of closure activities, the extraction of landfill gas will be initiated, involving the establishment of a landfill gas recovery system, which includes the following components:

Collection System: This encompasses the deployment of gas collection wells, well-heads, and a pipeline system designed to capture, control, monitor, and transport landfill gas to the extraction system. The gas wells will be strategically laid out at 30-meter center-to-center intervals, commencing from the top edge of the side slopes. In total, 72 landfill gas wells, each with a diameter of 200 mm and featuring both blind and perforated sections, will be installed. These gas wells will be connected to the ring main through well heads, which, in turn, will be linked to the flare system. The flare and generation set will be interconnected via specially designed connections.

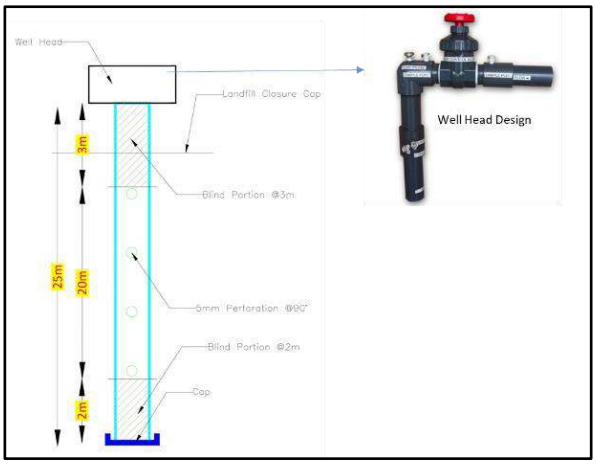


Figure 3-1 Conceptual Design of the Gas Well to be installed in Mehmood Booti Dumpsite

Extraction System: This involves the incorporation of blowers, valves, and a flow control system. The blower plays a critical role in creating negative pressure within the landfill, facilitating the extraction of gas from the collection wells into the collection header. The dimensions of the blower will be tailored to the final use of the gas.

Transportation Pipeline Network: A dedicated network will be established to transport the collected landfill gas to the electricity generation facility.

Furthermore, the landfill gas will undergo an upgrading process to enhance its methane content by eliminating other gases, primarily carbon dioxide. The application of pressure swing adsorption technology will be instrumental in this process, utilizing activated carbon or zeolites as adsorption materials. The operation will involve different pressure levels in four stages: adsorption, depressurization, regeneration, and pressure build-up. Raw biogas from the methane capture project will undergo separation from water and hydrogen sulfide before entering the compressed adsorption phase, where non-methane gases are adsorbed by the activated carbon or zeolites. The adsorption material will be recovered in multiple low-pressure phases.

The Power Generation System: The power generation system will utilize gas engine generators for the combustion of gas as fuel, enabling the generation of electricity. The facility plans to deploy five engines, and all electricity generated will be supplied to the electricity grid.

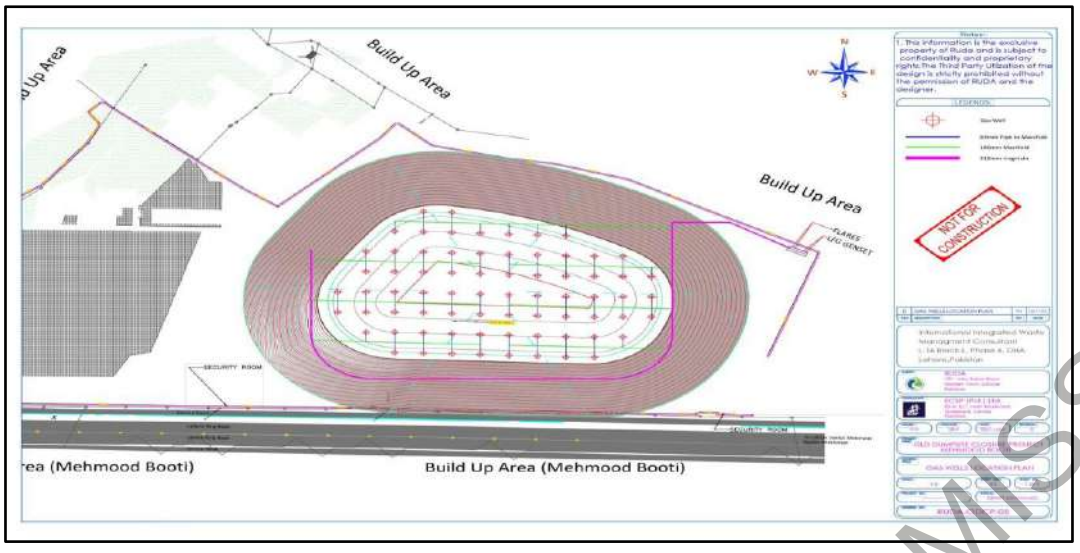


Figure 3-2 Proposed locations of gas collection wells

3.4 LEACHATE COLLECTION SYSTEM

Leachate generation is intricately linked to both rainwater infiltration and the decomposition of waste. Upon the successful implementation of the prescribed cover, as detailed earlier, the cessation of leachate generation from rainwater infiltration is anticipated. Subsequently, the sole source of leachate generation will emanate from the decomposition of waste, estimated at 5,044 cubic meters per year. To manage the leachate generation, a strategic approach involves the construction of four sumps equipped with leachate barriers strategically placed throughout the site. These sumps will serve the purpose of collecting the leachate, which will then be conveyed for treatment in an anaerobic treatment system. The anaerobic treatment system is designed to process the leachate, ensuring that only the resulting liquid is discharged into the nearest drain, subject to rigorous scrutiny to guarantee compliance with the guidelines stipulated by the National Environmental Quality Standards (NEQs).

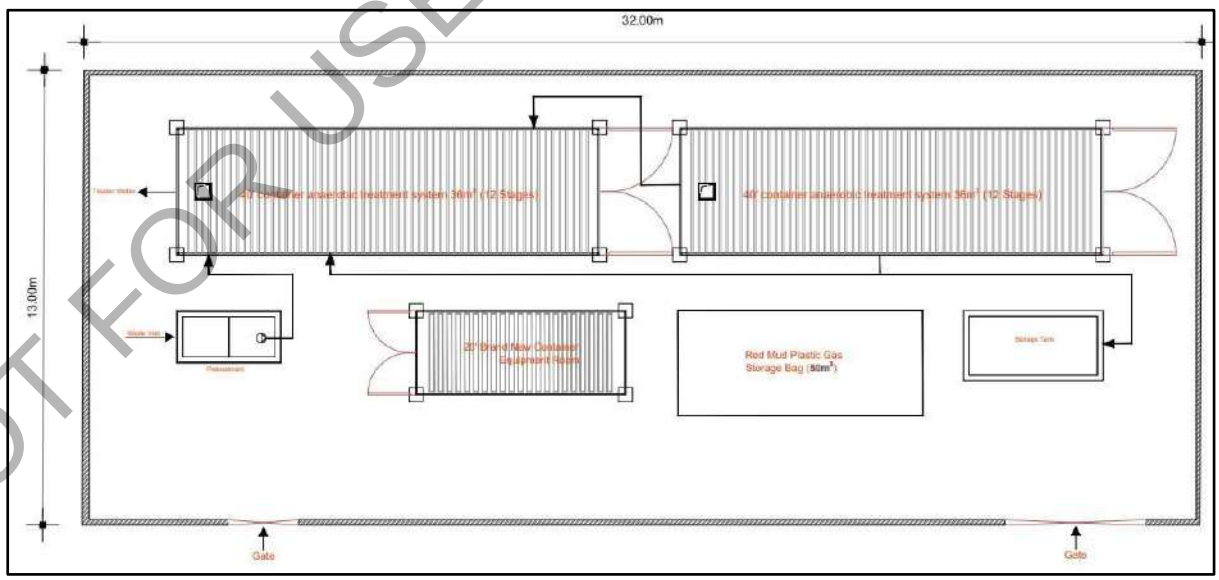


Figure 3-3 Containerized Anaerobic Digestion Treatment of Leachate

4. IMPACTS ASSESMENT AND MITIGATION MEASURES

An environmental impacts assessment using the source & receptor model has been developed to address specific environmental risks relevant to the Closure and Rehabilitation of Mehmood Booti Dumping/Landfill site.

4.1 SOURCE

A source is the origin of environmental impact which can lead to contamination or environmental harm. Sources of environmental impact at Mehmood Booti Landfill Site include:

- Leachate
- Landfill Gas
- Odor
- Dust
- Litter
- Noise

4.2 RECEPTOR

The receptor is the location where the environmental harm or impact is registered, this can be onsite and offsite. Possible receptors of environmental harm from Mehmood Booti landfill Site and its vicinity include:

- Groundwater
- Surface water
- Surrounding Infrastructure
- Surrounding land users
- Vegetation and flora

4.3 ENVIRONMENTAL IMPACT CHATACTERIZATION

The predicated environmental impacts were carefully characterized. There are different categories of impacts, including:

- Impacts based on Timing (Project Phase)
- Impacts based on Nature (Positive, Negative)
- Impacts based on Reversibility (temporary or permanent)
- Impacts based on Significance (High, Medium, Low)

4.4 IMPACTS EVALUATION

The Impact screening checklist and project impact evaluation matrix have been developed to evaluate the potential impacts of the proposed Project based on set procedures of environmental guidelines of the EPA-Punjab. The impact screening checklist is developed to screen out the potentially insignificant environmental and social impacts from the potentially significant adverse environmental and social impacts during the pre-construction (planning and design), construction, and operational phase of the proposed project. The objective of the impact screening process is to assess the significance of the issues related to the air, water, noise, soil, transportation, infrastructure, communication, hazards, and external limits of the proposed project. For the assessment of impacts, the project impact evaluation matrix is used by dividing the project action into different phases (planning, design, construction, and operations).

KEY	
INDICATOR	**DESCRIPTION**
+	Positive
-	Negative
3	High
2	Medium
1	Low
0	Negligible
P	Permanent
T	Temporary

Table 4-1: Impacts Evaluation Matrix

Sr. No	Parameters		Pre-Construction Phase	Construction Phase	Post-Construction/ Execution Phase
1	***Ecological Environment***				
1.1	Avifauna (Birds)		N/A	0T	+3P
1.2	Trees		N/A	-1T	+3P
1.3	Endangered Species		N/A	N/A	N/A
1.4	Fauna		N/A	0T	+2P
1.5	Aquatic life		N/A	N/A	N/A
1.6	Crop Cutting		N/A	N/A	N/A
2	***Physical Environment***				
2.1	Land Use		N/A	-1T	+1P
2.2	Climate Change		-2T	-0T	+1P
2.3	Ground depletion	Water	N/A	N/A	N/A
2.4	Ground Quality	Water	-1T	-0T	+1P
2.5	Surface Quality	Water	-2T	-0T	+1P
2.6	Air Quality		-3T	-0T	+2P
2.7	Noise		0T	-1T	0P
3	***Socio-Economic Environment***				
3.1	Loss of Electricity/Sui-gas Transmission lines		N/A	N/A	N/A
3.2	Loss of water and sewerage distribution pipelines		N/A	0T	0P
3.3	Loss of telephone lines		N/A	N/A	N/A
3.4	Accessibility infrastructure tracks and trails		N/A	-0T	+1P
3.5	Loss of Assets		N/A	N/A	N/A
3.6	Aesthetic		-3T	-1T	+3P

Sr. No	Parameters	Pre-Construction Phase	Construction Phase	Post-Construction/ Execution Phase
3.7	Quality of Life	-1T	-0T	+2P
3.8	Mosques	N/A	N/A	N/A
3.9	Monuments	N/A	N/A	N/A
3.10	Employment Opportunities	+0T	+1T	+2P
3.11	Public Health	-1T	-0T	+2P

5. ENVIRONMENTAL MONITORING PLAN

The EMP is a comprehensive guide to assess and mitigate environmental impacts throughout the project's lifecycle. It provides guidelines for mitigation, monitoring, responsibilities, and timelines. Construction and operation phases are all actively monitored to ensure mitigation effectiveness. Data collection, analysis, and reporting tasks are clearly assigned, keeping everyone accountable. By integrating environmental considerations into contracts and tenders from the outset, a solid foundation can be built for successful EMP implementation.

Most of the proposed EMP mitigation activities will be assured under supervision of engineering design, provisions in the construction contracts, engineering supervision contract, and as necessary by agreement with relevant communities emphasizes the institutions which are responsible for proper implementation and effective supervision. See **Table 5-1: Organizational Duties**:

Table 5-1: Organizational Duties

Organization	Duties
Designing & Planning Phase	
Proponent (RUDA / LWMC)	Implementation and monitoring of the EMP Provide all supervisory and management staff with the awareness and understanding of their responsibilities under this EMP Provide appropriate and adequate resources to allow for the effective implementation and maintenance of the EMP
Development Phase	
EPA-Punjab	Ensure EMP is sufficient to control impacts and ensure compliance with the statutory requirements of EPA
Contractor / Project Manager	Following are the responsibilities of the Contractor: Ensure compliance with the EMP at all times during development

Organization	Duties
	Ensure the health and safety of the labor by adopting best practices Maintain an environmental register which keeps a record of all incidents which occur on the site during construction Be aware of and understand the contents of and the reason for implementing the elements of the EMP and ensure all personnel including sub-contractors adhere to these requirements. Provide adequate training in the elements of the EMP to all personnel, including contractors. Provide personnel involved in the project,including subcontractors and visitors, with the appropriate environmental training required to provide them with awareness and understanding of their responsibilities under the EMP as well as an understanding of the environmental approvals that adhere to the strategies outlined in the EMP Carry out all work as per the procedures outlined in the EMP Make sure that all environmental safeguards and precautions are in place and adhered to at all times at the site and activity Regularly inspect and monitoring of all activities for adherence to environmental safeguards Report all environmental incidents to the Superintendent's Representative as soon as practicable, but within 24 hours of them occurring Ensure that all equipment used is properly serviced and that all precautions are in place to prevent the likelihood of an environmental incident occurring
PMC (Project Management Consultant)	Supervise and monitor environmental management actions and parameters Commence daily observations of EMP activities Confirm that every activity on the site is within the limits mentioned in PEQS Specific review of residual hazards to be undertaken at the prescribed intervals Develop the emergency plan in conjunction with all the employees Provide adequate and relevant training to ensure that all employees understand the authority's approach to HSE and are aware of their responsibilities Ensure that any innovation or positive input made by any staff member is acknowledged through praise and feedback from actions
Operational Phase	

Organization	Duties
Proponent (RUDA / LWMC)	Proponent will serve as the ultimate authority to approve the project-specific designs and will regulate the safe disposal of the wastewater and the provision of safe drinking water to the residents. Regular maintenance schedules and should be met.

The proposed environmental management and monitoring program for the construction and operational phase of the project is provided in **Table 5-2: Environmental Management and Monitoring Plan**:

Table 5-2: Environmental Management and Monitoring Plan

ACTIVITY	IMPACTS	MITIGATION MEASURES	MONITORING INDICATORS	FREQUENCY	RESPONSIBLE AUTHORITY
CONSTRUCTION PHASE					
Establishment of camps, mobilization of workforce, equipment, machinery, etc.	I. Conflicts may occur between locals and workforce; II. Child labor; III. Conflict between local and migratory job seeker; IV. Health and Safety of workers; V. Generation and disposal of waste.	➢ Establishment of camps in designated and bounded area within construction site after Engineer's approval. ➢ Hiring of workforce from local communities. ➢ Awareness raising of residents for safety protection and awareness raising of labor to ensure respect for local customs and norms. ➢ Child labor will strictly be prohibited. ➢ Preparation and implementation of OHS Plan. Safety measures taken by the contractor such as installation of firefighting equipment, safe storage of hazardous material, fencing, provision of first aid facilities etc.; Contingency measures in case of accidents. ➢ Provision of adequate sanitation, washing, lighting, cooking and dormitory facilities. OHS trainings to construction and camp staff.	• Approval obtained from the Engineer. • Photographic record. • Camp established at least 500 m away from the nearest community. • Community complaint register. • Approved OHS plan. • Presence of National Identity Card.	At the time of camp establishment	Contractor
Transportation of construction material and vehicles' Movement	I. Smoke and dust generation; II. Chance of accidents;	➢ Regular inspection, tuning, and maintenance of transport vehicles;	• No construction activities at night; Log of vehicle movement; Visual	Daily	Execution by Contractor Monitoring by

	III. Spillage & leakages from trucks and vehicles; IV. Damage to access roads and infrastructure; V. Soil erosion and contamination; VI. Air, water & noise pollution	➢ Material transport in closed containers or covered with canvas (Tarpal) sheets; ➢ Avoid night activity; ➢ Sprinkling of water on site and on routes near communities; ➢ Ensure engines of machinery are fitted with mufflers. Equipment and machinery operators should be equipped with ear protection equipment; ➢ Fixing of sign board at detours; Use of PPE; Awareness raising of drivers; ➢ Avoiding speedy movement of vehicles near communities; ➢ Restoration/rehabilitation of damaged infrastructure.	inspections of the vehicles; • Photographic records; • Record keeping of accidents and First Aid kits provision		Proponent through PMC
Construction Works	I. Accident risks; II. Noise pollution; III. Air pollution; IV. Construction material waste.	➢ Provision of PPEs, first aid kits and an emergency vehicle. Formation of emergency response team; ➢ Maintenance and lubrication of construction vehicles and heavy equipment; ➢ Use of earplugs and earmuffs by the workers. Night activities should be avoided; ➢ Proper engine tuning of machinery/ equipment; ➢ Water ssprinkling particularly at work sites near the communities; ➢ Removal of any left-over construction material/waste from the construction sites.	• Visual Inspection • Photographic record • No construction activities at night • Records of PPEs provision and accidents • Log of vehicular movement	Daily	Contractor / PMC
Storage, handling, and transportation of hazardous materials	I. Work safety; II. Human health risks.	➢ Provision of double/secondary containment for storage of hazardous materials (if any);	• Visual inspection • Photographic record	Weekly	Contractor

		➢ Use of PPEs for handling and storing of hazardous materials (if any); ➢ Provision of awareness and guidelines in the construction camp for handling and storing of hazardous materials (if any).	• Incident record keeping		
Solid Waste Generation	I. Land pollution; II. Health risks.	➢ Ensure proper collection and disposal of waste generated from camp at designated disposal pit (away from the camp site) approved by the Engineer; ➢ Prohibition on burning of waste; ➢ Good housekeeping practices to minimize waste generation; ➢ Provision of bins/containers for temporary waste disposal at camp.	• Covered disposal containers placed at camp • Designnated disposal pit provision • Visual inspection	Daily / Weekly	Execution by Contractor Monitoring by Proponent through PMC
Water Supply	Water related health risks (waterborne diseases)	➢ Provision of safe drinking water supply at the camp as well as at working places; ➢ Ensuring water quality analysis from a certified laboratory.	• Observations of workers' health • Records of water quality monitoring/analysis	Weekly	Contractor
Sanitation and wastewater disposal	I. Water contamination; II. Water pollution; III. Water related health risks.	➢ Avoid disposal of sewage into adjoining water bodies; ➢ Provision of sewage treatment arrangement such as lined septic tank and collection chamber; ➢ Pumping of sewage from collection chamber and disposal of sewage away from the camp and any other settlement.	• Monitoring compliance with regular disposal of sanitary waste • Photographic record • Visual inspection	Biweekly	Execution by Contractor Monitoring by Proponent through PMC
Operation of generators and other diesel operated equipment	I. Deterioration of Air quality; II. Noise pollution (if	➢ Proper tuning and maintenance of generators; ➢ Lubrication of mechanical parts	• Monitoring of smoke emissions • Noise and emissions test	Daily	Contractor

	noise level exceeds 75 dB); III. Diesel spillage/leakage; IV. Work safety; V. Accident risks.	to reduce noise generation; ➢ Inspection, maintenance and repairing of components that might cause diesel spillage or leakage; ➢ Application of generators at designated operational hours; ➢ Provision of sign boards and guidelines near generators about its operation by workers; ➢ Guided and monitored operations (turning on and off) of generators.	reports of generators • Visual and observations-based inspection • Provision of signs and safety guidelines		
Leachate	I. Leachate may expel out or seep into surface and ground water levels of project area; II. Water pollution; III. Sanitation problem; IV. Health risks; V. Odor and nuisance; VI. Contaminated storm water run-off may impact surrounding ecology; VII. Hazardous for deep rooted flora and fauna as well.	➢ The Closure cap will prevent any sort of leachate seeping; ➢ A leachate collection system will be installed under closure cap; ➢ The regular maintenance and associated safety guidelines for closure cap are recommended in the next section; ➢ Any sign of leachate expulsion must immediately be reported to the Project Manager.	• Visual inspection • Photographic record • Record keeping	Weekly	Contractor & Project Manager
Landfill Gas (LFG) Explosive and Asphyxiant gases	I. Asphyxiation and explosion caused by LFG; II. Nuisance and odor problems; III. Potential health impacts; IV. Air pollution.	Landfill gas causing explosions or asphyxiation is considered rare. Conditions on site are very dry, meaning decomposition of waste occurs at a very slow rate. Odor is likely present. ➢ Covering and capping of the waste via Closure Cap, limiting the active tip face, can reduce the odor detected at the landfill	• Visual inspection • Photographic record • Record keeping	Weekly	Contractor & Project Manager

		surface; ➢ A gas collection system will be provided beneath the closure cap to collect, divert from accumulation and safely dispose-off the LFG.			
OPERATIONAL PHASE					
Blasting conditions due to LFG	As a closure cap is being provided over the existing waste piles to create an even and holding surface and formal closing of the dump site, this generates a risk of pressurized LFG accumulation beneath the closure cap. This may create blasting conditions beneath the cap which can be tremendously dangerous for site as well as nearby communities.	➢ A gas collection system for LFG will be provided beneath the closure cap to collect, divert, depressurize, prevent from accumulation and safely dispose-off the LFG; ➢ The gas collection system is comprehensively designed by the consultants during design phase and is an ensured component of closure cap; As elaborated in the section of Post Closure Management and Maintenance Guidelines.	• Visual Inspection • Photographic record • Environmental monitoring in case if any negative impact observed	Monthly	Proponent

6. POST CLOSURE MONITORING & MAINTAINENCE GUIDELINES

The landfill cap forms a key component of the closure of Mehmood Booti Landfill site. The design objectives for the final landform and cap are as follows:

- Minimize infiltration of water into the waste, ensuring that the infiltration rate does not exceed the seepage rate through base of the landfill;
- Provide a long-term stable barrier between waste and the environment;
- Improve the visual amenity of the site;
- Provide a physical barrier to the waste body, minimizing the risk to the facility; and
- Manage surface water flows to minimize the potential for leachate generation and surface ponding.

Following considerations and monitoring measures are suggested for the maintenance of closure cap:

I. Due to the erodibility of soils in the region and the final slopes of the sites, a 150mm layer of a topsoil or a coarse mulch will be required to minimize the risk of cap erosion until vegetation has become established. The mulch can be produced from green waste received at the facility. However, to avoid the introduction of weed seeds, the mulch must be adequately pasteurized (composted) or a weed spraying program should be implemented.

II. 400 mm layer of soil will provide the rooting zone for the cap's vegetation. It can be produced with uncompacted local soils and composted green waste can be applied and incorporated within this layer to improve the soil's ability to support the vegetation planted on the cap.

III. Permeability is to be confirmed through laboratory tests, including on-site falling head tests conducted prior to excavation. If confirmed, soils excavated are suitable for the construction of low permeability final capping. A progressive capping design specification should be produced that meets these minimum requirements but provide flexibility in construction quality assurance to allow for council staff or a local earthworks contractor to construct the cell. The combination of minimum rainfall, high evaporation, surface run-off from the contoured capping layer and evapotranspiration from the vegetation, together with the compacted layer of clay are expected to exceed the 'less than 75% seepage rate' required for best practice.

IV. A daily cover layer of 150mm or intermediate cover of 300mm should be spread over the last layer of waste and appropriately compacted to ensure a stable, uniform layer with no exposed waste that the capping can be constructed over. Therefore, any suitable soil material for the soil/rooting layer that is received at the site during its remaining operational life should be stockpiled in preparation for rehabilitation works.

V. The landfill will be rehabilitated to natural vegetation after its closure; therefore, the plantings should be of species found in the surrounding natural vegetation.

VI. To avoid inappropriate planting, ensure the species are adoptable to the local climate and enhance the local habitat.

VII. The Gas Recovery System is provided for controlled extraction of entrapped landfill gas. This will eradicate any kind of blasting condition due to pressurized entrapped gases beneath the closure cap. The Gas Recovery System must be monitored and

regulated on regular basis with strict responsibility, until it is ensured that all landfill gas is extracted out.

VIII. The leachate collection system will prevent accumulation or seepage of leachate into nearby water bodies. Daily monitoring of this system is recommended along with monthly or quarterly inspection of system and water quality monitoring of nearby surface and ground water.

7. NON-COMPLIANCE OF EMP

The implementation of the proposed EMP involves inputs from various functionaries. The Contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, ensure the compliance of items mentioned under the head of EMP in attached BOQ, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of Project, for which the Contractor will be paid based on monthly compliance reports. However, if the Contractor fails to comply with the implementation of EMP and submission of the monthly compliance reports, deductions will be made from the payments to the Contractor claimed under the heads of EMP.

Ravi Urban Development Authority

RAVI RIVERFRONT URBAN DEVELOPMENT PROJECT

REHABILITATION OF MEHMOOD BOOTI DUMPSITE

MAY 2024

DESIGN DRAWINGS – VOLUME IV

VOLUME IV – DESIGN DRAWINGS

LIST OF DRAWINGS

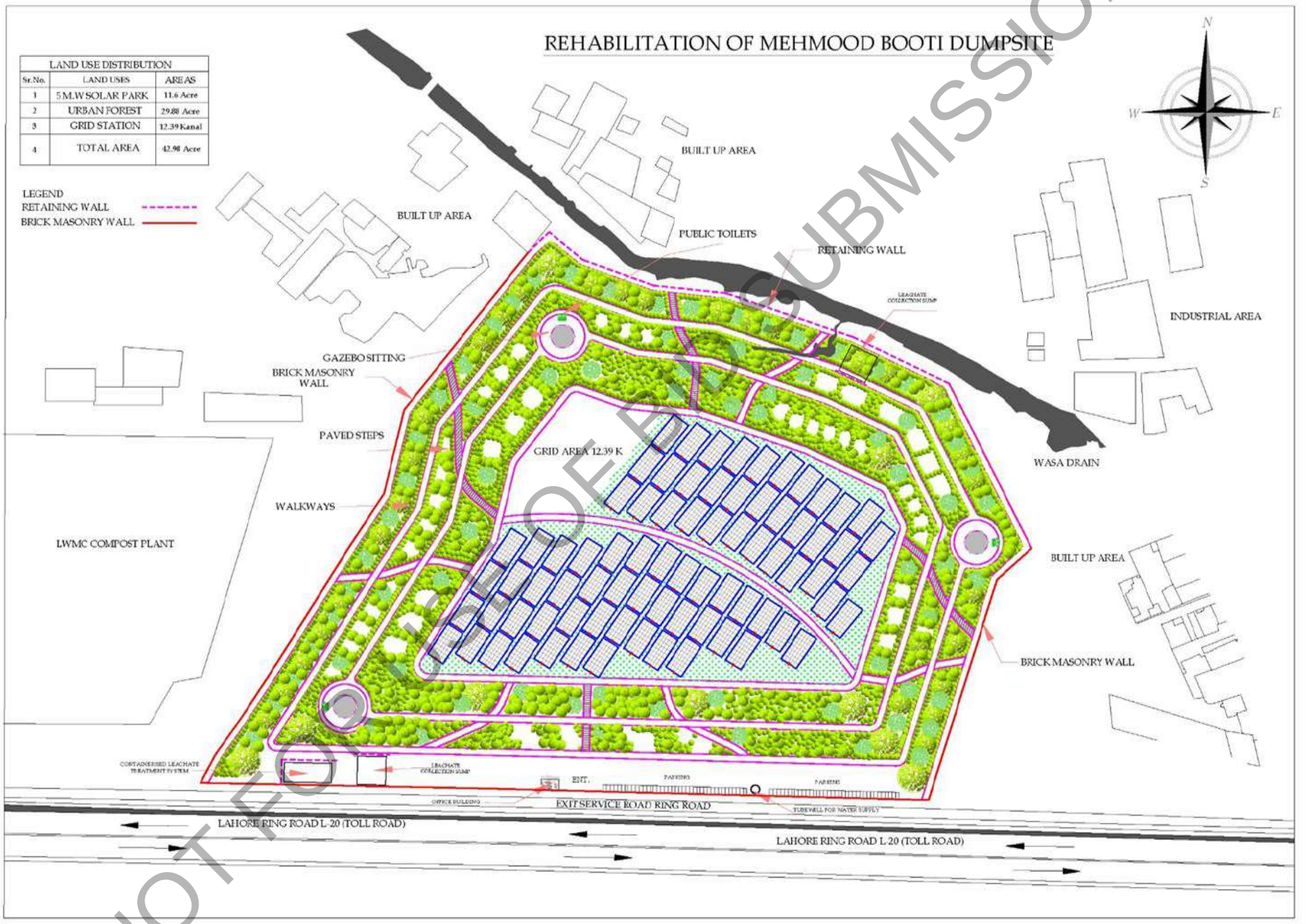
Sr. No	Drawings
A.	Proposed Site Utilization Plan
B.	Leachate Collection System (Sump Detail)
C.	Leachate Collection and Removal System (Leachate Sump Riser Detail)
D.	Leachate Collection Sumps and Containerized Leachate Treatment System Location Plan
E.	Gas Wells Location Plan
F.	Gas Well Section Detail
G.	Closure Cap Design
H.	Typical Cross Sections of Tracks
I.	Typical Section of Steps and Tracks
J.	Existing Topographic Map

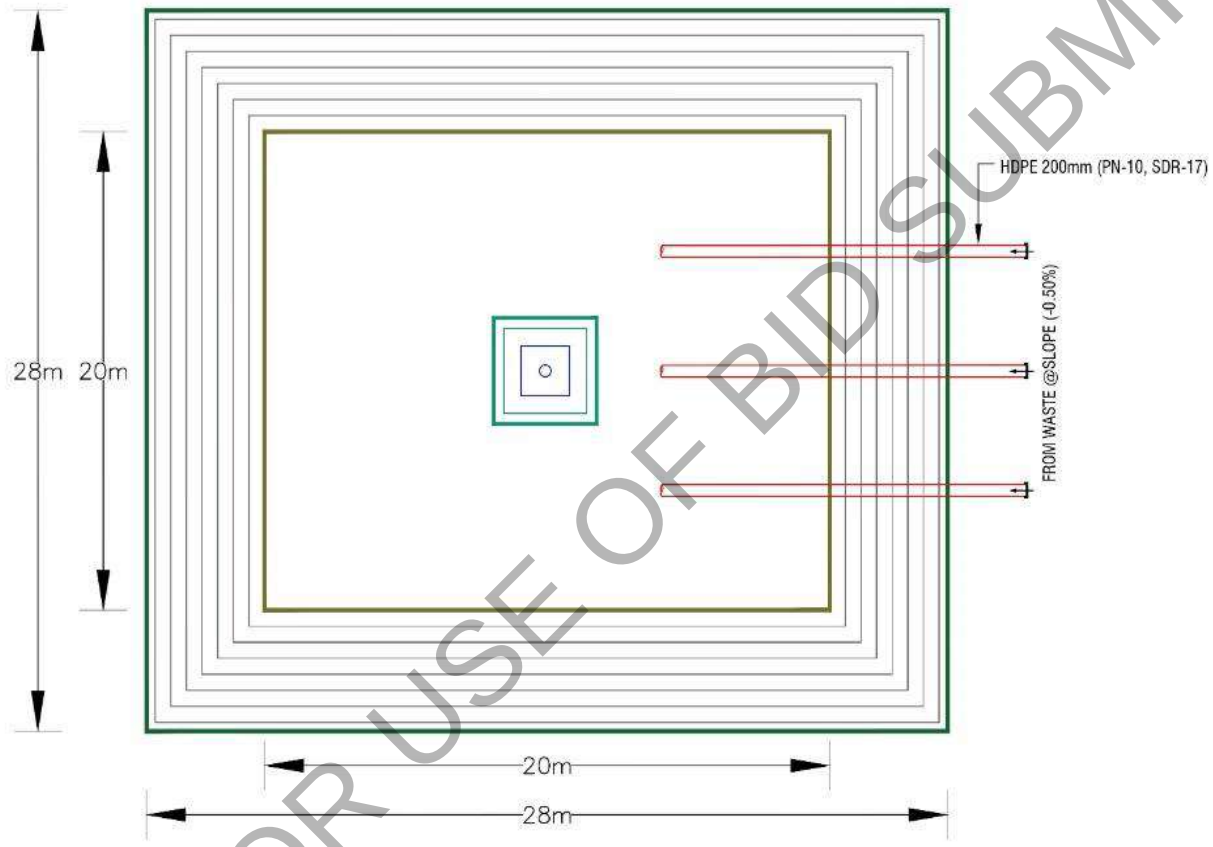
K.	X-Section Plan
L.	X-Section A-A & B-B
M.	Boundary Wall (Brick Masonry & R. C. C)
N.	Boundary Wall Layout Plan
O.	Office Building Plan
P.	Typical Toilets Plan
Q.	Water Supply System's Drawings

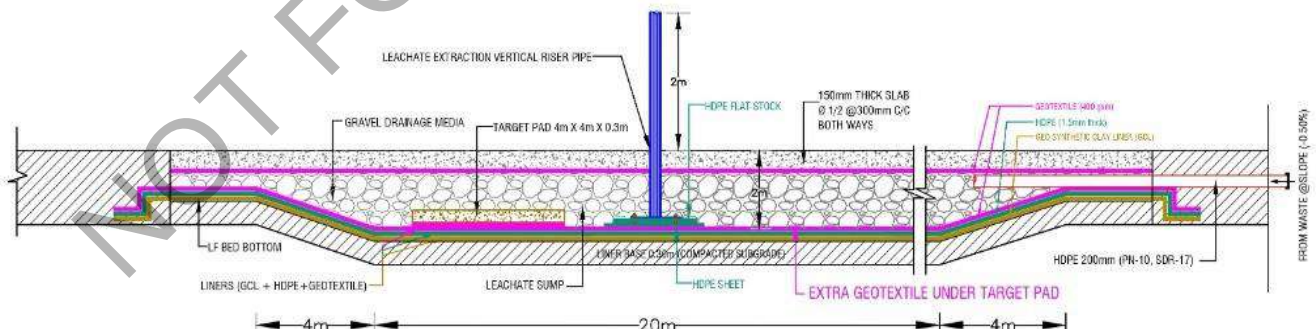
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

LAND USE DISTRIBUTION		
Sr.No.	LAND USES	AREAS
1	5 M.W SOLAR PARK	11.6 Acre
2	URBAN FOREST	29.88 Acre
3	GRID STATION	12.39 Kanal
4	TOTAL AREA	42.98 Acre

LEGEND
RETAINING WALL
BRICK MASONRY WALL







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LEGENDS:

REV.	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	FM	02/11/23

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
60-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
FM	SEH	02/11/23	0

PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: LEACHATE SUMP DETAILS

SCALE	SHEET SIZE	SHEET NO
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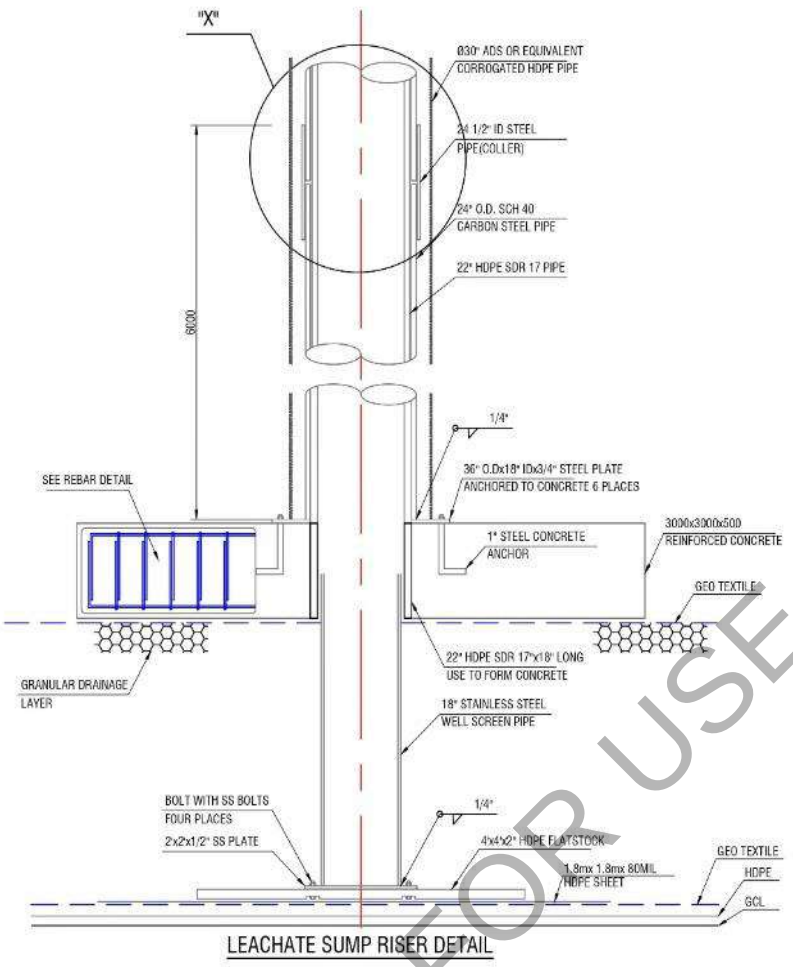
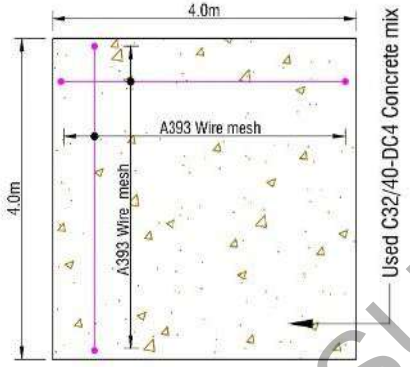
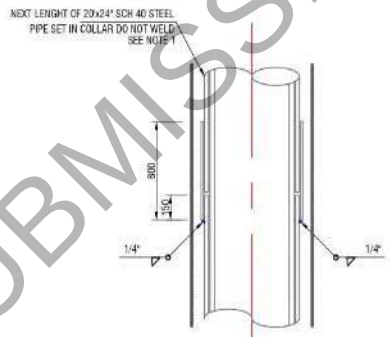


LEACHATE SUMP RISER DETAIL



TARGET PAD



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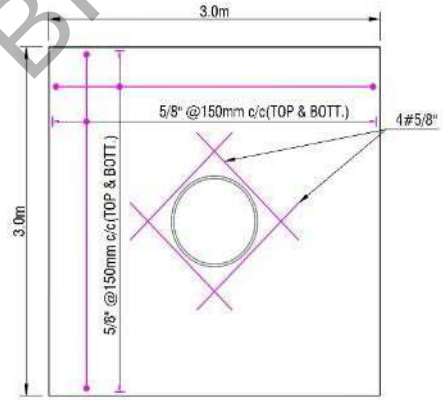

PLAN OF CONCRETE PAD
(REBAR DETAILS)

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LEGENDS:

REV:	DESCRIPTION:	BY:	DATE:

CLIENT: RUDA
131 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
FM	SEH	02/11/23	0

PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

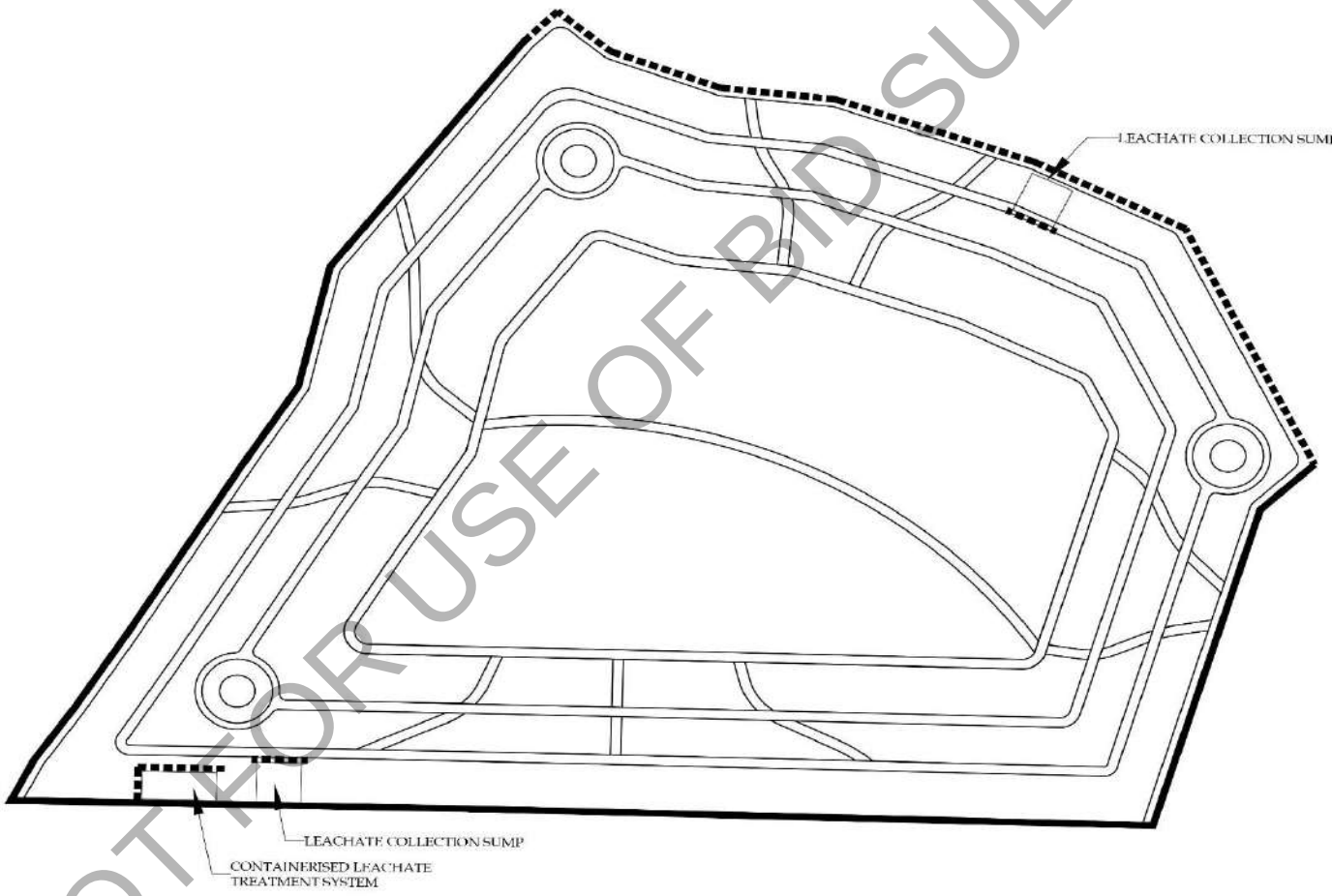
DRAWING TITLE: COLLECTION & REMOVAL SYSTEM

SCALE:	SHEET SIZE:	SHEET NO:
—	A3	1 of 1

PROJECT NO: ———

STATUS: DRAFT DRAWINGS

DRAWING NO: RUDA-ODCP-07



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LEGENDS:

REV	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	HM	02/11/23

RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

ECSP (Pvt.) Ltd.
B3-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	SEH	02/11/23	0

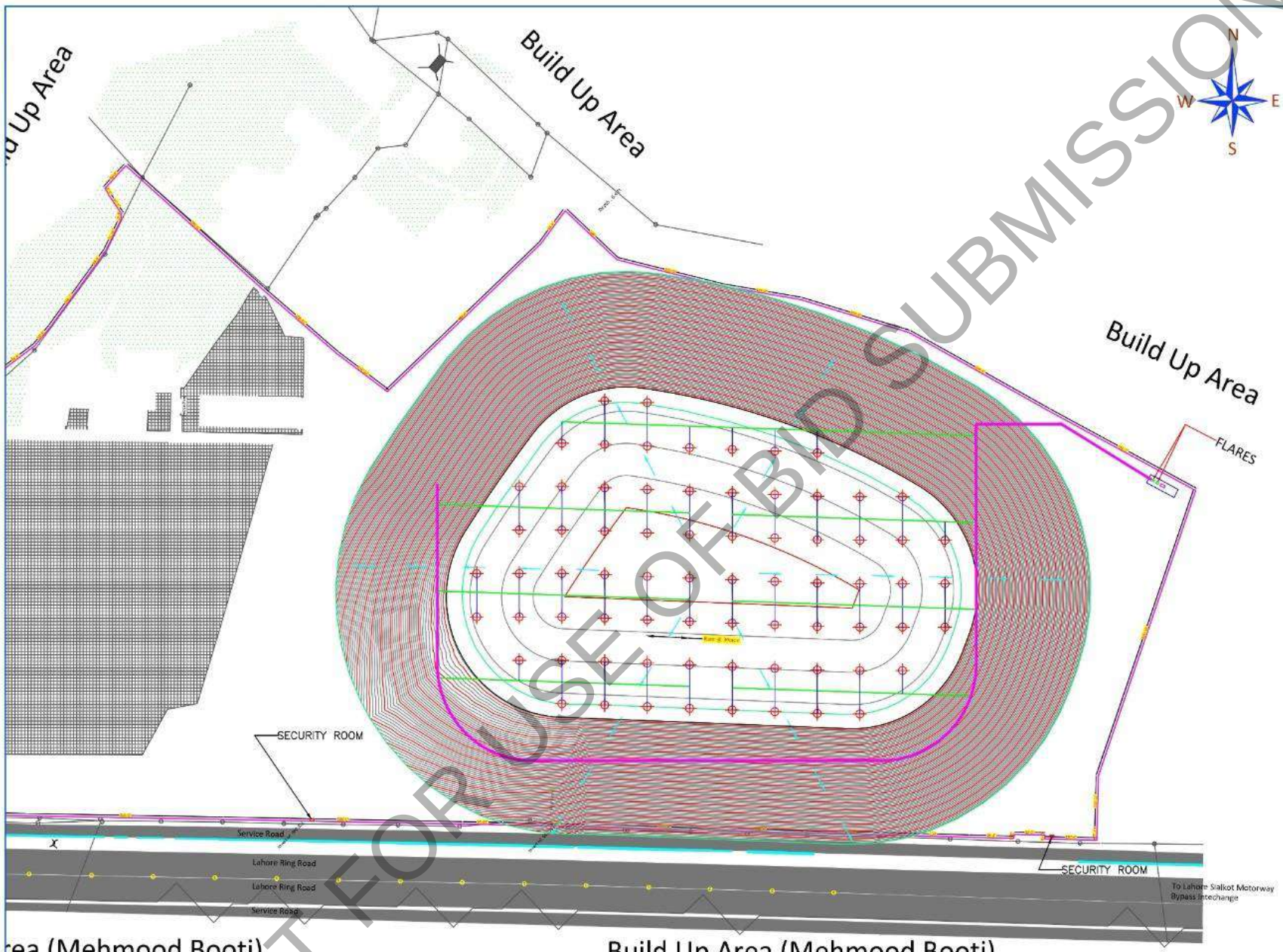
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: LEACHATE COLLECTION SUMPS & CONTAINERISED LEACHATE TREATMENT SYSTEM LOACATION PLAN

SCALE	SHEET SIZE	SHEET NO.
---	A3	1 of 1

PROJECT NO.	STATUS
--------	DRAFT DRAWINGS

DRAWING NO.: RUDA-ODCP-06



Notes:

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LEGENDS:

- Gas Wells @200mm (72 Nos)
- 63mm Pipe to Manifold
- 180mm Manifold
- 315mm ringmain

REV:	DESCRIPTION:	BY:	DATE:
0	GAS WELLS LOCATION PLAN	FM	02/11/23

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
F.M.	SEH	02/11/23	0

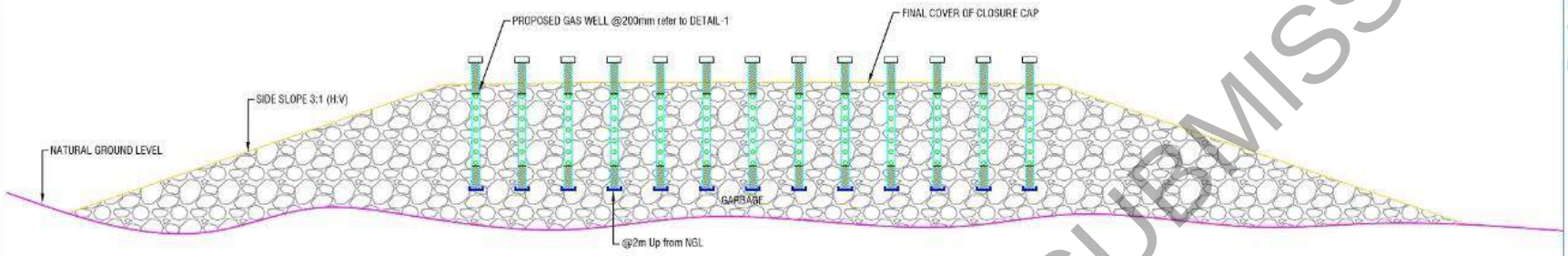
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPITE

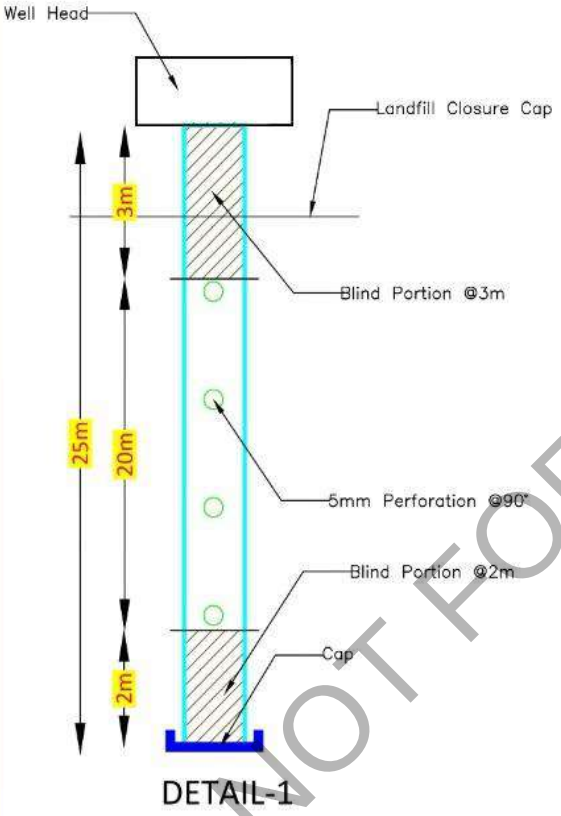
DRAWING TITLE:
GAS WELLS LOCATION PLAN

SCALE:	SHEET SIZE:	SHEET NO.
1:8	A3	1 of 1

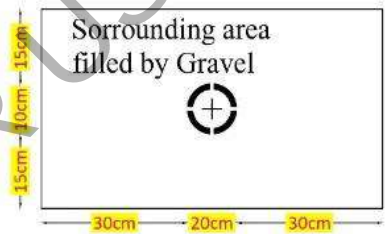
PROJECT NO:	STATUS:
----------	DRAFT DRAWINGS

DRAWING NO:
RUDA-ODCP-05 (1 of 2)

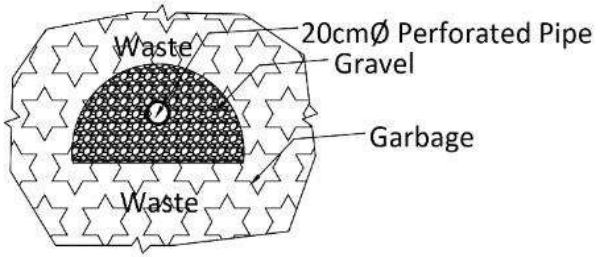




DETAIL-1



Gas Rec. Pipe
Section Y-Y



Notes:

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LEGENDS:

- Gas Well
- 63mm Pipe to Manifold
- 180mm Manifold
- 315mm ringmain

REV:	DESCRIPTION:	BY:	DATE:
0	GAS WELLS LOCATION PLAN	FM	02/11/23

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-II, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
FM	SEH	02/11/23	0

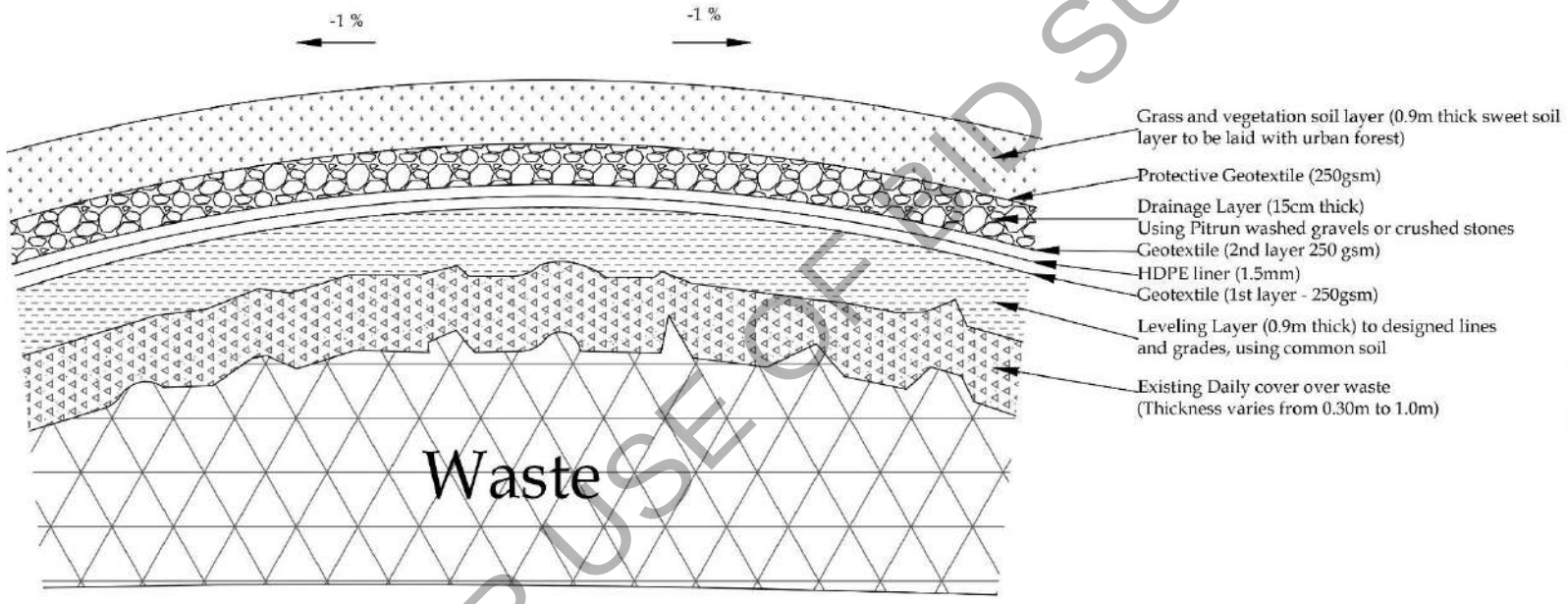
PROJECT NAME:
REHABILITION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
GAS WELLS SECTION DETAILS

SCALE:	SHEET SIZE:	SHEET NO:
NTS	A3	1 of 1

PROJECT NO:	STATUS:
------	DRAFT DRAWINGS

DRAWING NO:
RUDA-ODCP-05 (2 of 2)



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LEGENDS:

NO.	DESCRIPTION:	BY:	DATE:
0	LEACHATE SUMP DETAILS	FM	02/11/23

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	SEH	02/11/23	0

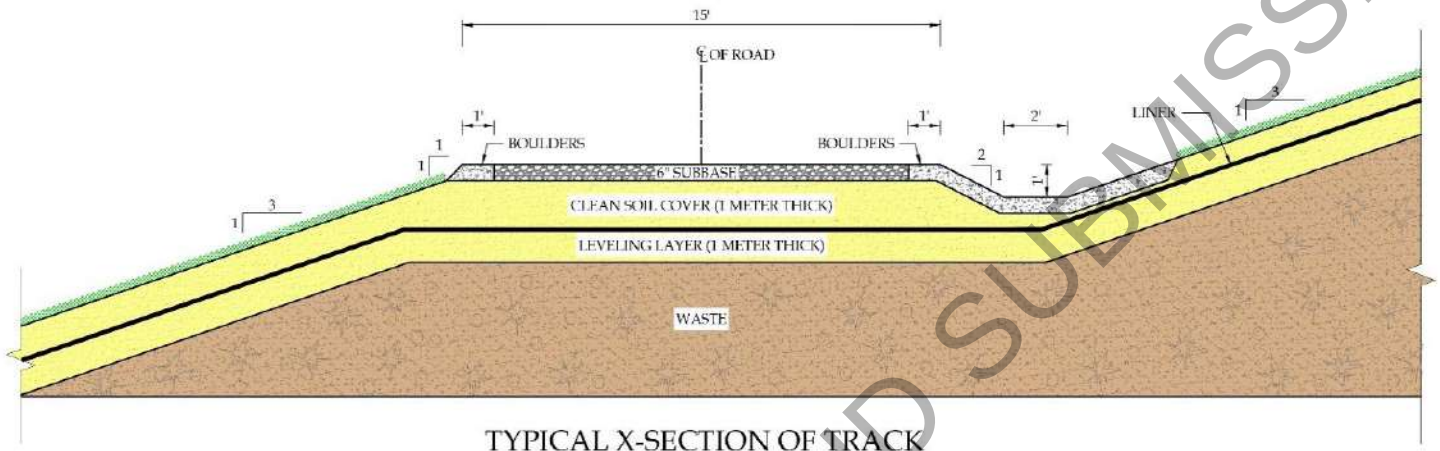
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
CLOSURE CAP DESIGN

SCALE:	SHEET SIZE:	SHEET NO:
---	A3	1 of 1

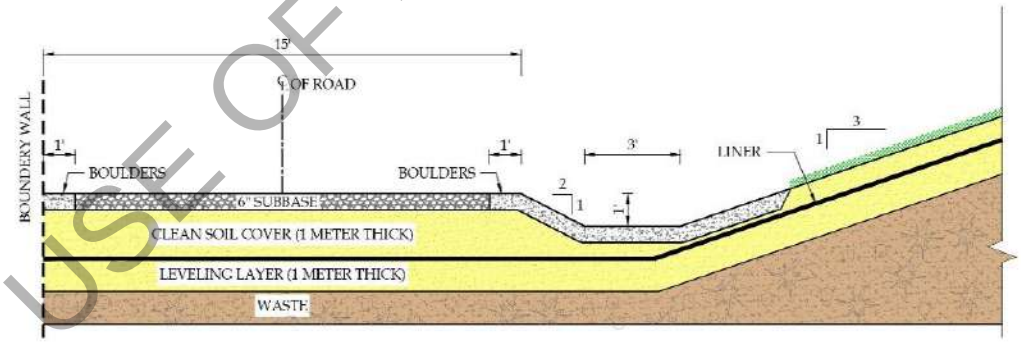
PROJECT NO:	STATUS:
------	DRAFT DRAWINGS

DRAWING NO:
RUDA-ODCP-06



TYPICAL X-SECTION OF TRACK

SCALE:- 1/4" = 1'-0"



TYPICAL X-SECTION OF TRACK (SIDE BOUNDARY)

SCALE:- 1/4" = 1'-0"

Notes:

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LEGENDS:

NO.	DESCRIPTION:	BY:	DATE:
0	LEACHATE SUMP DETAILS	YM	02/11/23

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83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
USMAN	SEH	02/11/23	0

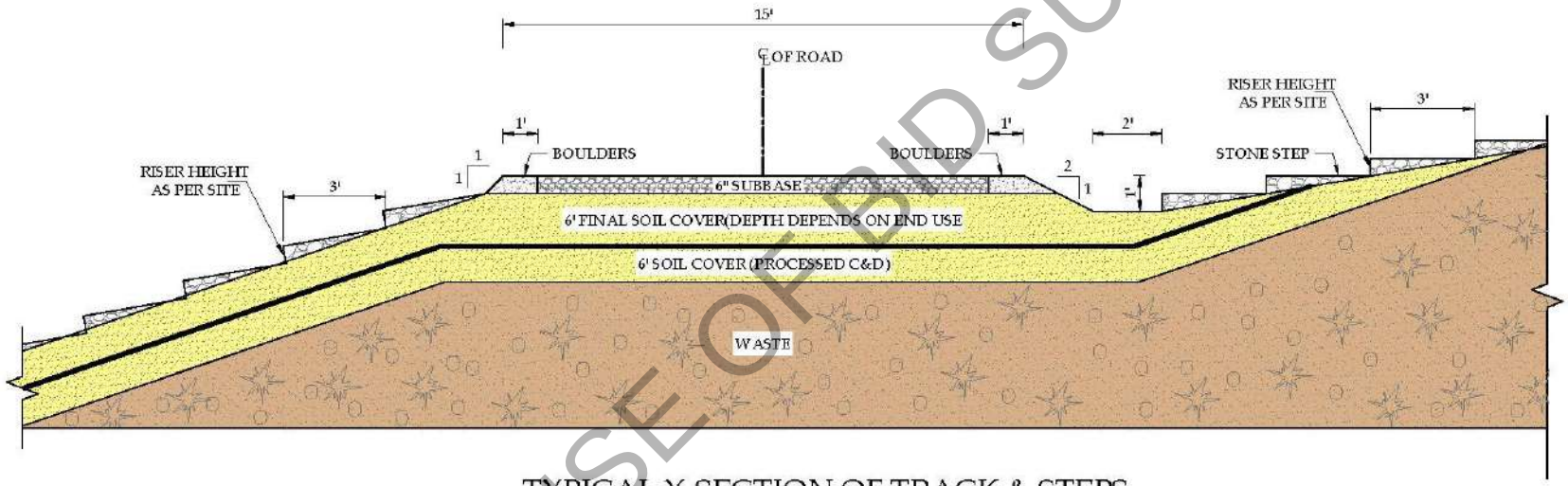
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
STORMWATER DRAIN DETAIL & X-SECTION OF TRACK

SCALE:	SHEET SIZE:	SHEET NO:
---	A3	1 of 1

PROJECT NO:	STATUS
----------	DRAFT DRAWINGS

DRAWING NO:
RUDA-ODCP-06



TYPICAL X-SECTION OF TRACK & STEPS

REV	DATE	DESCRIPTION	APPRD

Client:

Consultant:

Project Title:

CONVERSION OF EXISTING LANDFILL SITE
INTO URBAN FOREST / SOLAR FARKAT
MEHMOOD BOOTI

Drawing Title:

TYPICAL X-SECTION OF TRACK & STEPS

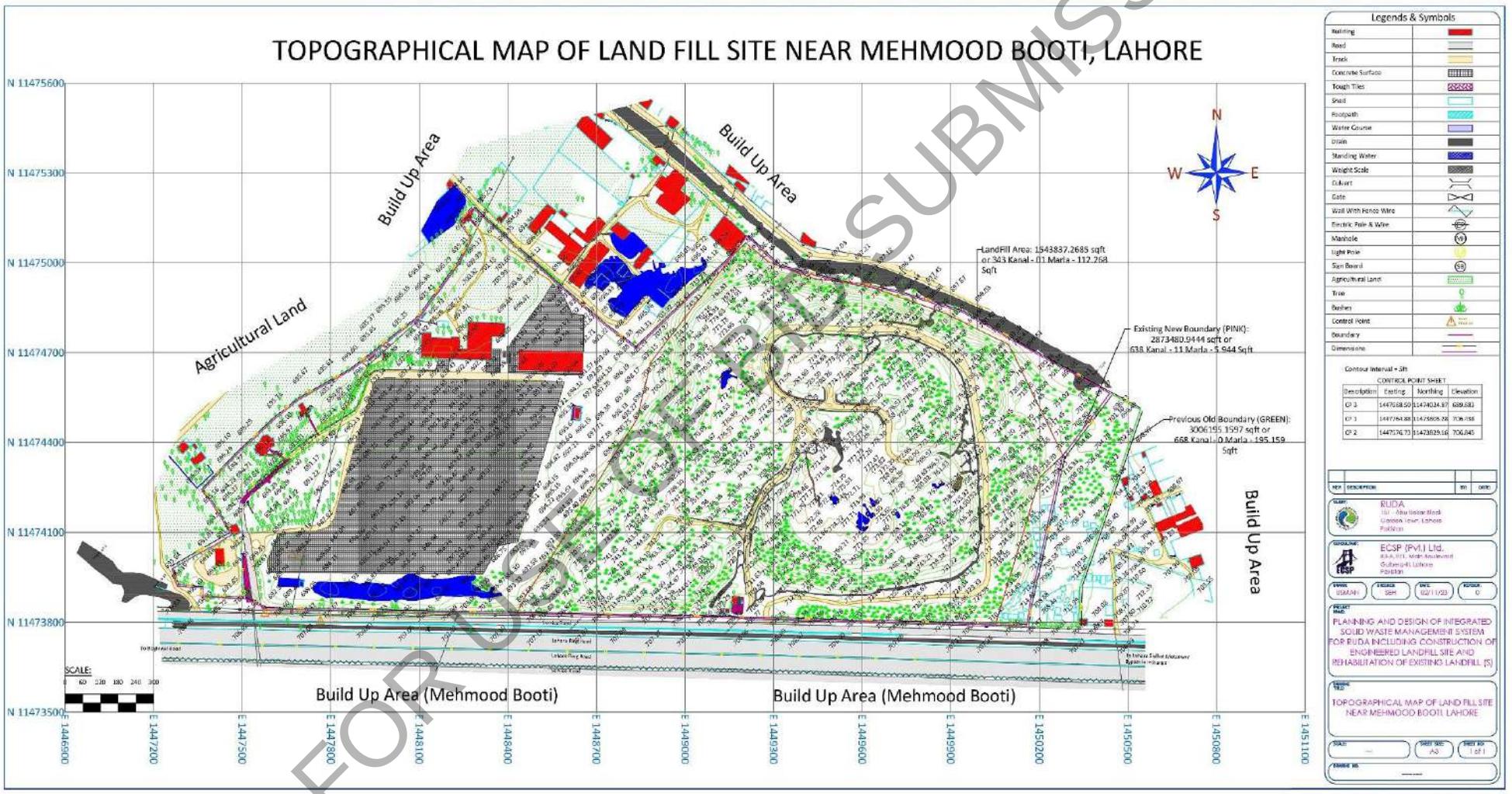
DRAWN BY:	ENGINEER AYUB
CHECKED BY:	ZUHAIB ALI
APPROVED BY:	
DATE:	10 MARCH 2023

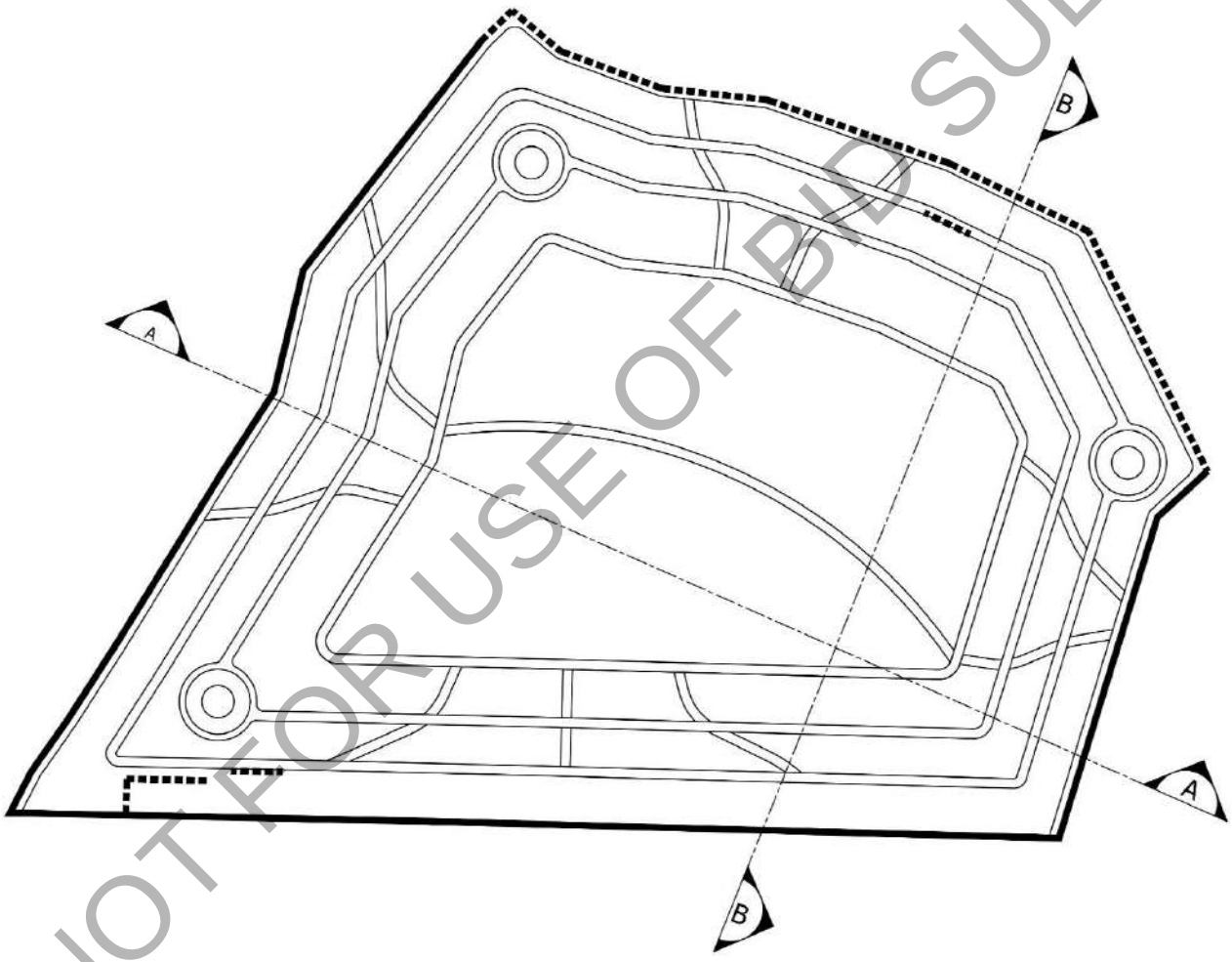
Drawing No.

Rev: 0

CROSS SECTION MEHMOOD BOOTI

TOPOGRAPHICAL MAP OF LAND FILL SITE NEAR MEHMOOD BOOTI, LAHORE





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LEGENDS:

REV:	DESCRIPTION:	BY:	DATE:
0	LEACHATE SUMP DETAILS	HM	02/11/23

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	SEH	02/11/23	0

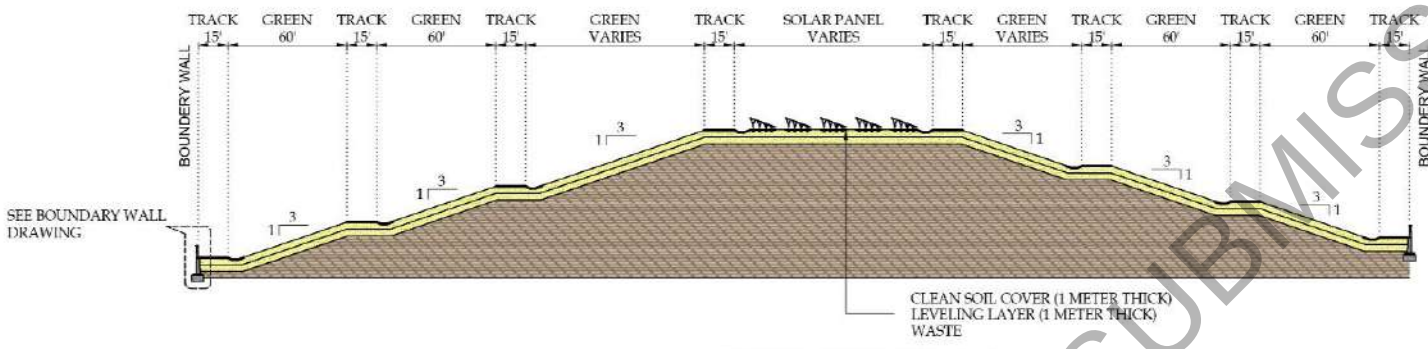
PROJECT TITLE:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
CROSS SECTION PLAN

SCALE	SHEET SIZE	SHEET NO.
---	A3	1 of 1

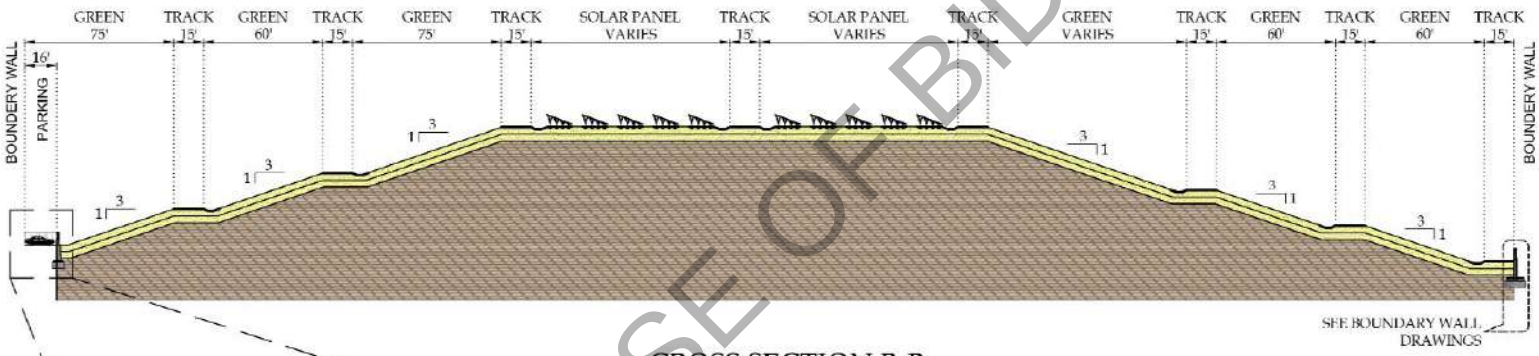
PROJECT NO.	STATUS
--------	DRAFT DRAWINGS

DRAWING NO:
RUDA-ODCP-06



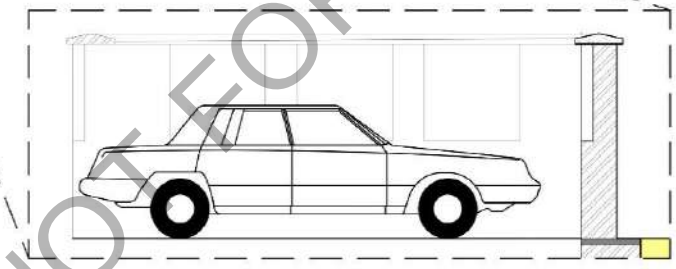
CROSS SECTION A-A

SCALE:- 1/64" = 1'-0"



CROSS SECTION B-B

SCALE:- 1/64" = 1'-0"



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LEGENDS:

REV	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	TM	02/11/23

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Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
85-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	SEH	02/11/23	0

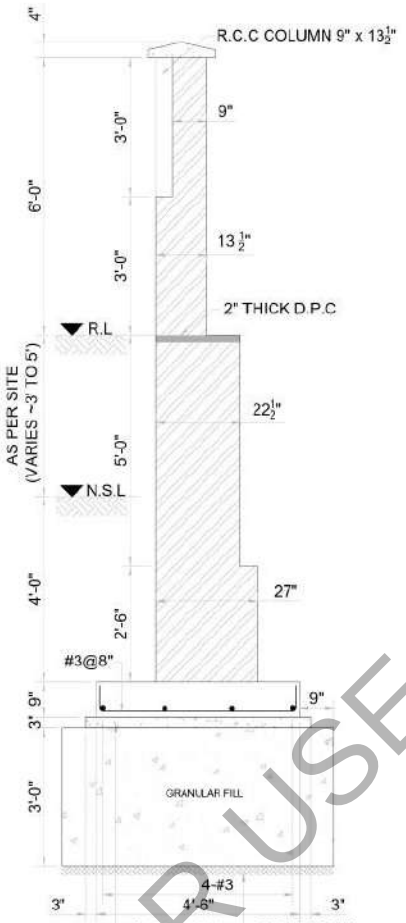
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: X-SECTION A-A & B-B

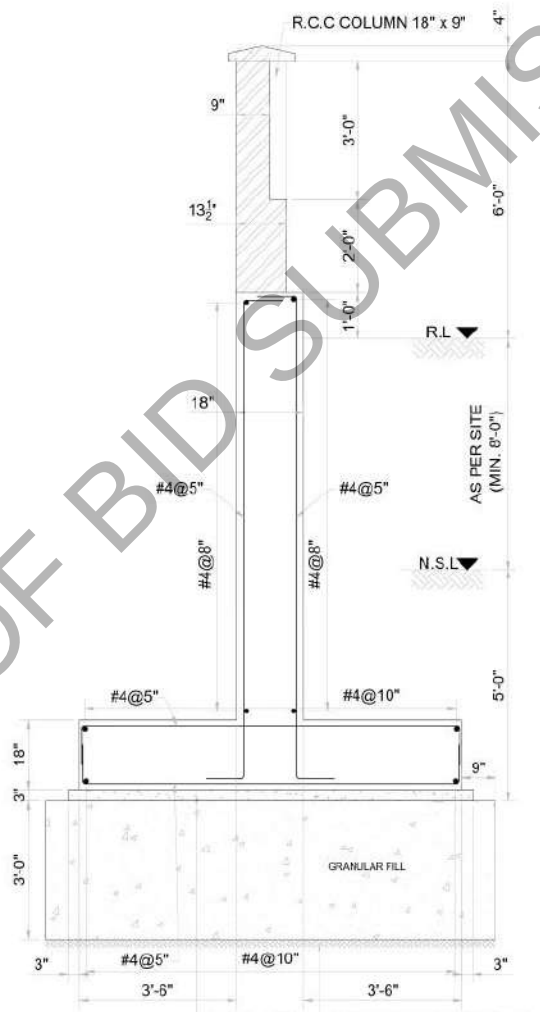
SCALE	SHEET SIZE	SHEET NO
---	A3	1 of 1

PROJECT NO	STATUS
--------	DRAFT DRAWINGS

DRAWING NO: RUDA-ODCP-06



TYPICAL RETAINING WALL
SECTION (EXCEPT DRAIN)
SCALE : 3/8" = 1'-0"



TYPICAL RETAINING WALL
SECTION (NEAR DRAIN)
SCALE : 3/8" = 1'-0"

NOTE:

1. PROVIDE 3 FT THICK CUSHION OF GRANULAR FILL MATERIAL COMPRISING OF SAND GRAVEL MIX IN 50:50 SHALL BE PLACED BELOW FOUNDATION. THE SELECT FILL MATERIAL SHALL BE PLACED IN LAYERS NOT MORE THAN 6" COMPACTED TO 95 % MODIFIED DRY DENSITY.
2. 1" EXPANSION JOINT WITH P.V.C WATER STOPPER @ 30' c/c.

Notes:

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LEGENDS:

REV.	DESCRIPTION	BY.	DATE
0	LEACHATE SUMP DETAILS	FM	02/11/23

CLIENT
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-II, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
ADNAN	SABIR	02/11/23	0

PROJECT NAME
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

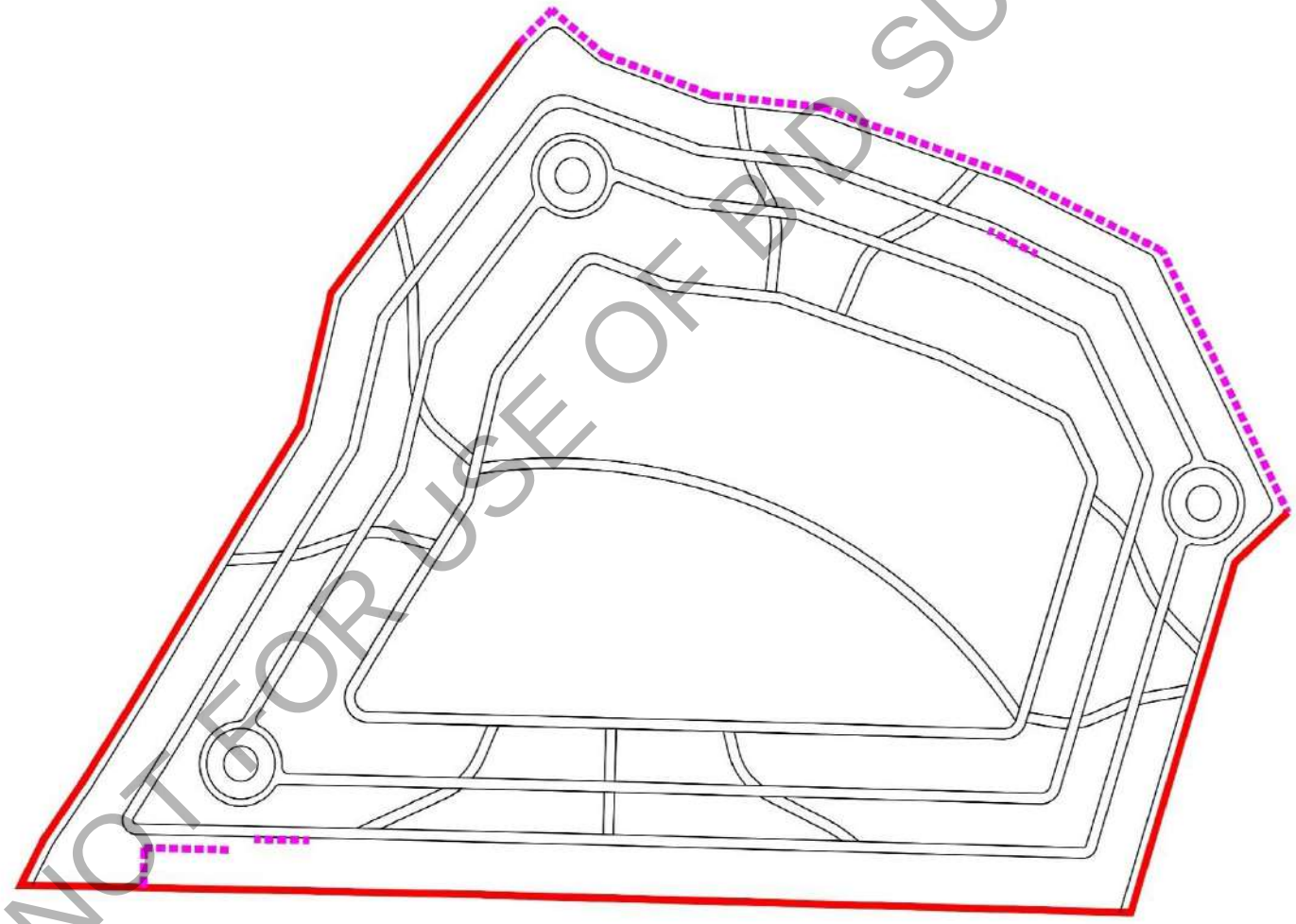
DRAWING TITLE
BOUNDARY WALL
(BRICK MASONRY & R.C.C)

SCALE	SHEET SIZE	SHEET NO
---	A3	1 of 1

PROJECT NO.	STATUS
--------	DRAFT DRAWINGS

DRAWING NO.
RUDA-ODCP- 01

LEGEND
RETAINING WALL
BRICK MASONRY WALL



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LEGENDS:

REV	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	FM	02/11/23

RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

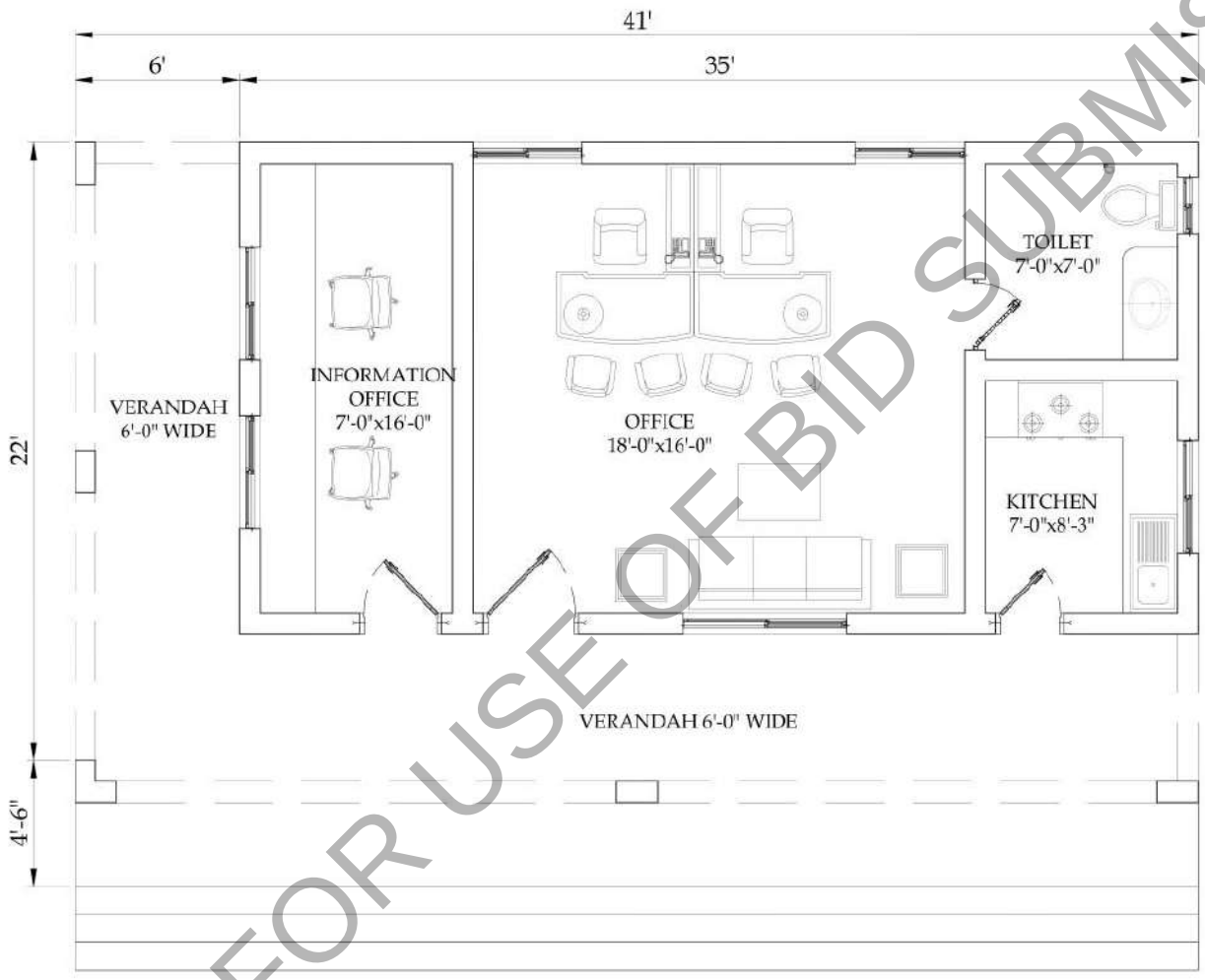
ECSP (Pvt.) Ltd.
B3-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	SEH	02/11/23	0

PROJECT TITLE:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
BOUNDERY WALL LAYOUT PLAN

SCALE	SHEET SIZE	SHEET NO.
—	A3	1 of 1



GROUND FLOOR PLAN

Notes:

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LEGENDS:

NO.	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	FM	02/11/23

CLIENT
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-II, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
MUBASHIR	ZEESHAN	02/11/23	0

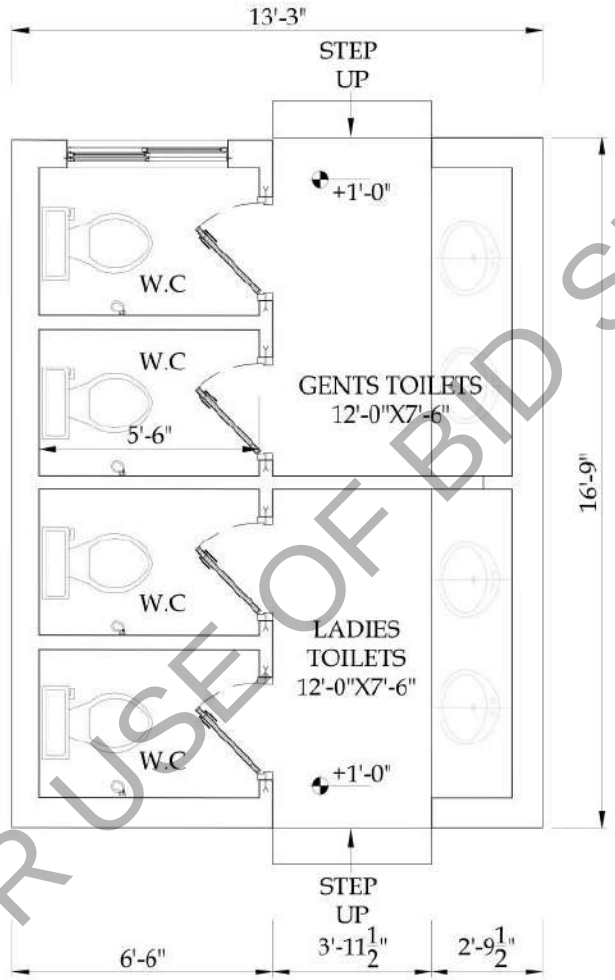
PROJECT NAME
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE
OFFICE BUILDING
GROUND FLOOR PLAN

SCALE	SHEET SIZE	SHEET NO.
---	A3	1 of 1

PROJECT NO.	STATUS
--------	DRAFT DRAWINGS

DRAWING NO.
RUDA-ODCP-06



GROUND FLOOR PLAN

SCALE:- 3/16" = 1'-0"

Notes:

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LEGENDS:

NO	DESCRIPTION	BY	DATE
0	LEACHATE SUMP DETAILS	FAH	02/11/23

RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Guberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	VERSION
MUBASHIR	ZEESHAN	02/11/23	0

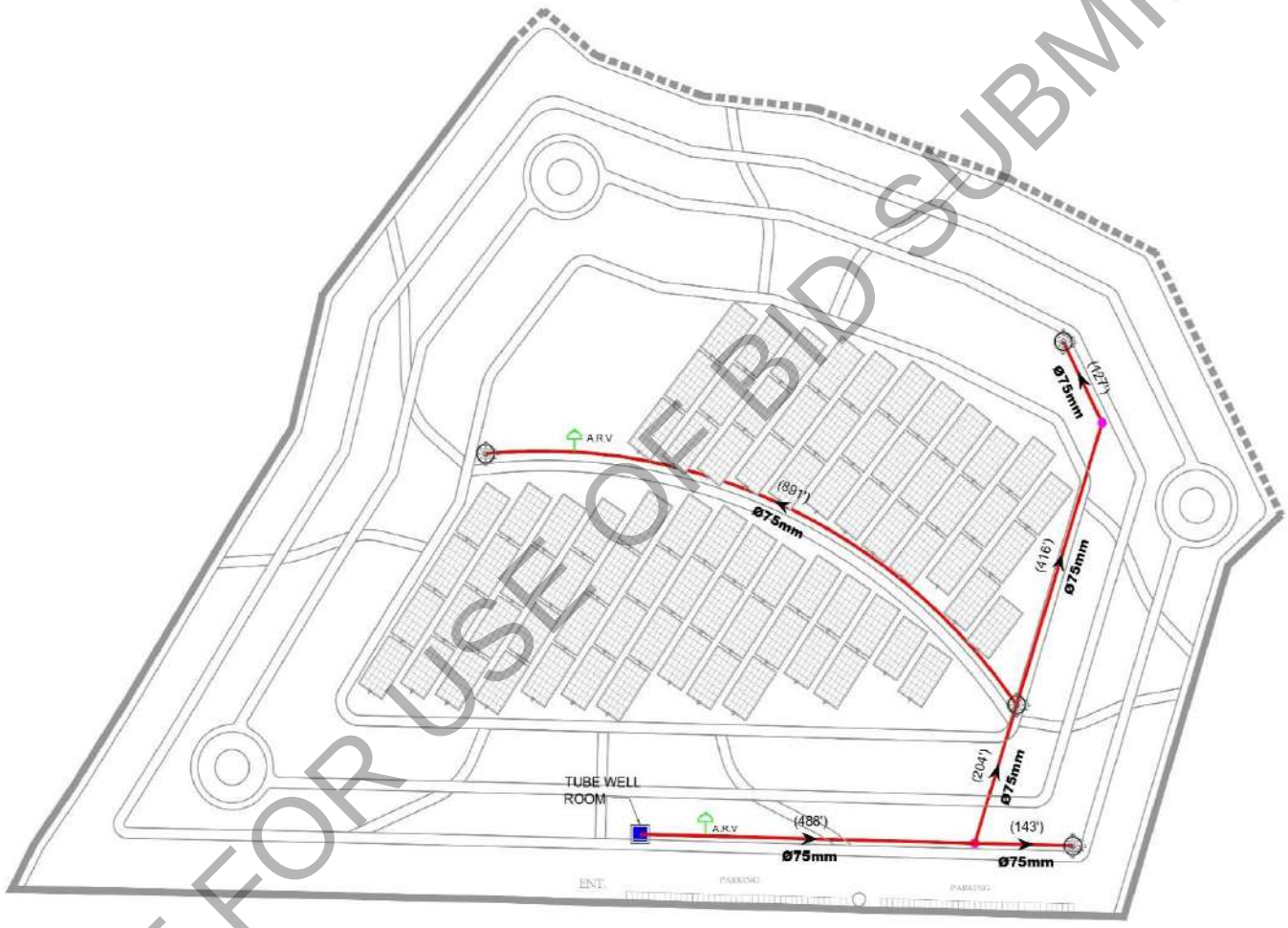
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: TYPICAL TOILETS GROUND FLOOR PLAN

SCALE	SHEET SIZE	SHEET NO
--	A3	1 of 1

PROJECT NO	STATUS
--------	DRAFT DRAWINGS

DRAWING NO: RUDA-ODCP-06



Notes:

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LEGENDS:

Hydrant	
PIPE 75mm HDPE PN-10	
LENGHT	(100')
DIA	Ø75mm
AIR RELEASE VALVE	A.R.V
TUBEWELL	

REV.	DESCRIPTION	BY	DATE

RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

ECSP (Pvt.) Ltd.
B3-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

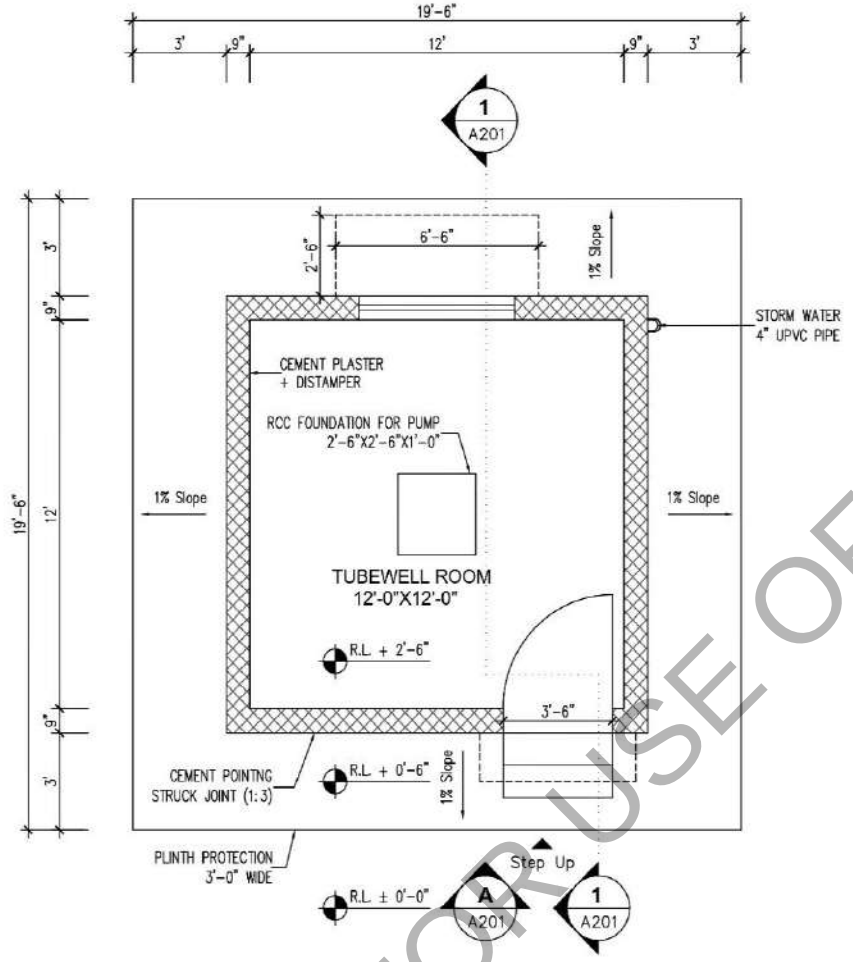
PROJECT TITLE:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
WATER SUPPLY LAYOUT PLAN

SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

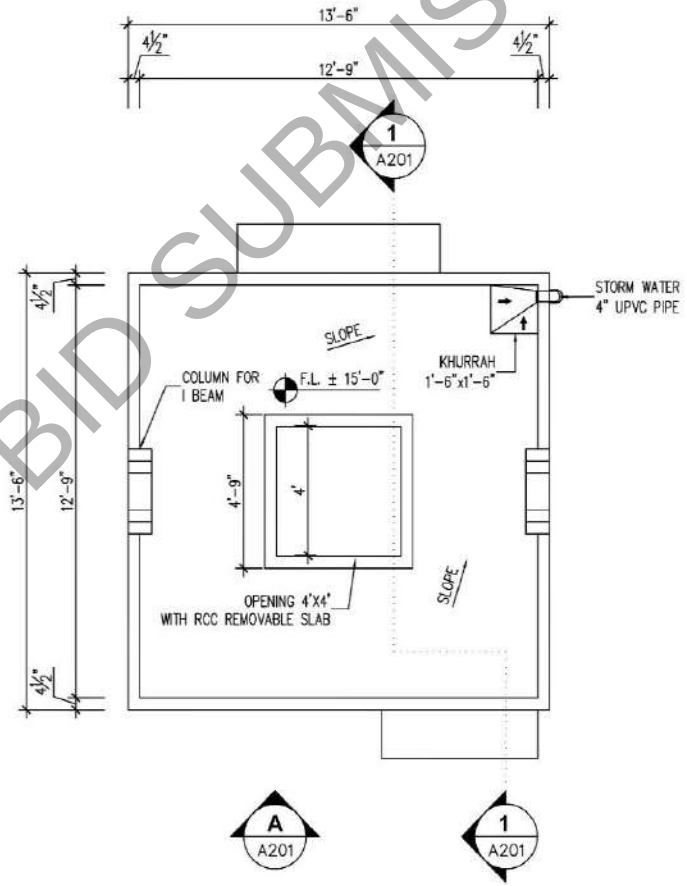
PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO:
240110-373-INFRA-101



1 GOUND FLOOR PLAN

Scale: 1/4"=1'-0"



2 ROOF PLAN

Scale: 1/4"=1'-0"

Notes:

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LEGENDS:

REV.	DESCRIPTION	BY	DATE

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

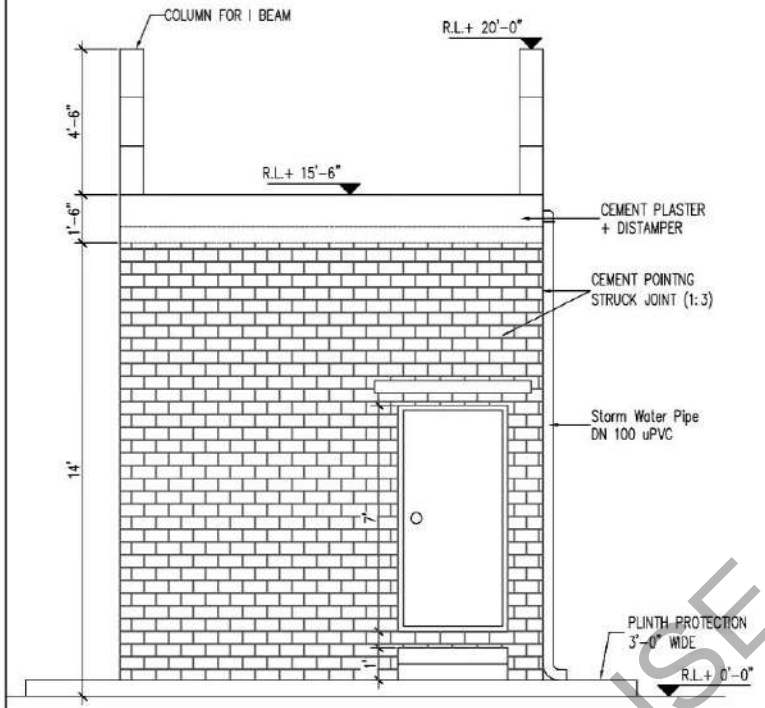
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
TUBEWELL ROOM
GROUNF FLOOR & ROOF LAYOUT PLAN

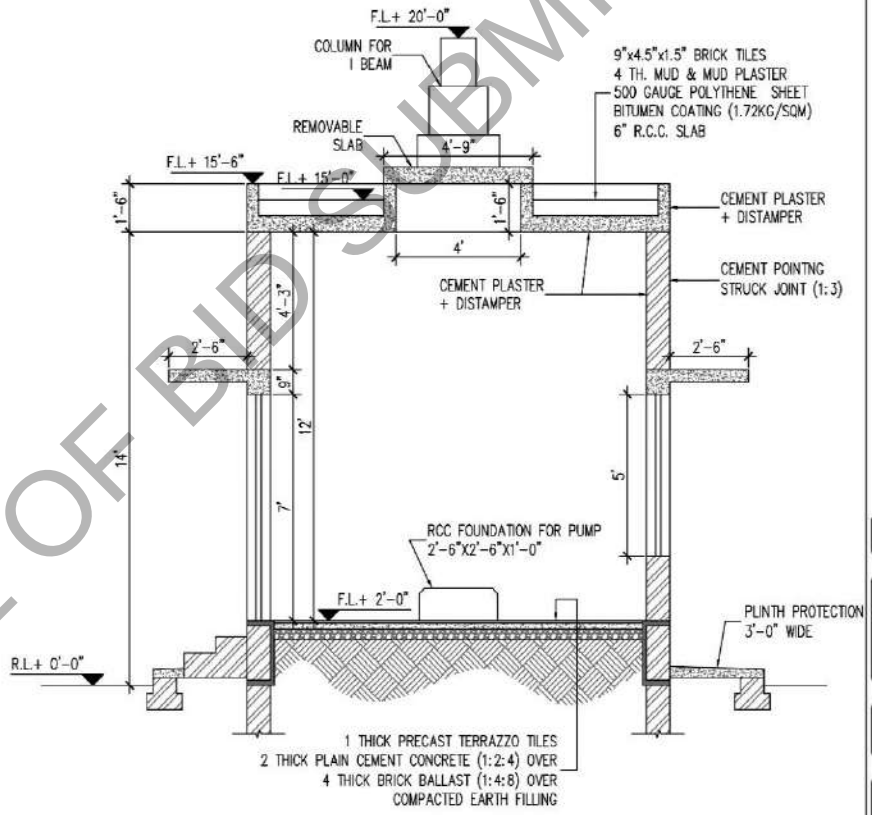
SCALE	SHEET SIZE	SHEET NO.
1/4" = 1'-0"	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO.: 240110-373-INFRA-102



A FRONT ELEVATION
Scale: 1/4"=1'-0"



1 SECTION
Scale: 1/4"=1'-0"

Notes:

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LEGENDS:

REV:	DESCRIPTION:	BY:	DATE:

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

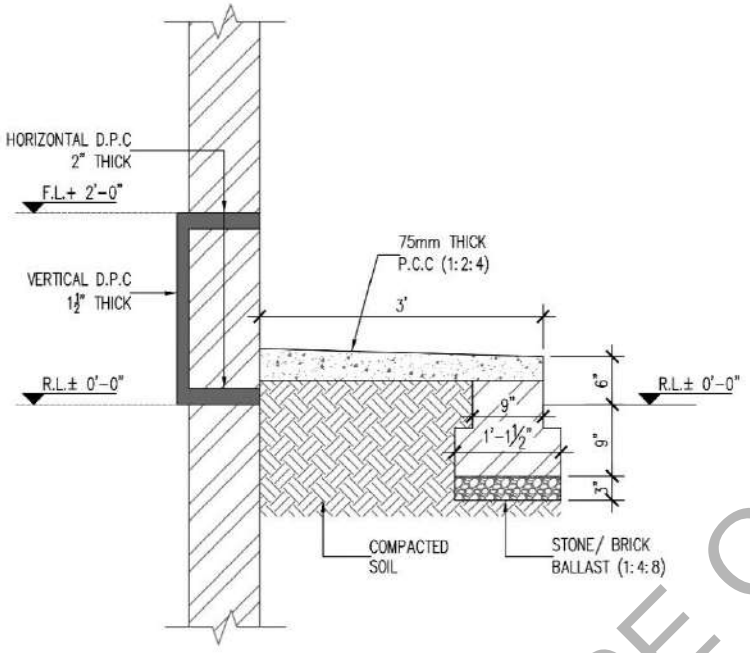
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
TUBEWELL ROOM
FRONT ELEVATION & SECTION-1

SCALE	SHEET SIZE	SHEET NO.
1/4" = 1'-0"	A3	1 of 1

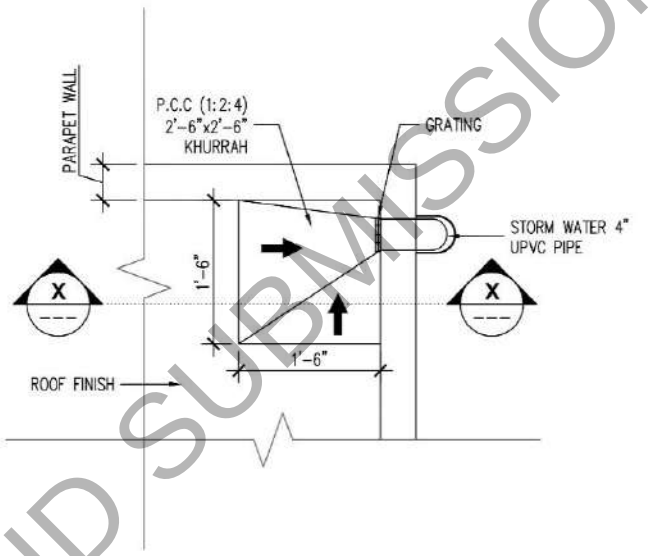
PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO.: 240110-373-INFRA-103



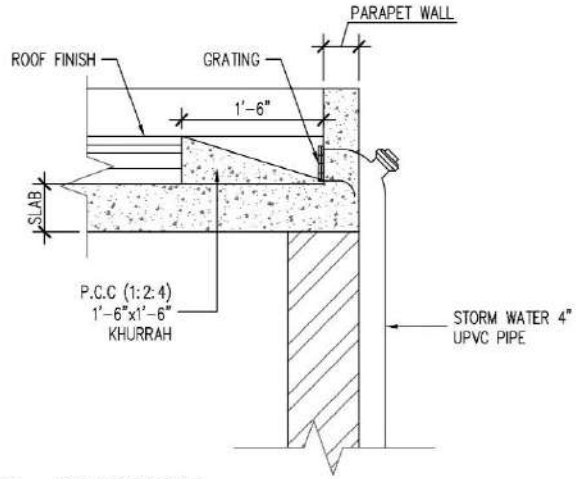
A PLINTH PROTECTION DETAIL

Scale: 3/4"=1'-0"



A ROOF DRAIN DETAIL

Scale: 3/4"=1'-0"



X SECTION

Scale: 3/4"=1'-0"

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LEGENDS:

REV.	DESCRIPTION	BY.	DATE

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

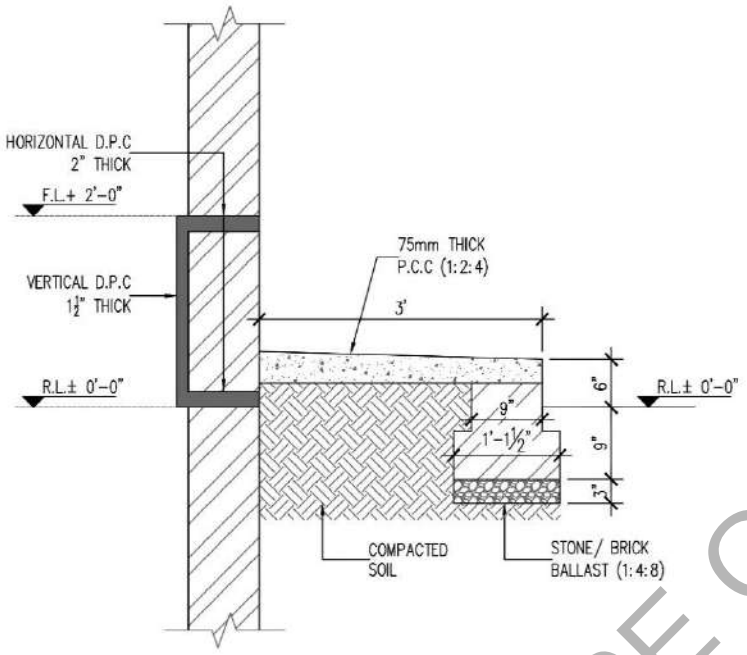
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
TUBEWELL ROOM
PLINTH PROTECTION DETAIL &
ROOF DRAIN DETAIL

SCALE	SHEET SIZE	SHEET NO.
3/4" = 1'-0"	A3	1 of 1

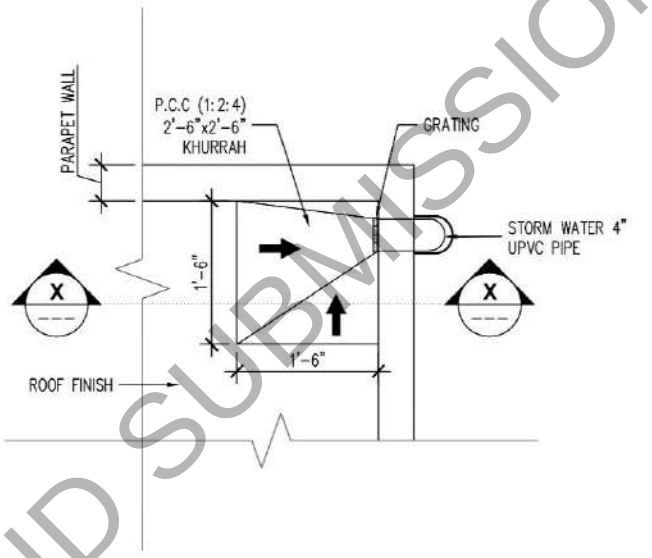
PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO.: 240110-373-INFRA-104



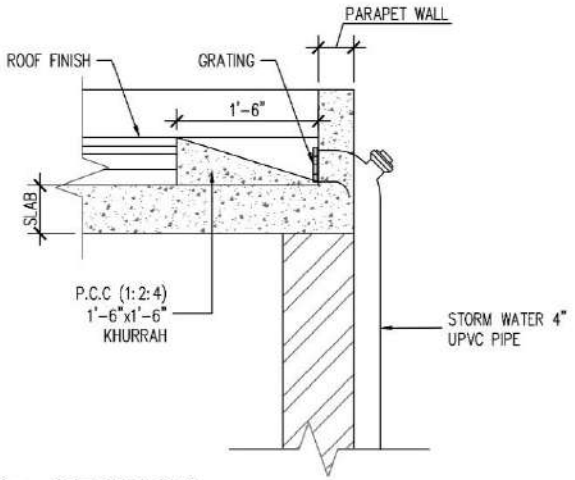
A PLINTH PROTECTION DETAIL

Scale: 3/4"=1'-0"



A ROOF DRAIN DETAIL

Scale: 3/4"=1'-0"



X SECTION

Scale: 3/4"=1'-0"

Notes:

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LEGENDS:

REV.	DESCRIPTION	BY.	DATE:

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
TUBEWELL ROOM
PLINTH PROTECTION DETAIL &
ROOF DRAIN DETAIL

SCALE:	SHEET SIZE:	SHEET NO:
3/4" = 1'-0"	A3	1 of 1

PROJECT NO:	STATUS:
373	DRAFT DRAWINGS

DRAWING NO:
240110-373-INFRA-104

STRUCTURAL GENERAL NOTES

GENERAL

1- ALL STRUCTURAL DRAWINGS MUST BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECTURAL DRAWINGS.

2- ALL LEVELS AND DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

3- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE STRUCTURES DURING CONSTRUCTION. HE SHALL ALSO VERIFY ALL DIMENSIONS AND LEVELS BEFORE EXECUTION OF WORK. ANY DISCREPANCY, ERROR OR OMISSION, IF FOUND, SHALL BE BROUGHT TO THE NOTICE OF THE ENGINEER FOR CORRECTION AND APPROVAL.

4- ALL MATERIAL AND WORKMANSHIP SHALL CONFORM TO PROJECT SPECIFICATION UNLESS NOTED OTHERWISE IF SPECIFICATIONS OF ANY MATERIAL ARE NOT AVAILABLE THEN THE SAME SHALL CONFORM TO RELEVANT ASTM STANDARD AND SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER IN CHARGE/CONSTULTANT.

5- PROJECT SPECIFICATIONS, SHALL BE FOLLOWED UNLESS NOTED OTHERWISE AND WILL BE SUBJECT TO APPROVAL OF THE ENGINEER INCHARGE / CONSULTANT.

6- ALL EARTH SURFACES AGAINST WHICH CONCRETE IS TO BE POURED SHALL BE CLEAN AND FREE OF ANY DETRIMENTAL IMPURITIES, ORGANIC MATTER OR UNSUITABLE MATERIAL. IF WEAK/SOFT SOIL IS ENCOUNTERED AT EXCAVATION BASE LEVEL, FURTHER EXCAVATION AND REPLACEMENT WITH SELECT FILL MATERIAL SHALL BE DONE.

7- LEAN CONCRETE MUST BE PLACED ON COMPACTED SELECT FILL MATERIAL.

8- FOUNDATION HAS BEEN DESIGNED FOR 1.0 TSF BEARING CAPACITY BASED ON THE PRILIMINARY GEO-TECHNICAL INVESTIGATION REPORT PROVIDED BY THE CLIENT.

9- FOUNDATION SHALL BE BACKFILLED BY APPROVED SELECT FILL MATERIAL COMPACTED IN LAYERS AS PER SPECIFICATIONS. BACKFILL SHALL BE COMPACTED TO A DRY DENSITY NOT LESS THAN 95 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST (ASTM D-1557) FOR THE MATERIALS BEING COMPACTED UNLESS NOTED OTHERWISE.

10- THE SELECT FILL MATERIAL AS SHOWN IN DRAWINGS SHOULD BE A-3 TYPE MATERIAL AND MUST MEET THE AASHTO / NHA SPECIFICATIONS COMPACTED IN LAYERS TO AT LEAST 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY OR 75% RELATIVE DENSITY.

11- THE DETAILED GEO-TECHNICAL INVESTIGATION SHALL BE CARRIED OUT BY THE CONTRACTOR FOR CONFIRMATION OF BEARING CAPACITY, DEPTH OF FOUNDATIONS AND ALL OTHER DESIGN RELATED PARAMETERS. THE DESIGN WILL BE REVISED ACCORDINGLY.

12- ALL CONCRETE SURFACES EXPOSED TO EARTH SHALL BE COATED WITH TWO COATS OF HOT BITUMEN OF 10/20 GRADE AT THE RATE OF 1.8 KG/SQM EACH COAT.

13- DURING CONSTRUCTION OF FOUNDATIONS, BEFORE POURING LEAN CONCRETE THE EXCAVATION SHALL BE INSPECTED BY AN EXPERIENCED GEO-TECHNICAL ENGINEER.

CONCRETE

1- REINFORCED CONCRETE MATERIALS SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE NOTED, SUBJECT TO APPROVAL OF THE ENGINEER IN CHARGE/CONSTULTANT.

(i) CEMENT SHALL CONFORM TO ASTM C-150 TYPE-1 (ORDINARY PORTLAND CEMENT)

(ii) CONCRETE AGGREGATE SHALL CONFORM TO ASTM C33

(iii) WATER SHALL CONFORM TO ASTM. C1602.

2- ALL CONCRETE EXPOSED SURFACES SHALL HAVE FAIR FACE FINISH.

3- CONCRETE SHALL HAVE THE FOLLOWING 28 DAYS CYLINDER STRENGTH AND SHALL CONFORM TO "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE ACI - 318

(i) LEAN CONCRETE = 10 MPa

(ii) FOR FOUNDATIONS AND PLINTH BEAMS AND BRACING BEAMS AND BRACING BEAMS = 21MPa

(iii) ALL COLUMNS, WATER TANK SLABS, WALLS AND BEAMS FROM EL. +25450 TO EL. +28550 = 28MPa

4- SULPHATE RESISTANT CEMENT CONFORMING TO ASTM C-150 TYPE V (HIGH SULPHATE RESISTANCE CEMENT) SHALL BE USED FOR STRUCTURES IN CONTACT WITH WATER AND SOIL.

BRICKS

1- ALL BRICKS SHALL BE FIRST CLASS BURNT BRICK WITH AVERAGE COMPRESSIVE STRENGTH OF 14MPa, HAVING MAXIMUM WATER ABSORPTION OF 1/6 OF ITS WEIGHT.

MORTAR RATIO

(i) BRICK WORK IN SUPER STRUCTURE 1:4 (C/S MORTAR)

(i) BRICK WORK IN FOUNDATIONS 1:5 (C/S MORTAR)

PLASTER RATIO

(i) CEILING PLASTER 10MM THICK 1:3 (C/S MORTAR)

(ii) WALL PLASTER (INNER) 12MM THICK 1:4 (C/S MORTAR)

(iii) WALL PLASTER (OUTER) 12MM THICK 1:4 (C/S MORTAR)

SPLICE LENGTH TABLE - A

(a) FOR TOP BARS

fc' (MPa) \ Bar Size	SPLICE/LAP LENGTH 'mm' (Fy=420 MPa)				
	10	13	16	19	25
21	720	940	1170	1430	2370
28	610	820	1020	1220	2040

SPLICE LENGTH TABLE - B

(b) FOR OTHER BARS

fc' (MPa) \ Bar Size	SPLICE/LAP LENGTH 'mm' (Fy=420 MPa)				
	10	13	16	19	25
21	540	720	920	1100	1810
28	460	640	790	940	1580

REINFORCEMENT

1- ALL REINFORCEMENT SHALL BE DEFORMED BARS CONFORMING TO ASTM-A615, GRADE 420, WITH SPECIFIED MINIMUM YIELD STRENGTH OF NOT LESS THEN 420 MPa.

2- CLEAR COVER TO REINFORCEMENT FROM THE OUTER SURFACE SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE

(i) FOUNDATION / RAFT ON LEAN CONCRETE 50 mm

(ii) WALLS, COLUMNS, BEAMS, BOTTOM AND TOP SLABS OF WATER TANK SPECIFICALLY 50 mm

(iii) BEAMS, COLUMNS 40 mm

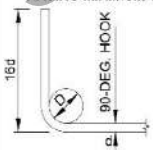
(iv) SLAB 25 mm

3- ALL BAR SPLICES SHALL BE TENSION SPLICES AS PER ACI-318. AS GIVEN IN TABLE-A AND TABLE-B.

4- ALL REINFORCEMENT STEEL SHALL BE ACCURATELY LOCATED IN THE FORMS AND HELD FIRMLY IN PLACE BEFORE & DURING THE PLACING OF CONCRETE, BY MEANS OF WIRES AND SUPPORTS ADEQUATE TO PREVENT DISPLACEMENT DURING THE COURSE OF CONSTRUCTION.

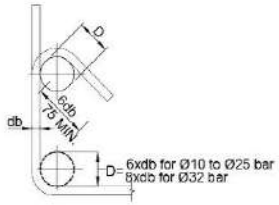
5- DISTRIBUTION REINFORCEMENT IF NOT SHOWN IN DRAWING SHALL BE PROVIDED AS Ø10@200 TYPICAL.

6- ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 HAVING MINIMUM YIELD STRENGTH OF 350 MPa.



STANDARD 90° HOOKS FOR FOOTING, COLUMN, BEAMS, SLAB BARS

STIRRUP DETAIL FOR COLUMNS AND BEAMS



STANDARD 135° HOOK DETAIL FOR STIRRUP

D (mm)	62	75	100	112	150
BAR DIA	10	13	16	19	25

Notes:

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LEGENDS:

REV.	DESCRIPTION:	BY:	DATE:

RUDA
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Garden Town, Lahore
Pakistan

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83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
USMAN	ABID	10/01/24	0

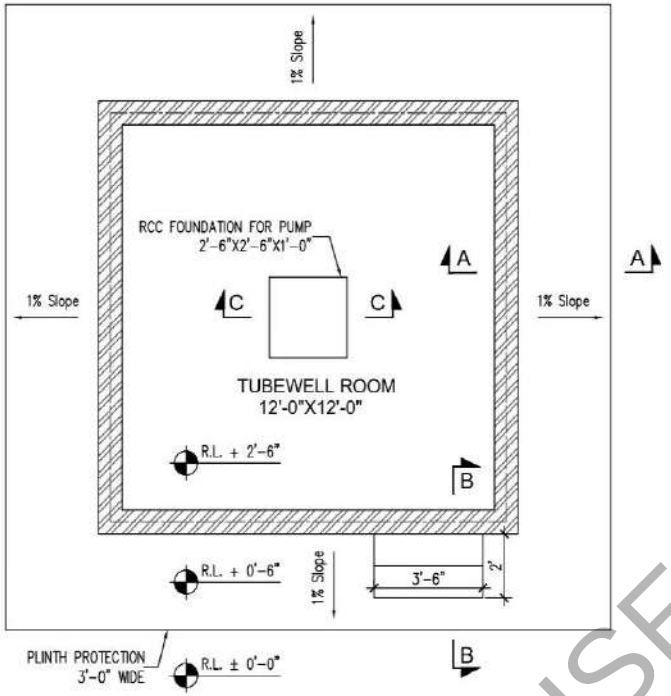
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
TUBEWELL ROOM
STRCTURE GENERAL NOTES

SCALE:	SHEET SIZE:	SHEET NO:
N.T.S	A3	1 of 1

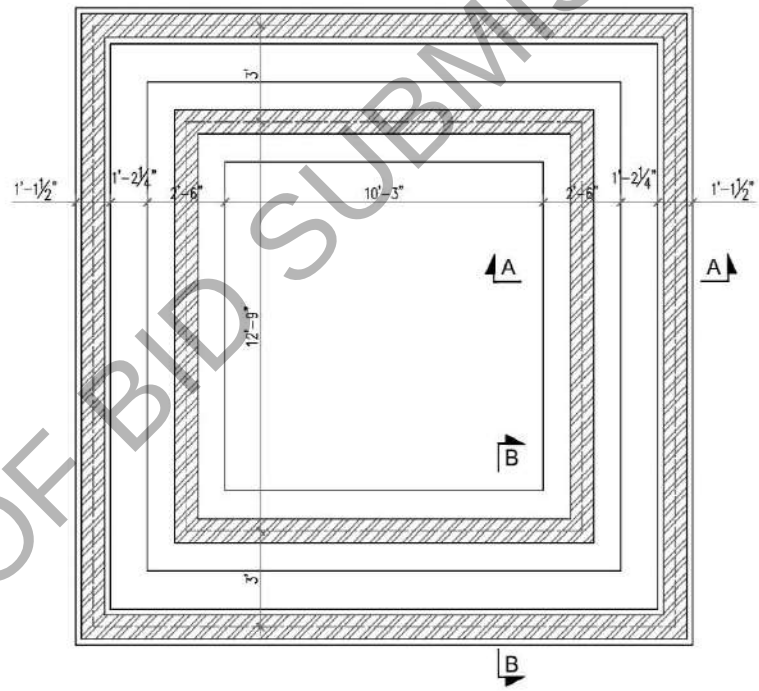
PROJECT NO:	STATUS:
373	DRAFT DRAWINGS

DRAWING NO:
240110-373-INFRA-105



1 PLINTH LEVEL LAYOUT PLAN

Scale: 1/4"=1'-0"



2 FOUNDATION LAYOUT PLAN

Scale: 1/4"=1'-0"

Notes:

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LEGENDS:

REV.	DESCRIPTION	BY.	DATE

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
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Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

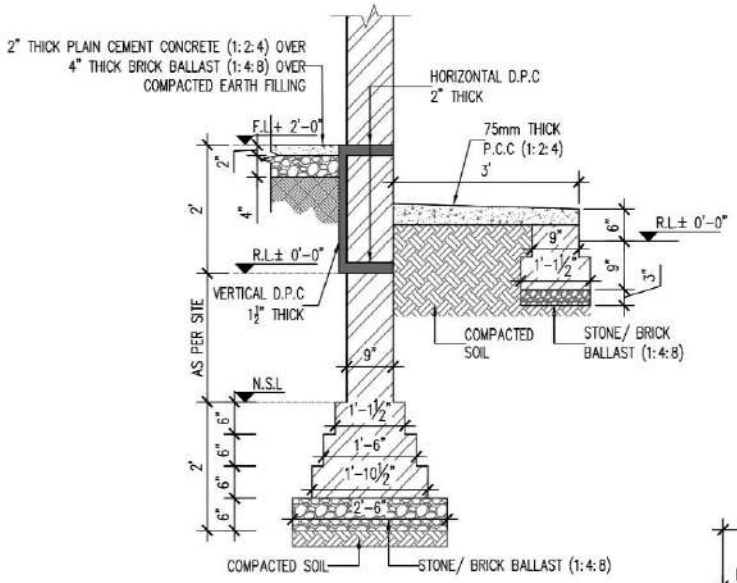
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
TUBEWELL ROOM
PLINTH LEVEL LAYOUT PLAN &
FOUNDATION LAYOUT PLAN

SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

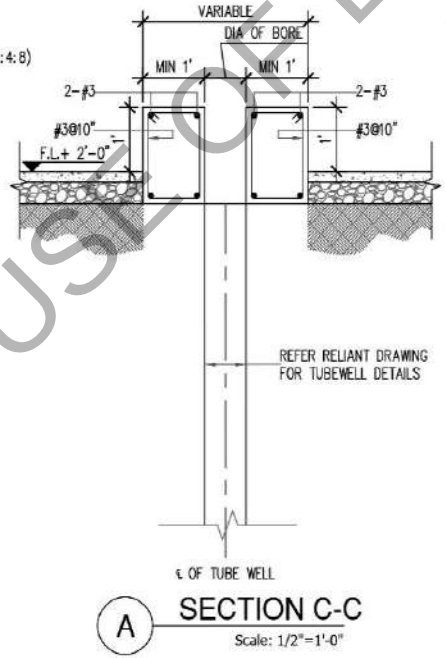
PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO.: 240110-373-INFRA-106



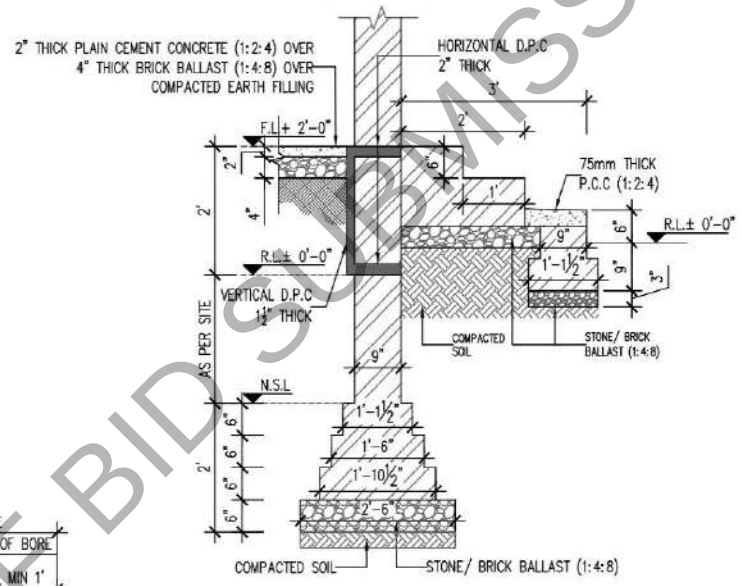
A SECTION A-A

Scale: 1/2"=1'-0"



A SECTION C-C

Scale: 1/2"=1'-0"



A SECTION B-B

Scale: 1/2"=1'-0"

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LEGENDS:

REV.	DESCRIPTION	BY.	DATE

RUDA
151 - Abu Bakar Block
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ECSP (Pvt.) Ltd.
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Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

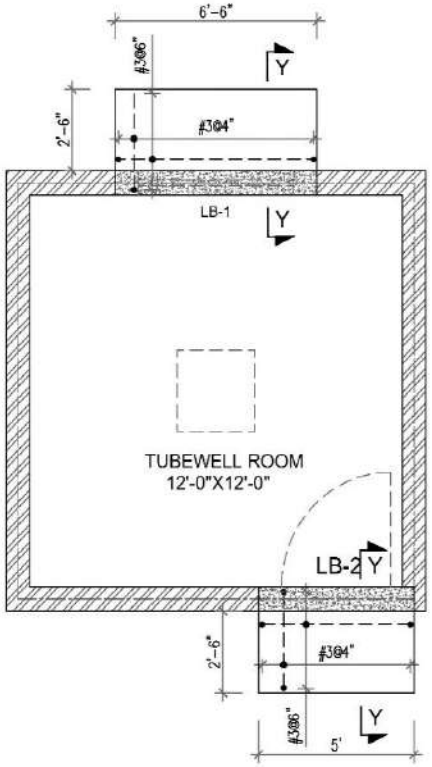
PROJECT TITLE:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
TUBEWELL ROOM
FOUNDATION SECTION A-A ,B-B & C-C

SCALE	SHEET SIZE	SHEET NO.
1/2" = 1'-0"	A3	1 of 1

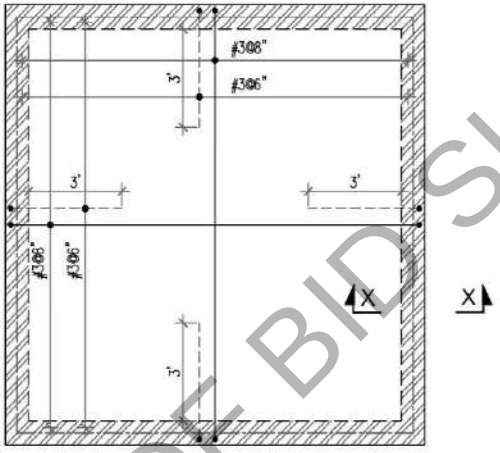
PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO.
240110-373-INFRA-107



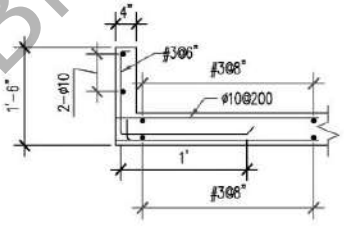
1 LINTEL BEAM PLAN

Scale: 1/4"=1'-0"



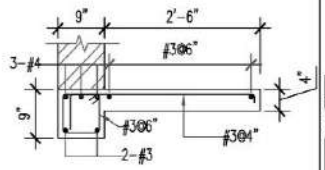
1 ROOF SLAB REINFORCEMENT PLAN

Scale: 1/4"=1'-0" SLAB THICKNESS = 6"



A SECTION X-X

Scale: 1/2"=1'-0"



A SECTION Y-Y

Scale: 1/2"=1'-0"

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LEGENDS:

REV.	DESCRIPTION:	BY:	DATE:

RUDA
151 - Abu Bakar Block
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Gulberg-III, Lahore
Pakistan

DRAWN:	CHECKED:	DATE:	REVISION:
USMAN	ABID	10/01/24	0

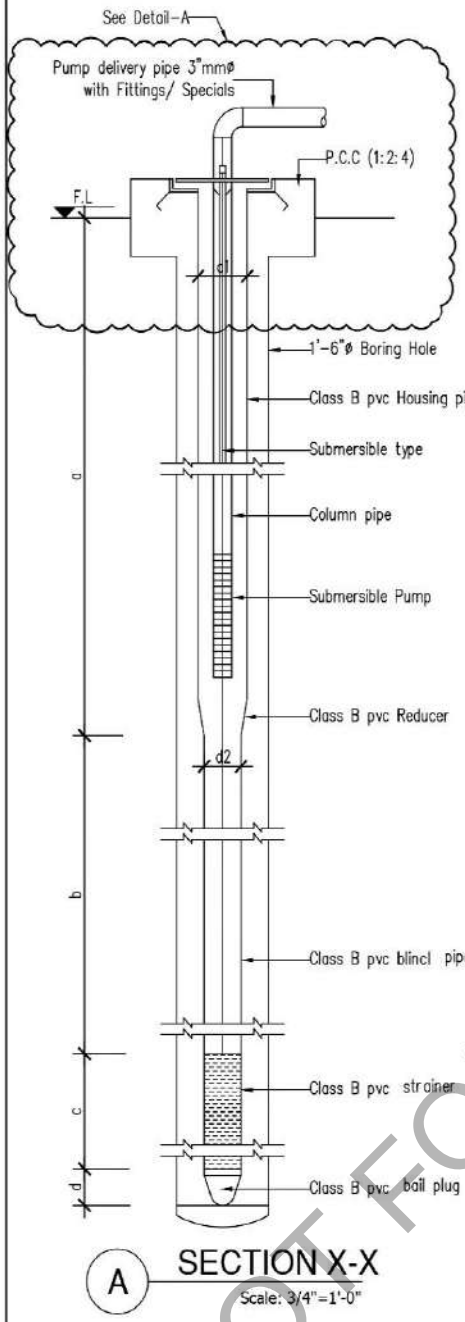
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
TUBEWELL ROOM
LINTEL BEAM PLAN,
ROOF SLAB REINFORCMENT PLAN,
SECTIONS X-X & Y-Y

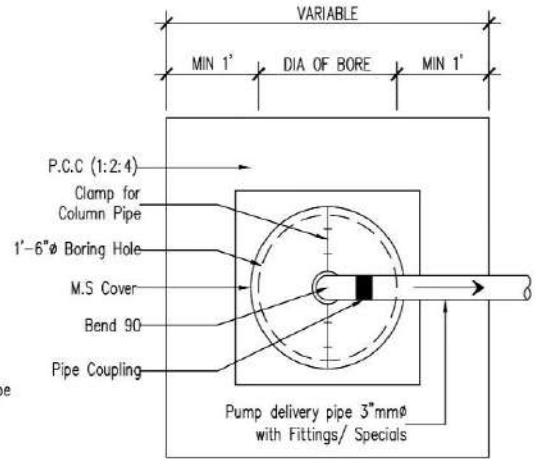
SCALE:	SHEET SIZE:	SHEET NO.
AS SHOWN	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

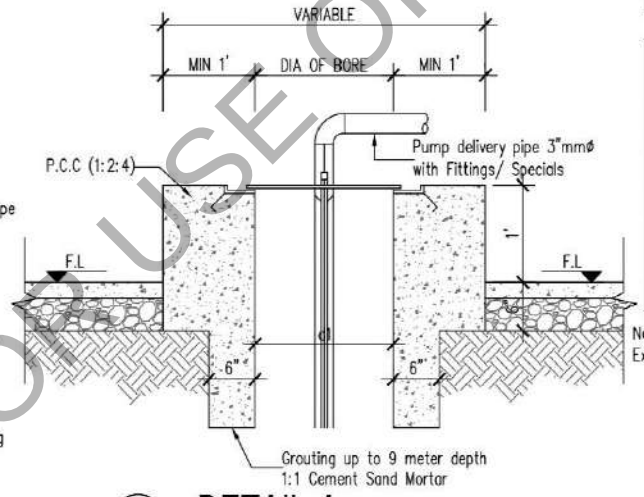
DRAWING NO.
240110-373-INFRA-108



A SECTION X-X
Scale: 3/4"=1'-0"



A TUBEWELL PLAN
Scale: 3/4"=1'-0"



A DETAIL-A
Scale: 3/4"=1'-0"

NOTE:

1. TOTAL LENGTH OF STRAINER AS PER DESIGN WILL BE PLACED AT DEPTHS OF APPROPRIATE STRATA PHYSICALLY TAPPED AND ASCERTAINED DURING BORING AND AS PER TUBE WELL CONVERSION DESIGN CHART TO BE PREPARED BY THE CONTRACTOR AND VERIFIED BY THE ENGINEER-IN-CHARGE.
2. THE DEPTH OF BORING AS PER DESIGN IS GIVEN IN THE DRAWING BUT FURTHER BORING BELOW THE PROPOSED LENGTH OF PUMP HOUSING PIPE, WILL BE STOPPED WHEN CUMULATIVE DEPTH OF PROSPECTIVE STRATA AT DIFFERENT DEPTH IS MET TO ACCOMMODATE THE DESIGN LENGTH OF STRAINER WITH SAFETY MARGIN OF 600mm ON EACH END.
3. THE CONTRACTOR WILL PROVIDE THE FOLLOWING DATA / REPORT AFTER DEVELOPMENT AND TESTING OF THE TUBE WELL DULY SIGNED BY HIM OR HIS AUTHORIZED SITE ENGINEER.

a. DEPTH OF STATIC GROUND WATER TABLE
b. SAFE RECOMMENDED YIELD OF THE TUBE WELL
c. DRAW DOWN AT THE RECOMMENDED SAFE YIELD
d. 3 COPIES OF STRATA AND CONVERSION CHARTS OF TUBE WELL WITH ONE COPY DULY FRAMED IN GLASS
e. TEST REPORT OF WATER OF TUBE WELL FOR CHEMICAL PARAMETERS FROM CENTRAL WATER TESTING LABORATORY OF PHED, PCRWR OR UET LAHORE AND ONE COPY DULY FRAMED IN GLASS

DESCRIPTION	LENGTH
Length of Housing Pipe + Reducer (a)	AS PER SITE
Length of Blind Pipe (b)	AS PER SITE
Length of Strainer (c)	AS PER SITE
Length of Bail Plug (d)	AS PER SITE

DESCRIPTION	LENGTH
d1 (Nominal dia) (As applicable)	12" – 15"
d2 (Nominal dia) (As applicable)	10" – 12"
Bore Hole Drilling Diameter	1'-6"
Housing Pipe (Nominal dia) (As applicable)	12"
Reducer (Nominal dia) (As applicable)	12"x8"
Blind Pipe (Nominal dia) (As applicable)	8" – 10"
Strainer (Nominal dia) (As applicable)	8" – 10"
Bail Plug (Nominal dia) (As applicable)	8" – 10"

Note:
Exact Parameters in above tables will be defined as per field Investigations.

REV:	DESCRIPTION:	BY:	DATE:

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

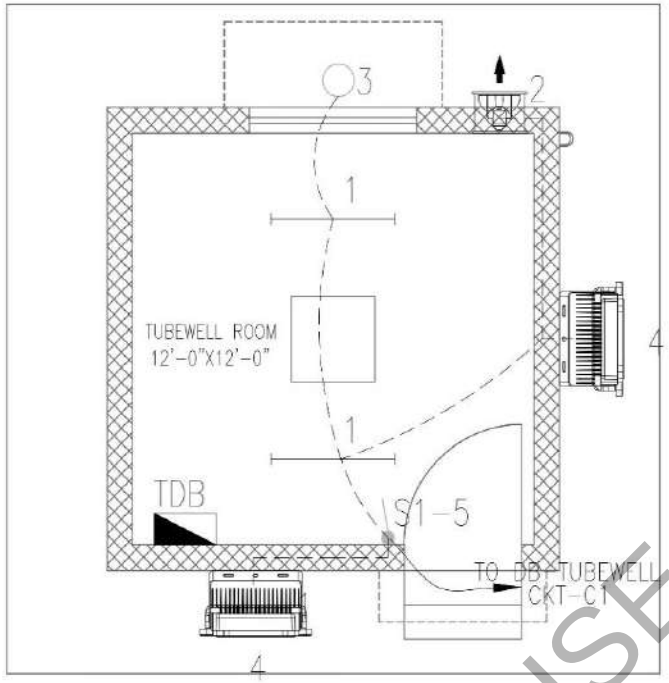
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
TUBEWELL ROOM
TUBEWELL DETAILS

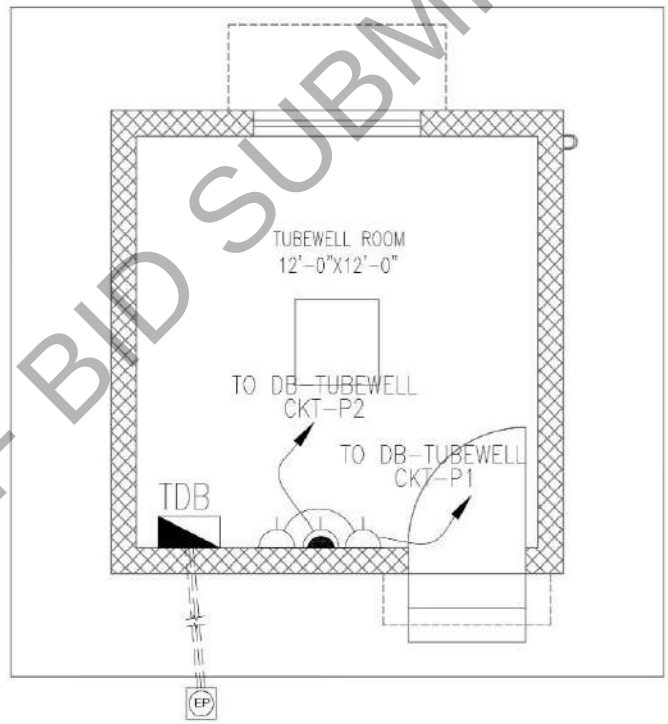
SCALE	SHEET SIZE	SHEET NO.
AS SHOWN	A3	1 of 1

PROJECT NO:	STATUS
373	DRAFT DRAWINGS

DRAWING NO: 240110-373-INFRA-109



LIGHTING PLAN



POWER PLAN

LEGEND

S.N	DESCRIPTION	SYMBOLS	MOUNTING HEIGHT
1	EXHAUST FAN		H=8'-0"/AFFL
2	RECESSED PVC CONDUIT SIZE 1" DIA		RECESSED IN SLAB
3	DISTRIBUTION BOX (DB)		ON WALL AT 4' F.F.L
4	FLOOD LIGHT		
5	LED DOWN LIGHT 11W		
6	5A, 220V, ONE WAY, MULTI GANG SWITCH WITH REGULATOR		H=4'-0"/AFFL
7	5A, 220V, ONE WAY, MULTI GANG SWITCH "(6)" INDICATES NUMBER OF SWITCHES	(6)	H=4'-0"/AFFL
8	WHITE BATTEN LIGHT		
9	MULTI STANDARD UNIVERSAL SOCKET 13 AMPS		ON WALL AT 2' F.F.L
10	MULTI STANDARD UNIVERSAL SOCKET 15 AMPS		ON WALL AT 2' F.F.L

Notes:

ABBL.
TDB–TUBE WELL DISTRIBUTION BOARD.
CKT–CIRCUIT.
EP–EARTHING PIT.

REV.	DESCRIPTION	BY.	DATE

CLIENT: RUDA
151 – Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
ALI HASSAN	NAWAZISH	10/01/24	0

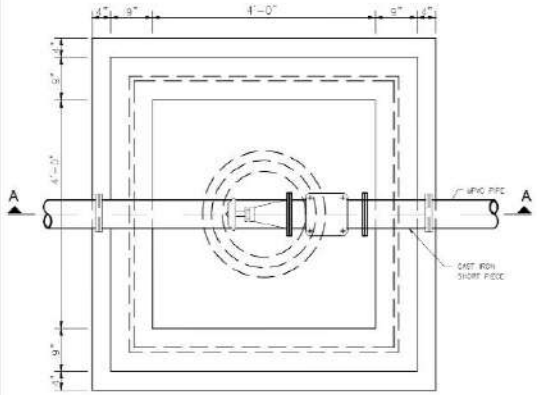
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: TUBE WELL
LIGHTING & POWER LAYOUT PLAN

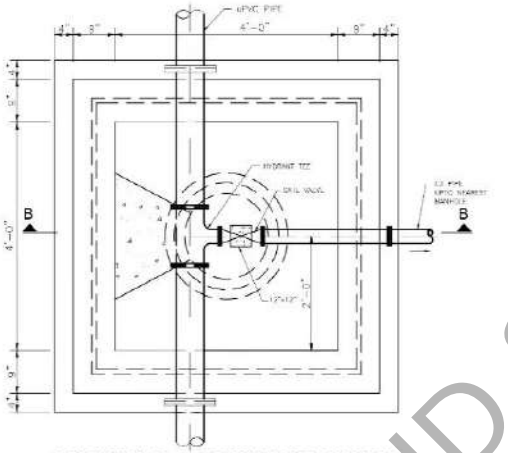
SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

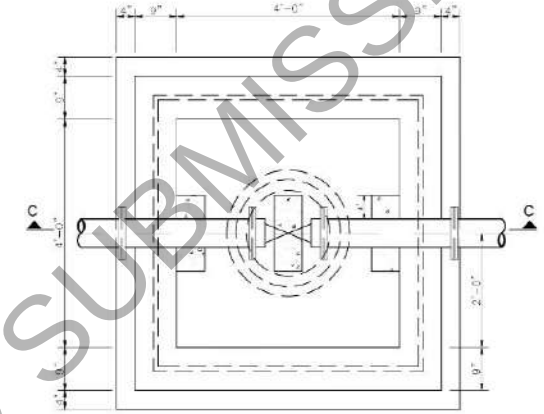
DRAWING NO: 240110–373–ELE–01



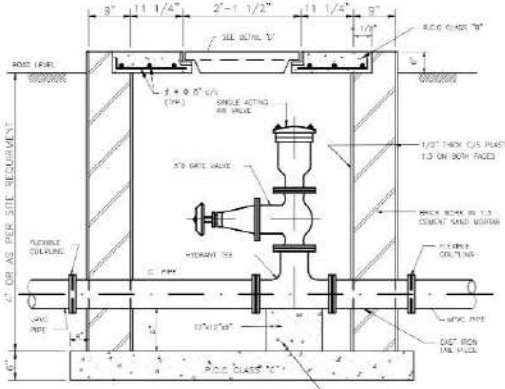
SECTIONAL PLAN OF AIR VALVE CHAMBER



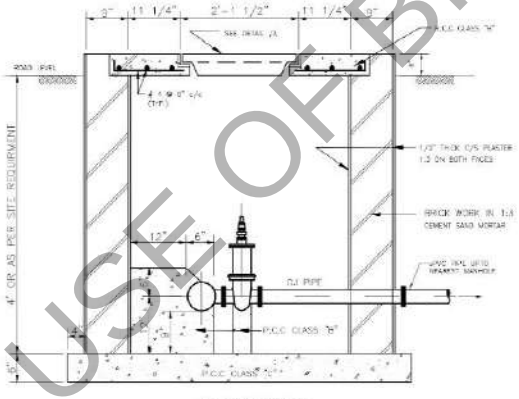
SECTIONAL PLAN OF WASHOUT CHAMBER



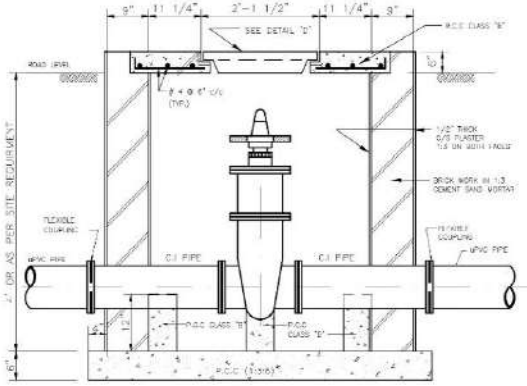
SECTIONAL PLAN OF GATE / SLUICE VALVE



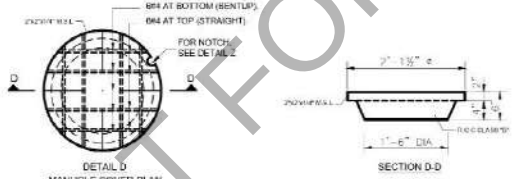
SECTION A-A



SECTION B-B

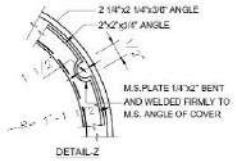


SECTION C-C



DETAIL D
MANHOLE COVER PLAN

SECTION D-D



DETAIL-Z

Notes:

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LEGENDS:

REV.	DESCRIPTION:	BY:	DATE:

CLIENT:
RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT:
ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

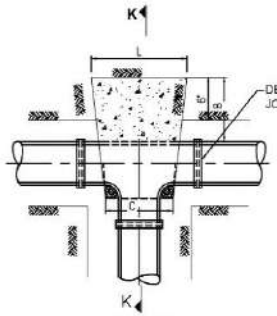
PROJECT NAME:
REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE:
WATER SUPPLY SYSTEM
VALVE CHAMBER DETAILS

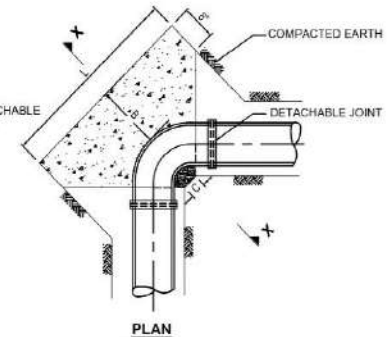
SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

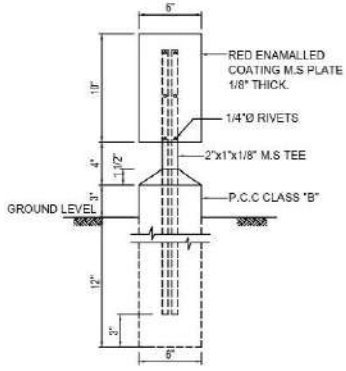
DRAWING NO:
240110-373-INFRA-111



PLAN TEE



PLAN
90° BEND



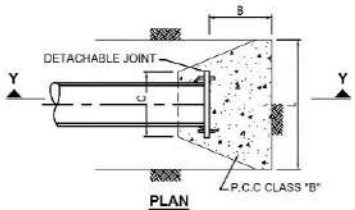
POST MOUNTED
INDICATION PLATE

RED ENAMALLED COATING M.S 10"x6"x1/8" PLATE
(INDICATION PLATES FOR GATE VALVE, FIRE HYDRANT, AIR VALVE AND WASHOUT.)

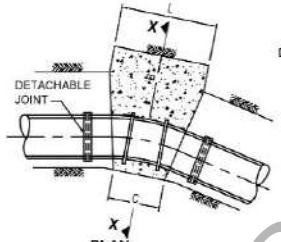
ANCHOR BLOCK DIMENSIONS FOR PIPE FITTINGS

DIA IN INCHES	AT TEES AND DEAD ENDS				AT 90° BENDS				AT 45° BENDS				AT 22 1/2° BENDS			
	C	B	D	L	C	B	D	L	C	B	D	L	C	B	D	L
3	4	12	12	12	2	12	24	12	4	12	12	12	6	12	12	12
4	6	12	12	12	2	12	24	18	6	12	12	12	6	12	12	12
6	8	12	15	24	2	18	24	30	4	12	18	18	6	12	18	12
8	12	12	18	33	6	18	27	36	12	12	21	24	18	12	18	21
10	12	12	24	42	8	27	27	48	14	12	27	30	18	12	24	21
12	21	12	30	48	10	30	33	60	16	15	30	36	21	12	27	24

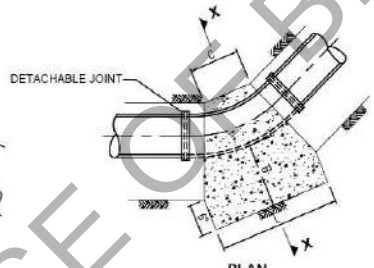
NOTE:- ALL DIMENSIONS ARE IN INCHES.



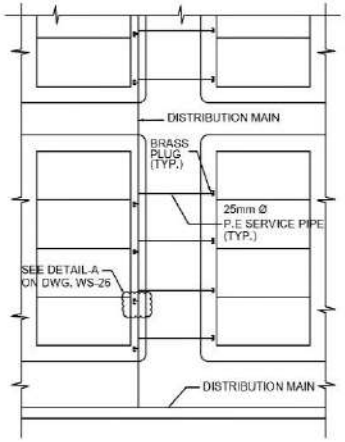
PLAN
DEAD END BLOCK



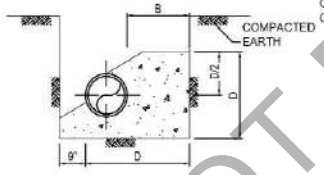
PLAN
22 1/2° BEND



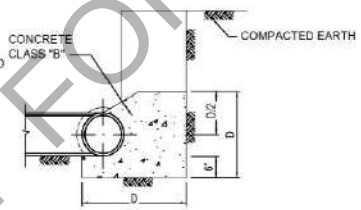
PLAN
45° BEND



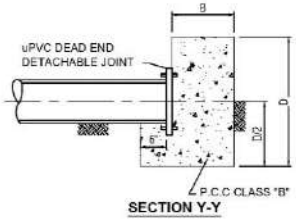
WATER SUPPLY SERVICE CONNECTION
(TYPICAL)



SECTION X-X



SECTION K-K



SECTION Y-Y

NOTES:

1: THE HEIGHT OF CHAMBERS TO BE DETERMINED BY THE SITE ENGINEER.

2: THRUST BLOCKS SHALL BE OF (CLASS-B) CONCRETE.

3: THE WORDS ON INDICATION PLATE SHALL BE WRITTEN IN WHITE BAKED ENAMEL COAT ABBREVIATIONS SUCH AS F.H, G.V, A.V, AND W.O SHALL REPRESENT FIRE HYDRANT, GATE VALVE, AIR VALVE AND WASHOUT RESPECTIVELY.

4: READ THIS DRAWING IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.

5: EXACT LOCATION OF AIR VALVES AND WASHOUTS SHALL BE CONFIRMED AT SITE BY THE ENGINEER

LEGENDS:

REV.	DESCRIPTION	BY	DATE

CLIENT: RUDA
151 - Abu Bakar Block
Garden Town, Lahore
Pakistan

CONSULTANT: ECSP (Pvt.) Ltd.
83-A, E/1, Main Boulevard
Gulberg-III, Lahore
Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

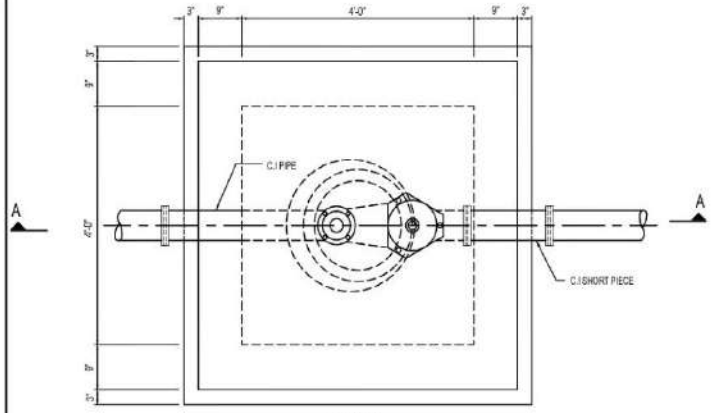
PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM THRUST BLOCK DETAILS

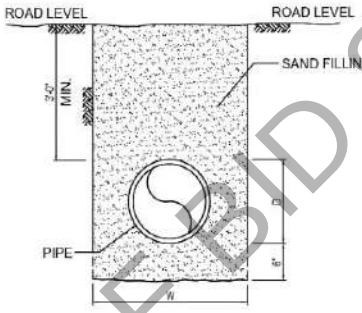
SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

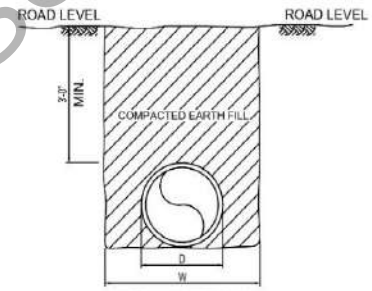
DRAWING NO: 240110-373-INFRA-112



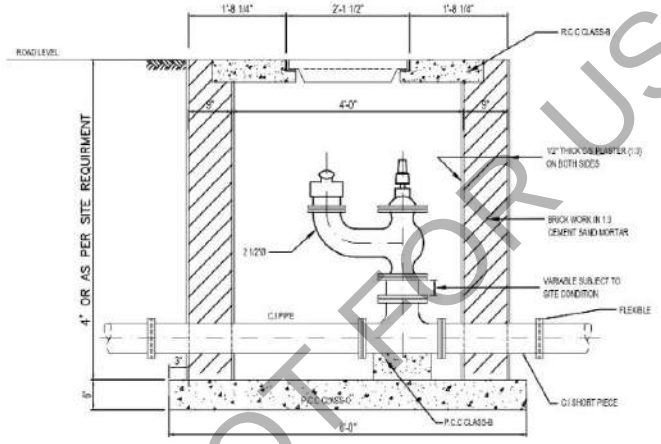
PLAN
FIRE HYDRANT
PN-10 BSS(750)



DETAIL FOR PIPE
CROSSING UNDER ROAD

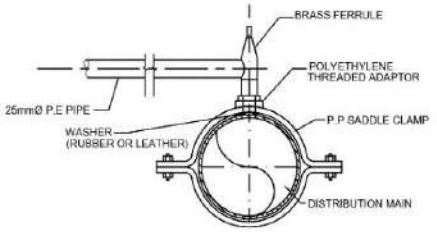


TRENCH DETAIL



SECTION A-A

TRENCH WIDTH SCHEDULE	
NOMINAL INTERNAL DIA OF PIPE (D)	MIN-TRENCH WIDITH (W)
3"	24"
4"	24"
6"	30"
8"	30"
10"	36"



SEE DETAIL "A"
HOUSE CONNECTION DETAIL

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Pakistan

DRAWN	CHECKED	DATE	REVISION
USMAN	ABID	10/01/24	0

PROJECT NAME: REHABILITATION OF MEHMOOD BOOTI DUMPSITE

DRAWING TITLE: WATER SUPPLY SYSTEM
FIRE HYDRANT DETAIL, TRENCH DETAIL, CONNECTION DETAIL

SCALE	SHEET SIZE	SHEET NO.
N.T.S	A3	1 of 1

PROJECT NO.	STATUS
373	DRAFT DRAWINGS

DRAWING NO: 240110-373-INFRA-113