Feasibility Study and Detail Design of Burj-e-Aziz Khan (BAK) Dam on Pishin Lora for Quetta Water Supply Project

Public Health Engineering Department

GOVERNMENT OF BALOCHISTAN

(Employer)

BAK DAM CONSULTANTS

(Consultants)

BIDDING DOCUMENTS FOR

GEOTECHNICAL INVESTIGATIONS WORKS

September 2020

SUMMARY OF CONTENTS

Section	Subject	Page No.
(I)	INVITATION FOR BIDS	04
(II)	INSTRUCTIONS TO BIDDERS & BIDDING DATA	07
(III)	FORM OF BID & SCHEDULES TO BID	19
(IV)	CONDITIONS OF CONTRACT & CONTRACT DATA	38
(V)	STANDARD FORMS	53
(VI)	TECHNICAL SPECIFICATIONS	62
(VII)	QUALIFICATION CRITERIA	89
(VIII)	DRAWINGS	99

SECTION-I

INVITATION FOR BIDS

Feasibility Study and Detail Design of Burj-e- Aziz Khan Dam on
Pishin Lora for Quetta Water Supply Project *Bidding Document for Geotechnical Investigation*

INVITATION FOR BIDS

Date: 07 Sept 2020
Bid Reference No. BDP-NCB-2

The Employer, Chief Engineer / Project Director, Public Health Engineering Department, Quetta, Government of Balochistan through BAK Dam Consultants, invites sealed bids from eligible firms or persons licensed by the Pakistan Engineering Council in the appropriate category and meeting the requirements of the qualification criteria given in Section-VII of the Bidding Documents for the works, viz a viz, Geotechnical Investigations Works including field and laboratory testing for the Project as mentioned in Schedule-B of the Bidding Documents, which will be completed in Ninety (90) days.

A complete set of Bidding Documents can be downloaded from Consultant's website **(www.egcpakistan.com)** and from Govt. of Balochistan PPRA website **(www.bppra.gob.pk)** free of cost.

To assist the bidders in preparation of their bids, the necessary Specifications, Bill of Quantities and Drawings, Form for submitting the Bid and a draft Contract Form etc., are enclosed. The Bidders are advised to visit the site of the works at their own expense, and obtain necessary information for preparing the bid.

All bids must be accompanied by a Bid Security in the amount of 2 % of total bid price in the name of Engineering General Consultants (EGC) Pvt. Ltd and must be delivered to the Team Leader, BAK Dam Consultants, 50-L, Model Town, Extension, Lahore at or before 15:00 hours, on September 25, 2020. Bids will be opened at 15:30 hours on the same day in the presence of bidders' representatives who choose to attend, at the same following address.

07/09/2020

Team Leader/Project Manager,
BAK Dam Consultants
50 L, Model Town Extension, Lahore
Ph: 042-32803746-7
email: bakproject@egcpakistan.com

SECTION-II

INSTRUCTIONS TO BIDDERS

&

BIDDING DATA

TABLE OF CONTENTS

INSTRUCTIONS TO BIDDERS

Clause No.	*Description*	*Page No.*
	A. GENERAL	
IB.1	Scope of Bid & Source of Funds	9
IB.2	Eligible Bidders	9
IB.3	Cost of Bidding	9
B. BIDDING DOCUMENTS		
IB.4	Contents of Bidding Documents	9
IB.5	Clarification of Bidding Documents	10
IB.6	Amendment of Bidding Documents	10
C- PREPARATION OF BID		
IB.7	Language of Bid	11
IB.8	Documents Comprising the Bid	11
IB.9	Sufficiency of Bid	11
IB.10	Bid Prices, Currency of Bid & Payment	11
IB.11	Documents Establishing Bidder's Eligibility and Qualifications	12
IB.12	Documents Establishing Works Conformity to Bidding Documents	12
IB.13	Bidding Security	12
IB.14	Validity of Bids, Format, Signing and Submission of Bid	13
D-SUBMISSION OF BID		
IB.15 of Bids	Deadline for Submission, Modification & Withdrawal	13
E. BID OPENING AND EVALUATION		
IB.16	Bid Opening, Clarification and Evaluation	14
IB.17	Process to be Confidential	16
F. AWARD OF CONTRACT		
IB.18	Qualification	16
IB.19	Award Criteria & Employers Right	17
IB.20	Notification of Award & Signing of Contract Agreement	17
IB.21	Performance Security	17
IB.22	Integrity Pact	17

INSTRUCTIONS TO BIDDERS

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

A. GENERAL

IB.1 Scope of Bid & Source of Funds

1.1 Scope of Bid

The Employer as defined in the Bidding Data (hereinafter called "the Employer") wishes to receive Bids for the Works summarized in the Bidding Data (hereinafter referred to as "the Works").

Bidders must quote for the complete scope of work. Any Bid covering partial scope of work will be rejected as non-responsive.

1.2 Source of Funds

The Employer has arranged funds from its own sources. [or any other source which may be indicated accordingly]

IB.2 Eligible Bidders

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

a) duly licensed by the Pakistan Engineering Council (PEC) in the appropriate category for value of Works.

b) duly pre-qualified/enlisted with the Employer.

IB.3 Cost of Bidding

3.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

B. BIDDING DOCUMENTS

IB.4 Contents of Bidding Documents

4.1 In addition to Invitation for Bids, the Bidding Documents are those stated below, and should be read in conjunction with any Addendum issued in accordance with Sub-Clause IB.6.1.

1. Instructions to Bidders & Bidding Data
2. Form of Bid & Schedules to Bid
   Schedules to Bid comprise the following:

(i) Schedule A: Schedule of Prices
(ii) Schedule B: Specific Works Data
(iii) Schedule C: Works to be Performed by Subcontractors
(iv) Schedule D: Proposed Programme of Works
(v) Schedule E: Method of Performing Works
(vi) Schedule F: Integrity Pact

3. Conditions of Contract & Contract Data

4. Standard Forms:
   (i) Form of Bid Security
   (ii) Form of Performance Security
   (iii)Form of Contract Agreement
   (iv)Form of Bank Guarantee for Advance Payment

5. Specifications

6. Drawings, if any

IB.5 Clarification of Bidding Documents

5.1 A prospective bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Engineer/Employer at the Employer's/Engineer's address indicated in the Bidding Data.

5.2 The Engineer/Employer will respond to any request for clarification which it receives earlier than ten **(**10) days prior to the deadline for the submission of Bids. Copies of the Engineer/Employer's response will be forwarded to all prospective bidders, at least five (5) days prior to dead line for submission of Bids, who have received the Bidding Documents including a description of the enquiry but without identifying its source.

IB.6 Amendment of Bidding Documents

6.1 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.

6.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 6.1 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.

6.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may at its discretion extend the deadline for submission of Bids.

C. PREPARATION OF BIDS

IB.7 Language of Bid

7.1 The bid prepared by the bidder and all correspondence and documents relating to the Bid, exchanged by the bidder and the Employer shall be written in the English language, provided that any printed literature furnished by the bidder may be written in another language so long as accompanied by an English translation of its pertinent passages in which case, for purposes of interpretation of the Bid, the English translation shall govern.

IB.8 Documents Comprising the Bid

8.1 The bid prepared by the bidder shall comprise the following components:

(a) Covering Letter

(b) Form of Bid duly filled, signed and sealed, in accordance with Sub-Clause IB.14.3.

(c) Schedules (A to F) to Bid duly filled and initialed, in accordance with the instructions contained therein & in accordance with Sub-Clause IB14.3.

(d) Bid Security furnished in accordance with Clause IB.13.

(e) Power of Attorney in accordance with Sub-Clause IB 14.5.

(f) Documentary evidence in accordance with Clause IB.11

(g) Documentary evidence in accordance with Clause IB.12.

IB.9 Sufficiency of Bid

9.1 Each bidder shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid and of the rates and prices entered in the Schedule of Prices, which rates and prices shall except in so far as it is otherwise expressly provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works.

9.2 The bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the bid and entering into a Contract for execution of the Works.

IB.10 Bid Prices, Currency of Bid and Payment

10.1 The bidder shall fill up the Schedule of Prices (Schedule A to Bid) indicating the unit rates and prices of the Works to be performed under the Contract. Prices in the Schedule of Prices shall be entered keeping in view the instructions contained in the Preamble to Schedule of Prices.

10.2 Unless otherwise stipulated in the Conditions of Contract, prices quoted by the bidder shall remain fixed during the bidder's performance of the Contract and not subject to variation on any account.

10.3 The unit rates and prices in the Schedule of Prices shall be quoted by the bidder in the currency as stipulated in Bidding Data.

IB.11 Documents Establishing Bidder's Eligibility and Qualifications

11.1 Pursuant to Clause IB.8, the bidder shall furnish, as part of its bid, documents establishing the bidder's eligibility to bid and its qualifications to perform the Contract if its bid is accepted.

11.2 Bidder/Manufacturer must possess and provide evidence of its capability and the experience as stipulated in Bidding Data and the Qualification Criteria stipulated in the Bidding Documents.

IB.12 Documents Establishing Works' Conformity to Bidding Documents

12.1 The documentary evidence of the Works' conformity to the Bidding Documents may be in the form of literature, drawings and data and the bidder shall furnish documentation as set out in Bidding Data.

12.2 The bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, *if* any, designated by the Employer in the Technical Provisions are intended to be descriptive only and not restrictive.

IB.13 Bid Security

13.1 Each bidder shall furnish, as part of his bid, at the option of the bidder, a Bid Security in the amount stipulated in Bidding Data in Pak. Rupees in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or an insurance company having alteast AA rating from PACRA/JCR in favour of the Employer valid for a period up to twenty eight (28) days beyond the bid validity date.

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

13.3 The bid securities of unsuccessful bidders will be returned upon award of contract to the successful bidder or on the expiry of validity of Bid Security whichever is earlier.

13.4 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security, pursuant to Clause IB.21 and signed the Contract Agreement, pursuant to Sub-Clauses IB.20.2 & 20.3.

13.5 The Bid Security may be forfeited:

(a) if a bidder withdraws his bid during the period of bid validity; or

(b) if a bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) hereof; or

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

(i) furnish the required Performance Security in accordance with Clause IB.21, or

(ii) sign the Contract Agreement, in accordance with Sub-Clauses IB.20.2 & 20.3.

IB.14 Validity of Bids, Format, Signing and Submission of Bid

14.1 Bids shall remain valid for the period stipulated in the Bidding Data after the date of bid opening.

14.2 All Schedules to Bid are to be properly completed and signed.

14.3 No alteration is to be made in the Form of Bid except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the bid may be rejected.

14.4 Each bidder shall prepare Original and number of copies specified in the Bidding Data of the documents comprising the bid as described in Clause IB.8 and clearly mark them "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

14.5 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign (in the case of copies, Photostats are also acceptable). This shall be indicated by submitting a written Power of Attorney authorising the signatory of the bidder to act for and on behalf of the bidder. All pages of the bid shall be initialed and official seal be affixed by the person or persons signing the bid.

14.6 The Bid shall be delivered in person or sent by registered mail at the address to Employer as given in Bidding Data.

D. SUBMISSION OF BID

IB.15 Deadline for Submission, Modification & Withdrawal of Bids

15.1 Bids must be received by the Employer at the address/provided in Bidding Data not later than the time and date stipulated therein.

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

15.3 Any bid received by the Employer after the deadline for submission prescribed in Bidding Data will be returned unopened to such bidder.

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

15.5 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in

forfeiture of the Bid Security pursuant to Sub-Clause IB.13.5(a).

E. BID OPENING AND EVALUATION

IB.16 Bid Opening, Clarification and Evaluation

16.1 The Employer will open the bids, in the presence of bidders' representatives who choose to attend, at the time, date and location stipulated in the Bidding Data.

16.2 The bidder's name, Bid Prices, any discount, the presence or absence of Bid Security, and such other details as the Employer at its discretion may consider appropriate, will be announced by the Employer at the bid opening. The Employer will record the minutes of the bid opening. Representatives of the bidders who choose to attend shall sign the attendance sheet.

Any Bid Price or discount which is not read out and recorded at bid opening will not be taken into account in the evaluation of bid.

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

16.4 (a) Prior to the detailed evaluation, pursuant to Sub-Clauses IB.16.7 to 16.9, the Engineer/Employer will determine the substantial responsiveness of each bid to the Bidding Documents. For purpose of these Clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations. It will include to determine the requirements listed in Bidding Data.

(b) Arithmetical errors will be rectified on the following basis:

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

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

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

16.6 Any minor informality or non-conformity or irregularity in a Bid which does not constitute a material deviation may be waived by Employer, provided such waiver does not prejudice or affect the relative ranking of any other bidders.

16.7 The Engineer/Employer will evaluate and compare only the bids previously determined to be substantially responsive pursuant to Sub-Clauses IB.16.4 to 16.6 as per requirements given hereunder. Bids will be evaluated for complete scope of works. The prices will be compared on the basis of the Evaluated Bid Price pursuant to Sub-Clause 16.8 herein below.

(a) Technical Evaluation

It will be examined in detail whether the Works offered by the bidder complies with the Technical Provisions of the Bidding Documents. For this purpose, the bidder's data submitted with the bid in Schedule B to Bid will be compared with technical features/criteria of the Works detailed in the Technical Provisions. Other technical information submitted with the bid regarding the Scope of Work will also be reviewed.

(b) Commercial Evaluation

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

16.8 Evaluated Bid Price

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

(i) making any correction for arithmetic errors pursuant to Sub-Clause 16.4 hereof.

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

(iii) making an appropriate price adjustment for Deviations in terms of Payments (if any and acceptable to the Employer).

(iv) discount, if any, offered by the bidders as also read out and recorded at the time of bid opening.

16.9 Evaluation Methods

Pursuant to Sub-Clause 16.8, Para (ii), and (iii) following evaluation methods for price adjustments will be followed:

(i) Price Adjustment for Technical Compliance

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

(ii) Price Adjustment for Commercial Compliance

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

(iii) Price Adjustment for Deviation in Terms of Payments
Refer to Bidding Data

IB.17 Process to be Confidential

17.1 Subject to Sub-Clause IB.16.3 heretofore, no bidder shall contact Engineer/Employer on any matter relating to its Bid from the time of the Bid opening to the time the bid evaluation result is announced by the Employer. The evaluation result shall be announced at least ten (10) days prior to award of Contract. The announcement to all bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated.

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

F. AWARD OF CONTRACT

IB.18. Post Qualification

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

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

18.2 The determination will take into account the bidder's financial and technical capabilities. It will be based upon an examination of the documentary evidence of the bidders' qualifications submitted under Clause IB.11, as well as such other information required in the Bidding Documents.

IB.19 Award Criteria & Employer's Right

19.1 Subject to Sub-Clause IB.19.2, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be qualified to satisfactory perform the Contract in

accordance with the provisions of Clause IB.18.

19.2 Not with standing Sub-Clause IB.19.1, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the Employer's action except that the grounds for its rejection of all bids shall upon request be communicated, to any bidder who submitted a bid, without justification of the grounds. Notice of the rejection of all the bids shall be given promptly to all the bidders.

IB.20 Notification of Award & Signing of Contract Agreement

20.1 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.

20.2 Within seven (7) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Form of Contract Agreement provided in the Bidding Documents, incorporating all agreements between the parties.

20.3 The formal Agreement between the Employer and the successful bidder shall be executed within seven (7) days of the receipt of Form of Contract Agreement by the successful bidder from the Employer.

IB.21 Performance Security

21.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period of fourteen (14) days after the receipt of Letter of Acceptance.

21.2 Failure of the successful bidder to comply with the requirements of Sub-Clauses IB.20.2 & 20.3 or 21.1 or Clause IB.22 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.22 Integrity Pact

The Bidder shall sign and stamp the Form of Integrity Pact provided at Schedule-F to Bid in the Bidding Document for all Federal Government procurement contracts exceeding Rupees ten (10) million. Failure to provide such Integrity Pact shall make the bid non-responsive.

BIDDING DATA

INSTRUCTIONS TO BIDDERS

Clause Reference

1.1 **Scope of Bid**

Name of Employer
The Employer in ITB wherever appears is replaced with the Engineer and will be read as the Engineer. The Chief Engineer / Project Director, Public Health Engineering Department, Quetta, Govt. of Balochistan.

Brief Description of Works
The works comprise of Geotechnical Investigations including field and laboratory testing for the project as mentioned in Schedule-B to the Bidding Documents.

5.1 (a) Employer's address:

Chief Engineer / Project Director
Public Health Engineering Department
Civil Secretariat Zarghoon Road Quetta
Ph: 081-9204009

(b) Engineer's Address:

BAK Dam Consultants
50 L, Model Town Extension, Lahore
Ph: 042-32803746-7

10.3 Bid shall be quoted entirely in Pak. Rupees. The payment shall be made in Pak. Rupees only.

11.2 The bidder has the financial, technical and execution capability necessary to perform the Contract as described under Section-VII.

12.1 The bidder will provide the Complete set of technical information, description data, literature and drawings as required in accordance with Schedule B to Bid, Specific Works Data. This will include but not be limited to a sufficient number of drawings, photographs, catalogues, illustrations and such other information as is necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the works to be performed.

13.1 **Amount of Bid Security**
Not less than 2 % of Total Bid Price.

14.1 **Period of Bid Validity**

Thirty (30) days after the date of bid opening.

14.4 **Number of Copies of the Bid to be submitted**

One (1) original and One (1) Copy only

14.6 **(a) Engineer's Address for the Purpose of Bid Submission**

Team Leader
BAK Dam Consultants
50 L, Model Town Extension, Lahore
Ph: 042-32803746-7

15.1 **Deadline for Submission of Bids**

As stipulated in Invitation for Bids

16.1 **Venue, Time, and Date of Bid Opening**

Venue: Consultant's address:
BAK Dam Consultants
50 L, Model Town Extension, Lahore
Ph: 042-32803746-7 or as per Bid Invitation Letter
Time & Date: 15:30 hours on September 25, 2020.

16.4 **Responsiveness of Bids**

(i) The Bid is valid till the required period;
(ii) The Bid prices are firm during currency of contract;
(iii) Completion period offered by the bidder is within the specified limits;
(iv) The bidder is eligible and possesses the requisite experience capability and qualification.
(v) The Bid does not deviate from basic technical requirements; and
(vi) The Bid is generally in order, etc.

SECTION-III

FORM OF BID

&

SCHEDULES TO BID

FORM OF BID

(LETTER OF OFFER)

Bid Reference No. _____
Geotechnical Investigation for the Project as mentioned in Bid Invitation Letter

To:

Team Leader
BAK Dam Consultants
50 L, Model Town Extension, Lahore
Ph: 042-32803746-7

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Contract Data, Specifications, Drawings, if any, Schedule of Prices and Addenda ,if any, for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address_____ _____ and being duly incorporated under the laws of Pakistan hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price of Rs_____(Rupees_____) or such other sum as may be ascertained in accordance with the said Documents.

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

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of _____ _____ drawn in your favour or made payable to you and valid for a period of twenty eight (28) days beyond the period of validity of Bid.

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

5. We agree to abide by this Bid for the period of thirty_(30) days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

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

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

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

Dated this day of _____, 2020

Signature _____

in the capacity of _____duly authorized to sign bid for and on behalf of _____
(Name of Bidder in Block Capitals)

(Seal)

Address
_____

_____

_____

Witness:

(Signature)_____

Name:_____
Address: _____
_____

SCHEDULES TO BID INCLUDE THE FOLLOWING:

- Schedule A to Bid: Schedule of Prices
- Schedule B to Bid: Specific Works Data
- Schedule C to Bid: Works to be Performed by Subcontractors
- Schedule D to Bid: Proposed Programme of Works
- Schedule E to Bid: Method of Performing Works
- Schedule F to Bid: Integrity Pact

SCHEDULE – A TO BID

PREAMBLE TO SCHEDULE OF PRICES

1. General

1.1 The Schedule of Prices/Bill of Quantities shall be read in conjunction with the Conditions of Contract, Contract Data together with the Specifications and Drawings, if any.

1.2 The Contract shall be for the whole of the Works as described in these Bidding Documents. Bids must be for the complete scope of works.

1.3 Schedule of Prices/Bill of Quantities will be provided along with Bid Invitation Letter.

2. Description

2.1 The general directions and descriptions of works and materials are not necessarily repeated nor summarized in the Schedule of Prices. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Schedule of Prices.

3. Units & Abbreviations

3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the International System of Units (SI Units).

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the works set forth or implied in the Contract; except for the amounts reimbursable, if any to the Contractor under the Contract.

4.2 Unless otherwise stipulated in the Contract Data, the rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.

4.3 All duties, taxes and other levies payable by the Contractor shall be included in the rates and prices.

4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Schedule of Prices, 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 and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates and prices for other items in the Schedule of Prices.

4.5 (a) The bidder shall be deemed to have obtained all information as to and all requirements related thereto which may affect the bid price.

*(b) The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site.

4.6 The Contractor shall provide for all parts of the Works to be completed in every respect. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Works, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

5. Bid Prices

5.1 Break-up of Bid Prices

The various elements of Bid Prices shall be quoted as detailed by the Employer in the format of Schedule of Prices.

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

5.2 Total Bid Price

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

6. Provisional Sums

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

SCHEDULE - A TO BID

SCHEDULE OF PRICES

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT			
GEOTECHNICAL INVESTIGATIONS			
BILLS OF QUANTITIES – BOQ			
Sr. No.	**Description**	**BOQ No.**	Amount (PKR)
1	Geotechnical Investigations (Field Work)	Bill No. 1	
2	Geotechnical Investigations (Laboratory Testing)	Bill No. 2	
3	Geotechnical Investigations (Report Preparation)	Bill No. 3	
TOTAL			

Note:

The quantities shown in the BOQ are approximate. The payment shall be made on the basis of actual work performed in accordance with the technical specifications given in Section-VI.

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT GEOTECHNICAL INVESTIGATIONS BILLS OF QUANTITIES - BOQ						
Bill No.	**1**	**Geotechnical Investigations (Field Work)**				
Sr. No.	**Description**		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
A	**MOBILIZATION AND DEMOBILIZATION**					
A1	Mobilization and demobilization of straight rotary / heavy percussion drilling rig including shifting from one investigation point to another and preparation of working platforms.		L.S	Job		
	Total:					
B1	**FIELD INVESTIGATIONS**					
	Rotary Drilling / Heavy Percussion / Coring					
B1-1	Drilling in over burden including setting up of hole		LM	40		
B1-2	Drilling of vertical holes in bedrock including setting up of hole		LM	315		
B1-3	Drilling of Inclined holes up to 30 degree from vertical in bedrock including setting up of hole		LM	115		
B1-4	Performance of Permeability Tests in boreholes (Falling Head)		No.	10		
B1-5	Performance of Packer Tests (Water Pressure)		No.	65		
B1-6	Preservation of selected rock core samples including transportation to the laboratory		No.	80		
B1-7	Providing & Installation of 1.5 inch dia PVC Pipe Piezometers		LM	200		
	Water Sampling					
B1-8	Collection and preservation of water samples during drilling of boreholes		No.	3		
B1-9	Collection and preservation of water samples from river or nullah		No.	2		
	Total:					

SCHEDULE – A TO BID

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT GEOTECHNICAL INVESTIGATIONS BILLS OF QUANTITIES - BOQ						
Bill No.	**1**	**Geotechnical Investigations (Field Work)**				
B2	**TEST PITS (Dam Site Reservoir Area)**		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
B2-1	Excavation of test pits (3m x 3m x 3m)		No.	3		
B2-2	Excavation of test pits (3m x 3m x 4m)		No.	2		
B2-3	Carry out field density tests in test pits		No.	10		
B2-4	Collection of composite bulk samples from test pits, their labelling, storage and transportation to laboratory		No.	5		
	Total:					
B3	**TEST PITS (CONSTRUCTION MATERIAL)**		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
B3-1	Excavation of test pits (3m x 3m x 3m)		No.	15		
B3-2	Collection of composite bulk samples from test pits, their labelling, storage and transportation to laboratory		No.	15		
	Total:					

SCHEDULE – A TO BID

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT GEOTECHNICAL INVESTIGATIONS BILLS OF QUANTITIES - BOQ						
Bill No.	**1**	**Geotechnical Investigations (Field Work)**				
C	**FIELD INVESTIGATIONS FOR PIPELINE ROUTE AND INTERMEDIATE PUMPING STATIONS**					
	Rotary Drilling / Heavy Percussion / Coring		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
C-1	Drilling soil and/or rock (Max. 3m in bedrock, Total No. of Boreholes = 03)		LM	30		
C-2	Performance of Standard Penetration Test (SPT), in Boreholes with Open or Close shoe		No.	30		
C-3	Collection of Undisturbed Soil Samples from boreholes using Shelby, Pitcher / Denison Sampler.		No.	5		
C-4	Preservation of selected rock core samples including transportation to the laboratory		No.	5		
	Total:					
	TEST PITS		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
C-5	Excavation of test pits (3m x 3m x 3m)		No.	10		
C-6	Carry out field density tests in test pits		No.	20		
C-7	Collection of compose bulk samples from test pits, their labelling, storage and transportation to laboratory		No.	10		
C-8	Collection of compose block samples (undisturbed) from test pits, their labelling, storage and transportation to laboratory		No.	5		
	Total:					

SCHEDULE – A TO BID

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT GEOTECHNICAL INVESTIGATIONS BILLS OF QUANTITIES - BOQ						
Bill No.	**2**	**Geotechnical Investigations (Laboratory Testing)**				
Sr. No.	**Description**		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
D	**Tests for Soil Samples**					
D1	Grain Size Analysis		No.	90		
D2	Hydrometer		No.	30		
D3	Atterberg Limits		No.	35		
D4	Bulk *I* Dry Density Test		No.	35		
D5	Moisture Content Test		No.	35		
D6	Swelling Potential		No.	20		
D7	Direct Shear Test		No.	15		
DB	Triaxial Compression Test		No.	5		
D9	AASHTO Modified Proctor Test		No.	20		
D10	Odeometer Test		No.	5		
D11	Permeability Test		No.	5		
D12	Sodium Sulphate Soundness Test		No.	20		
D13	Standard Proctor Compaction Test		No.	20		
D14	Sulphate and Chloride Content of Soil		No.	20		
		Total				

SCHEDULE – A TO BID

FEASIBILITY STUDY AND DETAIL DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT GEOTECHNICAL INVESTIGATIONS BILLS OF QUANTITIES - BOQ						
Bill No.	**2**	**Geotechnical Investigations (Laboratory Testing)**				
E	**Tests for Rock Samples**		**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs.)**
E1	Uniaxial Compression test (Rock)		No.	35		
E2	Modulus of Elasticity		No.	15		
E3	Specific Gravity (wet and dry)		No.	25		
E4	Slake Durability		No.	15		
E5	Los Angeles Abrasion Test		No.	10		
E6	Petrographic Analysis		No.	20		
E7	Hock Triaxial Compression Test		No.	10		
E8	Hock Direct Shear Test		No.	15		
E9	Point Load Index Test		No.	25		
F	**Tests for Water Samples**					
F1	Complete Chemical Analysis of water samples i.e. TDS, CL, S04, and pH		No.	10		
Bill No.	**3**	**Geotechnical Investigations (Report Preparation)**				
G	**Preparation of Geotechnical Investigations Report (5 copies)**		LS	1		
		Total				

SCHEDULE – B TO BID

*SPECIFIC WORKS DATA

The geotechnical Investigation will include drilling of fourteen (14) Nos. of boreholes with a total drilling depth of 500 meters. Five (05) boreholes will be located at proposed Main Dam Three (03) boreholes at spillway location. Further three (03) boreholes will be located in Water treatment plant and three (03) borehole will be drilled along pipeline alignment. The investigation will also include sixty (60) test pits each 3 m deep to be excavated in dam site area, construction material and along the pipeline route. The exact locations of boreholes and test pits will be finalized by the field Engineer at site. The investigation will also include sampling, preservation of samples, coring, field & laboratory testing and final geotechnical report.

SCHEDULE – C TO BID

WORKS TO BE PERFORMED BY SUBCONTRACTORS

The bidder will do the work with his own resources except the work listed below which he intends to sub-contract.

NOT APPLICABLE

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

SCHEDULE – D TO BID

PROPOSED PROGRAMME OF WORKS

Bidder shall provide a programme in a bar-chart showing the sequence of work items by which he proposes to complete the Works of the entire Contract. The programme should indicate the sequence of work items and the period of time during which he proposes to complete the Works.

SCHEDULE – E TO BID

METHOD OF PERFORMING WORKS

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

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.
- A list of all major items of constructional and erectional plant, tools and vehicles proposed to be used in delivering/carrying out the Works at Site
- The procedure for installation of equipment and transportation of equipment and materials to the site.
- Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

SCHEDULE – F TO BID

INTEGRITY PACT

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

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

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

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

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

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

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

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

SECTION-IV

CONDITIONS OF CONTRACT

&

CONTRACT DATA

TABLE OF CONTENTS

CONDITIONS OF CONTRACT

Clause No.	*Description*	*Page No.*
1.	General Provisions	36
2.	The Employer	38
3.	Engineer's/Employer's Representatives	38
4.	The Contractor	39
5.	Design by Contractor	39
6.	Employer's Risks	40
7.	Time for Completion	41
8.	Taking Over	41
9.	Remedying Defects	42
10.	Variations and Claims	42
11.	Contract Price and Payment	43
12.	Default	45
13.	Risks and Responsibilities	46
14.	Insurance	47
15.	Resolution of Disputes	47
16.	Integrity Pact	48

CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 Definitions

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

The Contract

1.1.1 "Contract" means the Contract Agreement and the other documents listed in the Contract Data.

1.1.2 "Specifications" means the document as listed in the Contract Data, including Employer's requirements in respect of design to be carried out by the Contractor (if any), and any Variation to such document.

1.1.3 "Drawings" means the Employer's drawings of the Works as listed in the Contract Data, and any Variation to such drawings.

Persons

1.1.4 "Employer" means the person named in the Contract Data and the legal successors in title to this person, but not (except with the consent of the Contractor) any assignee.

1.1.5 "Contractor" means the person named in the Contract Data and the legal successors in title to this person, but not (except with the consent of the Employer) any assignee.

1.1.6 "Party" means either the Employer or the Contractor.

Dates, Times and Periods

1.1.7 "Commencement Date" means the date fourteen (14) days after the date the Contract comes into effect or any other date named in the Contract Data.

1.1.8 "Day" means a calendar day

1.1.9 "Time for Completion" means the time for completing the Works as stated in the Contract Data (or as extended under Sub-Clause 7.3), calculated from the Commencement Date.

Money and Payments

1.1.10 "Cost" means all expenditure properly incurred (or to be incurred) by the Contractor, whether on or off the Site, including overheads and similar charges but does not include any allowance for profit.

Other Definitions

1.1.11 "Contractor's Equipment" means all machinery, apparatus and other things required for the execution of the Works but does not include Materials or Plant intended to form part of the Works.

1.1.12 "Country" means the Islamic Republic of Pakistan.

1.1.13 "Employer's Risks" means those matters listed in Sub-Clause 6.1.

1.1.14 "Force Majeure" means an event or circumstance which makes performance of a Party's obligations illegal or impracticable and which is beyond that Party's reasonable control.

1.1.15 'Materials" means things of all kinds (other than Plant) to be supplied and incorporated in the Works by the Contractor.

1.1.16 "Plant" means the machinery and apparatus intended to form or forming part of the Works.

1.1.17 "Site" means the places provided by the Employer where the Works are to be executed, and any other places specified in the Contract as forming part of the Site.

1.1.18 "Variation" means a change which is instructed by the Engineer/Employer under Sub-Clause 10.1.

1.1.19 'Works" means any or all the works whether Supply, Installation, Construction etc. and design (if any) to be performed by the Contractor including temporary works and any variation thereof.

1.1.20 "Engineer" means the person notified by the Employer to act as Engineer for the purpose of the Contract and named as such in Contract Data.

1.2 **Interpretation**

Words importing persons or parties shall include firms and organizations. Words importing singular or one gender shall include plural or the other gender where the context requires.

1.3 **Priority of Documents**

The documents forming the Contract are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the priority of the documents shall be in accordance with the order as listed in the Contract Data.

1.4 **Law**

The law of the Contract is the relevant Law of Islamic Republic of Pakistan.

1.5 **Communications**

All Communications related to the Contract shall be in English language.

1.6 **Statutory Obligations**

The Contractor shall comply with the Laws of Islamic Republic of Pakistan and shall give all notices and pay all fees and other charges in respect of the Works.

2. THE EMPLOYER

2.1 **Provision of Site**

The Employer shall provide the Site and right of access thereto at the times stated in the Contract Data.

2.2 **Permits etc.**

The Employer shall, if requested by the Contractor, assist him in applying for permits, licences or approvals which are required for the Works.

2.3 **Engineer's/Employer's Instructions**

The Contractor shall comply with all instructions given by the Employer or the Engineer, if notified by the Employer, in respect of the Works including the suspension of all or part of the Works.

2.4 **Approvals**

No approval or consent or absence of comment by the Engineer/Employer shall affect the Contractor's obligations.

3. ENGINEER'S/EMPLOYER'S REPRESENTATIVES

3.1 **Authorized Person**

The Employer shall appoint a duly authorized person to act for him and on his behalf for the purposes of this Contract. Such authorized person shall be duly identified in the Contract Data or otherwise notified in writing to the Contractor as soon as he is so appointed. In either case the Employer shall notify the Contractor, in writing, the precise scope of the authority of such authorized person at the time of his appointment.

3.2 **Engineer's/Employer's Representative**

The name and address of Engineer's/Employer's Representative is given in Contract Data. However the Contractor shall be notified by the Engineer/Employer, the delegated duties and authority before the Commencement of Works.

4. THE CONTRACTOR

4.1 **General Obligations**

The Contractor shall carry out the Works properly and in accordance with the Contract. The Contractor shall provide all supervision, labour, Materials, Plant and Contractor's Equipment which may be required.

4.2 **Contractor's Representative**

The Contractor shall appoint a representative at site on full time basis to supervise the execution of work and to receive instructions on behalf of the Contractor but only after obtaining the consent of the Employer for such appointment which consent shall not be unreasonable withheld by the Employer. Such authorized representative may be substituted/replaced by the Contractor at any time during the Contract Period but only after obtaining the consent of the Employer as aforesaid.

4.3 **Subcontracting**

The Contractor shall not subcontract the whole of the Works. The Contractor shall not subcontract any part of the Works without the consent of the Employer.

4.4 **Performance Security**

The Contractor shall furnish to the Employer within fourteen (14) days after receipt of Letter of Acceptance a Performance Security at the option of the bidder, in the form of Bank Draft or Bank Guarantee or an insurance company having alteast AA rating from PACRA/JCR for the amount and validity specified in Contract Data.

5. DESIGN BY CONTRACTOR

5.1 **Contractor's Design**

The Contractor shall carry out design to the extent specified, as referred to in the Contract Data. The Contractor shall promptly submit to the Engineer/Employer all designs prepared by him. Within fourteen (14) days of receipt the Engineer/Employer shall notify any comments or, if the design submitted is not in accordance with the Contract, shall reject it stating the reasons. The Contractor shall not construct any element of the Works designed by him within fourteen (14) days after the design has been submitted to the Engineer/Employer or which has been rejected. Design that has been rejected shall be promptly amended and resubmitted. The Contractor shall resubmit all designs commented on taking these comments into account as necessary.

5.2 **Responsibility for Design**

The Contractor shall remain responsible for his bided design and the design under this Clause, both of which shall be fit for the intended purposes defined in the Contract and he shall also remain responsible for any infringement of any patent or

copyright in respect of the same. The Engineer/Employer shall be responsible for the Specifications and Drawings.

6. EMPLOYER'S RISKS

6.1 The Employer's Risks

The Employer's Risks are:-

a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, within the Country**;**

b) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country**;**

c) riot, commotion or disorder by persons other than the Contractor's personnel and other employees including the personnel and employees of Sub-Contractors, affecting the Site and/or the Works**;**

d) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such an assembly, except to the extent to which the Contractor/Sub-Contractors may be responsible for the use of any radio-active material**;**

e) Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds**;**

f) use or occupation by the Employer of any part of the Works, except as may be specified in the Contract**;**

g) late handing over of sites, anomalies in drawings, late delivery of designs and drawings of any part of the Works by the Employer's personnel or by others for whom the Employer is responsible;

h) a suspension under Sub-Clause 2.3 unless it is attributable to the Contractor's failure; and

i) physical obstructions or physical conditions other than climatic conditions, encountered on the Site during the performance of the Works, for which the Contractor immediately notified to the Employer and accepted by the Employer.

7. TIME FOR COMPLETION

7.1 Execution of the Works

The Contractor shall commence the Works on the Commencement Date and shall

proceed expeditiously and without delay and shall complete the Works, subject to Sub-Clause 7.3 below, within the Time for Completion.

7.2 **Programme**

Within the time stated in the Contract Data, the Contractor shall submit to the Engineer/Employer a programme for the Works in the form stated in the Contract Data.

7.3 **Extension of Time**

The Contractor shall, within such time as may be reasonable under the circumstances, notify the Employer/Engineer of any event(s) falling within the scope of Sub-Clause 6.1 or 10.3 of these Conditions of Contract and request the Employer/Engineer for a reasonable extension in the time for the completion of Works. Subject to the aforesaid, the Employer/Engineer shall determine such reasonable extension in the time for the completion of Works as may be justified in the light of the details/particulars supplied by the Contractor in connection with the such determination by the Employer/Engineer within such period as may be prescribed by the Employer/Engineer for the same; and

the Employer shall extend the Time for Completion as determined.

7.4 **Late Completion**

If the Contractor fails to complete the Works within the Time for Completion, the Contractor's only liability to the Employer for such failure shall be to pay the amount stated in the Contract Data for each day for which he fails to complete the Works.

8. **TAKING-OVER**

8.1 **Completion**

The Contractor may notify the Engineer/Employer when he considers that the Works are complete.

8.2 **Taking-Over Notice**

Within fourteen (14) days of the receipt of the said notice of completion from the Contractor the Employer/Engineer shall either takeover the completed Works and issue a Certificate of Completion to that effect or shall notify the Contractor his reasons for not taking-over the Works. While issuing the Certificate of Completion as aforesaid, the Employer/Engineer may identify any outstanding items of work which the Contractor shall undertake during the Maintenances Period.

9. REMEDYING DEFECTS

9.1 **Remedying Defects**

The Contractor shall for a period stated in the Contract Data from the date of issue of the Certificate of Completion carry out, at no cost to the Employer, repair and rectification work which is necessitated by the earlier execution of poor quality of work or use of below specifications material in the execution of Works and which is so identified by the Employer/Engineer in writing within the said period. Upon expiry of the said period, and subject to the Contractor's faithfully performing his aforesaid obligations, the Employer/Engineer shall issue a Maintenance Certificate whereupon all obligations of the Contractor under this Contract shall come to an end.

Failure to remedy any such defects or complete outstanding work within a reasonable time shall entitle the Employer to carry out all necessary works at the Contractor's cost. However, the cost of remedying defects not attributable to the Contractor shall be valued as a Variation.

9.2 Uncovering and Testing

The Engineer/Employer may give instruction as to the uncovering and/or testing of any work. Unless as a result of an uncovering and/or testing it is established that the Contractor's design, Materials, Plant or workmanship are not in accordance with the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 10.2.

10. VARIATIONS AND CLAIMS

10.1 Right to Vary

The Employer/Engineer may issue Variation Order(s) in writing. Where for any reason it has not been possible for the Employer/Engineer to issue such Variations Order(s), the Contractor may confirm any verbal orders given by the Employer/Engineer in writing and if the same are not refuted/denied by the Employer/Engineer within seven (7) days of the receipt of such confirmation the same shall be deemed to be a Variation Orders for the purposes of this Sub-Clause.

10.2 Valuation of Variations

Variations shall be valued as follows:

a) at a lump sum price agreed between the Parties, or

b) where appropriate, at rates in the Contract, or

c) in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which

d) at appropriate new rates, as may be agreed or which the Engineer/Employer considers appropriate, or

e) if the Engineer/Employer so instructs, at day work rates set out in the Contract Data for which the Contractor shall keep records of hours of labour and Contractor's Equipment, and of Materials, used.

10.3 **Early Warning**

The Contractor shall notify the Engineer/Employer in writing as soon as he is aware of any circumstance which may delay or disrupt the Works, or which may give rise to a claim for additional payment.

To the extent of the Contractor's failure to notify, which results to the Engineer/Employer being unable to keep all relevant records or not taking steps to minimise any delay, disruption, or Cost, or the value of any Variation, the Contractor's entitlement to extension of the Time for Completion or additional payment shall be reduced/rejected.

10.4. **Valuation of Claims**

If the Contractor incurs Cost as a result of any of the Employer's Risks, the Contractor shall be entitled to the amount of such Cost. If as a result of any Employer's Risk, it is necessary to change the Works, this shall be dealt with as a Variation subject to Contractor's notification for intention of claim to the Engineer/Employer within fourteen (14) days of the occurrence of cause.

10.5 **Variation and Claim Procedure**

The Contractor shall submit to the Engineer/Employer an itemised make-up of the value of variations and claims within twenty eight (28) days of the instruction or of the event giving rise to the claim. The Engineer/Employer shall check and if possible agree the value. In the absence of agreement, the Employer shall determine the value.

11. CONTRACT PRICE AND PAYMENT

11.1 (a) **Terms of Payments**

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 47, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate 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; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project. 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 28 days rate of KIBOR+2% per annum in local currency and LIBOR+1% for foreign

currency, upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69.

(b) **Valuation of the Works**

The Works shall be valued as provided for in the Contract Data, subject to Clause 10.

11.2 **Monthly Statements**

The Contractor shall be entitled to be paid at monthly intervals:

a) the value of the Works executed; and

b) The percentage of the value of Materials and Plant reasonably delivered to the Site, as stated in the Contract Data, subject to any additions or deductions which may be due.

The Contractor shall submit each month to the Engineer/Employer a statement showing the amounts to which he considers himself entitled.

11.3 **Interim Payments**

Within a period not exceeding seven (7) days from the date of submission of a statement for interim payment by the Contractor, the Engineer shall verify the same and within a period not exceeding thirty (30) days from the said date of submission by the Contractor, the Employer shall pay to the Contractor the sum verified by the Engineer less retention money at the rate stated in the Contract Data.

11.4 **Retention**

Retention money shall be paid by the Employer to the Contractor within fourteen (14) days after either the expiry of the period stated in the Contract Data, or the remedying of notified defects, or the completion of outstanding work, all as referred to in Sub-Clause 9.1, which ever is the later.

11.5 **Final Payment**

Within twenty one (21) days from the date of issuance of the Maintenance Certificate the Contractor shall submit a final account to the Engineer to verify and the Engineer shall verify the same within fourteen (14) days from the date of submission and forward the same to the Employer together with any documentation reasonably required to enable the Employer to ascertain the final contract value.

Within sixty (60) days from the date of receipt of the verified final account from the Engineer, the Employer shall pay to the Contractor any amount due to the Contractor. While making such payment the Employer may, for reasons to be given to the

Contractor in writing, withhold any part or parts of the verified amount.

11.6 **Currency**

Payment shall be in the currency stated in the Contract Data.

12. DEFAULT

12.1 **Default by Contractor**

If the Contractor abandons the Works, refuses or fails to comply with a valid instruction of the Engineer/Employer or fails to proceed expeditiously and without delay, or is, despite a written complaint, in breach of the Contract, the Employer may give notice referring to this Sub-Clause and stating the default.

If the Contractor has not taken all practicable steps to remedy the default within fourteen (14) days after receipt of the Employer's notice, the Employer may by a second notice given within a further twenty-one (21) days, terminate the Contract. The Contractor shall then demobilise from the Site leaving behind any Contractor's Equipment which the Employer instructs, in the second notice, to be used for the completion of the Works at the risk and cost of the Contractor.

12.2 **Default by Employer**

If the Employer fails to pay in accordance with the Contract, or is, despite a written complaint, in breach of the Contract, the Contractor may give notice referring to this Sub-Clause and stating the default. If the default is not remedied within fourteen (14) days after the Employer's receipt of this notice, the Contractor may suspend the execution of all or parts of the Works.

If the default is not remedied within twenty eight (28) days after the Employer's receipt of the Contractor's notice, the Contractor may by a second notice given within a further twenty one (21) days, terminate the Contract. The Contractor shall then demobilise from the Site.

12.3 **Insolvency**

If a Party is declared insolvent under any applicable law, the other Party may by notice terminate the Contract immediately. The Contractor shall then demobilise from the Site leaving behind, in the case of the Contractor's insolvency, any Contractor's Equipment which the Employer instructs in the notice is to be used for the completion of the Works.

12.4 **Payment upon Termination**

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably

delivered to the Site, adjusted by the following:

a) any sums to which the Contractor is entitled under Sub-Clause 10.4,

b) any sums to which the Employer is entitled,

c) if the Employer has terminated under Sub-Clause 12.1 or 12.3, the Employer shall be entitled to a sum equivalent to twenty percent (20%) of the value of parts of the Works not executed at the date of the termination, and

d) if the Contractor has terminated under Sub-Clause 12.2 or 12.3, the Contractor shall be entitled to the cost of his demobilisation together with a sum equivalent to ten percent (10%) of the value of parts of the Works not executed at the date of termination.

The net balance due shall be paid or repaid within twenty eight (28) days of the notice of termination.

13. RISKS AND RESPONSIBILITIES

13.1 Contractor's Care of the Works

Subject to Sub-Clause 9.1, the Contractor shall take full responsibility for the care of the Works from the Commencement Date until the date of the Employer's/Engineer's issuance of Certificate of Completion under Sub-Clause 8.2. Responsibility shall then pass to the Employer. If any loss or damage happens to the Works during the above period, the Contractor shall rectify such loss or damage so that the Works conform with the Contract.

Unless the loss or damage happens as a result of any of the Employer's Risks, the Contractor shall indemnify the Employer, or his agents against all claims loss, damage and expense arising out of the Works.

13.2 Force Majeure

If Force Majeure occurs, the Contractor shall notify the Engineer/Employer immediately. If necessary, the Contractor may suspend the execution of the Works and, to the extent agreed with the Employer demobilise the Contractor's Equipment.

If the event continues for a period of eighty four (84) days, either Party may then give notice of termination which shall take effect twenty eight (28) days after the giving of the notice.

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

a) any sums to which the Contractor is entitled under Sub-Clause 10.4,

b) the cost of his demobilization, and

c) less any sums to which the Employer is entitled.

The net balance due shall be paid or repaid within thirty five (35) days of the notice of termination.

14. INSURANCE

14.1 Arrangements

The Contractor shall, prior to commencing the Works, effect insurances of the types, in the amounts and naming as insured the persons stipulated in the Contract Data except for items (a) to (e) and (i) of the Employer's Risks under Sub-Clause 6.1. The policies shall be issued by insurers and in terms approved by the Employer. The Contractor shall provide the Engineer/Employer with evidence that any required policy is in force and that the premiums have been paid.

14.2 Default

If the Contractor fails to effect or keep in force any of the insurances referred to in the previous Sub-Clause, or fails to provide satisfactory evidence, policies or receipts, the Employer may, without prejudice to any other right or remedy, effect insurance for the cover relevant to such as a default and pay the premiums due and recover the same plus a sum in percentage given in Contractor Data from any other amounts due to the Contractor.

15. RESOLUTION OF DISPUTES

15.1 Engineer's Decision

If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with the Works, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the twenty eight (28) days after the day on which he received such reference, the Engineer shall give notice of his decision to the Employer and the Contractor.

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

15.2 Notice of Dissatisfaction

If a Party is dissatisfied with the decision of the Engineer or if no decision is given within the time set out in Sub-Clause 15.1 hereabove, the Party may give notice of

dissatisfaction referring to this Sub-Clause within fourteen (14) days of receipt of the decision or the expiry of the time for the decision. If no notice of dissatisfaction is given within the specified time, the decision shall be final and binding on the Parties. If notice of dissatisfaction is given within the specified time, the decision shall be binding on the Parties who shall give effect to it without delay unless and until the decision of the Engineer is revised by an arbitrator.

15.3 **Arbitration**

A dispute which has been the subject of a notice of dissatisfaction shall be finally settled as per provisions of Arbitration Act 1940 (Act No. X of 1940) and Rules made thereunder and any statutory modifications thereto. Any hearing shall be held at the place specified in the Contract Data and in the language referred to in Sub-Clause 1.5.

16 INTEGRITY PACT

16.1 If the Contractor, or any of his Sub-Contractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Schedule-F 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 Sub-Contractors, 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 Sub-Contractors, agents or servants.

On termination of the Contract under Sub-Para (b) of this Sub-Clause, the Contractor shall demobilize from the Site leaving behind Contractor's Equipment which the Employer instructs, in the termination notice, to be used for the completion of the Works at the risk and cost of the Contractor. Payment upon such termination shall be made under Sub-Clause 12.4, in accordance with Sub-Para (c) thereof, after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.

CONTRACT DATA

Sub-Clauses of

Conditions of Contract

1.1.1 Other documents means as listed in the Contract Agreement.

1.1.4 **The Employer** means

Chief Engineer / Project Director, Public Health Engineering Department Quetta, Government of Balochistan or his authorized under Sub-Clause 3.1.

1.1.5 **The Contractor** means

As per letter of award

1.1.7 **Commencement Date** means the date of issue of Engineer's Notice to Commence which shall be issued within 7 days of the signing of the Contract Agreement.

1.1.9 **Time for Completion** Ninety (90) days

1.1.20 **Engineer**

BAK Dam Consultants

1.3 **Documents forming the Contract listed in the order of priority:**

(a) The Contract Agreement
(b) Letter of Acceptance
(c) The Completed Form of Bid
(d) Contract Data
(e) Conditions of Contract
(f) The completed Schedules to Bid including Schedule of Prices
(g) The Drawings
(h) The Specifications
(i) Addenda, if any

2.1 **Provision of Site:**

On the Commencement Date and /or as per Contractor's schedule of the Works

3.1 **Authorized Person:**

Team Leader/ Project Manager of BAK Dam Consultants or his authorized representative conveyed to the Contractor in writing.

3.2 **Name and address of Engineer's Representative:**

BAK Dam Consultants
50 L, Model Town Extension, Lahore.
Ph: 042-32803746-7

4.4 **Performance Security Amount and Validity**

Amount: 5% of the Contract Price.

Validity: Performance Security shall be valid till completion of all the Works and final settlement of accounts (Final payment).

7.2 **Programme:**

Time for Submission: Within Seven (7) days of the commencement date

Form of Programme: (Bar Chart/CPM/PERT or other)

7.4 Amount payable due to failure to complete shall be 0.1% per day up to a maximum of 10% of sum stated in the letter of Acceptance.

9.1 **Remedying Defects**

Not Applicable

10.2 **Variation Procedure**

If any variation required as per site conditions, the Engineer will get its approval from the Employer.

11.1 **(a) Terms of Payments**

Payment of Contract Price shall be made in the following manners**:**

Payment of the entire amount shall be made subject to the following conditions;

- 10% Advance payment upon provision of Bank Guarantee and successful mobilization to the Site
- 25% payment on 50% completion of field work
- 20% payment on 100% completion of field work
- 20% payment on completion of laboratory testing and submission of geotechnical report
- 25% payment upon approval of Geotechnical Report

(b) For any varied work, if required, additional payment will be made in pursuant to Clause10.

11.3 **Percentage of Retention**

Not Applicable

11.6 **Currency of payment:** Pak. Rupees

14.1 **Insurances:** The Contractor may get insurances to avoid any risk for equipment and man-power and third-party risks. The Employer will not be responsible for any such damages or loss.

15.3 **Arbitration**

Place of Arbitration: Lahore

SECTION-V

STANDARD FORMS

(Note: Standard Forms provided in this document for securities are to be issued by a bank. In case the bidder chooses to issue a bond for accompanying his bid or performance of contract or receipt of advance, the relevant format shall be tailored accordingly without changing the spirit of the Forms of securities).

FORM OF BID SECURITY

(Bank Guarantee)

Guarantee No._____

Executed on _____

(Letter by the Guarantor to the Employer)

Name of Guarantor (Scheduled Bank in Pakistan) with address:_____

Name of Principal (Bidder) with address:_____

_____

Penal Sum of Security (express in words and figures):_____

_____

Bid Reference No._____ Date of Bid _____

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

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

WHEREAS, the Employer has required as a condition for considering the said Bid that the Principal furnishes a Bid Security in the above said sum to the Employer, conditioned as under:

(1) that the Bid Security shall remain valid for a period of twenty eight (28) days beyond the period of validity of the bid;

(2) that in the event of;

(a) the Principal withdraws his Bid during the period of validity of Bid, or

(b) the Principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) of Instructions to Bidders, or

(c) failure of the successful bidder to

(i) furnish the required Performance Security, in accordance with Sub-Clause IB-21**.**1 of Instructions to Bidders, or

(ii) sign the proposed Contract Agreement, in accordance with Sub-Clauses IB-20.2 & 20.3 of Instructions to Bidders,

the entire sum be paid immediately to the said Employer for delayed completion and not as penalty for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefore, on the prescribed form presented to him for signature enter into a formal Contract Agreement with the said Employer in accordance with his Bid as accepted and furnish within fourteen (14) days of

receipt of Letter of Acceptance, 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 then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

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

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

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

_____
Guarantor (Bank)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
(Name, Title & Address)

1. Signature _____

2. Name _____

3. Title _____

Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ 202 _____ between _____(hereinafter called the "Employer") of the one part and _____ (hereinafter called the "Contractor") of the other part.

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

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders, shall be deemed to form and be read and construed as part of this Agreement, viz:

   (a) The Letter of Acceptance;
   (b) The completed Form of Bid alongwith Schedules to Bid;
   (c) Conditions of Contract & Contract Data;
   (d) The priced Schedule of Prices;
   (e) The Specifications; and
   (f) The Drawings

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

Signed, Sealed and Delivered in the presence of:

Witness:	Witness:
_____	_____
(Name, Title and Address)	(Name, Title and Address)

FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No._____

Executed on_____

(Letter by the Guarantor to the Employer)

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

_____

_____ (Particulars of Contract), with

_____

_____ (hereinafter called the Contractor).

AND WHEREAS the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Rs._____ Rupees _____) 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 advance payment for the performance of his obligations under the said Contract.

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

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

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

This Guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This Guarantee shall expire not later than _____

by which date we must have received any claims by registered letter, telegram, telex or telefax.

It is understood that you will return this Guarantee to us on expiry or after settlement of the total amount to be claimed hereunder.

_____
Guarantor (Scheduled Bank)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
(Name, Title & Address)

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

_____
Corporate Guarantor (Seal)

SECTION-VI

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

GEOTECHNICAL INVESTIGATIONS

1.0 INTRODUCTION

1.1 General

The geotechnical investigations are to be carried out as part of Feasibility Study and Detail Design of Burj-e-Aziz Khan (BAK) Dam on Pishin Lora for Quetta Water Supply Project.

1.2 Scope of the contract

The purpose of the work specified herein is to determine the type, nature, thickness, arrangement, structure and texture of the various subsurface strata, conditions and engineering characteristics of the subsurface materials (soil / rock) as they exist to the depth and at locations specified. This is to be accomplished by drilling of boreholes, excavation of test pits, rock coring, in-situ testing, SPT and collection of disturbed / undisturbed samples from the project sites. The selected samples of soil, rock and water shall be tested in the approved laboratory for their physical, chemical and engineering properties. The Bill of Quantities (BOQ) for geotechnical investigations is provided with this bidding document in Section-III. Moreover, the number of boreholes, their locations and respective depths, and the other quantities in BOQ may be varied as per site conditions and as directed by Site Engineer/Geologist. Such variations shall not affect the respective rates quoted by the Contractor in BOQ.

1.3 Access to the site

Access to the site is the responsibility of the contractor, where contractor have to visit the site prior submission of the bidding documents.

1.4 Work under instructions of Consultant

The contractor shall carry out the specified works under the supervision of the Consultant, his Representative or the Representative's assistants.

1.5 Mobilization

Within five (10) days of receiving a written order to commence the works, the Contractor shall mobilize to site for the execution of work as per agreed schedule. Mobilization shall consist of the delivery at the site of all plant, equipment, accessories, spares, materials, and supplies to be furnished by the Contractor; the complete assembly of all such plant and equipment in a satisfactory working order and satisfactory storage at site of all materials and supplies.

1.6 Permission to start the works

The Contractor shall not be allowed to commence the works until he has mobilized all the equipment mentioned in Qualification Criteria provided in section-VII and any delay caused thereby shall not be allowed as a basis of a claim for additional expenditure or an

extension of the time for completion of the Contract.

List of equipment which must be included but not limited to in items mobilized by the Contractor.

Sr. No.	Equipment Type & Characteristics	Minimum Number Required
1	Straight Rotary Drilling Rig complete in all respects including drilling rods, bits, mud pumps etc. along with at least one stand-by rig.	3
2	Percussion Boring Set (minimum 450 mm diameter) complete in all respects including tripod, chisel/bit etc.	1
3	Casing Set having various diameters for all types of boring at least 10 m in length with casing bits.	1
4	Core Barrels (single tube & double tube) including coring and casing bits.	1 each
5	Standard Penetration Test equipment complete in all respects including all rods, split spoon sampler, hammer and containers etc.	1
6	Denison/Pitcher/Shelby samplers and tubes	1 each
7	Hydraulic Jacks with all accessories for the extraction of casings	1
8	Electrically operated sounder for groundwater level measurement	1
9	Apparatus for performing Test Pits	2 each
10	In-situ Field Permeability Test apparatus	2 each
11	Packer Test (Water Pressure) apparatus	1
12	Wooden Boxes for the preservation of undisturbed soil samples and rock cores	As required
13	Transport for mobilization of equipment	As required

1.7 Demobilization

Demobilization shall consist of the removal from the site of all plant and equipment after completion of the work and leaving the site clear, clean and tidy to the satisfaction of the Consultant. Consultant's permission shall be sorted before demobilization from the site.

1.8 Plant and equipment

The Contractor shall keep on the site sufficient plant to meet the requirements of the work. The plant and equipment shall be in good operating condition and capable of efficiently performing the work as set forth.

1.9 Drillers and supervisory staff

The Contractor shall have on site, at all times, qualified, experienced, orderly and thoroughly competent persons including geotechnical engineer or engineering geologists who shall conduct and supervise drilling/boring operations, coring, sampling, logging and in situ testing. The Contractor shall remove from the site any of his employees that, in the opinion of the Consultant do not meet these requirements.

1.10 Setting up at each hole

The Contractor shall make all the necessary arrangements for setting up at the location of each hole, everything necessary for carrying out the work specified at that hole, and for the preparation and reinstatement of the work areas, improvement to access routes and all other temporary works.

1.11 Housing and storage

The Contractor shall make his own arrangements for housing of his personnel and storage of the equipment and supplies at the site. However, the Contractor shall provide a temporary site office established in a tent and properly furnished for the Consultant or Consultant's Representative.

1.12 Health, Safety and Environmental (HSE) Measures

a) The Contractor shall ensure that all necessary measures are undertaken to maintain good health of its staff and hygienic conditions at the job site.

b) The Contractor shall ensure the safety of all the personnel engaged in the work including the Consultant and his supervising staff, and shall take necessary precautions and preventive measures to that end including the use of Personal Protective Equipment (PPE) and safe working procedures.

c) The Contractor shall take effective steps to assure that during the work no air, water or soil pollution is generated.

1.13 Interference with others

It is possible that the Consultant may engage some other agency for the execution of other investigations at the Project sites, which will start within the period of this contract. The Contractor shall ensure that neither he nor his staff cause any interference with, as well as delays to any other agency working on or near the site and that his plant, equipment or supplies shall not prevent or hinder the movement of personnel or of plant, equipment or supplies belonging to others who are lawfully in the area. If the Contractor receives any complaint either verbally or in writing that his operations have caused or are causing delays or hindrance to others, he shall inform the Consultant immediately and pass on the original or a copy of any written complaint received. Likewise, the Consultant shall inform the Contractor of such complaint which he has received concerning the Contractor's operations.

1.14 Measurement of Quantities

The quantities shown in the BOQ are approximate. The payment shall be made on the

basis of actual work performed in accordance with the specifications.

1.15 Submission of Field Data

The Contractor shall supply complete field investigation data to the Consultant within two (02) days after the completion of field work. This data shall include copies of all approved logs and test records prepared during the course of the contract including any alterations or amendments required by the Consultant. Moreover, two (02) copies of geotechnical investigation report shall be provided to the Consultant in hard binding and one (01) in the form of digital file saved on a compact disc. No separate payment shall be made for this work.

1.16 Order of work

The order of the execution of the work will be specified by the Consultant.

2 DEFINITIONS

2.1 Holes

Any borehole or drill hole is referred to generally as a hole.

2.2 Boring

Boring shall mean advancing a hole using machine-driven bailer, drill-bit, chisel or clay-cutter. The rig used shall be called a boring rig and the hole formed shall be called a drilled/ augured/ percussion hole.

2.3 Drilling

Drilling shall mean the use of a machine-driven rig for advancing a hole in rock or soil required with a rotary cutting tool. The hole formed shall be called a drill hole and the rig used shall be called a drilling rig, which term shall include a boring rig with auxiliary equipment for drilling.

2.4 Rock Coring

A ‘rock core’ is true representative of rock mass retrieved after drilling activity on a specific depth vertical/ inclined/ horizontal of the shape of core recovery barrel.

2.5 Sample Tube

A ‘sample tube’ shall mean the container into which undisturbed soil is forced during sampling and in which the soil is extracted from the ground and stored, after sealing, against loss of moisture.

2.6 Sampler

A ‘sampler’ shall mean the sample tube and all the accessories that are required to obtain the disturbed or undisturbed sample of soil.

3. MATERIALS AND EQUIPMENTS

3.1 General

The Contractor shall keep on the site sufficient plant to meet the requirements of the Works. The plant and equipment shall be in good operating condition and capable of efficiently performing the work specified. Site investigation work shall be carried out in accordance with the recommendations of the Consultant.

3.2 Drilling Equipment

Percussion equipment capable of drilling to depths of 15 m shall be supplied for drilling exploratory holes in overburden/gravely strata. Percussion equipment shall be of the cable-tool type except where otherwise approved by the Consultant. Water jet equipment shall not be used. A sufficient number of rotary and percussion boring rigs shall be available for bore through overburden, or in lieu of this, the Contractor may provide rigs capable of drilling by both rotary and percussion methods. Sampling equipment to be provided shall include undisturbed samplers (like Pitcher, Denison and Shelby tubes), piston sampler, rock core recovery assembly and equipment for performing Standard Penetration Tests (SPTs).

4 WORKMANSHIP

4.1 General

Any quantities, patterns, spacing, types and depths of drilling given in these Specifications are tentative and may be altered or omitted as a result of the conditions revealed as work progresses.

4.2 Contractor's Experience

Unless the Contractor has satisfied the Consultant that he is skilled and experienced at drilling and has successfully completed drilling work of a similar nature and extent, the Contractor shall employ an approved specialist subcontractor to undertake the drilling.

The experience and qualifications of the drilling supervisors shall be subjected to the prior approval of the Consultant. The Contractor shall have on site, at all times, experienced graduate Consultants or geologists who shall conduct and supervise the drilling, sampling, logging and in-situ testing.

4.3 Location of Holes

The Consultant (Site Consultant/Geologist) will specify the exact location and reference number of all holes, but locating the holes accurately in the field shall be the Contractor's responsibility. Before work is started in connection with each hole, the Contractor shall confirm its position and required depth with the Consultant. These details shall be recorded either in the form of a written instruction from the Consultant to the Contractor, or if this is not received, by written confirmation from the Contractor to the Consultant

before work commences.

The Contractor shall measure and record the ground level at every hole position so as to establish the point from which depth measurements are taken.

The Consultant will indicate the type and maximum depth likely for each hole before it is started, and the Contractor shall use the equipment necessary for continuing the hole to that depth.

4.4 Drilling

4.4.1 General

Drill holes may be vertical, inclined or horizontal as directed by the Consultant. All reasonable care, including the use of stabilizers fitted to the drill-string in rotary drill holes, shall be exercised to ensure that deviations from the specified inclination are kept to minimum. When required by the Consultant, the verticality or inclination of any hole shall be checked by an approved method.

No lubricants shall be used in drill holes other than an adequate supply of clean water, unless specifically approved by the Consultant. The use of drilling mud may be required by the Consultant for drilling in certain holes, but shall not be used unless specifically approved by the Consultant.

Water shall not be added or removed from a hole when, in the opinion of the Consultant, such action might adversely affect undisturbed sampling and the results of in situ tests.

When drilling is carried out in any material which is not sufficiently cohesive to stand firmly without a casing, casing shall be used. Casing shall of a suitable size and shall be inserted in such a manner as to be recoverable. Casing shall not be removed from any hole nor any filling introduced into a hole until permission is given by the Consultant. This permission will normally be given as soon as work in the hole is completed and the groundwater level has been measured as specified herein. Casing shall be gradually withdrawn keeping the level of the backfill or grout above the bottom of the casing during withdrawal. The Contractor shall, as much as possible, avoid leaving a hole overnight after he has begun to withdraw the casing and before he has finished.

Any hole which becomes clogged or obstructed by caving or for any other reason before completion of the operation shall be cleaned out to the satisfaction of the Consultant, or an additional hole shall be drilled. Blasting shall not be allowed for breaking up material encountered in a hole except with the written permission of the Consultant.

Any hole that is abandoned before work on it is completed and any hole from which unsatisfactory samples have been obtained or in which unsatisfactory field tests have been performed shall be rejected and replaced by another hole adjacent to the original location. The exact location of any such replacement hole will be specified by the Consultant. Penetration of a replacement hole to depth to which the rejected hole was satisfactory completed may be made by any method selected by the Contractor which, in the opinion of the Consultant, will permit satisfactory completion of the replacement hole and any testing or sampling below that depth.

Logs of holes shall be provided on forms supplied by the Contractor in accordance with examples which will be provided by the Consultant. They shall include descriptions of all strata and details of samples taken, and an account of all observations and field tests.

All logs shall be subject to the approval of the Consultant, and two draft copies shall be submitted to the Consultant not more than 5 days after the hole is backfilled. Soil descriptions shall conform to the recommendations given in BS 5930. All depths and thickness shall be recorded in metres and all reduced levels shall be recorded in metres and to the datum established by the Consultant's representative on Site.

The presence of the Consultant, who may keep separate drilling records, shall not relieve the Contractor of any of his responsibilities for keeping records.

4.4.2 Rotary Drilling of Exploratory Holes

The Contractor may be required to carry out drilling under the direction of the Consultant to obtain cores to investigate subsurface conditions. Where core recovery is required, the minimum size shall be 4 inch in soft soil and rock.

Drilling shall be carried out in such a manner that the maximum amount of core is recovered. To achieve this, close surveillance shall be given to drilling fluid, drilling pressures, lengths of runs and all other factors relevant to the nature of the material being drilled. The drilled material shall be withdrawn and the core barrel removed as often as may be necessary to recover the maximum possible amount of core. Coring runs shall normally be limited to 5 ft. when core recovery is less than 80%, coring runs shall be limited to 1.65 ft. unless otherwise directed by the Consultant. The core barrel shall be removed from the drill hole immediately if blocking of the bit or grinding of the core is apparent, regardless of the length of run which has been made. The borehole will be considered as abandoned if core recovery is less than 70%.
Where required or ordered by the Consultant, the casing shall be advanced in sequence with each coring run, and the casing shoe shall be kept within 3 ft. of the core bit face.

4.4.3 Percussion Drilling of Holes

Where exploratory holes are drilled by percussion method, the Contractor shall avoid any unnecessary disturbance to the material and shall ensure that:

- The water level in the hole shall be maintained slightly above the water table in the permeable stratum.
- During percussion drilling, the casing shall be kept at least 6 inch ahead of the bottom of the hole, except where, in the opinion of the Consultant, it is impossible to advance the casing so far. The bottom of the casing shall never be higher than 6 inch above the bottom of the hole except where the Consultant has ordered a borehole to be depended without lowering casing to form a greater length of open hole for preliminary testing.
- Close – fitting tools shall be withdrawn slowly to avoid suction pressures.
- If any obstruction such as timber, brickwork, concrete, boulder or other material is encountered in any hole and such obstruction cannot be removed unless if first be broken up by the repeated use of a heavy chisel or other similar tool, the Contractor shall immediately inform the Consultant and either await the Consultant's

instruction before proceeding any further; or endeavour to break up and remove the obstruction immediately. The Consultant will instruct the Contractor as to which course is to be followed at beginning of each hole or set of holes. A small sample shall be taken of the material forming the obstructions.

The casing shall never be in advance of the bottom of hole by more than 150 mm (6 inches) during undisturbed sampling or standard penetration tests. When instructed by the Consultant, it shall be withdrawn so that the bottom of the casing is less than 150 mm (6 inches) below or level with the base of the hole at the time of sampling or testing.

Two sizes of bailer shall be available to work with each size of casing. The smaller bailer, which shall generally be used, shall have an outside diameter between 250-175 mm (10-7 inch) and 125 mm (5 inch) smaller than the internal diameter of the casing. The larger (close fitting) bailer, which shall only be used when in the opinion of the Consultant, it is impossible to advance the hole with the smaller bailer, shall have an outside diameter not more than 50 mm (2 inch) smaller than the internal diameter of the casing. The area of aperture through which the soil must enter at the base of the bailers shall be not less than 50 per cent of the overall cross sectional area of the bailers.

When directed by the Consultant, the Contractor shall suspend percussion drilling, clear the hole of any obstacles and set up a stand-by rotary rig to drill in advance of the bottom of the percussion drill hole. 5 inch diameter casing shall be lowered to the bottom of the hole before the start of rotary drilling and shall be kept as close as practicable to the bottom of rotary drill-hole. While rotary drilling, the Contractor shall install a T-piece on the top of the 5 inch diameter casing so that returning flush water is discharged outside the large diameter casing and may be sampled easily to determine the nature of the cuttings. The Contractor shall carry out Standard Penetration Tests through the 5 inch diameter casing when instructed by the Consultant. After the completion of rotary drilling and any tests ordered to be carried out through the 5 inch diameter casing, that casing shall be pulled out of the hole, the rotary rig shall be removed and shifted to its stand-by position, and the hole shall be cleared of any obstacle which may hinder the resumption of percussion drilling to advance the hole.

The material removed from all percussion drill-holes, except for disturbed samples in their containers and undisturbed samples in their samplers shall be laid out in sequence on a clean dry board for examination by the Consultant The material shall be displayed in such a manner that, when required by the Consultant, further disturbed samples can be taken unmixed with other material. No material shall be removed from the board until authorised by the Consultant. All the material displayed shall be protected from adverse effects of the weather including sun and rain.

4.5 Sampling

4.5.1 General

The Contractor shall take samples from any drill hole when ordered to do so by the Consultant. This shall include the provision of all necessary sampling equipment, tubes, containers, crates and boxes, core boxes, as well as handling and transport to the laboratory or store.

The contractor shall be responsible for the safe keeping of samples of all kinds until they have been handed over to the Consultant or disposed of at the Consultant's instructions, as the case may be. Any sample lost, damaged or showing signs of deterioration while in the Contractor's care shall be replaced by the Contractor. All samples shall be transported to the Consultant's approved laboratory or store at the Site the day the samples are collected. Samples in tubes shall be transported with the tubes in a horizontal or vertical position as instructed by the Consultant.

4.5.2 Labelling of Samples

The Contractor shall assign a reference number to each soil and water sample taken from a hole. The number shall be unique for that and shall be in order of depth below ground level.

All samples taken from drill holes shall be clearly labelled. Each label shall include the following information:

- Name of Contract
- Reference number of the hole
- Reference number of sample
- Date of sampling
- Brief description of the sample (e.g. sandy gravel)
- Depth of the top and bottom of the sample below ground level
- Number of the sample tube (if relevant).

Tubes and crates for undisturbed samples shall be labelled 'Do not jar or vibrate' in English and translated in Urdu.

4.5.3 Disturbed Samples

All large disturbed samples shall be sealed into heavy duty plastic bags of at least 500 micron thickness immediately after they are taken. The sealed bag shall then be placed inside another similar plastic bag. Each outer bag shall be labelled as specified and a second label giving the same information shall be placed inside the outer bag.

Small disturbed samples shall be taken from the split spoon samplers used for Standard Penetration Tests. When the samples have been taken they shall be placed without delay in airtight glass jars of not less than 1.1 lb nominal sample size, and each sample shall fill the jar as nearly as possible.

4.5.4 Field Moisture Content Samples

Samples for field moisture content shall be taken with (and separate from) each small disturbed sample or as otherwise instructed by the Consultant. The samples shall be placed in air tight containers immediately after sampling and shall fill the containers. The containers shall be kept wrapped in damp cloths in boxes and delivered to the site laboratory within four hours of sampling.

4.5.5 Open Drive Undisturbed Samples

Undisturbed samples up to 100 mm (4 inches) diameter shall be taken in sands and fine-grained soils, at changes of strata, and at intervals of 2 m in any stratum thicker than 2 m or otherwise as directed by the Consultant. Continuous undisturbed sampling may be required in some holes when directed by the Consultant.

The use of oil inside the sampler shall be limited to the minimum practical. The end of the sample tube marked 'TOP' shall be driven uppermost. Care shall be taken to ensure that the sample is not compressed by overdriving. The dimensions, construction and condition of each sample tube, cutting shoe and adaptor head shall be subject to the approval of the Consultant.

The Contractor shall make every effort to avoid disturbance of the material to be sampled. The debris in the bottom of the hole shall be cleaned out as much as possible before sampling by careful use of the clay-cutter or bailer. The Contractor may try two or three different types of samples such as Denison, Pitcher or Shelby as directed by the Consultant, to improve the quality of sampling.

Before withdrawal of the sampler, the sampler shall (if practicable) be rotated through one complete revolution to shear the soil horizontal at the bottom of the sampler. The sampler shall then be withdrawn smoothly so as to cause the minimum disturbance to the sample. The total length of the sample shall be measured and recorded and, if any of the soil has fallen out of the bottom of the tube, this fact shall also be recorded.

4.5.6 Preserving Undisturbed Samples

After removing the cutting shoes and the adaptor head with the disturbed material which they contain, the visible ends of the sample shall be trimmed of any wet disturbed soil and then immediately coated with not less than four layers of just molten microcrystalline wax or other similar material approved by the Consultant. A material foil disc with diameter 0.4 inch greater than the diameter of the tube shall then be added and followed by more layers of molten wax to give a total thickness of not less than 1 inch. Any space remaining in the ends of sample tube shall be completely filled with damp sawdust or other material approved by the Consultant and the ends of sample tube shall be covered with tight fitting screw caps.

The sample tube shall immediately be labelled as specified. A second label giving the same information shall be placed inside the sample tube at the top end.

Every precaution shall be taken to avoid damage to the undisturbed samples during transportation. Samples shall be transported in wooden boxes made from 0.5 inch or thicker timber, and with a capacity of six samples. The samples shall be well packed in suitable material to protect the samples against vibration. The Contractor shall not expose packed samples to direct sunlight or extreme temperatures. The samples shall be stored in the sheds.

4.5.7 Core Handling

The cores obtained from drill holes shall be carefully removed from the core barrel by means of a hydraulic or pneumatic core extruder onto half-round channel or split pipe of similar diameter to the core. The core shall then be lifted off that channel and placed

without delay onto the plastic wrapping sheets in the core boxes. The plastic sheets shall be wrapped around the core so to overlap at the top of the core and shall be sealed at the ends and along the side with adhesive tape, in order to preserve the original moisture content. The depth at the top and bottom of each run of core shall be indelibly marked on the wrapping and 'TOP' marked at the upper end. Field moisture content samples shall be taken as directed by the Consultant.

Where the core is contained in an expendable triple tube liner, the ends of the tube shall be sealed and waxed as described for undisturbed open drive samples. Field moisture samples shall be taken from the part of the core remaining in the bit.

The Contractor shall place the cores in core boxes in correct sequence and with each run segregated accurately be labelled wooden blocks 25 mm thick according to the measured depth in the drill holes. Cores of different size shall not be stored in the same box. No box shall weigh more than 112 lb when full. The depth of the bottom of all runs shall be neatly marked on the partitions with paint.

Pieces of rock shall be carefully fitted together as close as possible to their relative positions in the ground. Core losses shall be shown as wooden blocks each of a length equal to that of the core lost; these should be inserted immediately after the core is placed in the core box.

4.5.8 Marking and Storage of Core Boxes

The core boxes shall be marked prominently and clearly on the top, sides and ends or as directed by the Consultant using waterproof black paint. The markings shall include the name by the Contract, the working area, the drilling number, box number and the total number of boxes for the drill hole. The same markings shall be painted inside the lid. The marking shall be sufficiently large and clear to be legible in the photographs taken in accordance with the Specifications.

Until the boxes containing the cores are transported from the working areas, they shall be neatly stored under weatherproof cover at the drill hole locations in such a manner that inspection of the cores can easily be made.

At intervals throughout the contract period, or at the end of the contract period, the Consultant will direct the Contractor either to dispose of the cores and boxes or to move them to a permanent storage site.

4.5.9 Core Photography

The Contractor shall take colour photographs of cores in core boxes. Each photograph shall be taken from vertically above and shall be of two core boxes containing adjacent core runs. Plastic wrapping shall be folded back to expose the core and shall be folded over and resealed with adhesive tape immediately after the photographs have been taken. Similar colour photographs of triple-tube cores shall be required on their exposure in the laboratory and the cores shall be resealed on completion of the photography.

Within one month after core recovery, the Contractor shall submit to the Consultant 3 colour prints not less than 4 inch x 6 inch. The prints shall remain the property of the

Consultant.

4.5.10 Core Samples

Cores recovered from drill holes shall be taken for use as samples for laboratory testing when directed by the Consultant. Such samples shall be cut from the core as ordered by the Consultant either after it has been extruded onto the channel or split pipe from the core barrel, or after the core has been placed in the core box. A spacer bearing the sample number shall be placed in the core box to fill the space which would have been occupied by the core sample.

Immediately after they are taken, samples shall be coated with microcrystalline wax and cheese cloth or other similar material approved by the Consultant. The coating shall be built up in layers to a total thickness of not less than 0.2 inch in order to seal the samples against loss of moisture by evaporation. The samples shall then the packed with straw or sawdust against loss of moisture by evaporation. The samples shall then be packed with straw or sawdust boxes for transport to the Consultant's approved laboratory. The wooden boxes shall become the property of the Consultant. The samples shall be stored in the manner prescribed for undisturbed samples. The top of the sample shall be clearly marked before it is waxed and on the outside of the wax. Labels in accordance with the Specifications shall be placed inside the wax, outside the wax and on the wooden box.

4.5.11 Core Boxes

Core boxes shall be made of 0.75 inch thick timber with 0.75 inch thick partitions, and shall be safe against attack by termites. The bottoms shall be screwed on and the covers shall be hinged and securely padlocked at the end of each working period. Carrying handles shall be provided at each end of the box. No box shall contain more than 16.5 ft. of core from 4 inch diameter holes and not more than 10 ft. of core from holes larger than 4 inch diameter.

A separate continuous plastic sheet shall be provided to wrap all the cores placed in each channel formed by the partitions in the core boxes. The sheet shall be wide enough to wrap around the core with an overlap of 2 to 3 inch. Adhesive tape, to seal the edges and ends of the plastic wrapping, shall be suitable for damp as well as dry conditions and shall be suitable for unsealing without tearing the plastic wrapping.

The core boxes shall become the property of the Consultant after the core has been permanently placed therein.

4.5.12 Temporary Core Shed

The Contractor shall provide a temporary lockable core shed or sheds large enough to contain all the boxes of core and allow easy inspection of the core while protected from the weather.

4.5.13 Water Samples

The Contractor shall take water samples from drill holes before the addition of water to the hole unless this is impossible. If necessary, the hole shall be bailed out before taking the sample to ensure that any potential contaminant is removed. No fuel or other potential contaminant shall be allowed to enter the drill hole. Samples shall be stored in approved

air-tight and clean containers, and shall not be less than one litre in volume, labelled in accordance with the Specifications.

4.5.14 Water Level Reading in Holes

Reading of water levels in holes shall be taken with an electrically-operated sounder and recorded in the daily field records and logs at the following times:

- Before work commences in the morning.
- After work has finished in the evening, both before and after water (if any) is added to stabilize the hole.
- When a hole has been completed.
- Immediately prior to backfilling a hole.
- At the time of undisturbed sampling and standard penetration and other in situ tests.
- When the Consultant requires.

An electrically operated sounder in good working order shall be maintained at each drill hole where work is in progress, whether or not water has previously been observed in that hole. The level of the bottom of the drill hole and the bottom of the casing, if any, shall be measured and recorded at the same time as each water level reading. The times when water levels are measured shall also be recorded.

If, at any time, the level of the water in a drill hole fluctuates, a record shall be kept of the fluctuation. If the hole 'makes' or 'loses' water, the Consultant shall be informed immediately, and any extraordinary smell or colour of the water and any other unusual circumstances shall be reported. Any addition of water to assist the advance of a drill hole shall be recorded.

The groundwater level in drill holes shall be determined after completion of the hole as follows. Clear water shall be added, or the hole shall be bailed out as necessary, to bring the water level to the expected groundwater level as directed by the Consultant, and the water level shall be recorded. The water level within the casing at the start of normal working hours on the morning of the next working day shall be recorded.

4.5.15 Standpipe Piezometers

When directed by the Consultant's Representative the Contractor shall install a standpipe piezometer in any hole. More than one piezometer and standpipe may be required in any one hole. The Standpipe shall be 1.5 inch diameter PVC pipe and shall be connected at its lower end to a porous Casagrande piezometer tip or a type approved by the Consultant's Representative surrounded by sand and sealed with bentonite above the sand. A typical piezometer sketch is provided in Annex-4.

If more than one piezometer is installed in one hole, the sand surrounding the upper piezometer shall be sealed underneath with bentonite as well as above. The Contractor shall obtain from the Consultant's Representative, before starting to backfill, written instructions as to the depth of the tip, depth of granular material, and number of piezometers, in the hole. The cap provided at the top of the tube shall normally be kept closed. All Standpipe piezometers shall be provided with covers to prevent plugging or obstruction of the Standpipe.

The Contractor shall also maintain the record of groundwater level in each piezometer or standpipe using an electric dipmeter at the following frequencies:

- From the date of completion of the installation, readings shall be taken every day until one week after completion of a successful commissioning test.
- Readings shall then be taken at weekly intervals for the remainder of the Contract period, until one week before submission of the Final report.

Readings shall be reported weekly to the Consultant using an Excel spreadsheet summary table in a format to be approved by the Consultant. The results shall be presented in borehole/test pit and date order including the following information:

- Borehole or test pit number
- Date of the reading
- Reference point for readings (usually the top of the plastic pipe)
- Stick-up above (or below) ground level of the reference point
- Ground water level reading as depth below the reference point
- Ground water level reading as depth below ground level
- Notes and dates of exceptional events such as: water tests in installation, water samples taken, installation flooded by surface water, installation blown out, installation damaged or vandalised.

A soft copy in Excel file format shall be provided with the Draft and Final Geotechnical Investigation reports.

5 TESTING

5.1 Standard Penetration Tests (SPTs)

When directed by the Consultant, the Contractor shall carry out Standard Penetration Tests (SPTs) in any type of material. The penetration will be performed using a 140 lbs hammer, dropping freely from a height of 0.750 m (30 inches) to force the standard split barrel sampler 0.45 m (18 inches) into the soil. The penetration resistance 'N' shall be expressed as the number of blows of the number required to force the sampler the last 0.3 m (12 inches) into the soil.

The bevelled edge of the drive shoe shall be maintained in good condition and if worn, shall be re-sharpened to the satisfaction of the Consultant. A damaged or bent drive shoe shall not be used. It shall be replaced if damaged in such a manner as to cause projections within the interior surface of the shoe. No liner shall be fitted in the split barrel sampler. When directed by the Consultant, a core-ended adapter with a 30 degree half angle shall replace the open ended drive shoe for use in gravelly soils.

Standard Penetration Tests shall be carried out in holes when directed by the Consultant during the progress of the work. If the Consultant or Contractor has reason to believe that the hole has entered a layer which consists predominantly of sand or finer soil, percussion drilling shall be stopped after cleaning the bottom of the hole, taking care to bail out all the loosened material which could have remained in the hole above the test level. Then a rotary drilling machine shall be installed for drilling 100mm (4 inch) diameter holes, and

100mm (4 inch) external diameter casing fitted with a casing bit at the bottom should be lowered to the bottom of the percussion hole. The hole should then be drilled 200mm (8 inches) below the bottom of the percussion hole using mud and tricone bit. The 4 inch casing also should then be advanced by 200mm (8 inches) by rotating with wrenches. If, in the opinion of the Consultant it is impossible to advance the casing with wrenches it may be advanced using the rotary drilling machine but in no case may the 100mm (4 inch) casing be driven by hammering. The depth of the hole shall be checked by sounding and the hole should be drilled again, if necessary, using a tricone bit with mud flush, to ensure the hole is open to the base of the casing but no deeper. The 100mm (4 inch) dia casing shall remain filled to the top with mud slurry all the time. During the process of boring, washing or cleaning the hole, care shall be exercised to ensure that the material to be tested and sampled in not disturbed by these operations. The 100mm (4 inch) diameter casing shall not be in advance of the bottom of the hole where the test is to be conducted.
If the number of blows required to the drive the sampler including the seating drive exceeds seventy five, the test shall be terminated even if the required penetration of the sampler has not been obtained. In such cases the number of blows and the penetration attained shall be recorded.

Immediately after each test, the sampler shall be carefully taken apart and any soil sample collected shall be classified. The most representative portion of the soil sample from the bottom of the sampler shall be placed in an airtight container. This soil sample shall be considered as a disturbed sample. After performing the first test in this way, the hole shall be drilled with the tricone bit and mud flush, and soundings shall be taken to ensure that the hole is clean to the bottom of the previous test. Then a second SPT shall be performed in the same manner as described above. The 4 inch diameter hole shall then be advanced to the bottom of the second test using the tricone bit and mud flush, and then the 100mm (4 inch) diameter casing also shall be advanced to the bottom of the hole as previously specified. The 125 mm (5 inch) diameter hole shall be cleaned to the level of the bottom of the casing using the tricone bit and mud flush taking precaution to avoid disturbance. Soundings shall then be taken to ensure that the hole is clean to the bottom. Then an undisturbed sample shall be taken with a sampler in accordance with the provisions of Contract. The sampler shall be withdrawn and dismantled carefully to avoid disturbance, and the sample shall be waxed properly in the field. Subsequently, undisturbed sampling and SPTs shall be performed alternately until the Consultant directs otherwise.

During the performance of SPTs including the seating drives, an accurate free fall of the hammer shall be attained. The rod above the hole collar shall be held in a vertical position to prevent energy loss due to rod whip or buckling. The hammer shall be pulled up and held exactly 30 inch above the anvil with the help of only one free-running pulley and without any turn of the rope around any other pulley or cathead, and then shall be dropped. Uniformity shall be obtained in all SPTs to be done.

The rate of application of hammer blows shall be between 10 and 20 blows/minutes. The Contractor shall ensure that the persons engaged for pulling the hoist rope synchronise their timing for releasing the rope to avoid drag which could prevent a free fall condition. A foreman, if necessary, shall call the time and ensure synchronised timing.

The test data obtained shall be recorded in the field and shall include the following:

- No. of borehole, test number and depth.

- Description of soil.
- Thickness of layer.
- Depth of water surface at the time at which test conducted.
- Size of casing, depth of cased hole.
- Number of turns of rope around the cathead.
- Type and weight of anvil, and size of rods.
- Number of blows for each 3 inch penetration and total length of penetration.
- Penetration resistance 'N' value.
- Whether open-ended drive shoe or core-ended adaptor was used.

Two copies of the field data for each test recorded on forms to be supplied by the Contractor in accordance with examples which will be provided by the Consultant shall be submitted to the Consultant within 24 hours of completing the test.

5.2 Field Permeability Tests

When directed by the Consultant, the Contractor shall carry out variable (rising/falling) or constant head permeability tests to determine the in situ permeability of the soils. The contractor shall drill a cased exploratory hole and shall place a quantity of approved clean gravel in the hole sufficient to fill it to 1 m (3 ft.) above the bottom and shall withdraw the casing as much as 0.5m (20 inch) above the bottom of the hole prior to starting the test, if directed by the Consultant. The water in the hole shall then be observed until it reaches a steady level or a level acceptable to the Consultant, which shall be recorded. Only clean water shall be used in the hole for the test. The depth of the hole shall be sounded immediately before the gravel in the hole and before and after each field permeability test.

In the falling head permeability tests, the casing shall be filled with water which shall be allowed to seep into the soil. The rate of drop of the water level in the casing shall be observed by measuring the depth of the water surface below the top of the casing at 1, 2 and 5 minutes after the start of the test and at 5 minutes intervals thereafter. These observations shall be made until the rate of drop becomes negligible or until, in the opinion of the Consultant, sufficient reading has been obtained to determine satisfactorily the permeability.

For a rising head permeability test, water shall be added to the casing at a rate sufficient to maintain a constant water level at or near the top of the casing for a period of not less than 10 minutes. The water may be added by pouring from a USBR Well Permeameter or, if the amount required exceeds 0.5 gallons/min, by pumping through a water meter. The data recorded shall consist of amount of water added to the casing at 1, 2 and 5 minutes after the start of the test and at 5-minutes intervals thereafter until, in the opinion of the Consultant, an adequate determination of the permeability has been made.
The following data shall be recorded for all field permeability tests in addition to the readings specified:

- Date and time when the test was started.
- Steady water level inside the smallest casing before the test.
- Internal diameter of the smaller casing.
- Height of smallest casing above ground level.
- Depth of smallest casing below ground level.

- Depth of other casing below ground level.
- Depth of hole below ground level.
- Diameter of hole which has been filled with clear gravel below the casing.

Two copies of the filed data for each test recorded on forms to be supplied by the Contractor in accordance with samples which will be provided by the Consultant shall be submitted to the Consultant within 24 hours after completing the test.

5.3 Water Pressure Testing

Water pressure tests (packer tests) shall be carried out in drill holes and grout holes as directed by the Consultant. The water-level in the drill hole shall be measured before packer and other equipment are inserted in the drill hole and after they have been withdrawn. Double packer tests (with one packer at each end of the test section) or single packer tests may be required by the Consultant. To demonstrate that the packers operate satisfactorily, the Consultant may require that the packers be expanded periodically in an open-ended pipe on the surface. Only clear water shall be used for all pressure tests. The tests shall be carried out by expanding the packer in the drill hole, or in the tube-a-manchette installed for grouting the hole.

The pressures measured at the mouth of the hole with static conditions for the five stages of each water pressure test shall be listed below unless the Consultant decides that the flow of water into the test section in so low that the test may be terminated after the third stage.

Stage	1	2	3	4	5
Gauge Pressure	0.33 x P	0.67 x P	P	0.67 x P	0.33 x P

Where P is limited as follows:

Holes Inclined Down

P (kPa) = 9 H or P_{max} whichever is the less, where
H (m) = Difference between the elevation at the hole mouth and the elevation at the centre of the test section in the hole; and
P_{max} (kPa) = A maximum pressure issued as an instruction from the Consultant to the Contractor.

P_{max} shall be expressed in units applicable to the work and shall vary to suit the type of ground being tested. P_{max} is typically 700 kPa for formation such as are present on this Site. For holes inclined up, P_{max} shall be increased by 18 x H2 kPa.

Holes Inclined Up

P(kPa) = 1SH1 + 9H2, or P_{max} whichever is the less, where
H1 (m = Difference between the elevation at the centre of the test section in the hole and the elevation of the ground surface above; and
H2 (m) = Difference between the elevation at the centre of the test hole and the elevation at the hole mouth.

The pressure gauge shall be positioned where it will give a true reading without interference from local pressure variation induced by flow through the pipe work. In calculating the value of P, which will correspond to the reading on the pressure gauge, the Contractor shall take account of the height difference between the gauge and the top of the hole and the friction head loss due to flow of water between the gauge and the end of the water injection pipe at the test section in the hole.

Calibration tests shall be performed to determine the friction head loss between the pressure gauge and the point of injection into the section under test at different rates of flow as instructed by the Consultant. Groundwater levels in the hole shall be measured before and after each test.

The method of measuring the flow of water shall be accurate to 5 per-cent of the flow or 0.25 liters per minute whichever is the greater. The flow of water into the test section shall be measured for consecutive periods of 5 minutes for each stage of the test. The first stage shall continue from the time the test section is filled until the flow during this consecutive period of 5 minutes does not differ by more than 10% of the lower value.

In each subsequent stage, the flow of water shall be measured over three periods of 5 minutes duration unless the first two readings differ by not more than 10% of the lower reading.

Two copies of the filed data for each test, recorded on forms to be supplied by the Contractor to the Consultant within 48 hours after completing the test.

5.4 Excavation of Test Pits

5.4.1 Areas to be investigated

The Consultant will specify from time to time during the contract period the exact location and reference number of all test pits in project area, but locating the test pits accurately in the field shall be the Contractor's responsibility. In addition, the Contractor will provide the exact co-ordinates of test-pits to Site Consultant/Geologist and in its final report.

5.4.2 Excavation

5.3.2.1 Excavation method

The Contractor shall perform excavation in test pits to final dimensions, lines and depths as specified or approved by the Consultant. The Contractor will be free to choose any method of excavation with prior approval of the Consultant. The Contractor shall be entirely responsible for the success of the method of excavation used regardless of approval by the Consultant. The Contractor shall carry out his excavation operations in a manner so as to cause least disturbance to the in situ material outside the lines of excavation.

5.3.2.2 Excavation Extent

The test-pits shall be up to a maximum of 3.0 m depth or as specified in BOQ at least 3.0 m x 3.0 m throughout their depth or as directed by the Consultant. The Contractor shall excavate test-pit so as not to have any protrusions inside the clear section. Excess excavation performed by the Contractor for any purpose or reason, except that ordered in

writing by the Consultant, shall be at the expense of the Contractor. The Contractor shall keep the walls and floor of the test pits accessible and clean for inspection by the Consultant. The Contractor will prepare a detailed test-pit log of the strata encountered as directed by the Consultant.

5.3.2.3 Removal and Disposal of Excavated Materials

The Contractor shall remove all excavated materials and any caved in debris from the test-pits and shall be responsible for disposal of such excavated material away from top of the test pits as directed by the Consultant. The payment shall be made according excavated depth.

5.4.3 Supports of Test pits Excavation

The Contractor shall properly support the test-pit excavation as and when instructed by the Consultant in writing. The Contractor alone shall be responsible for the adequacy of the supports regardless of the approval by the Consultant. Timber supports shall be used and left in place after completion of test pits for sampling and logging. The Contractor shall be free to use his own system of timber supports with the approval of Consultant. However, nothing contained in this clause shall relieve the contractor of his responsibilities in respect of adequacy of supports of the excavations. If necessary, the Consultant shall direct the Contractor to install additional supports or to abandon an unsafe pit without any payment to the Contractor. The support system shall be removed before backfilling of Test pits.

5.4.4 Rain and Surface Water

Surface water shall be prevented from entering the test pit. For this purpose, suitable earth dykes or interceptor ditches shall be constructed by the Contractor around the test pit at suitable locations with the approval of the Consultant. The Contractor shall also remove any accumulated water from within the pits.

5.5 Hoisting Arrangements

5.5.1 Hoisting equipment

The Contractor shall provide, install, operate and maintain hoisting equipment wherever required as approved by the Consultant and operate such equipment for removal of excavated material and all other related purposes.

5.5.2 Mucking buckets

The Contractor shall provide, install, maintain and operate mucking buckets. The buckets shall be of suitable size and sound construction as approved by the Consultant. In addition, the Contractor will provide such other equipment, as he may deem necessary for efficient handling and disposal of excavated material.

5.5.3 Blasting in Test-pit

Blasting shall not be allowed for breaking up material encountered in a test pit except with the written permission of the Consultant. Such permission shall only be given if a boulder

with diameter larger than half the width of the pit is encountered.

5.5.4 Supplementary Test-pit

Test pits that are abandoned due to fault of the Contractor shall be supplemented by other test pits adjacent to the original location. The exact location of such supplementary test pits shall be specified by the Consultant in the field.

No payment will be made for the portion of supplementary test pit above the depths paid for the unacceptable test pit.

5.5.5 Daily Field Records

Each day during the work on the Site, the Contractor shall hand over to the Consultant the original and a legible copy of the records of the previous day's work containing the following information in respect of each test pit where work was in progress.

a. Name of Contract.
b. Number, and size of the test-pit.
c. Date and hours worked on the site.
d. Brief description of the weather.
e. Total depth of test-pit at the beginning and end of each shift.
f. Reference number, depths and other details of all small and large disturbed samples.
g. Description of material encountered.
h. Details of backfilling if any.
i. Details of reasons of delays.
j. Any other relevant information and details of any other operation.

5.5.6 Backfilling Test-pits

When instructed by the Consultant, the Contractor shall backfill the Test pits. The materials for backfilling shall come from material excavated and the procedures shall be approved by the Consultant.

5.5.7 Logging, Collection of Samples and In-situ Testing

The Consultant or his staff shall inspect strata exposed by the excavation to prepare test-pit logs on approved forms and direct the contractor to collect disturbed and undisturbed samples during the progress of excavation. Whenever the Consultant or his staff enters a test pit the Contractor shall temporarily suspend his operations inside the test pit and shall provide to Consultant or his staff all facilities including labor and access through ladders into and out of the pit.

5.5.8 Contractor's Responsibility for Records

The presence of the Consultant or any of his staff and their keeping separate test pit excavation records shall not relieve the Contractor of any of his responsibilities for keeping records.

5.5.9 Sampling

a) Disturbed samples

Disturbed samples shall be collected for carrying out classification test at the depth and location to be specified by the Consultant at the site.

b) Composite samples

Composite samples shall generally be collected in those horizons where field density tests are carried out. The quantity of each sample shall be enough to allow carrying out classification and laboratory compaction test.

c) Borrow Samples

Borrow samples shall be collected from the existing potential borrow sources (along the alignment), for sand/sandy non cohesive soil (A-3)/A-4 materials and for gravely material.

6 LABORATORY TESTING

6.1 Approved Laboratory

The soil, rock and water samples shall be tested at local approved laboratories mentioned at the end of this document. The Consultant shall have access to the laboratories to supervise and check the laboratory testing of the samples. The testing shall be carried out in accordance with ASTM, ISRM, BS or AASHTO Standards or as directed by the Consultant.

6.2 Testing Program

The Contractor shall arrange to carry out the following laboratory tests on the specified samples of the subsoil materials and water. The Consultant shall issue particular instructions for any tests, if required. The samples to be tested and the tests to be carried out for each sample shall be specified by the Consultant.

6.3 Type of Tests on Soil Samples

The testing in the laboratory shall comprise, but not limited to, the following tests:

1. Grain size Analysis including Hydrometer.
2. Atterberg Limits (LL, PL).
3. Natural Moisture Content, Bulk Density and Dry Density.
4. Direct Shear Test.
5. Tri-axial Compression Test.
6. Sulphate and Chloride Contents of soil.
7. Complete chemical analysis of water.
8. Specific Gravity Determination.
9. Uniaxial Compression Test.
10. Petrographic Analysis.

11. Los Angeles Abrasion Test.
12. Odeometer Test
13. Hock Shear Test
14. Hock Triaxial Compression Test
15. Point Load Index Test

7 REPORTS AND RECORDS

7.1 Introduction

The Contractor shall prepare and submit to the Consultant the final comprehensive Geotechnical Investigation Report (02 copies in good binding form and 01 saved on compact disc) including foundation recommendation, suitability of borrow area material, borehole and test pit logs along with field tests data, laboratory results and other details as required by the Consultant.

7.2 Daily Report

The Contractor shall prepare a Daily Report signed by the Contractor's agent or representative on site for each hole, which shall be submitted to the Consultant within 24 hours of the completion of the exploration to which they refer and contain the following information where relevant.

i. General
   (a) Job name, location and coordinates.
   (b) Foreman's name.
   (c) Exploratory borehole reference number and level.
   (d) Name of Supervisory Staff.

ii. Hand Auger/Light Percussion Borings
   (a) Rate of penetration.
   (b) Diameters and depths of all casings used.
   (c) Any addition of water to the boring.
   (d) Method of penetration and flushing system.

7.3 Submission of Complete Field and Laboratory Data

The results of each borehole, test pit and field tests carried out shall be communicated to the Consultant as follows:

i. Oral reports as the work proceeds.
ii. Two sets of complete data of the work in the form of a bound document, which shall contain but not limited to:
   a. A site plan showing the position of holes and giving their map reference.
   b. The borehole logs.
   c. Complete results of field tests.
   d. Complete results of Laboratory tests.
   e. Summary of Laboratory tests results
   f. Comments on any point, which the Consultant has put to the contractor

for inquiry and investigation during the works.

7.4 Detailed Geotechnical Investigations Report

The Contractor shall be responsible for preparation of detailed geotechnical investigations report if required in Bid Invitation Letter and Bill of Quantities. The report will include but not limited to the following information:

a) Brief detail of the project including location plan and geotechnical investigation plan
b) Information regarding geology, seismicity, topography & subsurface lithology of the area
c) Details of field and laboratory works
d) Necessary geotechnical recommendations for design of foundation, slopes, dam, pipeline and road works

8 MEASUREMENT AND PAYMENT

8.1 BOQ Field Work - Mobilization and Demobilization (Item No. A1)

a) Measurement

No quantity measurement will be made of the work under this item and payment shall be based on the completion of work as specified herein.

b) Payment

The payment shall constitute full compensation for all costs for mobilization and demobilization. The contract rates shall be deemed to include all costs for providing, transporting, operating and maintaining all the equipment and plant necessary for site investigation work along with providing water, power, providing all insurance covers, providing any other expense not covered in the item rates of the BOQ and shifting and setting up at each borehole location.

8.2 BOQ Field Work - Drilling of Boreholes (Item No. B1-1, B1-2, B1-3, C1)

a) Measurement

The actual quantity shall consist of the full depth of acceptable vertical drill hole as measured along the line of the hole.

b) Payment

All the necessary operations done to accomplish drilling as specified shall be deemed to be part of this item. The casing of the boreholes, taking and recording of water levels in holes, supply of daily field record and borehole logs and all associated costs shall be deemed to be included in the contract rate. No separate payment shall be made for backfilling of holes and drilling of angle holes.

8.3 BOQ Field Work - Collection of Undisturbed Soil / Rock Core Samples from Boreholes (Item No. B1-6, C-3, C-4)

a) Measurement

Measurement shall be made as number of acceptable undisturbed samples separately and actually recovered on the instructions of the Consultant.

b) Payment

Payment shall be made as a unit for each undisturbed sample successfully recovered. The contract rate for these items shall be deemed to include the cost of any incidental delay of standing time of labour and plant, for the cost of taking, sealing, labeling, transporting samples and the cost of supply of all approved tubes, containers, crates and boxes which shall become the property of the Consultant after delivery to the approved laboratory.

8.4 BOQ Field Work - Performance of Field Permeability Test (Item No. B1-4)

a) Measurement

Measurement shall be made as number of permeability tests performed actually and successfully, on the instructions of the Consultant.

b) Payment

Payment shall be made as a unit for each test. The contract rate shall be deemed to include all labour and equipment required to perform the tests including standing time of labour and plant while the test is being performed and preparation and supply of preliminary copies of the test data to the Consultant.

8.5 BOQ Field Work - Performance of Packer Tests (Item No. B1-5)

a) Measurement

Measurement shall be made as number of packer tests (water pressure) performed actually and successfully, on the instructions of the Consultant.

b) Payment

Payment shall be made as a unit for each test. The contract rate shall be deemed to include all labor and equipment required to perform the tests including standing time of labor and plant while the test is being performed and preparation and supply of preliminary copies of the test data to the Consultant.

8.6 BOQ Field Work - Collection and Preservation of Groundwater Samples From Boreholes/ River (Item No. B1-8, B1-9)

a) Measurement

Measurement shall be made as number of water samples actually taken on the instructions of the Consultant.

b) Payment

Payment shall be made as a unit for each water sample. All costs incurred for providing

equipment, material, and labor and bailing out of the hole, if necessary and taking sealing, labeling, transporting the water samples as well as the cost of the containers shall be deemed to be included in the contract rate for water sampling.

8.7 BOQ Field Work - Excavation of Test-pits and Field Density Tests (Item No. B2-1, B2-2, B2-3, , B3-1, C5, C6)

a) Measurement

Measurement under this item will be computed by actual measurement methods and will be made of number of test pits actually excavated below ground surface (according to a specified size and depth). Measurement will be correct to a centimeter. This also includes backfilling after logging. The measurement of Field Density Tests will be made according to number of tests performed as instructed by the Consultant in the Test-pits.

b) Payment

Payment shall be made at the Contract unit price for this item and shall constitute full compensation for the tools, plant, labour etc. required to excavate and perform mentioned testing in the test pit and to backfill the test-pit later on.

8.8 BOQ Field Work - Collection of Composite Bulk and Block Samples from Test Pits (Item No. B2-4, B3-2, C7, C8)

a) Measurement

Measurement shall be made as number of bulk samples actually taken on the instructions of the Consultant.

b) Payment

Payment shall be made as a unit for each bulk sample. All the costs incurred on providing equipment material and labour etc. for collection labeling, storage and transportation as well as the cost of bags, containers and boxes shall be deemed to be included in the contract value.

8.9 BOQ Items Laboratory Testing (Item No. D, E, F)

a) Measurement

Measurement under the item "Laboratory Testing" shall be made as per actual number of laboratory tests performed according to ASTM, AASHTO or the equivalent British Standards, or as directed by the Consultant.

b) Payment

Payment shall be made for number of laboratory test actually performed in the laboratories approved by the Consultant according to the price bid by the Contractor in the Bill of Quantities as a lump sum for each test. The lump sum shall be deemed to include complete laboratory testing for the specified test according to ASTM, ISRM,

AASHTO or British Standards and presentation of reports in standard form as directed by the Consultant.

8.10 BOQ Item G Detailed Geotechnical Investigations Report

a) Measurement

Measured under the item "Detailed Geotechnical Investigations Report" shall be made as per requirements mentioned in Clause 7.4.

b) Payment

Payment shall be made as per bid submitted by the Contractor subjected that the work is carried out to the entire satisfaction of the Consultant.

LIST OF APPROVED LABORATORIES

Consultant's approved laboratories have been listed hereunder:

1. SOILCON Geotechnical Testing Laboratories, 18- Km, Multan Road Lahore.

(Tel # 042-7510942, Fax # 042-7510944)

2. CENTRAL MATERIALS TESTING LABORATORIES (CMTL) WAPDA, Near Muhammad Pura Village P.O Thokar Niaz Baig, Lahore.

(Tel # 042-5300922, Fax # 042-5302921)

3. SOIL MECHANICS LABORATORY CIVIL ENGINEERING DEPARTMENT, UET, LAHORE

(Tel # 042-9029273, Fax # 042-9029202)

If the Contractor intends to acquire the services of any testing laboratory other than the laboratories mentioned above, he shall obtain approval of the Consultant and will be responsible for arranging to provide all relevant data required by the Consultant for the approval of the Consultant.

SECTION-VII

QUALIFICATION CRITERIA

1. Qualification Criteria

Qualification will be based on the criteria given in the following paras regarding the Applicant's experience, personnel and equipment capabilities, financial position and litigation history, as demonstrated by the Applicant's responses in the Forms attached as Annex-A to this Document. The Consultant reserves the right to waive minor deviations, if these do not materially affect the capability of an Applicant to perform the contract by the Applicant.

Experience and resources of the Company intended to be employed as sub-contractor shall not be taken into account in determining the Applicant's compliance with the qualifying criteria. However, for joint venture, collective experience, resources and financial soundness of all partners shall be considered.

If the bidding firm or Person, however, have been associated with the firm that prepared the design, specifications, or engaged in the preparation of the Project or firm that will provide supervision of the Works, you shall be disqualified.

1.1 General Information

The Applicant shall provide general information of his firm as per the format specified in the Application Form A-1 attached in Annex-A.

1.2 Experience of the Firm

The Applicant shall meet the following minimum criteria:

1) Successful experience as contractor in the execution of at least five (5) projects involving bulk of geotechnical investigations within the last three (03) years. This experience should specifically be of geotechnical investigations of similar nature. The Applicant will supply information as per the format specified in the Application Form A-2 attached in Annex-A.

1.3 Personnel Capabilities

The Applicant must have in his employment, suitably qualified and experience personnel to fulfill the positions tabulated below. The Applicant will supply information as per the format specified in the Application Form A-3 attached in Annex-A.

Sr. No.	Position	Qualification*	No.	Minimum Experience (Years)
1	Technical Manager	B.Sc. Civil Engg.	1	3
2	Site Geologist/ Supervisor /	M. Sc. Geology/ B.Sc. Civil Engg. / B.Sc.	3	2
3	HSE Supervisor	HSE Certification course	1	1
4	Driller	Literate	3	3
5	Skilled Labor	-	As required	

1.4 Equipment Capabilities

The Applicant should own, or have assured access to the following key items of equipment in full working order, and must demonstrate that, based on known commitments, these will be available for deployment on the proposed works.

Sr. No.	Equipment Type & Characteristics	Minimum Number Required
1	Straight Rotary Drilling Rig complete in all respects including drilling rods, bits, mud pumps etc. along with at least one stand-by rig.	3
2	Percussion Boring Set (minimum 450 mm diameter) complete in all respects including tripod, chisel/bit etc.	1
3	Casing Set having various diameters for all types of boring at least 40 m in length with casing bits.	1
4	Core Barrels (single tube & double tube) including coring and casing bits.	1 each
5	Standard Penetration Test equipment complete in all respects including all rods, split spoon sampler, hammer and containers etc.	1
6	Denison/Pitcher/Shelby samplers and tubes	1 each
7	Hydraulic Jacks with all accessories for the extraction of casings	1
8	Electrically operated sounder for groundwater level measurement	1
9	Apparatus for performing Test Pits, including field density test	2 each
10	In-situ Field Permeability Test apparatus	2 each
11	Packer Test (Water Pressure) apparatus	1
12	Wooden Boxes for the preservation of undisturbed soil samples and rock cores	As required
13	Transport for mobilization of equipment	As required

The Applicant will supply information as per the format specified in the Application Form A-4 attached in Annex-A.

1.5 Financial Capabilities

The Applicant shall meet the following minimum criteria:

1) Annual turnover which is also termed as income from contracting for procurement of geotechnical investigations and is defined as billing for works completed during the last three (3) years of at least Rs. 5 million or the said figure has been achieved in any year during the last three (3) years.

The Applicant shall also provide evidence of financial health such as bank account statements, available line of credits, etc., to show the soundness of the Applicant's financial position for procurement of geotechnical investigations works. The Applicant will provide annual turnover of the geotechnical investigation works carried out by him during the last three years. The Applicant will

supply annual turnover information as per the format specified in the Application Form A-5 attached in Annex-A.

1.6 Litigation History

The Applicant should provide accurate information on any litigation or arbitration resulting from Contracts completed or under execution over the last three (03) years. The Applicant will supply information as per the format specified in the Application Form A-6 attached in Annex-A. A consistent / overwhelming history of award against the Applicant may result in rejection of the application. In case an Applicant Claims nil litigation, he shall submit the same statement on the letter head of his company.

1.7 Application of Health, Safety and Environmental Standards

The Applicant should provide the HSE Policies and supporting documentary evidence for the following:

i)	First Aid Box
ii)	Personnel Protective equipment (PPEs)
iii)	Standard Operating Procedures (SOPs)
iv)	Health, Safety and Environmental (HSE) Policies
v)	HSE staff

Annex-A

Application Form A-1 **Page___of_____Pages**

General Information

All individual Applicants applying for qualification are requested to complete the information in this form. Nationality information (if applicable) is also to be provided for foreign owners as required under the PEC Bye-Laws as a Partnership.

1.	Name of Firm	
2.	Head Office Address	
3.	Telephone	Contact Person: Name: Title: Cell No.
4.	Fax	E-mail
5.	Place of Incorporation/Registration Certificates of the firm*	Year of incorporation/registration

*** Registration certificates must include:**

- Valid registration with Pakistan Engineering Council (PEC)
- Valid registration with Federal Board of Revenue (FBR)
- Valid registration with concerned Provincial Revenue Authority (PRA)
- Proof of active taxpayer of FBR & PRA

Application Form A-2

Page__of__Pages

Experience of the Firm

Name of Applicant: _____

Sr. No.	Name of Project	Value of Geotech Contract* (Pak Rs.)	Contract Duration

Attach copy of Letter of Awards / Project Completion Certificates for any five (5) latest projects.

Application Form A-3 **Page___of_____Pages**

Personnel Capabilities

Name of Applicant: _____

Sr. No.	Name of Person	Qualification	Designation/ Position*	Total Experience

Attach CVs of the Key Staff Members.

Application Form A-4 **Page___of_____Pages**

Equipment Capabilities

Name of Applicant: _____

Sr. No.	Equipment Description	Capacity	Number of Equipment	Working Condition a) Very good b) Good c) Satisfactory	Current Location

Application Form A-5 **Page___of_____Pages**

Financial Capabilities

Name of Applicant: _____

Year	Annual Turnover (in PKR)
2019 - 2020	
2018 - 2019	
2017 - 2018	

Note: Financial soundness certificate from the bank(s) as specified in section 1.5 must be provided by the Applicant

Application Form A-6 **Page___of___Pages**

Litigation History

Name of Applicant: _____

Year	Award for or against Applicant	Name of Client, cause of litigation, and matter in dispute	Disputed amount (current value Pak Rs. or equivalent)

Application Form A-7

Health, Safety and Environmental (HSE) Policies Personal Protective Equipment (PPE) and Standard Operating Procedures (SOP) of the Contractor

Name of Applicant: _____

The Applicant should provide the following policies/supporting documentary evidence as required in Para 1.7.

HSE Policies

Please attach HSE Policies

Details of PPE Available with the Contractor

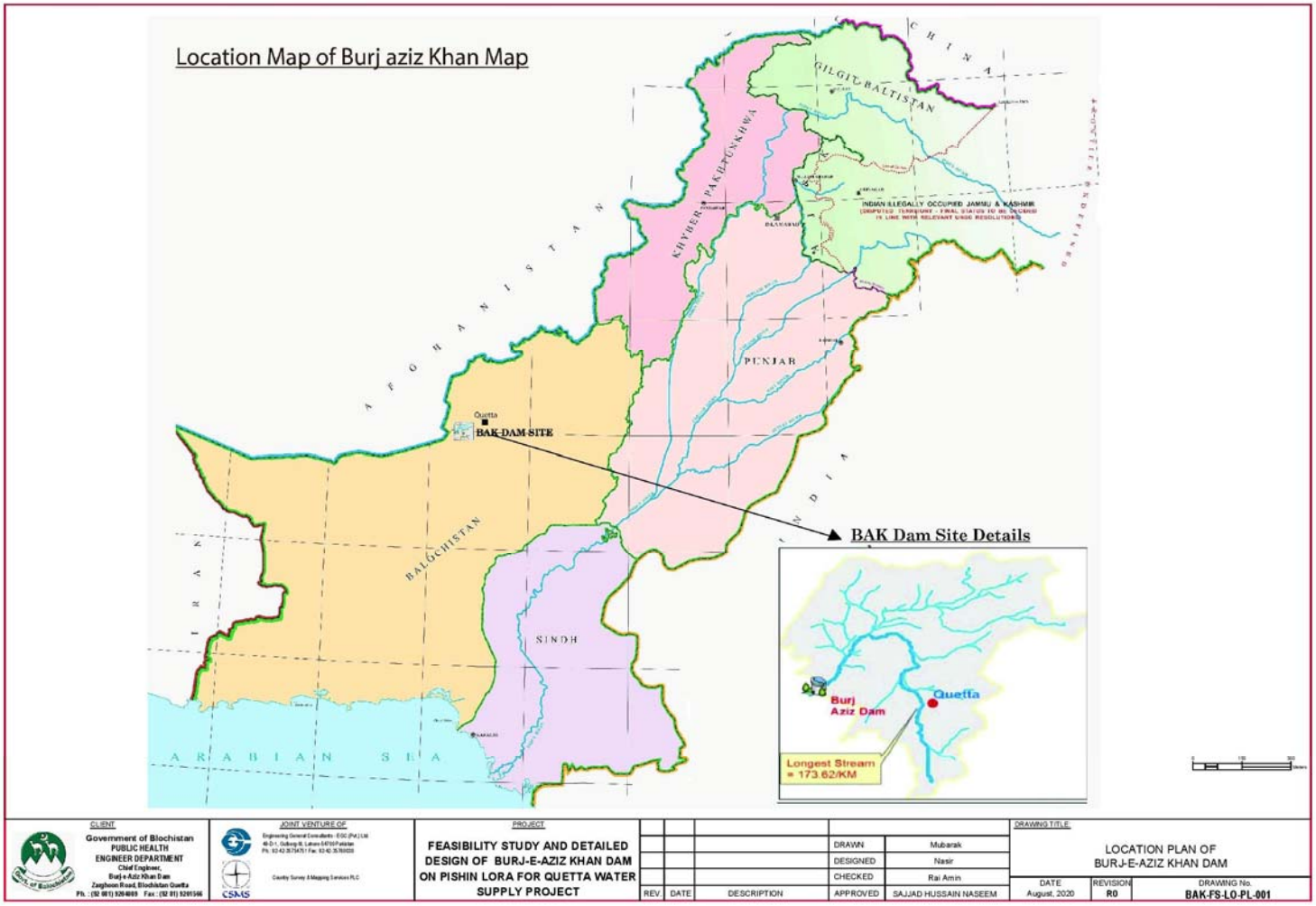
Sr. No.	Type of PPE	Total Number

A. Details of SOPs of the Contractor

Please attach the copies of SOPs

SECTION-VIII

DRAWINGS


Location Map of Burj aziz Khan Map
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GILGIT-BALTISTAN
KHYBER PAKHTUNKHWA
AFGHANISTAN
INDIAN ILLEGALLY OCCUPIED JAMMU & KASHMIR
PUNJAB
Quetta
BAK-DAM-SITE
BAK Dam Site Details
BALOCHISTAN
IRAN
SINDH
INDIA
ARABIAN SEA
Burj Aziz Dam
Quetta
Longest Stream = 173.62/KM
CLIENT
Government of Blochistan
PUBLIC HEALTH ENGINEER DEPARTMENT
Chief Engineer,
Burj e Aziz Khan Dam
Zarghoon Road, Blochistan Quetta
Ph. : (92 081) 3264669 Fax : (92 81) 3201566
JOINT VENTURE OF
CSMS
PROJECT
FEASIBILITY STUDY AND DETAILED DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT
REV.
DATE
DESCRIPTION
DRAWN
Mubarak
DESIGNED
Nasir
CHECKED
Rai Amin
APPROVED
SAJJAD HUSSAIN NASEEM
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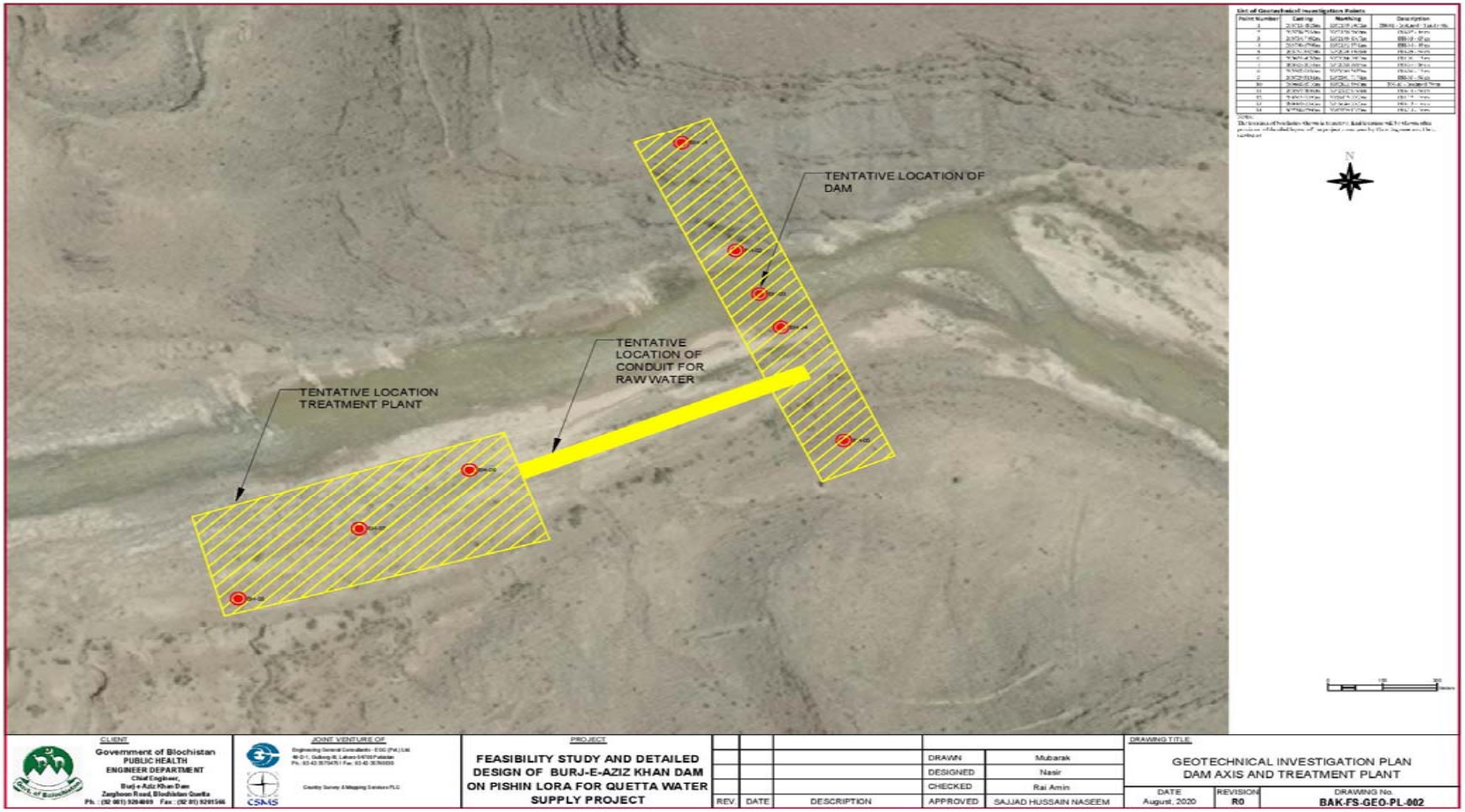
DATE
August, 2020
REVISION
R0
DRAWING No.
BAK-FS-LO-PL-001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TENTATIVE LOCATION OF CONDUIT FOR RAW WATER
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Government of Blochistan
PUBLIC HEALTH
ENGINEER DEPARTMENT
JOINT VENTURE OF
CSMS
PROJECT
FEASIBILITY STUDY AND DETAILED DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT
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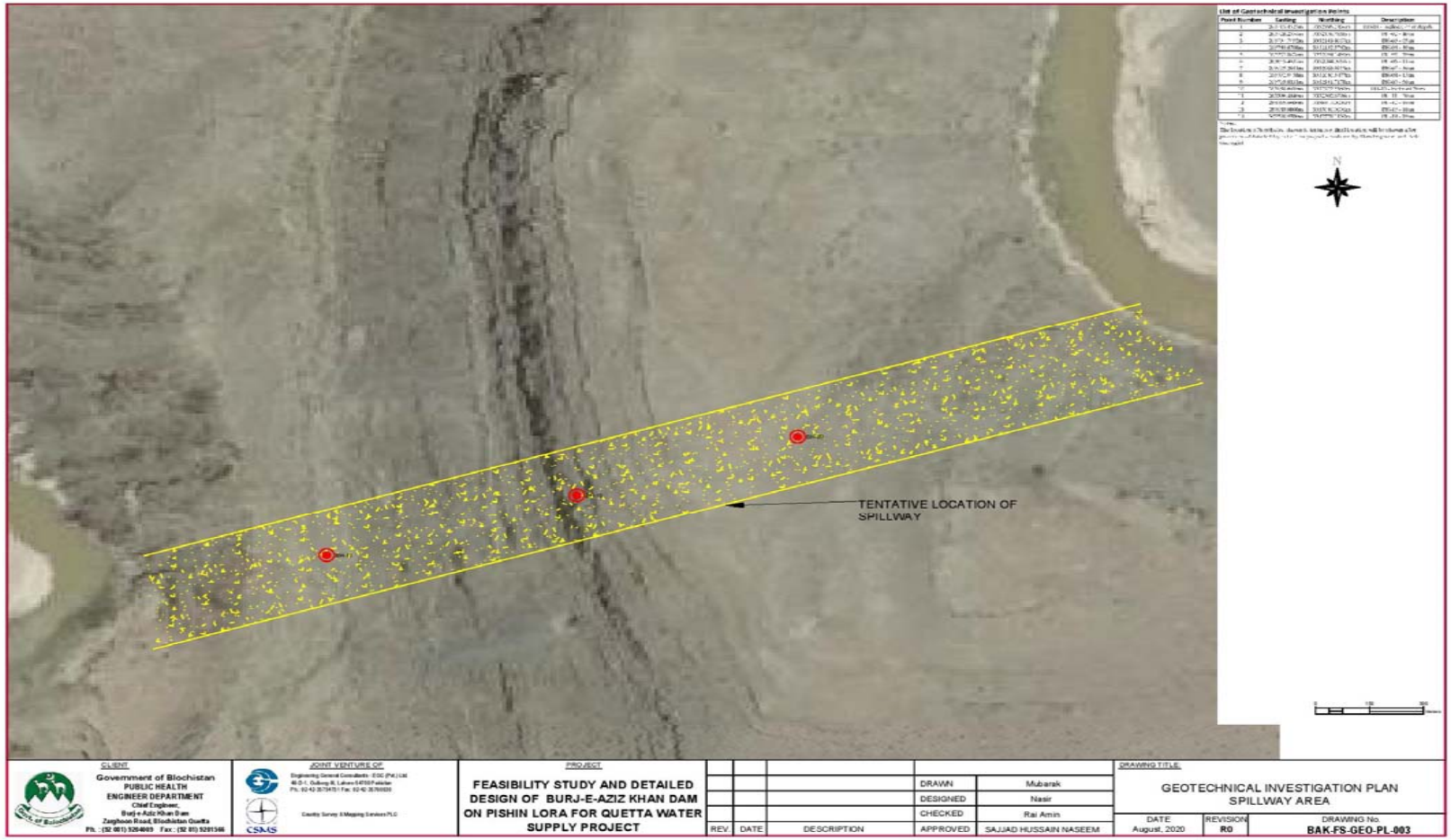
DESCRIPTION
DRAWN
Mubarak
DESIGNED
Nasir
CHECKED
Rai Amin
APPROVED
SAJJAD HUSSAIN NASEEM
DRAWING TITLE
GEOTECHNICAL INVESTIGATION PLAN
DAM AXIS AND TREATMENT PLANT
DATE
August, 2020
REVISION
R0
DRAWING No.
BAK-FS-GEO-PL-002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Government of Blochistan
PUBLIC HEALTH
ENGINEER DEPARTMENT
JOINT VENTURE OF:
PROJECT
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REV.
DATE
DESCRIPTION
DRAWN
Mubarak
DESIGNED
Nasir
CHECKED
Rai Amin
APPROVED
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GEOTECHNICAL INVESTIGATION PLAN
SPILLWAY AREA
DATE
August, 2020
REVISION
R0
DRAWING No.
BAK-FS-GEO-PL-003


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Description
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Government of Blochistan
PUBLIC HEALTH
ENGINEER DEPARTMENT
JOINT VENTURE OF
CSMS
PROJECT
FEASIBILITY STUDY AND DETAILED DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT
REV.
DATE
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DRAWN
Mubarak
DESIGNED
Nasir
CHECKED
Rai Amin
APPROVED
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IPS-1
DATE
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REVISION
R0
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BAK-FS-GEO-PL-004


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Government of Blochistan
PUBLIC HEALTH
ENGINEER DEPARTMENT
Chief Engineer,
Burj-e-Aziz Khan Dam
JOINT VENTURE OF
PROJECT
FEASIBILITY STUDY AND DETAILED DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT
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DRAWN
Mubarak
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CHECKED
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APPROVED
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August, 2020
REVISION
R0
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BAK-FS-GEO-PL-005


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Government of Blochistan
PUBLIC HEALTH
ENGINEER DEPARTMENT
Chief Engineer,
Burj-e-Aziz Khan Dam
Zarghoon Road, Blochistan Quetta
JOINT VENTURE OF
CSMS
PROJECT
FEASIBILITY STUDY AND DETAILED DESIGN OF BURJ-E-AZIZ KHAN DAM ON PISHIN LORA FOR QUETTA WATER SUPPLY PROJECT
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