I R R I G A T I O N D E P A R T M E N T
G O V E R N M E N T O F B A L O C H I S T A N

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

BIDDING DOCUMENT

FOR

PROCUREMENT OF WORKS

ESTABLISHMENT OF DEMO PLOTS& TUNNELS

Lot 1 - Nari Gorge/Mushkaf (Wheat & Cotton)
Lot 2 - Nari Gorge/Mushkaf (Orchards & Tunnels)
Lot 3 - Demos at Sehan (Wheat, Cotton, Orchard & Tunnels)
Lot 4 - Gundacha/Nimmi/Shab e Maidan (Wheat & Cotton)
Lot 5 - Gundacha/Nimmi/Shab e Maidan(Orchard & Tunnels)

NCB NO.	**:**	**PK-PMU-BIWRMDP-298513-CW-RFB**
EMPLOYER	**:**	**PROJECT DIRECTOR BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT**
ISSUED ON	**:**	**JULY 2022**
COUNTRY	**:**	**PAKISTAN**

BIDDING DOCUMENT

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A. GENERAL

1. Scope of Bid

1.1 The Employer as defined in the Contract Data invites bids for the construction of Works, as described in the Contract Data. The name and identification number of the Contract is provided in the Contract Data.

1.2 The successful Bidder will be expected to complete the Works by the Intended Completion Date specified in the Contract Data.

2. Source of Funds

2.1 The Borrower, as defined in the Bidding Data, intends to apply part of the funds of a loan from the World Bank, as defined in the Bidding Data, towards the cost of the Project, as defined in the Bidding Data, to cover eligible payments under the Contract for the Works. Payments by the World Bank will be made only at the request of the Borrower and upon approval by the World Bank in accordance with the Loan Agreement, and will be subject in all respects to the terms and conditions of that Agreement. Except as the World Bank may specifically otherwise agree, no party other than the Borrower shall derive any rights from the Loan Agreement or have any rights to the loan proceeds.

2.2 The loan agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the World Bank, is prohibited by a decision of the United Nations Security Council, taken under Chapter VII of the Charter of the United Nations.

3. Eligible Bidders

3.1 This Invitation for Bids is open to all bidders from eligible countries as defined in the Procurement Guidelines. Any materials, equipment, and services to be used in the performance of the Contract shall have their origin in eligible source countries.

3.2 All bidders shall provide in Part Two - Section 2, Forms of Bid and Qualification Information, a statement that the Bidder (including all members of a joint venture and subcontractors) is not associated, nor has been associated in the past, directly or indirectly, with the consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Borrower to provide consulting services for the preparation or supervision of the Works, and any of its affiliates, shall not be eligible to bid.

3.3 Government-owned enterprises in the Employer's country may only participate if they are legally and financially autonomous, operate under commercial law, and are not a dependent agency of the Employer.

3.4 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the World Bank in accordance with sub-clause 37.1.

4. Qualification of the Bidder

4.1 All bidders shall provide in Part two - Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2 In the event that prequalification of potential bidders has been undertaken, only bids from prequalified bidders will be considered for award of Contract. These qualified bidders should submit with their bids any information updating their original prequalification applications or, alternatively, confirm in their bids that the originally-submitted prequalification information remains essentially correct as of the date of bid submission. The update or confirmation should be provided in Part two - Section 2.

4.3 If the Employer has not undertaken prequalification of potential bidders, all bidders shall include the following information and documents with their bids in Part two - Section 2; unless otherwise stated in the Bidding Data:

(a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;

(b) total monetary value of construction work performed for each of the last five years;

(c) experience in works of a similar nature and size for each of the last ten years, and details of work under way or contractually committed; and clients who may be contacted for further information on those contracts;

(d) major items of construction equipment proposed to carry out the Contract;

(e) qualifications and experience of key site management and technical personnel proposed for the Contract;

(f) reports on the financial standing of the Bidder, such as profit and loss statements and auditor’s reports for the past five years;

(g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);

(h) authority to seek references from the Bidder’s bankers;

(i) information regarding any litigation, current or during the last five years, in which the Bidder is involved, the parties concerned, and disputed amount; and

(j) Proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.

4.4 Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated in the Bidding Data:

(a) the Bid shall include all the information listed in Sub-Clause 4.3 above for each joint venture partner;

(b) the Bid shall be signed so as to be legally binding on all partners;

(c) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

(d) one of the partners will be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and

(e) The execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

4.5 To qualify for award of the Contract, bidders shall meet the following minimum qualifying criteria:

(a) annual volume of construction work of at least the amount specified in the Bidding Data;
(b) experience as prime contractor in the construction of at least two works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);
(c) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed in the Bidding Data;
(d) a Contract Manager with five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and
(e) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than the amount specified in the Bidding Data.
(f) assessed available bid capacity (as provided in Bidding Data) is more than the total bid value, to indicate the ability of the contractor to take on additional work taking into consideration the work it already has at the time of award of the proposed contract.

A consistent history of litigation or arbitration awards against the Applicant or any partner of a Joint Venture may result in disqualification.

4.6 The figures for each of the partners of a joint venture shall be added together to determine the Bidder's compliance with the minimum qualifying criteria of Sub-Clause 4.5(a) and (e);

however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 4.5(a), (b), and (e) for an individual Bidder, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's Bid. Subcontractors' experience and resources will not be taken into account in determining the Bidder's compliance with the qualifying criteria, unless otherwise stated in the Bidding Data.

5. One Bid per Bidder

5.1 Each Bidder shall submit only one Bid, either individually or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder's participation to be disqualified.

6. Cost of Bidding

6.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible or liable for those costs.

7. Site Visit

7.1 The Bidder, at the Bidder's own responsibility and risk, is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

B. BIDDING DOCUMENTS

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 10:

PART 1: BIDDING PROCEDURES

- Section-1: Instructions to Bidders
- Section-2: Conditions of Contract

PART 2: INVITATION FOR BIDS

- Section 1: Bidding Data
- Section 2: Forms of Bid and Qualification Information
- Section 3: Contract Data
- Section 4: Specifications
- Section 5: Drawings
- Section 6: Bill of Quantities
- Section 7: Forms of Securities

8.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or to submit a bid not substantially responsive to the bidding documents in every respect will be at the Bidder's risk and may result in the rejection of its bid.

9. Clarification of Bidding Documents

9.1 A prospective Bidder requiring any clarification of the bidding documents may notify the Employer in writing or by cable ("cable" includes telex and facsimile) at the Employer's address indicated

in the invitation to bid. The Employer will respond to any request for clarification received earlier than 20 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all purchasers of the bidding documents, including a description of the inquiry, but without identifying its source.

10. Amendment of Bidding Documents

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing or by cable to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by cable to the Employer.

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend, as necessary, the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.

C. PREPARATION OF BIDS

11. Language of Bid

11.1 All documents relating to the Bid shall be in the language specified in the Contract Data.

12. Documents Comprising the Bid

12.1 The Bid submitted by the Bidder shall comprise the following:

(a) The Bid (in the format indicated in Part two - Section 2);
(b) Bid Security;
(c) priced Bill of Quantities;
(d) Qualification Information Form and Documents;
(e) Alternative offers where invited;

and any other materials required to be completed and submitted by bidders, as specified in the Bidding Data.

13. Bid Prices

13.1 The Contract shall be for the whole Works, as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.

13.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for 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 other rates and prices in the Bill of Quantities.

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

13.4 The rates and prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract if provided for in the Bidding and Contract Data and the provisions of Clause 47 of the Conditions of Contract. The Bidder shall submit with the Bid all the information required under the Contract Data and Clause 47 of the Conditions of Contract.

14. Currencies of Bid and Payment

14.1 The unit rates and prices shall be quoted by the Bidder entirely in Pak. Rupees.

15. Bid Validity

15.1 Bids shall remain valid for the period specified in the Bidding Data.

15.2 In exceptional circumstances, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable. A Bidder may refuse the request without forfeiting the Bid Security. A Bidder agreeing to the request will not be required or permitted to otherwise modify the Bid, but will be required to extend the validity of Bid Security for the period of the extension, and in compliance with Clause 16 in all respects.

15.3 In the case of contracts in which the Contract Price is fixed (not subject to price adjustment), if the period of bid validity is extended beyond 60 days, the amounts payable in local currency to the Bidder selected for award, shall be increased by applying to the factor specified in the Bidding Data or in the request for extension, for the period of delay beyond 60 days after the expiry of the initial bid validity, up to the notification of award. Bid evaluation will be based on the Bid prices without taking the above correction into consideration.

16. Bid Security

16.1 The Bidder shall furnish, as part of the Bid, a Bid Security in Pak. Rupees in the amount specified in the Bidding Data.

16.2 The Bid Security shall, at the Bidder's option, be in the form of a irrevocable encashable on-demand Bank call-deposit, certified check, bank draft, letter of credit, or a bank guarantee from a reputable bank located in the country of the Employer. The format of the Bid Security should be in accordance with the form of Bid Security included in Part two - Section 7 or another form acceptable to the Employer. Bid Security shall be valid for 28 days beyond the validity of the Bid.

16.3 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer. The Bid Security of a joint venture must define as "bidder" all joint venture partners and list them in the following manner: a joint venture consisting of "_____," "_____," and "_____".

16.4 The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the Bid validity period specified in Sub-Clause 15.1.

16.5 The Bid Security of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the required Performance Security.

16.6 The Bid Security may be forfeited

(a) if the Bidder withdraws the Bid after Bid opening during the period of Bid validity;

(b) if the Bidder does not accept the correction of the Bid price, pursuant to Clause 27; or

(c) in the case of a successful Bidder, if the Bidder fails within the specified time limit to

(i) sign the Agreement; or
(ii) Furnish the required Performance Security.

17. Alternative Proposals by Bidders

17.1 Bidders shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawings and specifications. Alternatives will not be considered, unless specifically allowed in the Bidding Data. If so allowed, Sub-Clause 17.2 shall govern.

17.2 If so allowed in the Bidding Data, bidders wishing to offer technical alternatives to the requirements of the bidding documents must also submit a Bid that complies with the requirements of the bidding documents, including the basic technical design as indicated in the drawings and specifications. In addition to submitting the basic Bid, the Bidder shall provide all information necessary for a complete evaluation of the alternative by the Employer, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.

18. Format and Signing of Bid

18.1 The Bidder shall prepare one original of the documents comprising the Bid as described in Clause 12 of these Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked “ORIGINAL.” In addition, the Bidder shall submit copies of the Bid, in the number specified in the Bidding Data, and clearly marked as “COPIES.” In the event of discrepancy between them, the original shall prevail.

18.2 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 on behalf of the Bidder, pursuant to Sub-Clauses 4.3(a) or 4.4(b), as the case may be. All pages of the Bid where entries or amendments have been made shall be initialed by the person or persons signing the Bid.

18.3 The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

18.4 The Bidder shall furnish information as described in the form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. SUBMISSION OF BIDS

19. Sealing and Marking of Bids

19.1 The Bidder shall seal the original and all copies of the Bid in two inner envelopes and one outer envelope, duly marking the inner envelopes as “ORIGINAL” and “COPIES”.

19.2 The inner and outer envelopes shall

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

(b) bear the name and identification number of the Contract as defined in the Bidding and Contract Data; and

(c) provide a warning not to open before the specified time and date for Bid opening as defined in the Bidding Data.

19.3 In addition to the identification required in Sub-Clause 19.2, the inner envelopes shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared late, pursuant to Clause 21.

19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

20. Deadline for Sub-mission of Bids

20.1 Bids shall be delivered to the Employer at the address specified above no later than the time and date specified in the Bidding Data.

20.2 The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

21. Late Bids

21.1 Any Bid received by the Employer after the deadline prescribed in Clause 20 will be returned unopened to the Bidder.

22. Modification and Withdrawal of Bids

22.1 Bidders may modify or withdraw their bids by giving notice in writing before the deadline prescribed in Clause 20.

22.2 Each Bidder’s modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clauses 18 and 19, with the outer and inner envelopes additionally marked “MODIFICATION” or “WITHDRAWAL,” as appropriate.

22.3 No Bid may be modified after the deadline for submission of Bids.

22.4 Withdrawal of a Bid between the deadline for submission of bids and the expiration of the period of Bid validity specified in the Bidding Data or as extended pursuant to Sub-Clause 15.2 may result in the forfeiture of the Bid Security pursuant to Clause 16.

22.5 Bidders may only offer discounts to, or otherwise modify the prices of their bids by submitting Bid modifications in accordance with this clause, or included in the original Bid submission.

E. BID OPENING AND EVALUATION

23. Bid Opening

23.1 The Employer will open the bids, including modifications made pursuant to Clause 22, in the presence of the bidders' representatives who choose to attend at the time and in the place specified in the Bidding Data.

23.2 Envelopes marked "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 22 shall not be opened.

23.3 The bidders' names, the Bid prices, the total amount of each Bid and of any alternative Bid (if alternatives have been requested or permitted), any discounts, Bid modifications and withdrawals, the presence or absence of Bid Security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening.

23.4 The Employer will prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 23.3.

24. Process to Be Confidential

24.1 Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer's processing of bids or award decisions may result in the rejection of his Bid.

25. Clarification of Bids and Contacting the Employer

25.1 To assist in the examination, evaluation, and comparison of bids, the Employer may, at the Employer's discretion, ask any Bidder for clarification of the Bidder's Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex, or facsimile, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 27.

25.2 Subject to sub-clause 25.1, no Bidder shall contact the Employer on any matter relating to its bid from the time of the bidding opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.

25.3 Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.

26. Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3; (b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the bidding documents.

26.2 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

26.3 If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

27. Correction of Errors

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

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

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

27.2 The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid will be rejected, and the Bid Security may be forfeited in accordance with Sub-Clause 16.6(b).

28. Currency for Bid Evaluation

28.1 Bids will be evaluated as quoted in Pak Rupees in accordance with Sub-Clause 14.1.

29. Evaluation and Comparison of Bids

29.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 26.

29.2 In evaluating the bids, the Employer will determine for each Bid the evaluated Bid price by adjusting the Bid price as follows:

(a) making any correction for errors pursuant to Clause 27;

(b) excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Day work, where priced competitively;

(c) making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with Clause 17; and

(d) Making appropriate adjustments to reflect discounts or other price modifications offered in accordance with Sub-Clause 22.5.

29.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the bidding documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in Bid evaluation.

29.4 The estimated effect of any price adjustment conditions under Clause 47 of the Conditions of Contract, during the period of implementation of the Contract, will not be taken into account in Bid evaluation.

29.5 In the case of several lots, pursuant to Clause 29.2(d), the Employer will determine the application of discounts so as to minimize the combined cost of all the lots.

30. Preference for Domestic Bidders

30.1 NOT APPLICABLE

F. AWARD OF CONTRACT

31. Award Criteria

31.1 Subject to Clause 32, 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 (a) eligible in accordance with the provisions of Clause 3, and (b) qualified in accordance with the provisions of Clause 4.

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

32.1 Notwithstanding Clause 31, the Employer reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Employer's action.

33. Notification of Award and Signing of Agreement

33.1 The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex, or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works and the remedying of any defects therein by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

33.2 The notification of award will constitute the formation of the Contract.

33.3 At the same time that the Employer notifies the successful bidder that its bid has been accepted, the Employer will send the bidder

the Agreement in the form provided in the bidding documents, incorporating all agreements between the Parties. Within 21 days of receipt of the agreement, the successful Bidder shall sign the Agreement and deliver it to the Employer, together with the required performance security.

33.4 Upon fulfillment of Sub-Clause 33.3, the Employer will promptly notify the other bidders that their bids have been unsuccessful and their bid security will be returned as promptly as possible, in accordance with Clause 16.4

34. Performance Security

34.1 Within 21 days after receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer a Performance Security in the amount stipulated in the Contract Data and in the form (Bank Guarantee Unconditional) stipulated in the Bidding Data, denominated in Pak. Rupees and in Accordance with the Conditions of Contract.

34.2 The Performance Security provided by the successful Bidder in the form of an Unconditional Bank Guarantee, shall be issued by a bank located in Pakistan.

34.3 Failure of the successful Bidder to comply with the requirements of Sub-Clause 34.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

35. Advance Payment and Security

35.1 The Employer will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to a maximum amount, as stated in the Bidding Data.

36. Adjudicator

36.1 The Employer proposes the person named in the Bidding Data to be appointed as Adjudicator under the Contract, at an hourly fee specified in the Bidding Data, plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in the Bid. If, in the Letter of Acceptance, the Employer has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by the Appointing Authority designated in the Contract Data at the request of either party.

37. Corrupt or Fraudulent Practices

37.1 The Bank requires that Borrowers (including beneficiaries of Bank loans), as well as Bidders/Suppliers/Contractors under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

i. “corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and

ii. “fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the

Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition;

(b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a Bank-financed contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a Bank-financed contract.

37.2 Furthermore, Bidders shall be aware of the provision stated in sub-clause 23.3 and sub-clause 59.2 of the General Conditions of Contract.

SECTION 2: CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

A. GENERAL

1. Definitions

1.1 Boldface type is used to identify defined terms.

The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in Clauses 24 and 25 hereunder.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

Compensation Events are those defined in Clause 44 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with Sub-Clause 55.1.

The **Contract** is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Employer.

The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

Day works are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects Liability Certificate** is the certificate issued by Project Manager upon correction of defects by the Contractor.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

Drawings include calculations and other information provided or approved by the Project Manager for the execution of the Contract.

The **Employer** is the party who employs the Contractor to carry out the Works.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.

The **Project Manager** is the person named in the Contract Data (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.

The **Site** is the area defined as such in the Contract Data.

Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.

The **Start Date** is given in the Contract Data. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Project Manager which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement,
(2) Letter of Acceptance,
(3) Contractor's Bid,
(4) Contract Data,
(5) Conditions of Contract,
(6) Specifications,
(7) Drawings,
(8) Bill of Quantities, and
(9) any other document listed in the Contract Data as forming part of the Contract.

3. Language and Law

3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Project Manager's Decisions

4.1 Except where otherwise specifically stated, the Project Manager will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. Delegation

5.1 The Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

6. Communica-tions

6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

7. Subcontracting

7.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the Contract Data. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

9. Personnel

9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the Contract Data, to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule.

9.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Employer's and Contractor's Risks

10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

(a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to

(i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or

(ii) Negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

11.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to
(a) A Defect which existed on the Completion Date,

(b) An event occurring before the Completion Date, which was not itself an Employer's risk, or

(c) The activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

12.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works,

Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

(a) loss of or damage to the Works, Plant, and Materials;

(b) loss of or damage to Equipment;

(c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and

(d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports

14.1 The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

15. Queries about the Contract Data

15.1 The Project Manager will clarify queries on the Contract Data.

16. Contractor to Construct the Works

16.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

17. The Works to Be Completed by the Intended Completion Date

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

18. Approval by the Project Manager

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

21. Possession of the Site

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data, the Employer will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

23. Instructions, Inspections and Audits

23.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit the World Bank to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Bank, if so required by the Bank.

24. Disputes

24.1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.

25. Procedure for Disputes

25.1 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.

25.2 The Adjudicator shall be paid by the hour at the rate specified in the Bidding Data and Contract Data, together with reimbursable expenses of the types specified in the Contract Data, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.

25.3 The arbitration shall be conducted in accordance with the arbitration procedure published by the institution named and in the place shown in the Contract Data.

26. Replacement of Adjudicator

26.1 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the Contract Data at the request of either party, within 14 days of receipt of such request.

B. TIME CONTROL

27. Program

27.1 Within the time stated in the Contract Data, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.

27.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.

27.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.

27.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

28.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to

accelerate the remaining work, which would cause the Contractor to incur additional cost.

28.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Acceleration

29.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager will obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date will be adjusted accordingly and confirmed by both the Employer and the Contractor.

29.2 If the Contractor's priced proposals for an acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.

30. Delays Ordered by the Project Manager

30.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.

31. Management Meetings

31.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

31.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

32. Early Warning

32.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

32.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.

C. QUALITY CONTROL

33. Identifying Defects

33.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

34. Tests

34.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

35. Correction of Defects

35.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

35.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

36. Uncorrected Defects

36.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

D. COST CONTROL

37. Bill of Quantities

37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

37.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

38. Changes in the Quantities

38.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.

38.2 The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.

38.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

39. Variations

39.1 All Variations shall be included in updated Programs produced by the Contractor.

40. Payments for Variations

40.1 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

40.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

40.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.

40.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

40.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

41. Cash Flow Forecasts

41.1 When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.

42. Payment Certificates

42.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.

42.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within 14 days of receipt of such statement.

42.3 The value of work executed shall be determined by the Project Manager.

42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

42.5 The value of work executed shall include the valuation of Variations and Compensation Events.

42.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

43. Payments

43.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing.

43.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

43.3 All payments and deductions will be paid or charged in Pakistani Rupees comprising the Contract Price.

43.4 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

44. Compensation Events

44.1 The following shall be Compensation Events:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.

(b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.

(c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.

(d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.

(e) The Project Manager unreasonably does not approve a subcontract to be let.

(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.

(g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.

(h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

(i) The advance payment is delayed.

(j) The effects on the Contractor of any of the Employer's Risks.

(k) The Project Manager unreasonably delays issuing a Certificate of Completion.

(l) Other Compensation Events described in the Contract or determined by the Project Manager shall apply.

44.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

44.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager will assume that the Contractor will react competently and promptly to the event.

44.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

45. Tax

45.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of Clause 47.

46. Currencies

46.1 Payments will be made in Pakistani Rupees.

47. Price Adjustment

47.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the Contract Data. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective

price adjustment factor to the payment amounts due. A formula of the type indicated below applies:

$$P = A + B\ Im/Io$$

where:

P is the adjustment factor for the portion of the Contract Price payable.

A and B are coefficients specified in the Contract Data, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable, and

Im is the index prevailing at the end of the month being invoiced and Io is the index prevailing 28 days before Bid opening for inputs payable;

47.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

48. Retention

48.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

48.2 On completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected.

48.3 On completion of the whole Works, the Contractor may substitute retention money with an “on demand” Bank guarantee.

49. Liquidated Damages

49.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.

49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in Sub-Clause 43.1.

50. Bonus

50.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day stated in the Contract Data for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The

Project Manager shall certify that the Works are complete, although they may not be due to be complete.

51. Advance Payment

51.1 The Employer shall make advance payment to the Contractor of the amount stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in the amount equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amount repaid by the Contractor. Interest will not be charged on the advance payment.

51.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

51.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.

52. Securities

52.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank acceptable to the Employer, and denominated in Pak. Rupees in which the Contract Price is payable. The Performance Security in the form of an Unconditional Bank Guarantee shall be valid until a date 28 days from the date of issue of the Certificate of Completion.

53. Day works

53.1 If applicable, the Day works rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

53.2 All work to be paid for as Day works shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.

53.3 The Contractor shall be paid for Day works subject to obtaining signed Day works forms.

54. Cost of Repairs

54.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. FINISHING THE CONTRACT

55. Completion

55.1 The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager will do so upon deciding that the work is completed.

56. Taking Over

56.1 The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.

57. Final Account

57.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

58. Operating and Maintenance Manuals

58.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the Contract Data from payments due to the Contractor.

59. Termination

59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:

(a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;
(b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
(c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
(d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
(e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
(f) the Contractor does not maintain a Security, which is required; and
(g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of

liquidated damages can be paid, as defined in the Contract Data.

(h) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
For the purpose of this paragraph:
"Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
"fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.

59.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under Sub-Clause 59.2 above, the Project Manager shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

59.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

60. Payment upon Termination

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.

60.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

61. Property

61.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.

62. Release from Performance

62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has

been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

63. Suspension of World Bank Loan or Credit

63.1 In the event that the World Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:

(a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the World Bank's suspension notice.

(b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 43.1, the Contractor may immediately issue a 14-day termination notice.

PART 2– INVITATION FOR BIDS

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

INVITATION FOR BIDS (IFB)

Date: 29th July, 2022.
World Bank Credit No.: IDA 58850

1. The **Government of Pakistan** has received credit from the International Development Association towards the cost of Balochistan Integrated Water Resources Management and Development Project (BIWRMDP) and intends to apply part of the funds to cover eligible payments under the Contracts for Works of following schemes:

S. No.	Name of Scheme & Contract Identification No.	Scope of Works	Completion Time
1.	Procurement of Works for Establishment of demo plots Lot 1 - Nari Gorge/Mushkaf (Wheat/Cotton) Lot 2 - Nari Gorge/Mushkaf (Orchards & Tunnels) Lot 3 - Demos at Sehan, Lot 4 - Gundacha/Nimmi/Shab e Maidan (Wheat/Cotton), Lot 5 - Gundacha/Nimmi/Shab e Maidan(Orchard & Tunnels) PK-PMU-BIWRMDP-298513-CW-RFB	Land preparation, Supply and sowing of Certified quality of wheat, cotton and vegetable seeds, Supply of orchards plants and plantation work, Supply and installation of drip system for orchards, Supply and construction of Nursery tunnels, Supply and application of fertilizers & pesticides, Watering and Provision of technical qualified firm services for design of demo plots, periodic inspections, training of farmers, etc.	182 days

2. Based on MOU, the Project Director, Balochistan Integrated Water Resources Management and Development (BIWRMDP) entrusted Director General Agriculture On Farm Water Management (OFWM) to perform the procurement activities. The DG Agriculture OFWM now invites sealed bids from eligible bidders for Construction Works of above mentioned scheme.

3. The Procurement will be conducted through **National Competitive Bidding (NCB) method** as specified in the World Bank's Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers dated January 2011 revised July 2014 ("Procurement Guidelines") and is open to all bidders from eligible source countries as defined in the Procurement Guidelines. In addition, please refer to paragraphs 1.6 and 1.7 setting forth the World Bank's policy on conflict of interest.

4. Interested eligible bidders may obtain further information from **Office of the Director General Agriculture, On Farm Water Management** at the address given below.

5. A complete set of bidding documents in English may be purchased by interested eligible bidders upon submission of a written application to the address below and upon payment of a nonrefundable fee of Rs. 3000 for each set. The method of payment will be submission of Green Challan at National Bank of Pakistan in head of Account C03434. The document may be collected in person. Additional Charges of Rs. 500 for each set will be payable if the documents are required through courier.

6. A pre-bid conference will not be held. Any questions/queries may be delivered in writing, at least 10 days before the deadline for submission of bids, at the Office of the Director General Agriculture, On Farm Water Management at the address given below.

7. Bids must be delivered to the address below on or before **12:00 hours of 5th September, 2022** at which time they will be opened publicly in the presence of the bidders' designated representatives and anyone who choose to attend at the address below. Electronic bidding will not be permitted. Late bids will be rejected.

8. Bids shall be valid for a period of **91 days** after Bid opening and must be accompanied by security of **2%** of the Bid Price.

9. All bidders shall be required to submit with their bids, qualification information specified in the bidding documents. This information shall be used to establish through post-qualification whether the bidder is qualified to perform the work.

10. Bids are required to be submitted on item rate basis (not on the basis of Composite Schedule of Rates with percentage premium) and the rates and amounts (in Rupees) must be filled by the bidder for each item in the Bill of Quantities and provide a total price. Non-compliance may result in rejection of bid. Bidders should give their best and final price in their bids as no negotiations are expected.

11. As provided in the bidding documents, bidders engaged in corrupt or fraudulent practices (including collusion/pooling) will be declared ineligible, either in indefinitely or for a stated period of time, to be awarded a contract financed by the World Bank.

12. The address(es) referred to above is:

    Office of Director General Agriculture,
    On Fam Water Management,
    Rani Bagh, Sariab Road Quetta.
    Attn: Mr. Akbar Jamali
    Agriculture Officer
    Tel: 081-9211872, Cell: 0333-7836821
    E-mail: dgwmbalochistan@gmail.com
    Web site: biwrmdp.org.pk

SECTION 1: BIDDING DATA

BIDDING DATA

Instructions to Bidders Clause Reference

2.1	The Borrower is*: **Islamic Republic of Pakistan***
	The "World Bank" means "International Development Association (IDA)," and loan refers to an "IDA credit," which, as of the date of issue of the bidding documents has been approved by the World Bank.
	The Project is **Balochistan Integrated Water Resources Management and Development Project.** The works consist of procurement of Works for Establishment of Demo Plots: Lot 1 - Nari Gorge/Mushkaf (Wheat & Cotton) Lot 2 - Nari Gorge/Mushkaf (Orchards & Tunnels) Lot 3 – Demos at Sehan (Wheat, Cotton, Orchard & Tunnel, Lot 4 - Gundacha/Nimmi/Shab e Maidan (Wheat & Cotton), Lot 5 - Gundacha/Nimmi/Shab Maidan(Orchard & Tunnels) The works shall be carried on lot wise basis as per BOQ and Specifications in accordance with the Conditions of Contract.
4.4	The qualification data required from Joint Venture bidders in Sub-Clause 4.4 are modified as follows: **None.**
4.5 (a)	The minimum required annual volume of construction work for the successful Bidder in any of the last five years shall be as follows: Lot 1 - Pak Rs. 25.0 Million Lot 2 - Pak Rs. 31.0 Million Lot 3 - Pak Rs. 38.4 Million Lot 4 - Pak Rs. 36.4 Million Lot 5 - Pak Rs. 51.4 Million
4.5 (b)	The value of each of the works shall be at least as follow: Lot 1 - Pak Rs. 12.5 Million Lot 2 - Pak Rs. 15.5 Million Lot 3 - Pak Rs. 19.2 Million Lot 4 - Pak Rs. 18.2 Million Lot 5 - Pak Rs. 25.7 Million

4.5 (c)

The essential equipment to be made available for the Contract by the successful Bidder shall be:

Sr. No.	Equipment Type	Minimum Number required
1	Tractors	6
2	Raised bed Machine	1
3	Seed Drill Machine	1
4	Level Machines	2
5	Total Stations	1
6	Generators 30 KVA	2

Please provide supporting documents of above-mentioned equipment.

4.5 (d)

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements:

Sr. No.	Position	Minimum specific qualifications, if any	Minimum total work experience (years)	Minimum similar works experience (years)
1	Contractor's Representative/ Construction Manager, resident at the Site	B.E. Civil Engineering. Registered with PEC	5	3
2	Surveyor / Measurement Engineer (01 Nos.)	D.A.E. (Civil)	5	3
3	Occupational Health Officer	M.B.B.S.	2	2
4	Community Liaison Officer	Degree in Sociology	3	2

The Bidder shall provide details of the proposed personnel and their experience records.

4.5 (e)

The minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder shall be as follows:

Lot 1 - Pak Rs. 3 Million
Lot 2 - Pak Rs. 4 Million
Lot 3 - Pak Rs. 4 Million
Lot 4 - Pak Rs. 4 Million
Lot 5 - Pak Rs. 6 Million
The Bidder shall meet the above requirements for each Lot separately.

4.5 (f)

The minimum Assessed Bid Capacity of the successful Bidder shall be more than the total bid value.

The Assessed Bid Capacity = A*N*1.5-B, where:

- A = Maximum value of works executed in any one year during the last five years (updated to the current price level)

	• B = Value at current price level of the existing commitments and on-going works to be completed by the Bidder during the next N years and • N = Number of years prescribed for completion of the works for which the bid is invited.
7.2	Add the following as sub-clause 7.2: A pre-bid conference will not be held. Any questions/queries may be delivered in writing, at least 10 days before the deadline for submission of bids, at the Office of the Director General Agriculture, On Farm Water Management, Rani Bagh Sariab Road, Quetta.
8.3	Add the following as sub-clause 8.3: Except where otherwise provided in the Bill of Quantities "Instructions to Bidder" are provided to assist bidders in their bids and do not constitute part of the Contract Documents.
9.1	For Clarification purpose only, the Employer's address is: **Office of Director General Agriculture,** **On Farm Water Management,** **Rani Bagh Sariab Road,** **Attn: Mr. Behram Khan, Agriculture Officer,** City: **Quetta** Country**: Pakistan** Telephone: **081-9211873** Electronic mail address: **dgwmbalochistan@gmail.com** Requests for clarification should be received by the Employer no later than: 10 days before deadline for submission date of Bids. Clarification shall be in the form of hard copy letter. The clarification shall be sent also by fax or preferably as a scan of the letter attached to an email.
9.1	The following is amended: or by cable ("cable" includes telex and facsimile) replace the above sentence with the following sentence: or by cable ("cable" includes facsimile or email)
13.3	The bidder should get itself acquainted with all the applicable taxes as Employer shall deduct all applicable taxes according to prevailing rules and regulations.
13.4	The Contract is **Not Subject to Price Adjustment.**
15.1	The period of Bid validity shall be **91 days** and period of validity of Bid Security shall be **119 days** after the deadline for Bid submission specified in the Bidding Data.
15.3	Not Applicable.
16.1	The amount of Bid Security shall be minimum ***2%*** of the Bid Value.

16.2	The Bid Security acceptable to the employer shall be in the form of a irrevocable encashable on-demand Bank call deposit, bank draft or a bank guarantee from a reputable bank in local currency located in the country of Employer. Other forms of Bid Security as stated in ITB 16.2 shall not be accepted.
17	Alternative proposals to the requirements of the bidding documents will not be permitted.
18.1	The Bid to be completed and submitted shall be One (1) Original and Two (2) Copies.
18.2	In the second line after the word ink, add "(in the case of copies, Photostats are also acceptable)".
19.2	The Employer's address for the purpose of Bid submission is: **Office of Director General Agriculture,** **On Farm Water Management,** **Rani Bagh Sariab Road,** **Attn: Mr. Behram Khan, Agriculture Officer,** City: **Quetta** Country**: Pakistan** Telephone: **+92-81-9211873** Electronic mail address: **dgwmbalochistan@gmail.com**
20.1	The deadline for submission of bids shall be **5th September, 2022** at *12:00 hours PST.*
23.1	The Employer's address for the purpose of Bid Opening is: **Office of Director General Agriculture,** **On Farm Water Management,** **Rani Bagh Sariab Road,** **Attn: Mr. Behram Khan, Agriculture Officer,** City: **Quetta** Country**: Pakistan** Telephone: **081-9211873** Electronic mail address: **dgwmbalochistan@gmail.com** The Bids opening shall take place on **5th September, 2022** at *12:30 hours PST.*
26.2	Add at the end of Sub-Clause 26.2: 'A material deviation also includes any modification to the item descriptions or quantities in the Bill of Quantities.'
29.2	Add the following: The works for procurement of Works for establishment of demo plots are divided into 4 Lots as below: Lot 1 - Nari Gorge/Mushkaf (Wheat & Cotton) Lot 2 - Nari Gorge/Mushkaf (Orchards & Tunnels) Lot 3 – Demos at Sehan (Wheat, Cotton, Orchard & Tunnel, Lot 4 - Gundacha/Nimmi/Shab e Maidan (Wheat & Cotton), Lot 5 - Gundacha/Nimmi/Shab Maidan(Orchard & Tunnels)

	In evaluating the bids, the evaluated Bid price shall be determined lot wise meaning that the bid price of each bidder for each lot shall be compared separately and the contract(s) will also be awarded lot wise such that a single bidder can be awarded all the lots if found lowest in each lot and meets all other criteria of Bidding Documents. Similarly, four the lots can be awarded to four different bidders if different bidders are found lowest in each lot and meet other requirements of bidding documents.
29.6	Add the following as Sub-Clause 29.6: 'If a bid is seriously unbalanced or front loaded in relation to Employer's estimate of the price of items of work to be performed under the contract, the Employer may require the bidder to produce detailed price analysis for any or all items of the Bill of Quantities to demonstrate the internal consistency of those prices with his proposed construction methods and programme. After the evaluation of the price analysis the Employer may require the amount of the Performance Security stated in Clause 34 to be increased at the expense of the bidder to a level sufficient to protect the Employer against financial loss in the event of default of the bidder under the contract.
34.0	The Standard Form of Performance Security acceptable to the Employer shall be Bank Guarantee (Unconditional) ***from a Scheduled Bank of Pakistan.***
35.0	The Advance Payment shall be limited to ***10%*** of the Contract Price.
36.1	The Adjudicator proposed by the Employer is***:*** ***Shoaib Nadeem Tareen*** *address at* ***Quetta***. The hourly fee for this proposed Adjudicator shall be: **Pak *Rs. 4000/ hour.*** The biographical data of the proposed Adjudicator is as follows: Ex. Chief Engineer (Rtd.), Irrigation Department, Government of Balochistan, Pakistan. More than 30 years of professional experience as Government Officer.
38	Add following new clause: Stamp Duty The formal Agreement between the Procuring Agency and the successful bidder shall be duly stamped at rate levied by the Government (updated from time to time), of bid price and shall be paid by the successful bidder.

SECTION 2: FORMS OF BID, QUALIFICATION INFORMATION, LETTER OF ACCEPTANCE, AND AGREEMENT

Section 2: Forms of Bid, Qualification Information, Letter of Acceptance, and Agreement

Table of Standard Forms

Standard Form: Contractor's Bid

_____[date]

To:

The Project Director,
Balochistan Integrated Water Resources
Management and Development Project
18-B, Jinnah Town, Samungli Road, Quetta.
Telephone: +92-81-2870705
Facsimile: +92-81-2870704

We offer to execute the _____
[name and identification number of Contract] in accordance with the Conditions of Contract accompanying this Bid for the Contract Price of _____
[amount in numbers (_____)
[amount in words] (_____)[in Pak. Rupees.].

The Contract shall be paid in Pakistani Rupees.

The advance payment required is:

Amount	Currency
	Pakistani Rupees

We accept the appointment of _____
[name proposed in Bidding Data] as the Adjudicator.

[or]

We do not accept the appointment of _____
[name proposed in Bidding Data] as the Adjudicator, and propose instead that_____
[name] be appointed as Adjudicator, whose daily fees and biographical data are attached.

This Bid and your written acceptance of it shall constitute a binding Contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and address of agent	Amount and Currency	Purpose of Commission or gratuity

(if none, state "none")
We hereby confirm that this Bid complies with the Bid validity and Bid Security required by the bidding documents and specified in the Bidding Data.

Authorized Signature: _____
Name and Title of Signatory: _____
Name of Bidder: _____

Address: _____

_____

_____

Standard Form: Qualification Information

Notes on Form of Qualification Information

The information to be filled in by bidders in the following pages will be used for purposes of post qualification or for verification of prequalification as provided for in Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract. Attach additional pages as necessary. Pertinent sections of attached documents should be translated into English. If used for prequalification verification, the Bidder should fill in updated information only.

1. Individual Bidders or Individual Members of Joint Ventures

1.1 Constitution or legal status of Bidder: [attach copy]

Place of registration: [insert]

Principal place of business: [insert]

Power of attorney of signatory of Bid: [attach]

1.2 Total annual volume of construction work performed in last five years in Pak. Rupees

2016-17_____
2017-18_____
2018-19_____
2019-20_____
2020-21_____

1.3 Work performed as prime Contractor on works of a similar nature and volume over the last five years. The values should be indicated in Pak. Rupees. Also list details of work under way or committed, including expected completion date.

Project name	Name of client and contact person	Type of work performed and year of completion	Value of contract
[etc.]			

1.4 Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below. Refer also to Sub-Clause 4.3(c) of the Instructions to Bidders.

Item of equipment	Description, make, and age (years)	Condition (new, good, poor) and number available	Owned, leased (from whom?), or to be purchased (from whom?)
[etc.]			

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to Sub-Clause 4.3(e) of the Instructions to Bidders and Sub-Clause 9.1 of the Conditions of Contract.

Position	Name	Years of experience (general)	Years of experience in proposed position
Project Manager			
[etc.]			

1.6 Proposed subcontracts and firms involved. Refer to Clause 7 of Conditions of Contract.

Sections of the Works	Value of subcontract	Subcontractor (name and address)	Experience in similar work
[etc.]			

1.7 Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports, etc. List below and attach copies.

1.8 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of support documents.

1.9 Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the Employer.

1.10 Information on current litigation in which the Bidder is involved.

Other party(ies)	Cause of dispute	Amount involved

1.11 Statement of compliance with the requirements of Sub-Clause 3.2 of the Instructions to Bidders.

1.12 Proposed Program (work method and schedule). Descriptions, drawings, and charts, as necessary, to comply with the requirements of the bidding documents.

2. Joint Ventures

2.1 The information listed in 1.1 - 1.11 above shall be provided for each partner of the joint venture.

2.2 The information in 1.12 above shall be provided for the joint venture.

2.3 Attach the power of attorney of the signatory(ies) of the Bid authorizing signature of the Bid on behalf of the joint venture.

2.4 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that

(a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

(b) one of the partners will be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and

(c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

3. Additional Requirements

3.1 Bidders should provide any additional information required in the Bidding Data or to fulfill the requirements of Sub-Clause 4.1 and Clause 30 of the Instructions to Bidders, if applicable.

Standard Form: Letter of Acceptance

[Letterhead paper of the Employer]

[date]

To: [name and address of the Contractor]

This is to notify you that your Bid dated [date] for execution of the [name of the Contract and identification number, as given in the Contract Data] for the Contract Price of [amount in Pak. Rupees numbers and words] (as corrected and modified in accordance with the Instructions to Bidders)[1] is hereby accepted by our Agency.

(a) We accept that [name proposed by bidder] be appointed as the Adjudicator[2] .

(b) We do not accept that [name proposed by bidder] be appointed as adjudicator, and by sending a copy of this letter of acceptance to [insert the name of the Appointing Authority], we are hereby requesting [name], the Appointing Authority, to appoint the Adjudicator in accordance with Clause 36.1 of the Instructions to Bidders[2] .

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

Authorized Signature: _____
Name and Title of Signatory: _____
Name of Agency: _____

Attachment: Agreement

[1] Delete "corrected and" or "and modified" if not applicable. See Notes on Standard Form of Agreement, next page.

[2] To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the Instructions to Bidders, and has accordingly offered another candidate. If the Employer does not accept the counterproposal, the sentence should so state, and be followed by an additional sentence: "We therefore shall request the *[name of Appointing Authority as named in the Contract Data]* to appoint the Adjudicator in accordance with Clause 36 of the Instructions to Bidders."

Standard Form: Agreement

AGREEMENT

This Agreement, made the [day] day of [month], [year] between [name and address of Employer] (hereinafter called "the Employer") and [name and address of Contractor] (hereinafter called "the Contractor") of the other part.

Whereas the Employer is desirous that the Contractor execute [name and identification number of Contract] (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

Now this Agreement witnessed 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, and they shall be deemed to form and be read and construed as part of this Agreement.

2. 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 any defects therein in conformity in all respects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein 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 thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____
was hereunto affixed in the presence of: _____

Signed, Sealed, and Delivered by the said _____
in the presence of: _____

Binding Signature of Employer _____

Binding Signature of Contractor _____

SECTION 3: CONTRACT DATA

Contract Data

The Conditions of Contract (as included in 'Bidding Documents for National Competitive Bidding Pakistan. Procurement of Works, Smaller Contracts, PART ONE (FIXED) May 1999) are amended as set out below. In the event of discrepancies between the amendments set out below and the Conditions of Contract, the amendments shall prevail.

Clause Ref	Amendment
1.1	**In Sub-Clause 1.1, delete:** 'Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site. **And replace with:** Site Investigation Reports are those documents stated in the Contract Data.
	The **Borrower** is the Islamic Republic of Pakistan
	The **"World Bank"** means the International Development Association and "loan" refers to an IDA credit
	The **Employer** is the Project Director, Balochistan Integrated Water Resources Management and Development Project (BIWRMDP)
	The **Project Manager** is Team Leader (TL) of Project Supervision and Implementation Assistance (PSIA) appointed by the Employer for Balochistan Integrated Water Resources Management & Development Project. The TL is nominee of Associated Consulting Engineers ACE Limited, the Lead Firm of ACE-CAMEOS (JV) in association with KASIB Associates or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Project Manager.
	The name of the Contract is: Procurement of Works for Establishment of Demo Plots: Lot 1 - Nari Gorge/Mushkaf (Wheat & Cotton) Lot 2 - Nari Gorge/Mushkaf (Orchards & Tunnels) Lot 3 – Demos at Sehan (Wheat, Cotton, Orchard & Tunnel, Lot 4 - Gundacha/Nimmi/Shab e Maidan (Wheat & Cotton), Lot 5 - Gundacha/Nimmi/Shab Maidan(Orchard & Tunnels) Identification number: **PK-PMU-BIWRMDP-298513-CW-RFB**
	The Works consist of: Land preparation, Supply and sowing of Certified quality of wheat, cotton and vegetable seeds, Supply of orchards plants and plantation work, Supply and installation of drip system for orchards, Supply and construction of Nursery tunnels, Supply and application of fertilizers & pesticides, Watering and Provision of technical qualified firm services for design of demo plots, periodic inspections, training of farmers, etc.

Clause Ref	Amendment
1.1	Add the following with respect to the definition of Drawings. The Project Manager shall have full power and authority to supply to the Contractor from time to time, during the progress of the Works, such further drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and correction of the defects of the Works. The Contractor shall carryout and be bound by the same. The Project Manager shall provide Construction Drawing within 38 days after issue of Letter of Acceptance.
	The **Start Date** shall be 38 days after the date of issuance of the Letter of Acceptance. The Intended **Completion Date** for the whole of the Works shall be 182 days after the Start Date. The Defect Liability Period will be continued for 365 days after the Completion Date.
	In Sub-Clause 1.1, delete: 'The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3 below.' **and replace with:** 'The Contract is the Contract between the Employer and the Contractor to execute and complete the Works and correct Defect until the end of the Defects Liability Period. It consists of the documents listed in Clause 2.3.'
	In Sub-Clause 1.1, delete: 'The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.' **and replace with:** 'The Defects Liability Certificate is the certificate issued by the Project Manager at the date of expiry of the Defects Liability Period provided that all Defects have been corrected.'
	Add the following to Sub-Clause 1.1: '**The Contractor's Form of Bid** is the Standard Form: Contractor's Bid' as modified and agreed by the Employer and the Contractor prior to the award of the Contract.' '**Employer's Temporary Works** are works designed by the Employer, but constructed, installed and removed by the Contractor that are needed for construction or installation of the Works.' '**A Section of the Works** is a part of the Works explicitly defined as such in the Contract Data.'

Clause Ref	Amendment
	The Site are located as below: - Nari Gorge Irrigation Scheme Area located in District Sibi, - Mushkaf Flood Irrigation Scheme Area located in District Dhadar, - Sehan Irrigation Scheme Area located in District Loralai, - Nimmi, Gundacha and Sheb e Maidan Irrigation Schemes Areas located in District Lesbela.
2.2	Sectional Completion of Works is not applicable.
2.3	In Sub-Clause 2.3(3) delete 'Contractor's Bid' and replace with 'Contractor's Form of Bid'
2.3(5)	The Conditions of Contract are the Conditions of Contract included in 'Bidding Documents for National Competitive Bidding, Pakistan, Procurement of Works, Smaller Contract, Part One (Fixed), May 1999.
3.1	The language of the Contract documents is English The law that applies to the Contract is the law of Islamic Republic of Pakistan which includes the following legislation: The Employment of Children (ECA) Act 1991 The Bonded Labour System (Abolition) Act of 1992 The Factories Act 1934. Latest legislation of the Acts shall be applicable.
5.2	Add this Sub-Clause as follows: The Project Manager shall obtain the specific approval of the Employer in writing before taking any of the following actions specified in Part 1– Section 2. Conditions of Contract. (i) determining an extension of time under Clause 28. (ii) adjustment in rates due to changes in Bill of Quantities under Clause 38. (iii) issuing a variation under Clause 40; except (a) in an emergency situation, as reasonably determined by the Project Manager; or (b) if such variation would increase the Contract Price by less than 1 percent. (iv) deciding increase in Contract Price and extending the Intended Completion Date under Sub-Clause 44.2. (v) determining liquidated damages under Clause 49. (vi) issuing a completion certificate under Clause 55. (vii) issuing Defects Liability Certificate under Clause 57. *(viii)* notifying release from performance under Clause 62.

Clause Ref	Amendment
13.1	All the cost of insurance shall be borne by the Contractor. The minimum insurance covers shall be: The minimum cover for insurance of the Works and of Plant and Materials is 110% of the Contract Price a) The maximum deductible for insurance of the Works and of Plant and Materials is 10% of the Contract Price b) The minimum cover for loss or damage to Equipment is the replacement cost of the Equipment c) The maximum deductible for insurance of Equipment is 5% of the replacement cost of the Equipment d) The minimum for insurance of other property is Rs 500,000 [to be reviewed for each Bidding Document] e) The maximum deductible for insurance of other property is Rs 30,000. f) The minimum cover for personal injury or death insurance for the Contractor's employees is as required by the law of Pakistan including, for example, the Workmen's Compensation Act and for other people is Rs. 500,000 per event with reputed insurer and in terms approved by the Project Manager. In respect of item (c) the Contractor shall submit a schedule listing each item of his proposed equipment that shall include the age, number of hours worked if applicable and current value. Add the following to Sub-Clause 13 For fulfilling his obligations under Sub-Clause 13.1(a), 13.1(b), 13.1(c), 13.1(d), the Contractor shall be reimbursed on a prime cost basis the actual amount of premium paid by the Contractor for providing the required insurance. The Contractor's overhead costs, profits and all other costs incidental to providing the specified insurance in the Bill of Quantities and no separate payment on this account will be made by the Project Manager. The Insurance Company shall have financial strength rating / outlook AA with PACRA (The Pakistan Credit Rating Agency) or JCR-VIS (Affiliation of Japan Credit Rating Agency) or which acceptable by the Employer. The Insurance Company shall submit their financial highlights.
14.1	Nil
15.2	Add Sub-Clause 15.2: 'The Contractor shall promptly notify the Project Manager of any error, omission, fault or any other defect in the design of or specifications for the Works which he discovers when reviewing the Contract documents or in the process of execution of the Works.'

Clause Ref	Amendment
21.1	The Site Possession Date shall be within 38 days after issuance of Letter of Acceptance.
25.2	Institution whose arbitration procedures shall be used is the Court of Law of Pakistan; Pakistan Engineering Council. The Adjudicator proposed by the Employer is***:*** ***Shoaib Nadeem Tareen*** *address at* ***Quetta***. The hourly fee for this proposed Adjudicator shall be: **Pak *Rs. 4000/ hour.*** The biographical data of the proposed Adjudicator is as follows: Ex. Chief Engineer (Rtd.), Irrigation Department, Government of Balochistan, Pakistan. More than 30 years of professional experience as Government Officer. Arbitration will take place in accordance with the Arbitration Act 1940 under the law of Islamic Republic of Pakistan. Reimbursable expenses shall be as follows: • Travel e.g. air/taxi fares Actual expense plus 10% • Accommodation Actual expense plus 10% • Subsistence Actual expense plus 10%
25.3	Arbitration will take place in accordance with the Arbitration Act Law 1940 under the law of Islamic Republic of Pakistan by one or more Arbitrators appointed under the said rules.
26.1	Appointing Authority for the Adjudicator: Pakistan Engineering Council.
27.1	The Contractor shall submit a Program and Methodology for the Works within 38 days of delivery of the Letter of Acceptance. The amount to be withheld for late submission of program and methodology is 0.5% of contract price.
27.2	**ESHS Reporting** Inserted at the end of GCC 27.2 "In addition to the progress report the Contractor shall also provide a report on the Environmental, Social, Health and Safety (ESHS). The Contractor shall also provide immediate notification to the Project Manager of incidents in the following categories. Full details of such incidents shall be provided to the Project Manager within the timeframe agreed with the Project Manager. (a) confirmed or likely violation of any law or international agreement; (b) any fatality or serious (lost time) injury; (c) significant adverse effects or damage to private property (e.g. vehicle accident, damage from fly rock, working beyond the boundary) (d) major pollution of drinking water aquifer or damage or destruction of rare or endangered habitat (including protected areas) or species; or any allegation of gender based violence (GBV), sexual exploitation or abuse, sexual harassment or sexual misbehavior, rape, sexual assault, child abuse, or defilement, or other violations involving children.

Clause Ref	Amendment
27.3	The period between Program updates is 28 days. The amount to be withheld for late submission of an updated Program is 1 % of the Contract Price.
32.1	The notification / warning by the contractor regarding any such event (leading to extension of time, increase in contract price or delay the execution of works) shall be given as soon as practicable and not later than 28 days after the contractor become aware, or should have become aware of the event or circumstance. If the contractor fails to give notice of a claim within such period of 28 days, the contractor shall not be entitled to additional payment.
35.1	The Defects Liability Period is 365 days.
42.2	In Sub-Clause 42.2, delete: 'The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within 14 days of receipt of such statement.' and replace with: 'The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within 28 days of receipt of such statement.' or return back if the required documents are not attached.
43.1	Substitute the words: "42 days of the date of each certificate" in place of the words "28 days of the date of each certificate". Delete the words: "Prevailing rate of interest for commercial borrowing" in the fourth sentence of this sub-clause. and replace with: "Rate of 7% per annum".
43.2	Add to the end of the Sub-Clause 43.2: `No interest shall be payable on an amount that was not certified by the Project Manager due to insufficient details having been provided to the Project Manager at the time.'

Clause Ref	Amendment
44.1(g)	In Sub-Clause 44.1(g), delete: 'The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.' and replace with: 'Not used.'
44.3	Insert at the start of the Sub-Clause 44.3: As soon as practicable after a Compensation Event is identified, the Contractor shall provide information demonstrating his forecast of the effect of the Compensation Event upon the Contractor's forecast cost, which shall include 15 % for offsite overheads and profit'
46.1	The currency of the Employer's country is the Pakistan Rupees.
47.1	The Contract is **not** subject to price adjustment in accordance with Clause 47 of the Conditions of Contract.
48.1	The proportion of payments retained is 10 % from each Interim Payment Certificate up to a maximum of 5% of the Contract Price as stated in the Letter of Acceptance.
48.4	Add Sub-Clause 48.4 as follows: 'Where a Section of the Works is explicitly defined in the Contract, the Project Manager shall determine what fraction of the amount retained in is respect of that Section, having regard to the relative value of that Section. On Completion of that Section, half of the amount retained in respect of the Section shall be repaid to the Contractor. The remaining half shall be repaid only when the Defects Liability Period for that Section has passed and the Project Manager has certified that all Defects relating to that Section notified by the Project Manager to the Contractor before the end of this period have been corrected.
49.1	The liquidated damages per day for the whole of the Works are 0.1 percent of the Contract Price as stated in the Letter of Acceptance. The liquidated damages for Sections of the Works (if applicable) are entered under Sub Clause 2.2 in the Contract Data. The maximum amount of liquidated damages for the whole of the Works is 10 % of the Contract Price as stated in the Letter of Acceptance. The work program / revised work program shall be considered as part of the Contract Agreement. The Project Manager shall review, asses and evaluate the progress of work in relation to the identified milestone. If the Contractor's performance is not as per the said program and one / two milestone (s) are not meet, the Contractor shall be liable for advance liquidated damages at the same rate as liquidated damages which may be refunded if the progress again matches with the subsequent agreed milestone. The amount of Advance liquidated damages deducted by the Employer from Interim Payment Certificate of the Contractor's liability under Clause 49. In case three (03 Milestone are not met, the Project Manager may take action under GCC 59.2 e.

Clause Ref	Amendment
50.1	The clause 50 regarding Bonus in respect of Conditions of Contract is deleted.
51.1	The Advance Payment will be 10% of the Contract Price as stated in the **Letter of Acceptance** and will be paid to the Contractor no later than 42 days after fulfilment of the requirements of Clause 51. The Advance Payment shall be recovered at a rate of 10 % from each Interim Payment Certificate until fully received.
52.1	The Performance Security shall be for the minimum amount equivalent to: 5 % of the Contract Price as stated in the Letter of Acceptance. The standard form(s) of Performance Security acceptable to the Employer shall be Unconditional Bank Guarantee of the type presented in Section 7 of the Bidding Documents. The cost of complying with the requirements of this Clause shall be borne by the Contractor.
53.1	Not Applicable
58.1	Delete the words “Operating and maintenance manual”. The date by which “as built” drawings are required is 56 days after issuance of the Certificate of Completion of the Works. The amount to be withheld for failing to produce “as built” drawings by the date required is 3% of the Contract Price as stated in the Letter of Acceptance
60.1	The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is 20%.

Clause Ref	Amendment
64	Following Clause is added: **Environmental and Social Protection** 64.1 The Contractor shall take all reasonable steps to protect the environment at the site and avoid public nuisance and property from pollution, noise and other effects of operations. 64.2 The contractor shall ensure that emissions, surface discharges and effluent etc. from his activities shall not exceeds the values stated in the specifications or as prescribed by the applicable laws and as directed by the Project Manager. The Contractor shall (a) comply with measures relevant to the Environmental and Social Protection and (b) make available a budget for all such environmental and social measures. 64.3 Contractor shall comply with all social, environmental and labor laws before start of civil works. Health and safety measures will be taken by the contractor simultaneously with civil works; else it will result in stoppage of works by the Project Manager. The Contractor shall not be entitled to log any claim or any extra payment for the duration of the stoppage period for aforementioned reason. The work at site will be resumed from the day when the Project Manager observes the compliance of EMMP being prepared for low risks OFWM Schemes.

SECTION 4: SPECIFICATIONS

Specifications
Table of Content

Preamble

The Specifications for the Works to be carried out under this contract is described in the following Section. Some of the specification may not relate to any of the work item as provided in the Bill of Quantities. The bidder shall only concentrate on those items of specification which relate to the works and ignore all other items.

PART I - SPECIAL PROVISIONS

1 General

1.1 The Requirement

It is required to construct and complete in accordance with the stipulated Conditions of the Contract, and this specification (special and technical provisions) and the drawings, the Works for Establishing demo plots for Wheat, Cotton, Orchards and Tunnels at Nari Gorge, Mushkaf, Sehan, Gundacha, Nimmi & Sheb e Maidan Irrigation Schemes areas. The Contractor shall supply all material, equipment, labour etc. for the Works.

1.2 Location

The Project area is situated within Command Areas of several Irrigation Schemes as below:

- Nari Gorge Irrigation Scheme Area located in District Sibi,
- Mushkaf Flood Irrigation Scheme Area located in District Dhadar,
- Sehan Irrigation Scheme Area located in District Loralai,
- Nimmi, Gundacha and Sheb e Maidan Irrigation Schemes Areas located in District Lesbela.

1.3 Summary of Works

The works to be executed in these Contracts pertaining to Lot-1, Lot-2, Lot-3, Lot-4 and Lot-5 shall consist any of the following components:

- Land preparation for establishing the Demo plots
- Survey and demarcation (Level survey)
- Supply of seeds of certified quality and sowing.
- Supply of plants of certified quality and plantation work.
- Supply and application of manure, fertilizers & pesticides
- Provision of technical qualified firm services for design of demonstration plots (Wheat, Cotton, Orchards and Tunnels) and providing technical inputs for water and soil sampling & testing, seed /plant selection, period inspection of crops, vegetables and plants, recommendation for use of fertilizers and pesticides and training to the farmers.
- Any other works according to these Specification and as instructed by the Project Manager

2 Climate

The Contractor shall be deemed to have taken into account all possible weather conditions when preparing his Tenders and his program of Works, and he will not be entitled to any additional payments whatsoever as a result of meteorological phenomena.

The Contractor shall make suitable arrangements to protect the Works, Temporary Works, Constructional Plant and materials stored on site against the effects of the weather.

No work will be performed by the Contractor when in the opinion of the Project Manager such work is liable to be affected by the weather. The Contractor shall not be entitled to any additional payment on account of loss alleged to have been sustained as a result of the Project Manager declining to

permit such work to start or to continue or ordering any work which has been affected by the weather to be removed, and re-executed, or made good.

3 Site Description

The site will include public and private roads, alleyways and lands and shall mean the minimum extent of each such public and private lands as in the opinion of the Project Manager is necessary or practicable for the construction of the Works.

The Contractor shall make records to be agreed by the Project Manager of the condition of the surfaces of the Site immediately before entering upon them for the purpose of construction of the Works.

3.1 Levels

The Contractor shall establish, construct and protect bench marks as necessary during the period of construction and such bench marks shall be checked periodically and whenever required.

The bench marks shall either be standard concrete monuments. The Project Manager will approve the position of any such benchmark before it is established.

The levels of the benchmarks will be determined on Site and approved as necessary by the Project Manager.

The above mentioned levels will all be based on the Project Datum. The Contractor shall seek prior approval from owners for the establishment of benchmarks on privately owned properties.

3.2 Site in Public and Private Land

The Employer will serve the necessary notices to permit pipelines to be laid in public and private lands in accordance with the agreed program of work and the Contractor shall not enter on those lands until given permission by the Project Manager. The Contractor shall temporarily fence the Site where the Works are to be or are being constructed to the satisfaction of the Project Manager and the Contractor shall confine all the works plant, labour, materials and transport within the Site so fenced. The Contractor shall use the Site only for the construction of the Works.

3.3 Right of Way

Right of way shall be the area (s) allocated to the Contractor to enable execution of the works in accordance with the Contract. Due to physical statutory other special conditions the working width of Right of Way may be restricted (including restricted access to working sites). The Contractor is deemed to have included in Contract Price all costs encountered for complying with such restrictions.

In general the maximum working width (Right of Way) for any section of trench work in agricultural land, garden, etc shall be not more than 6 meter. For isolated compact sites an all-around width of 12m beyond the net sizes of the units will allowed, unless the area is otherwise defined by the Project Manager.

In case the Contractors requires areas outside the allocated Right of Way he may, with the prior agreement of the Project Manager, negotiate these on his own behalf and shall be responsible for all costs involved and for the restatement after completion of permanent work.

Prior to commencement of works the Contractors shall record on drawings the location and dimension of irrigation channels, structures, walls, fences laying within an area of 20 meters measured from the center line of pipes or from the outer edges of structures to be executed. These drawings together with a written description of the condition of such structures shall be submitted in duplicate to the Project Manager 14 days before start of construction works (excavation).

The Contractor shall be responsible for maintaining the flow of water in irrigation channels and natural water course during the entire period of construction. His Contract Price shall include costs for reinstating irrigation channels and natural water course after completion of works located outside the areas occupied by permanent works.

Before commencement of construction the Contractor shall carefully strip the top soil from any agricultural land, garden and the like to the depth as directed by the Project Manager and over the entire working width. Topsoil shall be deposited separately from over other excavated material for reuse. After completion of works and before placing top soil, the entire area affected by the Contractor's activities shall be scarified to a depth of 450mm and shall be made up to the required level to receive top soil.

All fences, walls structures, buildings, etc affected by the Contractor's work shall be reinstated to the satisfaction of the owner and the Project Manager.

Trees within the Right of Way may be cut down only after having received the owner's and the Project Manager's permission. Any damage to trees, whether accidental or otherwise, shall be reported to the Project Manager.

The Completion Certificates, as per Clause 55 of the Conditions of Contract, for any section of works will only be issued if the Contractor submits together with his application a written statement of the owner confirming that reinstatement of land, garden, etc has been carried out to the owner's satisfaction.

3.4 Site for Additional Accommodation

In the event of the Contractor making use of any special or temporary wayleave or additional accommodation acquired by him pursuant to the Conditions of Contract hereof or any tip for the disposal of surplus materials he shall obtain and forward to the Project Manager a copy of the written consent of the owner and occupier or Authority having charge of the land in which such wayleave accommodation or tip is situated and shall make a record to be agreed by the Project Manager of the condition of the surfaces of that land before entering thereon. The Contractor will not be permitted to occupy space in public roads or through fares along the route of pipelines nor additional accommodation except with the written consent of the Project Manager which consent will not be given unless the Contractor shall have first obtained the written consent of the Authority concerned and having charge of the road surface.

3.5 Security of the Works & Persons

Watching and security of the Works shall be provided by the Contractor at his own expense. If the Project Manager considers it necessary he will order in writing that additional watchmen be provided

all at the Contractor's expense to ensure proper security of works and persons associated with the project.

The Contractor shall provide to the Works an adequately supported temporary screen or fence in accordance with local bye-laws and to the approval of the Project Manager.

All excavation shall be adequately lit at night complete with hazard warning lights to pedestrians and traffic in accordance with applicable Traffic Police Regulations.

Unfenced openings and surface obstructions shall be attended by days and night and shall be adequately lit at night.

3.6 Closing of Roads

The Contractor shall not close any road unless the Authority having charge of the road surfaces shall have previously given the appropriate notice or made the appropriate order and without the Contractor having first obtained the written consent of the Police and of the said Authority to close the same. In the event of such consent being refused the Contractor shall have no claim for any additional payment. In the event of such consent being given the Contractor shall give warning in advance of the date of the commencement of the road closure to all Statutory Local or other Authorities and public service undertakers as may be affected by such closure and shall provide fix and maintain all warning signs and diversion notices as may be required by the said Authority, by the Police and by the Project Manager.

3.7 Roads and Site to be kept Clean

The Contractor shall take great care and all reasonable precautions to ensure that roads and thoroughfares used by him either for the construction of the Works or for the transport of plant, labour and material are not made dirty as a result of such construction or transport and in the event of their becoming thus dirtied in the opinion of the Project Manager the Contractor shall take all necessary and immediate steps to clean them.

Each individual site must be kept clean during the work and must be thoroughly cleaned up on completion.

3.8 Proximity to Buildings or Roads

In such areas where pipes will be close to the foundations of buildings, the Contractor should allow in his rates for all work necessary for the protection of buildings and their foundations.

Where pipelines are to be laid close to public highways, the Contractor shall ensure that works are properly protected at all times, including the provision of day and night traffic signals when and where necessary.

4. Codes and Specifications

Material, equipment and workmanship shall conform with all applicable British Standards, or such other standards as may be specified herein or approved by the Project Manager.

If the Contractor proposes the use of alternative standards he shall allow sufficient time for the Project Manager to check such standards and for carrying out any tests as directed by the Project Manager in order to confirm that materials to be supplied under alternative standards are of

equivalent standard. No claim for testing expenses and for delays arising as a result of time required for carrying out such tests will be accepted.

Whenever requested by the Project Manager, in writing, the Contractor shall procure and provide to the Project Manager two English copies of any standards used in the works.

5. Setting Out of Works

It shall be the Contractor's responsibility to obtain from the Project Manager before commencing the work co-ordinates and levels of setting out points, which have already been established by the Project Manager. The Contractor shall use these to establish additional temporary bench marks as necessary throughout the project area. These shall be of a form approved by the Project Manager and maintained until the completion of the Works.

The Contractor shall be responsible for the setting out of the Works. All dimensions and levels shown on the drawings or referred to in any document forming part of the Contract shall be verified by the Contractor on Site. He shall be responsible for pointing out promptly any discrepancy or error in such dimensions or levels.

The Contractor shall prepare detailed setting out drawings and data sheets as necessary and submit them to the Project Manager's Representative for approval. Any modification of these drawings or data sheets required by the Project Manager's Representative shall be made by the Contractor and resubmitted for final approval.

6. Water Supply (Temporary)

The Contractor shall provide at his own expense a temporary supply of potable and other water required, for any portion of the works. He shall provide, operate and maintain the supply throughout the duration of the Works. Quality of water shall be to the satisfaction of the Project Manager.

7. Electricity Supply for Power and Lighting (Temporary)

The Contractor shall arrange for and pay all costs in connection with the temporary supply of electricity he may need for the duration of the Contract. If the Contractor intends to provide his own electricity supply, the regulations of the Pakistan WAPDA are to be observed and the permission of this Authority is to be obtained.

8. Other Services

The Contractor shall make his own arrangements for and shall provide and pay for any services required during the duration of the Contract.

9. Site Conditions

Where pipelines are to be laid close to public highways, the Contractor shall ensure that works are properly protected at all times, including the provision of day and night traffic signals when necessary.

10. Working Hours

The Contractor shall perform his construction work only during the standard working hours on construction sites which are 48 hours, distributed over 6 days per weeks, except on holidays.

Should the Contractor wish to carry out works outside normal working hours or on Sunday and public holidays; he shall comply with Clause 19 of Conditions of Contract.

Work during the Defects Liability Period shall be carried out only after the Contractor has given the Project Manager at least 48 hours' notice in writing.

11. Materials

11.1 Quality of Materials and Workmanship

All materials to be used in the Permanent Works shall be new and of the required specifications. The workmanship shall also be of the specified quality, all to the approval of the Project Manager.

11.2 Approval of Suppliers of Materials

Before entering into any sub-Contract for the supply of any materials or goods the Contractor shall obtain the Project Manager's approval in writing of the sub-contractor from whom he proposes to obtain such materials or goods. Should the Project Manager at any time be dissatisfied with such materials or goods or with the methods of operation carried out at such sub-Contractor's works or place of business, he shall be empowered to cancel his previously given approval of such sub-Contractor and to specify and other suppliers whom he may choose or to approve another sub-Contractor for the supply of such materials or goods. The Contractor shall then obtain the said materials or goods from such other supplier and shall bear any additional cost thereof.

11.3 Copies of Orders

The Contractor shall provide the Project Manager with three copies of all orders for the Supply of materials and goods required for the Works.

11.4 Samples

In addition to specific provisions in the Specifications for sampling and testing of materials, the Contractor shall submit to the Project Manager, as he may require, samples of all materials which he proposes to use in the Works. When approved, these will be retained by the Project Manager.

Samples to be submitted shall be accompanied by an approved form on which all information about specifications, description, location of use, manufacturers etc. are stated.

The Contractor is advised to submit a "Materials Procurement Program" for all materials and equipment which are deemed to be used in the permanent works indicating dates for sampling, approval, ordering, delivering to site.

The Project Manager may reject any materials or goods, which in his opinion are inferior, to the samples submitted.

The Project Manager's approval of manufacturers or materials for the Works, whenever required by the Specifications, shall not relieve the Contractor of his responsibilities under the Contract.

11.5 Tests

The Project Manager may examine and may require testing of any materials or goods to be used in the works at any place inside or outside Pakistan. The Contractor shall give the Project Manager

unrestricted access to his and his Sub-contractor's premises and suppliers for such purposes at all times.

The Contractor shall afford the Project Manager all facilities, assistance, labour and appliances necessary for the convenient examination, testing, weighing or analysis of all materials and goods. The Contractor shall prepare test samples, which the Project Manager may require.

Tests carried out off the site shall not relieve the Contractor of the responsibility of ensuring that the materials pass any required tests when they are incorporated in the permanent Works.

The costs of all tests prescribed in the Specifications are to be borne by the Contractor and are deemed to be included in his contract prices. The costs for any additional tests required by the Project Manager shall be borne by the Employer.

11.6 Test Certificates

The Contractor shall obtain Test Certificates from his supplier and forward three copies of such certificates to the Project Manager. Such certificates shall certify that the material or goods have been tested in accordance with the Specifications and British Standards, and shall give the results of the tests which have been carried out. As regards the major project equipment the Contractor shall ensure that the tests are carried out in the presence of the Employer's representative.

The Contractor shall provide adequate means on site to identify the materials or goods with their respective test certificates.

12. Pollution of Drains and Waterways

The Contractor shall take all necessary precautions to secure the efficient protection of all waterways against pollution including spillage of oil or concrete mixer wastes, site drainage or any other harmful materials. The Contractor shall seek the Project Manager's approval before discharging any substance that may degrade groundwater quality. If nevertheless, such spillage occurs, the Contractor shall clean the waterway at his own expenses, and keep the Employer indemnified against any claim arising from such pollution during the execution of the Works and the Period of Maintenance.

13 Existing Public Services

Existing pipes and services being affected by the construction activities have to be adequately secured in co-ordination with the respective entities.

Where in the drawings any crossing or parallel services are shown, their location and size are approximate only; the indicated services do not necessarily represent all the existing services.

The Contractor shall before the start of excavation and upon the approval of the Project Manager establish by means of trial excavations the location and dimensions of crossing services lines.

If services are to be crossed at the same level, then the existing service line can be passed over by means of deviations in the joints up to a deviation of 15 cm. In the case of passing below existing services, this can be done up to a deviation of 45 cm by the same method. For greater deviations

from the indicated levels, the existing service lines have to be passed in adequate depth by means of installing bends.

Each deviation from the indicated level in the zone of a service crossing shall be brought to the attention of the Project Manager to define up to which extent pressure pipelines to be installed have to be provided in adequate length at both sides of the crossing with thrust resistant TKF joints.

14 Damage to Services

The Contractor will be held responsible and shall pay all costs related to damages to private property or roads, bridges, irrigation ditches, mains, pipes, electric cables, lines or services of any kind caused by him or any of his sub-Contractors during the execution of the Works.

The Contractor shall make good or arrange to make good at his own expense any damage without delay, and shall carry out any further remedial work ordered by the Project Manager.

The Contractor shall make good at his own expenses any damage without delay to the pipes during the construction. Lining should be repaired according to manufacture,s instructions.

15 Drawings

15.1 Bid Drawings

Drawings provided with the Biddings Documents are Bid drawings. Bid Drawings show the scope of the work to be performed by the Contractor. The Bid Drawings shall not be used as a basis for fabrication or construction but may be used as a basis for placing preliminary orders for materials, subject to corrections based on the future issue of as provided under Sub-Clause 1.1 hereof issued for Construction. Any other drawings if issued through Addenda, before opening of Bids, shall be part of the Bid Drawings.

15.2 Construction Drawings

After award of Contract, the Bid Drawings will be replaced by Drawings Issued for Construction including Supplementary Specifications, if necessary. The Drawings Issued for Construction will include Bid Drawings reissued, Bid Drawings as may be modified, and additional drawings as required to develop the work in greater detail, and will make modifications as necessary to further detail the construction required.

The Drawings Issued for Construction will be drawings from which shop, reinforcing steel detail, erection, concrete placing, formwork, or other construction detail drawings shall be prepared by the Contractor. The work shall be executed in conformity with the Drawings Issued for Construction.

15.3 Checking of Drawings

The Contractor shall verify all dimensions, quantities and details shown on the drawings or other data received from the Project Manager, and shall notify him immediately of any error, discrepancy or conflict found therein. Failure to discover such errors, discrepancies or conflicts shall not relieve the Contractor of full responsibility of unsatisfactory work, nor from rectifying such work at his own expense.

The drawings are in conformity with the statics calculated by the Project Manager. However, the Contractor shall check the statics and verify all assumption and results. In particular, he shall check

the load assumptions made for electromechanical equipment and gantry capacity for the pump stations, storage reservoirs and operation building.

15.4 Copies of Contract Drawings, Construction Drawings and Specifications

One complete set of Contracts Documents, Construction Drawings and Specifications will be issued to the Contractor free of charge. The Contractor may make further copies to suit to his requirements.

16 Working Drawings

If required for the execution of this Contract or requested by the Project Manager, the Contractor shall incorporate in the drawings all openings, ducts, recesses, anchor holes, etc. as required for the mechanical and electrical installations. All related costs are considered included in the Contract Price.

The title block shall be as on the Tender Drawings. And shall show in addition the Contractor's name and the descriptive name of the Works shown on the drawing. Materials and material Standards shall be indicated on the drawings.

Drawings from Sub-Contractors shall be checked signed and stamped by the Contractor before being forwarded to the Project Manager, who shall deal in all respects only with the Contractor.

When the Project Manager approves a Working Drawings, he shall return a copy marked "Approved" to the Contractor, who shall then insert the date of approval on the tracing and furnish the Project Manager with three prints of the working drawings as approved.

Approval of a working drawing by the Project Manager will only signify his general approval of the design and shall not make him liable for any error of the Contractor in details or lack of strength or efficiency of any part. Where errors, deviations and / or omissions are discovered later, they shall be made good by the Contractor at his own expense irrespective of any approval by the Project Manager.

17 Technical Records

The Contractor shall submit to the Project Manager not later than one month before commissioning draft copies in English of technical data as the following:

- Information on suppliers (address, fax, telephone) of pipes, fittings, etc. for water supply system.
- Full technical documentation for the above items.
- Step-by-step description of the preparation and setting to work of the whole of the water supply system including pipes, valves etc.

Not later than the time at which the works are taken over, the Contractor shall provide four copies of instruction manuals in English to the approval of the Project Manager to cover all details of normal operation of each item and requirements regarding its functional relation with the plant as a whole and of all the individual items, together with routine maintenance instructions.

18 Survey Records and As- Built Drawings

After clearing the Site, the Contractor shall take and record levels in the manner directed by and in the presence of the Project Manager's Representative of the Site and works. Such levels, when approved by the Project Manager, shall be recorded by the Contractor on drawings and/ or schedules which shall be signed as a true record by the Contractor and the Project Manager's Representative and shall form the basis of the measurement of the Contractor's work.

Excavation works shall not commence before such records are certified by the Project Manager's representative.

Prior to handing over of completed works and the issue of the Completion Certificate the Contractor shall prepare the As-Built Drawings and submit them to the Project Manager for approval.

19 Contractor's Monthly Reports

19.1 Progress Reports

The Contractor shall report monthly progress to the Project Manager on charts submitted in triplicate showing actual work done superimposed on copies of his agreed programme. He shall provide an explanation for any deviation from his programme and shall in the case of delays propose strategies for improving progress.

The reports shall be delivered to the Project Manager within one week after the end of each month.

19.2 Labour and Plant Returns

The Contractor shall include with his monthly reports details of all plant, (including their values) and labour force employed on the Site together with a description of their deployment. He shall also provide list of all materials intended for use in the Permanent Works delivered to the Site.

19.3 Photographic Records

The Contractor shall provide a photographic record of the execution of the Works by having photographs taken at monthly intervals from such points as the Project Manager may specify from time to time. The number of such photographs shall not exceed ten per month.

The Contractor shall supply three sets of colour prints, size 9x13 cm mounted on album sheets, dated and described.

20. Contractor's Compounds

No separate item is provided in the Bill of Quantities to cover the cost to the Contractor of providing and maintaining the offices, compounds, workshop and housing necessary for the proper organization and superintendence of the Works. These are deemed to be included in all other items of works. The Contractor shall be responsible to arrange the necessary land for the compounds at his own expense.

The Contractor has to submit to the Project Manager the layout and design of his compounds showing areas required for workshops, garages, concrete yards, stores, housing etc., for his approval.

The compounds and their contents shall be dismantled and cleared away by the Contractor at the completion of the Contract.

The Contractor shall provide, erect and maintain sign boards at locations to be indicated by the Project Manager. They shall be lettered in Balochi and English and be not smaller than 3 m x 2 m in size. The wording shall be as directed by the Project Manager.

21. Office and Accommodation for Project Manager

Not Applicable.

22. Transport

The Contractor shall provide, operate and maintain all vehicle (Such such 4WD, Double Cabin, Vigo/Revo) as specified in the BoQ in good running condition for the exclusive use of the Employer/ Project Manager. The Contractor shall provide the vehicle within 28 days after the Start Commencement Date or when instructed by the Project Manager. The Contractor shall submit the catalogues of the models to be purchased /hired to the Project Manager and shall obtain his approval before placing the orders.

The vehicles shall be new at the commencement of the Works and be comprehensively insured, fuelled, repaired, serviced and maintained by the Contractor for the duration of the Contract. The Contractor shall provide an equivalent substitute vehicle during any period when the specified vehicle is taken out of service for maintenance or repair.

Qualified driver approved by the Project Manager's Representative shall be available exclusively to drive and look after the vehicle.

The transport provided by the Contractor in accordance with this clause may be used, at the discretion of the Project Manager's Representative, for general duties connected with the Project in addition to the Project Manager's Representative's duties under the Contract.

The vehicles will be return to the Contractor at the end of the Project or when required by Project Manager. Provisional Sums has been allocated in BoQ for payments of the above transport facility.

23. Laboratory

Construction of Laboratory is not required in this Contract. However, the Contractor shall be responsible for testing of any material as and when required by the Project Manager.

24. Control of Construction Noise

The Contractor shall employ the best practical means to minimize noise and vibration produced by his operations. These shall include but not be limited to the following:

(a) All vehicle and mechanical plant shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.
(b) All compressors shall be "sound reduced" models fitted with lined and sealed acoustic covers which shall be kept closed whenever the machines are in use and all ancillary pneumatic percussion tools shall be fitted with mufflers or silencers. Dampened bits shall be fitted to percussion tools.
(c) Machines in intermittent use shall be turned off or throttled down when not in use.

(d) All pumps shall be fitted with effective exhaust silencers where appropriate, and maintained in good and efficient working order. Pumps running overnight shall be effectively silenced. Alliteratively the Contractor shall use electrically driven pumps if necessary.

(e) All stationary plant shall be screened where possible.

25. Public Roads

The Contractor shall take every precaution and make adequate provision to relevant excavated material or other debris from being deposited on public roads, and shall maintain safe use 24 hours per day of all roads through or around any part of the Works. No work that will in any way inconvenience the travelling public shall be started until adequate provision, satisfactory to any approved by the Authority concerned and the Project Manager, has been made to divert or by-pass traffic in safety and comfort. A road shall only be closed with the written permission of the Authority concerned. All diversions shall be maintained in good condition by the Contractor and shall be least 6 meters wide. All diversions shall be to the satisfaction of the Project Manager, and where existing private or public roads are used as diversions, they shall be maintained and left in a good condition upon completion of the re-routing activity.

The Contractor will be held responsible for any accidents relating to roadways, structures, services, stream crossing and for the proper direction of traffic in a manner approved by the Highway Authority, Police and by the Project Manager. It shall be the Contractor's responsibility to obtain the permissions required.

26. Entry to Private Land

Where it is necessary to enter on privately owned land for the purpose of making temporary road diversions, or for any other reason, the landowner or occupier shall first be consulted by the Contractor and his written permission obtained.

The Contractor shall ensure that, in case the landowner or occupier refuses access, the Project Manager is informed at least 6 weeks before the intended start of work in the area concerned.

Care shall be taken that no undue damage is caused to land, and at the completion of the work, the land shall be left in a tidy and restored (if appropriate) condition to the satisfaction of the landowner or occupier and the Project Manager.

27. Safety Measures and Services

The Contractor shall be responsible for the safety and health of the all workmen and other persons in or around the Works, to the satisfaction of the Project Manager. Such measures shall include, but not be limited to, the following:

- Provision of proper safety and emergency regulations, fire, gas and electric shock prevention, stretchers and first aid box together with rescue facilities generally at each place of work.
- Adequate supports and braces for all excavations.
- Provision of sufficient safety helmets for all personnel including the Project Manager, his staff, and any authorized visitor to the Site.
- Safe control of water including the provision of standby pumping plant.
- Provision and maintenance of safe, sound ropes, slings, pulleys and other lifting equipment, each having an up-to-date test certificate.
- Provision and maintenance of safe, sound mechanical frames, hoists, cranes, and vehicles for transporting materials, with an up-to-date test certificate for each items.
- Provision of good and safe access to the Works.
- Provision of warning notices to the public in English, Balochi and Urdu warning them of the existence of any dangers from the Works.

The Contractor shall ensure that employees are available at each site to administer emergency first aid and that all employees are aware of their names. The Contractor shall provide for the transport of serious cases to hospital. All medical facilities shall also be to the satisfaction of any properly appointed medical officer authorized by the Government of the Balochistan to inspect medical facilities at Site.

The Contractor shall ensure that all his employees are fully conversant with regulations and emergency procedures, and shall enforce the rule that any employee committing a serious breach of such regulations shall be immediately dismissed and shall not be re-employed.

28. Sanitary Arrangements

The Contractor shall provide and maintain sufficient sanitary conveniences for all operatives and site staff engaged on the works. These shall be in accordance with any requirements and regulations of the Government of the Pakistan and subject to the approval of the Project Manager. The ground shall be disinfected at the end of the Contract.

The Contractor shall ensure that all operatives and staff are aware that the sanitary conveniences of must be used by all personnel, and the Project Manager reserves the right to require dismissal of any person committing a nuisance on or about the site by failing to use the conveniences provided.

29. Working Program

Before commencing trench or structural excavation the Contractor shall record any existing damage to adjacent buildings and notify the Project Manager thereof. Failing to do so, the Contractor may become liable to make good such damage at his own expense as it may be considered a result of result of his activities.

The Contractor shall program his activities in such a way that construction of sewers and main holes precedes the construction of water lines in any section of the Works.

30. Training of Staff

The Employer will delegate to the Contractor a team of civil engineers and or technicians to be trained on various sections of the Works.

The Contractor shall submit for the approval of the Project Manager a training program and shall report to the Project Manager in writing in monthly intervals detailing the activities, attendance, performance and ability of each member of the team.

31. Fencing of the Works

The Contractor shall fence the Works in a manner sufficient for the protection of the public and livestock and property during the progress of the works and shall satisfy the Employer and the Project Manager or his Representative in this respect.

The Contractor shall erect and maintain adequate safety measures a round all trenches and other open excavations in a manner sufficient to provide maximum safety to pedestrians and vehicles at all times.

Temporary bridges shall be provided across trenches to maintain reasonable and safe access for pedestrians and vehicles to land and property on provide side of trenches.

32. Language of Records

All time sheets, records, notes, drawings, documents, etc. shall be in the English language. If the original documents are in another language a certified translation in English shall be submitted to the Project Manager.

33. Connection to Public Services

The Contractor shall be responsible to obtain in time all necessary approvals from the relevant Balochistan / Federal Government Authorities to connect the works in such a manner as required and approved by these Authorities. The costs involved are deemed to be included in the Contract Price.

34. General Requirement

Not Applicable

35. Measurement and Payment

35.1 Scope

This Section includes requirements for measurement and payment procedures, conditions for nonconformance assessment and nonpayment for rejected products.

35.2 Measurement

(a) Measurement methods delineated in individual Sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Section governs.
(b) Take measurements and compute quantities accordingly.
(c) Provide equipment, workers and survey personnel as necessary to perform the measurement.

35.3 Unit Quantities

(a) Quantity and measurement estimates stated on the Bill of Quantities are for contract purposes only.
(b) If greater or lesser quantities are required than those quantities indicated in the Bill of Quantities, provide the required quantities at the unit prices contracted.
(c) Measurement by Volume: Measure by cubic dimension.
(d) Measurement by Area: Measure by square dimension.
(e) Linear Measurement: Measure by linear dimension, at the item centerline of mean chord.
(f) Unit Price Measurement: Measure by unit designated on the Bill of Quantities.

35.4 Payment

(a) No Separate payment will be made for all of the items described under Clause 1 to 34 unless otherwise specified in the Bill of Quantities. The cost of these items is deemed to be included in all other item of works.
(b) Payment includes: Full compensation for required supervision, labor products, tools equipment, plant, transportation, services and appurtenances; erection, application or installation of an item of the work; and Contractors overhead and profit.
(c) Total compensation for required work shall be included in the unit prices bid on the Bill of Quantities. Claims for payment of work not specifically covered in the list of unit prices contained in the Bill of Quantities will not be accepted.
(d) Progress payments will be based on the Project Managers observations and evaluations of quantities incorporated in the work multiplied by the unit price.
(e) Final payment for pay items governed by unit prices will be made on the basis of actual measurements and quantities determined by the Project Manager, multiplied by the unit price for the pay item which is incorporated in or made necessary by the work.
(f) Prepare and submit an Application for Payment for work completed and not previously paid. The application at a minimum shall include the following:

1. Application for Payment: The application will be in a from acceptable to the Project Manager.
2. Construction Schedule.
3. Quantity supporting documents include: plotted and tabulated cross-sections, quantity calculations or suppliers invoice etc.
4. Application supporting documents and submittal items are provided to verify products, regulations and contract requirements are being met. Application supporting documents include: field obtained data, truck volume tickets, truck weight tickets, seed and fertilizer tags, pesticide use records, etc and other supporting documents as they may be necessary or required by Contract Documents.

(g) Incomplete Applications for Payment will not be processed and will be returned to the Contractor.

35.5 Nonconformance of Work

(a) Remove and replace the work, or portion of the work, not conforming to the Contract Documents**.**

(b) If, in the opinion of the Project Manager, it is practical to remove and replace the work, the Project Manager will direct one of the following remedies.

1. The nonconforming work will remain as is, but the unit price will be adjusted to a lower price at the discretion of the Project Manager.
2. The nonconforming work will be modified as authorized by the Project Manager, and the unit price will be adjusted to a lower price at the discretion of the Project Manager, if the modified work is deemed to be less suitable than originally specified.

(c) Individual Sections may modify these options or may identify a specific formula or percentage price reduction.

(d) The authority of the Project Manager to assess the nonconforming work and identify payment adjustment in final.

35.6 Nonpayment

Payment will not be made for any of the following.

1. Products wasted or disposed of in a manner that is not acceptable to Project Manager.
2. Products determined as nonconforming before or after placement.
3. Products placed beyond the lines and levels of the required work.
4. Products remaining on hand after completion of the work, unless specified to remain.
5. Loading, hauling and disposing of rejected products.

35.7 Deductions

Deductions will be made for any of the following.

1. Contractors failure to arrange for the items described under Clause 1 to 34.

Part II - TECHNICAL PROVISIONS

SECTION 1 – PROVISION OF TECHNICAL QUALIFIED FIRM SERVICES

1.1 General

After issuance of the commencement order by the Employer, the Contractor shall submit the eligibility and qualification documents for approval of the technical qualified firm (s) services. The technical firm shall have demonstrated rich experience on similar works with government departments and international donors. The technical qualified firm shall provide the services of qualified agriculture engineer and agronomist and all related services to perform the following activities:

- Carry out field visit of the proposed demo plots of wheat, cotton, orchard and or tunnel and collect soil and water samples for conducting the laboratory analysis and preparation of analysis reports.
- Based on the field study and the sampling results, identify an overall irrigation strategy for land preparation, seeds & plant selection, tillage, sowing, fertilizers, pesticides, harvesting, etc.
- Prepare technical report for each lot Works covering each aspect and phase of establishing the demo plots and submit for Project Manager & Employer approval.
- Perform field visits at each sowing, growing and harvesting stages of crops and plants and advise for the application of fertilizers, pesticides, etc.
- Prepare and deliver presentations for farmers training at the four stages of crops / plants. The provisional sums are allocated in Bill 1 – General Items of Bill of quantities to reimburse the petty expenses of these training sessions.
- preparation of scheduling for water requirements
- Preparation, submission and approval of operation and maintenance manuals.

1.2 Measurement and Payment

The measurement and payment for the provision of technical qualified firm services shall be made on lump sum basis against the BoQ item as provided in Bill-1 of the Bill of quantities. The lump sum price shall constitute full compensation for hiring of qualified technical qualified firm services blessed with the agriculture engineer and agronomist, transport charges of experts, accommodation, field visits and training to formers, technical report preparation, submission and approval and any other relevant expenses incurred during providing the technical expert services as per the contract. No separate payment shall be made in this respect for whatever expenses.

Part II - TECHNICAL PROVISIONS

SECTION 2 –SUPPLY OF SEEDS & PLANTS AND SOWING / PLANTATION

2.1 Purchase and Supply of Seeds

The Contractor shall purchase and supply certified quality of seeds of wheat, cotton and vegetables recommended by the Contractor's hired technical qualified firm including transportation, loading, unloading and sowing. The seeds supplied shall be fresh, clean without any pods and will be verified by the Project Manager prior supplied in bulk. The packing of the each approved seed shall clearly mark the germination rates.

2.2 Purchase and Supply of Plants

The Contractor shall purchase and supply of green, healthy plants (citrus, dates, lemon, olive, almond, etc.) of 2 years' maturity with 3 to 4' ft height or as recommended by the Contractor's hired technical expert, including cost of transportation, loading, unloading, staking and damages/ losses due to transportation as per requirement or as approved by the Project Manager. Provisional sums are allocated for the purchase and supply of certified quality of seeds and plants for this purpose.

2.3 Digging/ excavating of Planting Pits and Plantation - Orchards

The excavation/ digging of planting holes/ pits with size 3 ft x 3 ft and 3 ft in depth at spacing of 15 ft between plant to plant and 15 between row to row or as shown in drawing will be done either through manual (labor) or mechanical with tractor mounted post auger/ digger and dressing of excavated material. The Contractor shall warrant the pits are excavated as per the provided drawing and shall not execute the work unless approval granted by Project Manager and will not modify the design without the consent of the Project Manager. The Contractor will start plantation of desired plants as recommended by the Project Manager/ Technical expert firm upon approval of check request by the Supervisory staff of PSIAC.

2.5 Watering of Plantation

The Contractor should warrant that once the plantation is complete in the site, he will start watering of plants immediately through established irrigation system furrows / pipelines. The Contractor should maintain proper watering to the plants for specified time through hiring or engaging community labour.

2.6 Protection and maintenance of Plantation

The Protection and watching of the newly established plantation from browsing and grazing by livestock shall be the responsibility of the relevant beneficiary of the plot.

Part II - TECHNICAL PROVISIONS

SECTION 3 –SUPPLY AND APPLICATION OF FERTILIZERS AND PESTICIDES

3.1 Supply of Fertilizers

The Contractor shall purchase and supply certified quality of fertilizers such as urea, DAP, SOP, Zinc etc, as recommended by the Contractor's hired technical expert including transportation, loading, unloading and application. The Contractor shall supply the fertilizers from renowned manufacturers in the quantities only as recommended by the Contractor's hired technical expert and approved by the Project Manager. The Contractor shall be paid only for the quantities of each fertilizer as actually used at site and verified by the Project Manager. No payment shall be made for the surplus quantities left over on site due to the Contractor's fault and no payment shall be made for those leftover quantities.

3.2 Supply of Pesticides

The Contractor shall purchase and supply certified quality of pesticides such as insecticides (Including Imidacloprid, emamectin benzoate, lufenuron etc), fungicides, weedicides (such as Pendimethalin) etc. as recommended by the Contractor's hired technical expert firm including transportation, loading, unloading and application. The Contractor shall supply the pesticides from renowned manufacturers in the quantities only as recommended by the Contractor's hired technical expert and approved by the Project Manager. The Contractor shall be paid only for the quantities for which approval is granted by the Project Manager. The payment for the pesticides shall be made from provisional sum provided in the Bill of quantities for this purpose.

PART II - TECHNICAL PROVISIONS

SECTION 4 – LAND PREPARATION FOR DEMO PLOTS AND TUNNELS

4.1 Initial Considerations

Initially, the Contractor shall identify an overall irrigation strategy based on field study. Once accomplished, the Contractor shall initiate land development and preparation programme derived from traditional engineering practice. The first step is to establish the plane of the field. This shall involve placing a reference grid on the field, surveying the existing topography of the field by establishing the elevations of the grid points, and calculating the new field topography by adjusting the grid elevations to correspond to the desirable plane. Once the surface design has been determined, the Contractor shall begin the land preparation operation which include preparation of furrows, ridges, and or raised bed furrows. The Contractor shall utilize his equipment to move the earth into the new position on the field to achieve the required elevations of the design surface. The adequacy of the land preparation is dependent on the skill of the equipment operators, therefore the Contractor provide skilled equipment operators.

4.1 Provision of Raised Bed and Seed drill Machines AND Cotton Picker

Generally the demonstration plots, sowing, etc. shall be done using the traditional approaches and methods, however, the contractor shall introduce the advance technology and use the raised bed machines and seed drill machines in case the Contractor's hired technical expert firm advises so and approved by the Project Manager. In this case, the transport charges of the above machines shall be bear by the Employer whereas the rental, operation and maintenance charges shall be bear by the Contractor. Lump sum amount has been provided in Bill-1 of BoQ to reimburse the transport charges for providing the above machines.

4.4 Measurement and Payment

The measurement for land development work shall be made lump sum basis as "per acre of land" acceptably prepared, tillage, etc. and brought to the shape with design field slopes as approved by the Project Manager.

The payment for land preparation work shall be made at the lump sum Contract Price "per acre of land" measured as above. The lump sum payment per acre of land acceptably prepared shall include shall include all costs of site clearance, survey, demarcation, preparation of furrows, raised bed, tillage, etc. The payment shall also included all costs of all labour, materials, machinery, fuels and all other associated costs.

PART II - TECHNICAL PROVISIONS
CHAPTER 5 – HIGH EFFICIENCY IRRIGATION SYSTEM

5. Technical Specifications:

Bidders are required to offer standard products matching the specifications given below;

5.1 General:

5.1.1 Summary:

a. The required work consists of furnishing all labor, materials, equipment, services and related items necessary to complete all irrigation system, and all related work, complete as indicated on the drawings or specified herein.
b. The major items of work include, but are not limited to the following:
i. Verifying underground utility locations.
ii. Trenching and backfilling.
iii. Furnishing and installing a fully operational HEIS, including all mains, laterals, fittings, quick coupling valves, gate valves, drain valves, and backflow preventer, etc.
iv. Testing of system and making it operative, at satisfaction of farmers, OFWM-Team.

5.1.2 Quality Assurance:

i. ***Manufacturer's Qualification:*** Contractor shall submit manufacture qualification details regularly engaged in manufacturing irrigation systems materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
ii. ***Installer's Qualification*****s:** Contractor shall submit Installer's qualification details who have successfully completed execution of a minimum of two (2) contracts involving the installation of irrigation and piping work similar in size and scope to that required for this project. Such experience should be able to be demonstrated through references.

5.1.3 Submittals:

i. ***Product Data:*** Submit manufacturer's technical product data and installation instructions for irrigation system materials and products.
ii. ***Record Drawings:*** At project completion, submit record drawings of installed irrigation system piping and products.
iii. ***Maintenance Data:*** Submit maintenance data and parts lists for irrigation system materials and products. Include these data, product data, shop drawings and record drawings in maintenance manual.

5.1.4 Utilities and Protection:

a. Contractor shall acquaint itself with all site conditions. Should utilities not shown on the plans be found during excavations, Contractor shall promptly notify the Project Manager for instructions as to further action. Failure to do so will make Contractor liable for any damage arising from its operations subsequent to discovery of such utilities not shown on plan.
b. Contractor shall make necessary adjustments in the Layout as may be required to connect the existing stubouts. Should such stubs not be located exactly as shown, Contractor may be required to work around existing conditions at no increase in cost to the Employer.

5.1.5 Permits and Fees:

Obtain all permits and pay required fees to any Government agency having jurisdiction over the work. Inspections required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished to Project Manager & Employer to show that all work has been installed in accordance with the ordinances and code requirements.

5.1.6 Drawings, Specifications and Detail Sheets:

a. Drawings and specifications as being compatible. When discrepancies exist between scales and dimension or between the works to be accomplished by each trade, these shall be brought to the Project Manager attention immediately. The Project Manager decision regarding such discrepancies shall be final and binding.
b. All measurements shall be verified at the site for measurement purpose.

5.1.7 Piping Arrangement:

If any change in location of piping, etc., is required at site in the opinion of the Contractor, it shall be submitted to the Project Manager for approval before proceeding with the work, with written assurance that such changes will not cause any extra cost on their part or alteration of design requirements.

5.1.8 Guarantee:

a. Guarantee all work done for one (1) years from date of validation against all defects in material, equipment and workmanship. Guarantee shall cover repair of damage to any part of the premises resulting from leaks, or other defects in material, equipment and workmanship to the satisfaction of the Project Manager. Repairs, if required, shall be done promptly, at no cost to the Employer.
b. All repairs and servicing required during the guarantee period shall be made under the observation of the farmers to help train them in the proper operation and repair of the system.

5.2 Products:

5.2.1 General:

Design, installation and material used in the schemes must conform to applicable international standards. A list of relevant standards is attached. Equivalent national standards may be proposed if these meet or exceed ISO requirements.

5.2.2 Design and Installation:

Only qualified Irrigation or Agricultural Engineers should design the system, preferably they should have passed a certification program of a reputable institution. Junior professionals may assist in the design provided the final design must be checked and signed for correctness by an experienced Irrigation Designers.

5.2.3 Material:

The Supplier should indicate the source of the equipment and material used in the project. All equipment and material should conform to relevant international standards (list attached) and should be clearly marked. Samples of the equipment and material delivered to the sites will be taken at random and tested. Materials failing the test shall be replaced with better quality material.

5.2.4 Head Unit:

Head unit with booster pumps, non-return valve, air valve, pressure relief valve, water meter, pressure gauges and filtration should be provided in accordance with ISO11738:2000. Double filtration (media and disc filter) may be necessary depending on the water quality. Chemigation (Fertilization) devices are strongly recommended.

5.2.5 Booster Pumps:

Booster motor pump system with controller set are required to pump water from on-farm reservoirs and to create the required pressure in the drip system. Due to lack of reliable energy source, the solar driven pumps sets will be considered. Refer Section 6 & 7 of these specifications for details.

5.2.4 Disc Filter:

Typical specifications for disk filter;

- Inlet/outlet dia.: 2”
- Maximum working Pressure: 8 Bar
- Maximum Flow: 20-25 m^3/h
- Filtering Volume: 25 cu. m/hr
- Filtration Grade: 120 mesh/130 micron
- Body Material: Polypropylene (PP)
- Standards: ISO 9912: 2008/ISI 12785:1994

5.2.5 Fertilizer (venture) Injectors:

Typical specifications for venture injector;

- Inlet/outlet dia.: 1”
- Flow at 50 PSI on inlet: 471 GPH
- Fertilizer Draw with outlet pressure at 30 PSI: 75 GPH
- Fertilizer Draw with outlet pressure at 10 PSI: 100 GPH
- Body Material: Polypropylene (PP)
- Standards: ISO 9001: 2008 / IS0 15873

5.2.6 Fertilizer Tank:

Typical specifications for fertilizer tank;

- Volume: 60 liters
- Body Material: High quality Plastic of approve make

5.2.7 Kinetic Air Valve:

Typical specifications of Kinetic Air Valve;

- Valve Size: 1”
- Working Pressure range: 3 – 150 PSI (0.2 – 10 bar)
- Body Material: Brass UNI EN 192
- Cap Bras CW617N
- Float Polyethylene
- Washer NBR
- Mechanism Brass
- Junction, Level and Stop Acetyl resin

5.2.8 Pressure Gauge:

- 0 – 100 PSI Glycerin-Filled Pressure Gauge

5.2.9 Gate Valve:

Gate Valve should be according to the following specifications:

- Size: 2”
- Body Material: Cast Gunmetal/Brass
- Maximum Operating Pressure: 150 PSI
- Standard: BS 5154

5.2.10 Non Return Valve:

Non Return Valve should be according to the following specifications:

- Valve Size: 2”
- Body Material: Cast Gunmetal/Brass
- Maximum Operating Pressure: 150 PSI

5.2.11 Pressure Relief Valve:

Pressure Relief Valve should be according to the following specifications:

- Valve Size: 2”
- Body Material: Cast Gunmetal/Brass
- Pressure Adjustment Range: 0 - 250 PSI

5.2.12 Water Meter:

- Size: 2”
- Minimum Flow: 20 GPM
- Maximum Flow: 400 GPM
- Minimum Working Pressure: 14 PSI
- Maximum Working Pressure: 230 PSI
- Body Material: Brass
- Standards: ISO 4064

5.3 Pipe Network:

5.3.1 Polyvinyl Chloride (PVC) Pipes:

uPVC pipes can be used for mainlines and submains in drip, bubbler and sprinkler systems provided they are buried. Maximum Sustained working pressure should be 6 bar.

Typical specifications for Polyvinyl Chloride (PVC) Pipe;

- Maximum working pressure: 9 bar (class – C) or 12 bar (Class – D)
- Size of main: 2” dia
- Size of sub-main: 1.5” dia
- Standard: BS 3505 & PS 3051

5.3.2 PVC Fittings:

- Schedule 80 PVC
- Size: Sized for main and submain
- Standards: BS-4346/ASTM-2467

5.3.3 Polyethylene (PE) Pipes:

Low Density Polyethylene (LDPE) Pipe will be used for laterals. Typical specification of PE Pipe;

For Drip Irrigation System;

- Inside Dia.: 14.8 mm
- Outside Dia.: 16.0 mm
- Wall Thickness: 1.20 mm
- Maximum Operating Pressure: 58 PSI (4.0 bar)
- Material: UV resistant poly resin material
- Uses: 16 mm fittings and accessories
- Standard: ISO-8779, ISO-4427, ISO 4437 and BS – 6437

5.3.4 Integrated Drip line for Tunnels:

- Dripper Spacing: 30 cm
- Outside Diameter: 16 mm (0.60”)
- PN: 4 bar
- Inside Diameter: 15.0 mm
- Wall Thickness: 1.00 mm
- Material: Polyethylene (PE)
- Standard: ISO 9261:2004 / ISI 13488:1992

5.3.5 PE Fittings:

Typical specification of PE fittings;

- Operating Pressure: 60 PSI (4.2 bar)
- Material: UV resistant polyethylene resin materials
- Uses: 16 mm polyethylene tubing
- Standard: ISO 9261:2004 / ISI 13488:1992

5.3.6 Flush Valve:

Typical specifications of Flush Valve;

- Valve Size: 1.5”
- Operating Pressure: 7-60 PSI (0.5-4.2 Bar)
- Body Material: PVC/Polypropylene (PP)
- Standard: ASTM F-1970

5.3.7 Ball Valve:

Ball Valve should be according to the following specifications:

- Material Schedule 80
- Size: 2” (50 mm)
- Body Material: Polypropylene (PP)
- Maximum Operating Pressure: 150 PSI
- Standard: ISO 9911:1993

5.4 Emission Devices:

a. Drippers:

Typical specification for drippers;

Online (Point Source) Drippers for Orchards:

- Dripper Type: Pressure Compensating (PC), self-cleaning Drippers
- Dripper Flow rate: 8 l/hr (6 dripper per plant)
- Pressure compensating range: 7 – 50 PSI (0.5 – 3.5 bar)
- CV: less than 7%
- Filtration Requirement: 120 mesh
- Material: UV resistant plastic
- Standard: ISO 9261:2004 / ISI 13488:1992

Inline (Line Source) Drippers for Tunnels:

- Built-in pressure compensated in-line drippers at 30 cm intervals
- Dripper Type: Pressure Compensating (PC), self-cleaning Drippers
- Dripper Flow rate: 2 l/hr
- Pressure compensating range: 14.7 – 60 PSI (1.0 – 4.0 bar)
- CV: less than 7%
- Filtration Requirement: 120 mesh
- Material: UV resistant plastic
- Standard: ISO 9261:2004 / ISI 13488:1992

5.5 Execution:

5.5.1 Inspection:

Examine areas and conditions under which irrigation system’s materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

5.5.2 Installation of Piping and Fittings:

5.5.2.1 Excavating and Trenching:

i. The Contractor shall perform all excavations as required for the installation of the work included under this section.
ii. The trenches should be as uniform and level as possible, free of large stones and other sharp-edged materials. Where required it must be filled with embedment material such as grained soil or sand to a depth of 10 cm. Trench dimensions should be 60 cm (24") for 75 mm (3") pipe and above and 50 cm (20") for 63 mm (2.5") pipe and below. The width should be 35 cm (14") in all cases.

5.5.2.2 Pipe and Assembly:

i. No pipe shall be laid when, in the opinion of the Project Manager, trench or weather conditions are unsuitable. When pipe laying is not in progress, the open ends of the installed pipe shall be closed by approved means to prevent entrance of trench water and other foreign material into the line(s). Enough backfill shall be placed in the center sections of the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and re-laid.
ii. PVC pipe and fittings shall be solvent welded using solvents and methods as recommended by the manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush.
iii. Pipe may be assembled and welded on the ground. Snake pipe from side to side in the trench to allow for expansion and contraction.
iv. Make all connections between plastic pipe and metal valves or steel pipe with threaded fittings using plastic male adapters.

5.5.2.3 PE and D Pipe Installation:

i. Install all LDP Pipe as indicated on drawings. Use only Teflon tape on all threaded connections.
ii. Cap or plug all openings as soon as lines have been installed to prevent the intrusion of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.
iii. Thoroughly flush all water lines before installing valves and other hydrants.
iv. Test in accordance with instructions on Hydrostatic Tests.

5.5.2.4 Backfilling and Compacting:

i. After the system is operating, and required tests and inspections have been completed, backfill excavations and trenches with clean soil free of rubbish.
ii. Backfill for all trenches, regardless of type of pipe covered, shall be compacted to minimum ninety (90%) percent Procter Test.
iii. Compact trenches in areas to be planted by thoroughly flooding the backfill.
iv. Dress off all areas to finish grades.

5.5.2.5 Flushing:

Prior to backfilling and before connection of the line flushing valves, flush the entire system to remove any dirt or sediment that may have entered the system during the installation.

5.5.3 Field Quality Control:

a. Make Hydrostatic Tests in the presence of Project Manager & Employer. No pipe shall be backfilled until it has been inspected, tested and approved.
b. Test all mainlines, submain and laterals under a hydrostatic pressure of 60 PSI for period of two hours.

5.5.4 Instructions:

After completion and testing of the system, the Contractor will instruct the Project Manager and Owner's personnel in the proper operation and maintenance of the system.

5.5.5 Protection:

Supplier shall be responsible for work until finally inspected, tested and accepted. After delivery, and before and after installation, protect work against theft, injury or damage. Protect open ends of work with temporary covers or plugs during construction, to prevent entry of obstruction material.

5.5.6 Goods/Product Standards:

The Goods/Products shall comply with following standards:

Standard Code	Standard Name
ANSI/ASAE Standards	
ANSI/ASAE S330.1 February 2003	Procedure for Sprinkler Distribution Testing for Research Purposes
ANSI/ASAE S376.2 February 2003	Design, installation and Performance of Underground, Thermoplastic Irrigation Pipelines
ANSI/ASAE S395 February 2003	Safety for Self-Propelled, Hose-Drag Agricultural Irrigation Systems
ANSI/ASAE S397.2 February 2003	Electrical Service and Equipment for Irrigation
ANSI/ASAE S436.1 December 2001	Test Procedure for Determining the Uniformity of Water Distribution of Center Pivot and Lateral Move Irrigation Machines Equipped with Spray or Sprinkler Nozzles
ANSI/ASAE S539 February 2003	Media Filters for Irrigation – Testing and Performance Reporting
ANSI/ASAE S553 March 2001	Collapsible Emitting Hose (Drip Tape) – Specifications and Performance Testing
BSR/ASAE S577-200x	Specification for Poly (Vinyl Chloride) (PVC) Irrigation Pipe (PIP) Fittings
ASAE EP367.2 February 2003	Guide for Preparing Field Sprayer Calibration Procedures
ASAE EP405.1 February 2003	Design and Installation of Micro irrigation Systems
ASAE EP458	Field Evaluation of Micro irrigation Systems
ASAE S327.2 February 2003	Terminology and Definitions for Agricultural Chemical Application
ASAE S398.1 January 2001	Procedure for Sprinkler Testing and Performance Reporting
ASAE S435 February 2004	Polyethylene Pipe Used for Micro-irrigation Laterals
ASAE S447 February 2003	Procedure for Testing and Reporting Pressure Losses in Irrigation Valves
ASAE S471 February 2003	Procedure for Measuring Sprayer Nozzle Wear Rate
ASAE S491 February 2003	Graphic Symbols for Pressurized Irrigation System Design
ASTM Standards	
ASTM D1785-06	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

Standard Code	Standard Name
ASTM D-2104	Standard specifications for Polyethylene (PE) plastic pipe, schedule 40
ASTM D2241-05	Standard Specification for Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D-2447-03	Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
ASTM D2464-99	Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466-02	Standard Specification for (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2467-02	Standard Specification for (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D-2468	Standard specification for Acrylonitrile Butadiene Styrene (ABS) plastic pipe fittings, Schedule 40
ASTM D-2469	Standard specifications for socket type Acrylonitrile-Butadiene-Styrene (ABS) plastic pipe fittings, Schedule 40
ASTM D-2609	Standard specifications for plastic insert fittings for polyethylene (PE) plastic pipes
ASTM D2683-98	Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
ASTM D2683-04	Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
ASTM D-2855	Standard practice for making solvent cemented joints with poly (vinyl chloride) (PVC) pipe and fittings
ASTM D-3036	Standard specifications for Socket-type poly (vinyl chloride) (PVC) plastic line couplings
ASTM D3139-98(2005)	Standard Specification for joints for Plastic Pressure Pipes Using Flexible Elastometric Seals
ASTM D-3261-03	Standard specifications for butt heat fusion polyethylene (PE) plastic fittings for polyethylene (PE) plastic pipe tubing
BS Standards	
BS 1387: 1985 (1990)	Specification for screwed and socketed steel tubes and tubulars and for plain and for steel tubes suitable for welding or for screwing to BS 21 pipe threads
BS 21:1985	Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions) (equivalent to ISO 7-2:1982)
BS 3867:1987	Method of specifying outside diameters and pressure ratings for pipe of thermoplastics materials (inch series) (equivalent to ISO 161-2:1977)
BS 4346: Part 1-3	Joints and fittings for use with unplasticised PVC pressure pipes
BS 5556: 1978 (1986)	Specification for general requirements for dimensions and pressure ratings for pipe of thermoplastic materials (metric series) (ISO 161/1)
BSR/ASAE S577-200x	Specification for Poly Vinyl Chloride (PVC) Irrigation Pipe (PIP) Fittings
DIN Standards	
DIN 2440/41/42	Steel tubes (Medium-Weight) suitable for screwing
DIN 2999 (1-6)	Pipe threads for tubes and fittings
DIN 8062 (1988)	Unplasticised polyvinyl chloride (PVC-U, PVC-HI) pipes – Dimensions

Standard Code	Standard Name
DIN 8072 (1987)	Pipes of low-density PE (low-density polyethylene) – Dimensions
DIN 8074 (1999)	High-density polyethylene (PE-HD) pipes – Dimensions
DIN 8075 (1999)	High-density polyethylene (PE-HD) pipes – Testing
DIN 8161 (1994)	Unplasticised polyvinyl chloride pipes – General quality requirements and testing
ISO Standards	
ISO 10522: 1993	Agricultural irrigation equipment – Direct-acting pressure-regulating valves
ISO 11419: 1997	Agricultural irrigation equipment – Float type air release valves
ISO 11545: 2001	Agricultural irrigation equipment – Center-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles – Determination of uniformity of water distribution
ISO 11678: 1996	Agricultural irrigation equipment – Aluminium irrigation tubes
ISO 1167: 1996	Thermoplastics pipes for the conveyance of fluids – Resistance to internal pressure – Test method
ISO 11738: 2000	Agricultural irrigation equipment – Control heads
ISO 12347: 1995	Agricultural irrigation – Wiring and equipment for electrically driven or controlled irrigation machines
ISO 13457: 2000	Agricultural irrigation equipment – Water driven chemical injector pumps
ISO 13460: 1998	Agricultural irrigation equipment – Plastics saddles for polyethylene pressure pipes
ISO 15081:2005	Agricultural irrigation equipment – Graphical symbols for pressurized irrigation systems
ISO 15873: 2002	Irrigation equipment – Differential pressure Venturi-type liquid additive injectors
ISO 15886-1:2004	Agricultural irrigation equipment – Sprinklers – Part 1: Definitions of terms and classification
ISO 15886-3:2004	Agricultural irrigation equipment – Sprinklers – Part 3:Characterization of distribution and test methods
ISO 16149:2006	Agricultural irrigation equipment – PVC above-ground low-pressure pipe for surface irrigation – Specifications and test methods
ISO 3126: 1997	Plastics pipes – Measurements of dimensions
ISO 3460: 1975	Unplasticized polyvinyl chloride (PVC) pressures pipes – Metric series – Dimensions of adapter for backing flange
ISO 3501: 1976	Assembled joints between fittings and polyethylene (PE) pressure pipes – Test of resistance to pull out
ISO 3503: 1976	Assembled joints between fittings and polyethylene (PE) pressure pipes – Test of leak proofness under internal pressure when subjected to bending
ISO 3603: 1977	Fittings for unplasticized polyvinyl chloride (PVC) pressure pipes with elastic sealing ring type joints – Pressure test for leakproofness
ISO 3604: 1976	Fittings for unplasticized polyvinyl chloride (PVC) pressure pipes with elastic sealing ring type joints – Pressure test for leakproofness under conditions of external hydraulic pressure
ISO 4422-1:1996	Pipes and fittings made of unplasticised poly(vinyl chloride) (PVC-U) for water supply – Specifications – Part 1: General

Standard Code	Standard Name
ISO 4422-2:1996	Pipes and fittings made of unplasticised poly(vinyl chloride) (PVC-U) for water supply – Specifications -Part 2: Pipes (with or without integral sockets)
ISO 4422-3:1996	Pipes and fittings made of unplasticised poly(vinyl chloride) (PVC-U) for water supply – Specifications -Part 3: Fittings and joints
ISO 4422-4:1997	Pipes and fittings made of unplasticised poly(vinyl chloride) (PVC-U) for water supply – Specifications -Part 4: Valves and ancillary equipment
ISO 4422-5:1997	Pipes and fittings made of unplasticised poly(vinyl chloride) (PVC-U) for water supply – Specifications -Part 5: Fitness for purpose of the system
ISO 49: 1994	Malleable cast iron fittings threaded to ISO 7-1
ISO 7-1: 1994	Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation
ISO 7-2: 2000	Pipe threads where pressure-tight joints are made on the threads – Part 2: Verification by means of limit gauges
ISO 7714: 2000	Agricultural irrigation equipment – Volumetric valves – General requirements and test methods
ISO 7749-1: 1995	Agricultural irrigation equipment – Rotating sprinklers – Part 1: Design and operational requirements
ISO 7749-2: 1990	Agricultural irrigation equipment – Rotating sprinklers – Part 2: Uniformity of distribution and test methods
ISO 8779: 2001	Polyethylene (PE) pipes for irrigation laterals -- Specifications
ISO 8796: 1989	Polyethylene (PE) 25 pipes for irrigation laterals -- Susceptibility to environmental stress-cracking induced by insert-type fittings -- Test method and specifications
ISO 8796:2004	Polyethylene (PE) 32 and PE 40 pipes for irrigation laterals – Susceptibility to environmental stress-cracking induced by insert-type fittings – Test method and requirements
ISO 9260: 1991	Agricultural irrigation equipment -- Emitters -- Specification and test methods
ISO 9261:2004	Agricultural irrigation equipment – Emitters and emitting pipe – Specification and test methods
ISO 9624: 1997	Thermoplastics pipes for fluids under pressure -- Mating dimensions of flange adapters and loose backing flange
ISO 9625: 1993	Mechanical joint fittings for use with polyethylene pressure pipes for irrigation purposes
ISO 9635-1:2006	Agricultural irrigation equipment – Irrigation valves – Part 1: General requirements
ISO 9635-2:2006	Agricultural irrigation equipment – Irrigation valves – Part 2: Isolating valves
ISO 9635-3:2006	Agricultural irrigation equipment – Irrigation valves – Part 3: Check valves
ISO 9635-4:2006	Agricultural irrigation equipment – Irrigation valves – Part 4: Air valves
ISO 9635-5:2006	Agricultural irrigation equipment – Irrigation valves – Part 5: Control valves
ISO 9644: 1993/Amd 1: 1998	Agricultural irrigation equipment -- Pressure losses in irrigation valves -- Test methods

Standard Code	Standard Name
ISO 9911:2006	Agricultural irrigation equipment – Manually operated small plastics valves
ISO 9912-1:2004	Agricultural irrigation equipment – Filters for micro-irrigation – Part 1: Terms, definitions and classification
ISO 9912-2:1992	Agricultural irrigation equipment – Filters – Part 2: Strainer-type filters
ISO 9912-3:1992	Agricultural irrigation equipment – Filters – Part 3: Automatic self-cleaning strainer-type filters
ISO 9952: 1993	Agricultural irrigation equipment -- Check valves
ISO/TR 10501: 1993	Thermoplastics pipes for the transport of liquids under pressure -- Calculation of head losses
ISO/TR 8059: 1986	Irrigation equipment -- Automatic irrigation systems -- Hydraulic control

Note:

- **ASAE:** The Society for Engineering in Agriculture, Food, and Biological Systems (former American Society of Agricultural Engineers).
- **ANSI:** American National Standards Institute.
- **ASTM:** American Society for Testing Material.
- **BS:** British Standards.
- **DIN:** Deutsches Institut für Normung (German standards).
- **ISO:** International Standards Organization.
- **EN:** European Standard.

Part II - TECHNICAL PROVISIONS

SECTION 6 –PUMPING EQUIPMENT

6.1 Works to be Included

The works to be included in this section shall be in accordance with specification and shall comprise the design, manufacture, works witness testing, delivery, storage, installation, site testing and commissioning and maintenance of :-

a) The Surface pumping units shall be selected for operation on solar energy system Piping, Fittings and Allied Works.

6.2 Reference Standards

ASTM - A 27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM - A 210	Heat Resisting Chromium and Chromium - Nickel Stainless Steel Plates
ASTM - A 276	Standard Specification for Stainless Steel Bars and Shapes
ASTM - A 743	Castings, Iron - Chromium, Iron – Chromium - Nickel, Corrosion Resistant, for General Application
ASTM- A 213	Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service
ASTM- A 214	Specification for Carbon and Alloy Steel Nuts & Bolts for High Pressure Or High Temperature Service

6.3 Brief Description of works

The Surface pumps to be installed at demo plots (Orchards & Tunnels) in different areas having discharge and dynamic head requirements as per drip system requirements:

A. The pumps shall be designed, installed and tested in accordance with applicable requirements of ASTM and Hydraulic Institute Standards.

B. The Supplier shall check the design functions of each equipment; analyze system pressure loss, hydraulic transients for normal and emergency conditions at minimum and maximum flow.

C. Each equipment shall be suitable for rendering intended functions individually as well as part of the system under the Project's climatic and environmental conditions.

6.4 Pump Requirements

The Supplier shall carefully select the pumps to ensure that have a stable characteristic under all suction heads. Detail of pumps is provided in the BoQ and specifications.

6.5 Submittals for Pumping Units

A. Shop drawings: Indicate general assembly, components, dimensions, weights, clearances and methods of assembly before shop tests.

B. Product Data: Provide manufacturer's literature including general assembly, certified pump curves showing performance of pump and system, operating point indicated, NPSH curve, controls, connection diagrams and service factor.

C. System design and pressure loss calculations at different speeds.

D. Proposed system operation and contract description.

E. Manufacturer's Installation Instructions: Including handling, storage and start-up instructions for pumping system.

F. Manufacturers recommended spare parts and tools list.

G. Manufacturer's Certificate: Certifying that pumps shall meet or exceed specified requirements at specified operating conditions.

H. Field Reports: Submit as directed by the Purchaser.

I. Pumping Unit Brands: Grundfos, KSB, Sulzer & Goulds or equivalent

6.6 Materials

1. The entire pumping unit parts, unless otherwise specified shall be of standard materials of the manufacturer, suitable for the specified operating conditions and contents of the well water.
2. All materials shall be new and of first-class quality, suitable for the purpose, free from defects and imperfections. Furbished pumping units will not be accepted.
3. Materials for pumping units coming in contact with pumped water shall be selected such that no part renders any harmful effect to the water for human consumption.
4. Materials of pumping units and valve parts shall be compatible with the corrosive and / or abrasive properties of the pumped water.
5. All materials or parts used in the equipment shall be tested, unless otherwise directed in conformity with applicable methods prescribed by the ASTM for mechanical, fracture, corrosion, fatigue, erosion, effect of water temperature, metallography and chemical analysis, or such other organization as may be specifically required, and generally in accordance with the best commercial methods. When requested, tests shall be made in the presence of the Purchaser; stocked material may be used, provided evidence is furnished to show that such material meets the requirements as specified herein.
6. Certified material test reports shall be furnished as soon as possible after the tests are made. The test certificates shall identify the component for which the material is to be used and shall contain all information necessary to verify compliance with the Contract Documents.
7. All the pumping units shall have manufacturer brands of pump strainer. Their material and size shall be compatible to the raw or source water from the well.

6.7 Friction Loss

The friction losses have been assessed from a point 1.0 meters outside the pumping station wall and have been calculated at the duty flow and are based on the charts contained in the United Kingdom Hydraulics Research Station, Hydraulics Research Paper No.2 (charts for the hydraulic design of channels and pipes) Third Edition (metric units) using a roughness value as stated in the above table. The Supplier shall make his own assessment of the mains friction losses over all other conditions of operation.

The Supplier shall add to the external head stated above his own allowance for friction and other losses within the confines of the pumping station.

The friction losses stated in the tables may not coincide with the Supplier's own calculations and he should comment accordingly. However, for purposes of his Tender he should base his figures on data given herein.

6.8 Characteristic Curves

Characteristic and system curves for the pumps shall be supplied to scale which shall enable the Purchaser to identify the capacity of the pumps under single and multi pump operation at the duty point.

When tested through their complete range of working head at the Supplier's premises, all the pumps shall give results which conform to the curves submitted with the Tender or any other curves subsequently approved by the Purchaser. Curves showing pump efficiency and KW loading shall also be submitted to the Purchaser for his consideration.

6.9 Description of Pumps

The pumps shall be frame mounted, multistage and shall conform to the following construction or as decided and approved by the Purchaser.

Type	Surface DC Type
Design Head	100 ft (or as per site conditions)
Design discharge	100 LPM min. or as per site requirements
Operating Pressure	4 bar
Maximum Pressure	10 bar
Efficiency of Pumps :	Not less than 70 % at min & max speeds
R.P.M. Range	1740 rpm to 3000rpm
Rated Power of motor pump set	1 or 2 hp (or as selected by the manufacturer) on solar

Material

Casing	AISI 304 or equivalent
Impeller (Brass)	AISI 304 or equivalent
Shaft	AISI 304 or equivalent

The Supplier shall confirm that the above materials are suitable for the typical analysis of water samples.

Each pump shall be designed to give a continuous falling head/quantity characteristic to allow parallel operation. Impeller diameters shall be at least 5% less than the maximum diameter than can be fitted into the casing. Each pump shall be fitted with a stainless steel wire rope or space-lay cable of adequate strength and length to permit raising the pump for inspection.

The stator casing, oil casing, and impeller shall be of grey iron construction, with all parts coming into contact with water protected by a coat of rubber-asphalt paint. All external bolts and nuts shall be of stainless steel. A replaceable wear ring designed for abrasion resistance shall be installed at the inlet of the pump to provide protection against wear to the impeller. The impeller shall be of a non-clog design, capable of passing solids and constructed with long throughway with no acute turns.

Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals. The lower consisting of one stationary and one rotating tungsten-carbide ring, with each pair held in contact by separate spring. The seals shall require neither maintenance nor adjustment, and shall be easily replaceable. The rotating half shall be positively driven by a spring and ball arrangement. Friction fit to the shaft is not acceptable. Conventional double mechanical seals with a single or double spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces shall not be considered equal to the tandem seal specified.

A sliding guide bracket shall be an integral part of the pumping unit and the pump casing shall have a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the floor of the sump and so designed as to receive the pump connecting flange without the need of any bolts or nuts.

Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided by no less than two (2) guide bars to and pressing tightly against the discharge connection; no portion of the pump shall bear directly on the floor of the borehole and no rotary motion of the pump shall be required for sealing. Sealing at the discharge connection by means of a diaphragm, O-ring, or similar method of sealing will not be accepted as an equal to a metal contact of the pump discharge and mating discharge connection specified.

Pump motor shall be housed in an air-filled watertight casing and shall have Class F insulated windings which shall be moisture resistant. The motor shall be NEMA Design B rated 155° C maximum. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially, or non-submerged condition. The pump shall be capable of running dry continuously in a totally dry condition. Before final acceptance, a field running test demonstrating this ability, with twenty-four (24) hours of continuous operation under the above conditions, shall be performed for all pumps being supplied, if required. Cable junction box and motor shall be separated

by a stator-lead sealing gland or terminal board which shall isolate motor from any water or solids gaining access through pump cable.

Pump motor cable shall be suitable for pump applications which statement shall be permanently embossed on the cable.

6.10 Pump Drive (Surface Motor) and Flat Cable

All Electric motors for pumps shall be 3 phase, 400v or 12v, 50-60 Hz, insulation class F with class B temperature rise or higher, IP 68, suitable for prime operation on Solar Energy.

The pumping unit will be provided with manufacturer`s recommended flat cable 4G (3 phase + N) and spliced with round cable as per cable splicing standards using manufacturer`s recommended splicing kit.

6.11 Power Cable (Round)

Electrolytic circular copper conductor, class 5 or 6 (flexible) based on EN 602228, PVC nitrile flexible or thermosetting insulation rubber (E14), PVC nitrile flexible or thermosetting rubber (Type EM 2) outer sheath.

Color code (4G) Brown+ Black+ Grey+ Yellow/ Green, round jacked shape. The product to be marked as “Surface Pump Cable” with rated voltage ”600/ 1000 V“. The insulation and sheath material to be selected as per raw water temperature in the well sites.

The applicable standards for surface power cable (round & flat) are:-

I) IEC 60332-1 Flame retardant or fire rate cables
II) IEC 60228 Conductors of insulated cables
III) IEEE 1018 Recommended practice for specifying electric submersible pump cable. Ethylene-Propylene rubber insulation
IV) IEEE 1021 Recommended practice for specifying electric submersible pump cable. Propylene rubber insulation

6.12 Operation and Maintenance Data

A. Operation Data: Include manufacturer's instructions, start-up data, and trouble-shooting check lists for pump motors and controls.

B. Maintenance Data: Include manufacturer's literature, cleaning procedures, replacement parts lists, and repair data for pumps, VFD motors and VFD controls.

6.13 Quality Assurance

A. Perform work in accordance with manufacturer’s recommendation.

B. Maintain one copy of document on Site.

6.14 Test for Pumping Units

6.14.1 Shop Tests

The surface pumps shall be assembled completely in the shop to ensure correct fitting of all parts and shall be match marked before shipment, unless the pump is shipped completely assembled, to ensure correct assembly in the field. The pump casing shall be tested hydrostatically under a pressure equal to 150 percent of either the sum of the pump shut off head plus the maximum suction head or the maximum working pressure whichever is greater.

The hydrostatic test pressure shall be held for not less than 30 minutes after all leaks have been stopped.

The pumps shall be tested by and at the expense of the Supplier to establish that the performance requirements of these Specifications and the Supplier's guarantees have been fulfilled. The pumps shall be tested in the manufacturer's shop and the performance tests shall be made with the entire pumping unit at different speeds. Readings shall be taken at a minimum of five capacity points, including one point with plus or minus 2 percent of capacity specified.

The tests shall be conducted in accordance with the accepted practices at minimum speed, full speed, maximum speed and unless otherwise specified, the procedure and instruments used shall conform to the latest applicable standards.

The test shall be carried out in the presence of the representatives of the Purchaser.

The test shall cover:

A. Determination of the total head.

B. Determination of rate of water pumped.

C. Measurement of input power to the pump or output power of the motor.

D. Determination of pump efficiency at different speeds.

E. Preparation of characteristic curve showing pump efficiency, flow and head.

F. Measurement of reverse runaway speed.

G. Determination of NPSH required.

H. Minimum submergence required.

6.14.2 Operational Tests

Operational tests may be performed by the Purchaser on the pump before the pump is placed in service. If so desired by the Purchaser, the tests shall be repeated one month before the expiry of the defect liability period or guarantee/ maintenance Period.

6.14.3 Performance Tests, Capacity and Efficiency

A. General: Within two weeks after the operation of the pump with has been approved by Purchaser, as provided in the Contract, the pumping units shall be tested by and at the expense of the Purchaser to determine whether the equipment meets the guarantees as given. If so desired by the Purchaser, the tests shall be repeated one month before the expiry of the Maintenance Period.

B. Provision in Case of Damage or Wear: Prior to the tests, pumps having VSD features will be inspected by the Purchaser and the Supplier. Should such inspection disclose any damage or wear has taken place the Supplier shall rectify such damages at his own cost.

C. Capacity and Efficiency Tests: The capacity and efficiency of the pump will be determined for as many different heads within the range of operating heads as possible. The capacities and efficiency at the guaranteed conditions will be determined from smooth curves drawn through the test points.

D. Conduction of the Tests: The tests will be conducted in accordance with latest applicable Hydraulic Institute Standards.

E. Determination of Rate of Flow: The rate of flow of water through the pump will be determined by the properly calibrated flow meter to be installed at well station.

F. Determination of Total Head: Total head on pump (H) will be the difference between the pressure elevation at the pump discharge and the pressure elevation near the entrance to the suction elbow, both corrected for velocity head.

G. Determination of Power: The electrical input to the motor will be measured by using accurate, sensitive and calibrated, test instruments connected to the permanently installed instrument transformers or as directed by the Purchaser. The input to the pump will be the measured input to the motor minus the mechanical and electrical losses in the motor. The losses in the motor will be determined by separate tests in accordance with the latest standards and test codes of the Institute of Electrical and Electronic Engineers, Inc; and the American National Standards Institute.

H. Determination of Efficiency Curve: The efficiency curve of the surface pump will be determined at various frequencies of the input, head and rate of flow of water, all as determined in accordance with the above sub-paragraphs.

I. Runaway Tests: The surface pumps will be subject to runaway tests & witnessed by the Purchaser. The tests will be performed under normal operating conditions by interrupting the power supply.

6.15 Installation

A. Install pumping units, pump pipes & cables in accordance with manufacturer's instructions.

B. Lubricate pumps and motors before lowering in to the well (if required).

C. Use cable guards supplied by the manufacturer around the flat and round cables in order to protect their sheaths from abrasion.

D. Tie up the cable guards with metallic flexible clamps supplied by the manufacturer.

6.16 Support of Pipe work and Valves

Support and attachments shall be supplied to support the pipe work and its associated equipment in an approved manner.

Wherever possible flexible joints shall be provided with tie-bolts or other means to transfer longitudinal thrusts along the pipe work as a whole so that the external anchorages at blank flanges, ends, bends, tees and valves may be kept to a minimum. The Supplier shall indicate on his working drawing the thrust blocks required to anchor pipe work for approval by the Purchaser.

6.17 Lifting Equipment

Lifting equipment at the pumping stations shall be provided by the Contractor.

6.18 Measurement of Payment

6.18.1 Surface Motor-Pump Set with Motor Pump Controller and Accessories

Measurement

Measurement of furnishes and installation of surface motor-pump set along with motor pump controller set will be for complete equipment including its ancillaries and shall be considered as one unit as stated in Bill of Quantities.

Payment

The payment of surface motor-pump set along with motor pump controller set will made at the tendered unit rate in the priced Bill of Quantities for complete assembly and all relevant ancillaries including all costs for design fabrication according to approved specification and make, delivered, store, installed, tested and commissioned by erection supervisor from manufacturer, maintained during the Defect Notification Period of one year.

Unit of Measure

Unit of measure: Number

Part II - TECHNICAL PROVISIONS
SECTION 7 –SOLAR POWER SUPPLY SYSTEM

7.1 Scope of Work

The scope of work includes Procurement, Installation, Integration, Testing and Commissioning of the Solar Power Supply (SPS) in accordance with the Functional, Technical and Special provisions lay down herein. In case of conflict in the provisions herein with those present in the balance of the Bidding Documents, the requirement of the Price Schedules will take precedence. A typical baseline solution is described herein. Supplier may propose alternate solutions provided that they are better technically and economically. Supplier shall in this case provide adequate justifications. It may be noted that Supplier must provide the Schedule of Technical Data (STD) duly filled in for each of their proposed equipment.

7.2 Solar Power Supply System (SPS)

Solar power systems shall be proposed for the operation of pressure Pumps for drip system. These pumps shall be operational during the day time only.
The Solar pump system shall be installed to operate the onsite pump loads. The system shall have Off grid operation mode.
Pumps and PV modules shall meet the design constraints resulting in an efficient and economical system but still meeting the daily watering requirements. The system shall be designed to be efficient such as to minimize the system losses and capital expenditure without compromising on quality and performance of the proposed system.

7.2.1 System Configuration

Each pump can be powered by independent Solar system, driven by a MPPT Solar Variable Frequency Drive panel.

7.3 Design Considerations for Solar Power Supply

The following paragraphs lay down the design considerations for the solar power supply systems.
Supplier shall clearly explain the design, scheme of their system(s) and identify estimated system(s) output in watts and expected hours of operation per day for Pumps taking into consideration the total electrical demand (based on water requirement), load patterns, available solar insulation and other relevant factors.

Power supply ratings shall be determined on the basis of steady state load. As a safety factor, the capacity of the solar power supply system shall typically be (minimum) 30% higher than the connected load and shall be done in accordance with IEC 61727.

The scheme and the capacity of the solar power systems is left upon the Supplier’s choice being the most knowledgeable on his specific solution for the tube well pumps. However, VFD based solar pump system(s) is to be proposed for this specific pump(s) load.

Following parameters shall be considered for the design of pump systems and shall be stated in the design report.

- Flow Rate/Daily Water Requirement (L/h).
- Type (Surface).
- Total Dynamic Head (Static Lift + Static Head).
- Diameter of the pump.
- Mode of Operation (Solar).
- Efficiency.
-

Following parameters shall be considered for the design of pump systems and shall be stated in the design report.

- Total energy requirement to be generated per day
- System losses
- Mode of Operation (Solar).
- Efficiency.
-

In addition to the above, the Supplier's design will also consider provision of following documents (as a minimum) for Pumping:

1- Scheme of the proposed system
2- Capacity of System designed against given load.
   - Total PV Array capacity
   - Rating of the proposed Inverter(s)
   - Average daily Output in kWh (yearly)
   - Footprint (area required) for the installation of PV Array
3- System design sheets with detailed steps incorporating different stages system losses computing the overall system capacity
4- Monthly energy yield/ performance estimate sheets.
5- Detailed description of Tool, methodology & procedures used to ensure accuracy & calibration of performance modeling, including but not limited to weather assumptions.
6- Complete electrical and structural engineering services including labeled single line diagrams.
7- System operation, safety manuals.
8- Final PV system "as-built" schematics.
9- Specification sheets of proposed equipment
10- The performance assessment of installed systems will be carried out with respect to the provided energy yield estimates.

a) Energy Consumption of the Pumps

The estimated energy consumption per day for each tube well station is to be computed by the Supplier and will be submitted.
Solar Power Supply shall be designed with the consideration of the following important factors like equipment & system losses, Solar PV panel output power de-rating at NOTC, system design optimization and solar insulation on site.

b) Meteorological Analysis

A detailed Meteorological analysis shall be carried out to determine the amount of energy provided by the sun incident upon the solar panels. Multiple factors shall be considered including but not limited to: average sunny days, average sun duration / day, averaged carryover ambient temperature, extreme maximum/minimum recorded temperature, Carryover averaged precipitation and evaporation, Carryover averaged wind speed, carryover highest wind speed and occurrence time, prominent wind direction, clearness of the skies & latitude. Data on carryover and yearly monthly radiation incident, and data on the radiation incident (direct radiation, diffuse radiation and total radiation).

Based on above data specific to the site, a monthly insolation shall be computed for the site which should correlate with any of the internationally recognized irradiance data bases e.g. Meteonorm, NASA etc. This calculation shall encompass the change in sunlight due to cloudy or partially cloudy days.

Other parameters and their effect on system sizing shall also be considered. Monthly and yearly variations of these factors shall be considered to ensure sufficient output of the Solar Power Systems under the worst conditions. All calculations shall be put up for vetting by the Purchaser in the Supplier's design report.

c) System Sizing

The size of the Solar Power System shall depend upon the amount of power that is required (watts), the amount of time it is to be used (hours), and the amount of energy available from the sun in a particular area (sun-hours per day). Supplier shall state the rating (watts) of their solar power systems and the estimated energy yield after incorporating losses. The rating shall commensurate as a minimum the electrical load of the filtration plant site plus a safety factor of 30%. The system losses must clearly be indicated during the detail design process. Supplier shall provide detailed design calculations showing that the SPS has sufficient capacity to power the water pump. All factors for the optimization of system design are to be considered.

d) Location and Orientation of PVPs (Photo Voltaic Panels)

A survey will be undertaken by the Supplier to identify the location and orientation adequate for placing the solar panels. The survey shall identify the cable routes and lengths. Solar panels shall be placed in an area that receives maximum sunlight and can securely support the PV panels. The area should preferably be clear of tall trees and foliage that could obstruct the exposure of the Panels to the sun. The shadows from trees, neighboring building or other structures shall also be considered such that the entire lot of PV Panels once installed shall not be subject to shadows at all times of the day throughout the year.

e) PVP Footprint (Area Determination)

Sufficient space has to be allocated at site for the installation of PV Array. The scheme of mounting structure is to be proposed by the Supplier. Panels can be ground mounted or pole mounted as the roof space won't be sufficient enough for the entire PV Array installation.

In order to highlight the best possible area for Solar array installation at site, detailed shadow analysis of the proposed site(s) must be carried out using relevant softwares to study variable sun paths & subsequent shadow projections on different times of the day, throughout the year.
This best-case scenario will act as an upper bound on the size of the system that could be installed. The final placement and distribution of the PV Array installation shall be reflected on a CAD drawing created using the set of plans and the measurements taken at site.

7.4 Technical Description and System Components

The Solar Power System (s) consists of the basic components;

- PV modules,
- Solar Pump Inverters (including MPPT & VFD feature)
- Cables
- Grounding equipment
- Instrumentation
- Mounting structures.
- Protection equipment shall include AC/DC circuit breakers/ switches.

The system shall be designed considerations above and the functional description herein. Contractor shall provide specifications of his proposed solution.

a) Solar Photovoltaic Panels (PV modules) – General Characteristics

The specifications of modules are mentioned in specifications.
The following design factors need to be detailed in:

- Bills of Materials, BoMs: (glass, encapsulant, back sheet, ribbon, adhesives, cable, junction box, connector).
- Type of cells comprising the module
- Specify number of modules and total power to be provided
- Maximum rated power
- Rated power tolerance
- Cell efficiency
- Module efficiency
- Power conversion efficiency at STC
- Voltage at the maximum power point, V_{mp}
- Current at the maximum current point, I_{sc}
- Open-circuit voltage, V_{oc}
- Short-circuit current, I_{sc}
- Maximum system voltage
- Temperature coefficient of short-circuit current
- Temperature coefficient of open-circuit voltage
- Temperature coefficient of maximum power < -0.40%/ C
- Minimum efficiency at 200,600 & 800 W/m² (25°, AM 1.5)
- Minimum efficiency at 200,600 & 800 W/m² (45°, AM 1.5)
- Relative Power Conversion Efficiency reduction and I-V curves for different light intensities & temperatures
- Materials and workmanship warranty of a minimum of 10 years

- Power warranty/performance guarantee of a minimum of 25 years: the power output should not fall below 90% within 10 years, and below 80% within 25 years; linear warranty is mandatory.
- Degradation Curve from Manufacturer
- Module designed to withstand PID.
- Manufacturers confirmation for the suitability of module for specific weather conditions and the high UV-radiation
- Use of integrated bypass diodes
- Fill factor
- Series fuse rating
- Connector type
- Cable length
- Cross-sectional view of the module materials
- Tolerance to wind (maximum load) impact
- Dimensions and weight
- Type of frame with weatherproof specifications
- Junction box degree of protection
- Manufacturers installation guidelines
- Provide guarantees and data sheets (to be transferred to Purchaser upon COD)
- Modules per box and 40 feet container
- Application Class- A
- Safety Class II
- Fire rating C.

The following module standards must be met, as applicable to crystalline silicon:

- IEC 61215
- IEC 61730 Part I and II for safety qualification testing
- IEC 61701
- ISO 9001, ISO 14001
- MCS, CE,
- Application Class: A
- Other applicable standards.

The efficiency of the PV modules should be minimum 15 % and fill factor should be more than 70%. Modules with higher power output per unit area shall be preferred and should not be less than 250 Watts.

There shall be a Name Plate fixed inside the module which should include but not limited to:

a) Name of the Manufacturer or Distinctive Logo.
b) Model Number
c) Serial Number
d) Year of manufacture

Moreover, Provide the I-V curves at different irradiance & temperature levels.

The PV modules shall be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

Panels shall be of Mono/Poly crystalline silicon (Si) cells, protected by anti-reflective glass and by a special synthetic material. The number of panels to be used in a system shall be determined by the voltage current and power ratings of the PV modules vis-a-vis the plant and respective pump electrical power requirements.

The sizing calculations to determine the number of modules, number of strings and number of arrays shall be calculated by the contractor on the basis of design parameters, functional characteristics and the Schedule of Technical Data (STD).

Basic mechanical characteristics, such as dimensions, frame profile, and static load rating, as well as grounding and mounting locations shall be considered while designing the system.

The Solar Panels must be of renowned brand as specified. Solar panels shall have framed module with type a junction box (rain tight) accepting PG 13.5 conduit/cable fitting.

Mounting Structure

Hot dip galvanized, mechanically robust, iron mounting structures (movable) shall be provided for mounting the modules/panels/arrays. These mounting structures shall be used to mount the modules/panels/arrays on the ground or roof tops at an angle of tilt with the horizontal in accordance with the altitude of the place of installation. Supplier shall state the angle of tilt inhis detailed design report computed on the basis of yearly optimum yield.

- The solar array shall be supported by galvanized steel pillars with concrete foundations and shall be at suitable height from the ground level.
- They shall be designed for maximum durability and corrosive resistance in all environments.
- The mounting structure should be able to withstand wind speed of 160 km/ hr. Moreover, there should be adequate gap between modules to ensure withstand capacity of the complete structure.

The make, type and main features of SPSs shall be in compliance with the requirements of the STD (Schedule of Technical Data) & is to be duly filled accordingly.

b) Solar Pump System Components

c) Installation Cables/Wires

- Installation including wiring shall meet the requirements and recommendations given in 8.3 of IEC 62124 ed 1. IEC 61000 / EN 501-78.
- The commissioning and acceptance will be subject to the fulfilment of all requirements specified in the above mentioned paragraphs of IEC 62124 ed.1 and additional requirements as detailed below.
- Stranded and flexible insulated copper wires and cables must be used for all outdoor and indoor installations. Indoor installation of the lighting distribution system might be performed with solid wires, if appropriate and common practice.
- The wiring that leads into the building shall be protected in a conduit.
- External cables should be specifically adapted to outdoor exposure (see IEC 60811). Especially the outer insulation must be sunlight (UV)-resistant, weatherproof and designed for underground installation. Preferably rubber- coated and PE-coated cables shall be used.
- The temperature resistance of all interconnecting wires and cables should be > 75°C. All wiring must be sized to keep line voltage losses to less than 3% between PV generator and Variable frequency drive for pump systems, battery (for battery backed system), less than 1% between battery and charge regulator, and less than 3% between battery and load, all of them at the maximum current conditions. The minimum cross-section must also allow the circuit to operate within the Amp capacity rating of the wire.

- Earth conductors, either separate or as a third wire in 3-core cables, if 'present, must be green-yellow.
- All exposed wiring must be in UV-resistant conduits or be firmly fastened to the building and/or support structure. Cable binders, clamps and other fixing material must also be UV-resistant, preferably made of polyethylene.
- Wiring through roofing, walls and other structures must be protected through the use of bushings. Wiring through roofing must be sealed (waterproof).
- Holes through roofing materials should be avoided wherever possible. Cables through roofing shall be contained in purpose-made roof-entry boxes, or proper UV-resistant glands, which shall form a weatherproof seal to prevent leakages. In corrugated roofs, holes for cables are to be drilled at the top of corrugations. All holes in roofing shall be thoroughly sealed and made waterproof with UV-resistant silicone sealant or an equivalent method.
- Fittings need to be fastened to suitable supports, which may need to be provided if not already present. No conduit or fitting shall be attached directly to thatch or any other non-supportive surface.
- Holes that penetrate external walls shall slope slightly upward to prevent the ingress of water and be suitably sealed.
- Cables must be joined by the use of junction boxes, screw-connectors, block- connectors. All stranded wires must be terminated with proper end-sleeves. Soldering in the field and the use of wire nuts are not allowed. The rated current-carrying capacity of each joint must not be less than the circuit current rating.
- Junction boxes or enclosures must be dust- and waterproof, non- corrosive and electrically insulated (no metal boxes). Interior junction boxes shall have an IP protection of at least IP 32, and external junction boxes a minimum of IP 55 according to IEC 60529.
- Careful attention shall be given to entries into enclosures and junction boxes, to provide good sealing, proper strain relief to ensure that the wiring connections themselves are not under tension and to prevent chafing and damage to the insulation.
- Surface-mounted cabling shall be installed using appropriate fasteners at suitable intervals (15 to 20 cm) to prevent sagging.
- Visible interior cabling or conduits shall be aesthetically tidy, and should not slant from the vertical or horizontal unless essential.
- Suspended cables shall be mounted so that the lowest point is at least 2.8 m above ground level. The cable shall be held in position by suitable brackets and strain relief to prevent mechanical wear and any strain on the electrical connections.
- Mains (230VAC) sockets and plugs are not to be used under any circumstances. Any 12 V appliances with a mains-type plug attached constitute an unacceptable safety risk to the user if the appliance is used in a 230 VAC outlet.
- A product of good quality standard material to be provided, according to the given specification and good engineering practices.
- The flexible PVC conduit should be of good quality material with minimum ½ inch size.
- A wiring for solar connected load should be separate and independent in all aspects.
- Stranded and flexible insulated copper DC wires and cables must be used for all outdoor and indoor installations.
- The cables are selected such that the voltage drop must not exceed 1 % on DC side of the power inverter and 2.5 % on AC side of the power inverter. The calculation on the basis of which cable sizes shall be selected will be submitted.
- Single line diagram of the wiring scheme shall be submitted with the detailed proposal.
- The wiring that leads into the pole shall be protected in a PVC Spiral / Flexible conduit.

- External cables should be specifically adapted to outdoor exposure as per IEC 60811. The outer insulation shall be sunlight (UV)-resistant and weather-proof.
- All wiring should be colour coded.
- All exposed wiring must be in UV-resistant conduits and firmly fastened to the support structure. Cable binders, clamps and other fixing material must also be UV-resistant. All underground cabling shall be done in metal conduits.

d) DC Cables

The main design specification is to reduce Ohmic losses, without adversely affecting the cost trade-off, to < 1% at full power (under STC conditions 1000 W/m 2,25°C module temperature). Design calculations through cable loss simulation to be provided in the design report for review & comment. The Supplier shall firmly specify manufacturer, types and amount of cables to be installed.

The following design factors need to be detailed by the Supplier:

- String cable shall be of the following type: single conductor type, copper, 1000 V / Class II (according to protection class II / 1000V, IEC 61140, single core cable, tinned copper conductor, XLPE Insulation, double EVA jacket (resistant to heat and cold, resistant to ozone, UV, oil and chemicals), Temperature: 90 º C (Temperature Max. Allowable: 120 ºC), Halogen free Connectors of Modules and string cables shall be connected of self-locking type, have IP65 rating and shall be from same manufacturer and type.
- The DC main (downstream of combiner box) wiring harness shall have the quality:
- Aluminium / Copper / 1000 V / Class II
- All cables shall be capable of accommodating all electric loads without overheating. Current carrying capacity certificate shall be provided to Employer for review and comments.
- Cables shall be suitable for the environmental conditions at the project site, including UV protection (certification from manufacturer to be provided by the Supplier)
- Balance of electrical potential shall be provided by the Supplier.
- Installation to be verified by measurement-protocols
- Technical documentation of DC-UV shall be provided by the Supplier.
- Clear and systematic labelling required

Standards:

- IEC 60228
- IEC 60364-1
- IEC 60754
- IEC 61034
- IEC 60811-2
- CSN-EN-ISO-4892
- IEC 60068:2011-12
- IEC 60228 (Cable losses)
- Other applicable standards.

e) **DC Connectors**

The following design factors shall be detailed in by the Supplier:

- High current rating
- Minimal contact resistance

- Convenient handling
- Broad compatibility
- Incompatibility with AC connectors to avoid mistakes during installation
- Force required to un lock connectors from cables, whether a tool is required for it or not.
- Double insulated for outdoor Installations.
- Suitable for Operation without de-rating upto 55°C.

Standards:

- EN 50521
- IEC 60512
- Other applicable standards

MC4 is effectively an industry staple for DC connectors, if not a standard, even though it is a proprietary design. If MC4 comparable connectors are used, a combination of different manufacturers are allowed. MC4 comparable connectors have to be certified.

FACTORY TESTS:

i. PV Panels (PVP)

Supplier shall provide complete test reports listed herein from testing labs mentioned here in demonstrating that the PV modules being proposed have passed the following tests in accordance with the *latest IEC standards or the product fully complies with IEC 61215/61646*. Note that complete test reports showing test parameters, test equipment and test procedures are required.

Requirements of Type Tests and Test Reports to Qualify Acceptable Manufacturers

In case a Supplier is unable to provide type complete test reports from laboratories listed here above, then he shall arrange at his own cost to have the said tests be performed. The Purchaser and/or his representative shall in such a case witness the tests. All costs of testing and witnessing by the Purchaser and or his representative shall be deemed to be included in the contract price.

Life Expectancy Tests

Only those Solar PV modules shall be acceptable that have undergone Life Expectancy Tests (LETs) and full reports of the procedure and results of the LETs is provided. LETs shall be conducted as per ASTM E1171, UL1703. These comprise 1,000 hours of damp heat testing at 85 Deg C and 85% RH. 200 cycles of thermal cycle testing from -40°C to +85°C and back. Minimum dwell times of 10 minutes at -40 and + 85°C and maximum temperature transition rate of 100°C per Hour. i.e. 1.67°C per minute.

Guaranteed Performance Tests

Following tests shall be done to establish guaranteed performance parameters. These shall be done in accordance with IEC 61215 and IEC 61724 complete type test reports shall be provided by the Supplier:

- Visual Inspection Tests
- Maximum Power Determination Test
- Insulation Test
- Measurement of Temperature Coefficients
- Measurement of NOCT

- Performance at STC and NOCT
- Performance at Low Irradiance
- Outdoor Exposure Test
- Hot-Spot Endurance Test
- UV-preconditioning Test
- Thermal Cycling Test
- Humidity Freeze Test
- Damp Heat Test
- Robustness of Terminations
- Wet Leakage Test
- Mechanical Load Test
- Hail Impact Test
- Bypass Diode Thermal Test

Additionally, the Purchaser and/or his representative shall witness the following tests at the factory or place of production, on sampling basis on each lot of panels to be shipped. The test lot shall be 100 panels and sample size shall be five percent. The maximum allowable failure rate per lot shall be *5%.* For failure rates exceeding the allowable limit the entire lot shall be rejected or tested on a 100% basis as directed by the Purchaser and/or his representative.

- Visual Inspection Tests
- Maximum Power Determination Test
- Insulation Test
- Measurement of NOCT
- Performance at STC and NOCT
- Performance at Low Irradiance
- Robustness of Terminations
- Bypass Diode Thermal Test

Testing Laboratories

All the test reports shall preferably be from the following independent laboratories.

- NREL USA
- TUVs
- CESI Italy
- Fraunhofer ISE Germany
- Intertek, UK
- Fraunhofer, Germany, U.S.A
- Florida Solar Energy Centre, U.S.A
- ScienLab Electronic Systems Germany (for Inverters Only)
- Korea Testing Laboratory, Korea (for Inverters Only)
- Japan Photovoltaic Expansion Center, Japan
- Renewable Energy Test Centre, U.S.A
- CFV (by CSA Group Canada, Fraunhofer USA, VDE Germany)
- VDE Institute, Germany
- CSA Group, (Canadian Standards Association), Canada.

Site Testing

Upon shipment and before installation, following tests shall be arranged and performed again at site before installation of modules in the presence of Purchaser and his representative personnel; selection of modules for these tests shall be in accordance with IEC standard (IEC 60410):

- Visual Inspection for major visual defects only
- Bypass Diode Thermal Test
- Wet Leakage Test
- Insulation Test
- Maximum Power Determination Test

TESTS ON COMPLETION OF INSTALLATION

The following tests as a minimum are required to be performed on the completion of installation.

Pre-Commissioning Tests

During the pre-commissioning checks, the PV systems shall not be engaged to the grid.

The pre-commissioning checks shall consist of the following (mandatory minimum):

- Information about Project
- Compliance with the system design
- General Inspection
- Compliance with relevant installation instructions/regulatory requirements
- PV Module Mounting Structure & Civil foundation
- DC Junction Box or String Monitoring Box
- Earthing & Lightning Arrestor
- PV Module
- Inverter
- AC Distribution Box
- Cable identification and cable routing inspection
- The provision of adequate ventilation for system components electrical safety
- Cable insulation test
- The security and integrity of system components
- Fuse continuity and string open circuit voltage test
- String DC short circuit current test
- Isolation device functional test
- Electrical over-current protection arrangements

Commissioning Tests

After completion of all visual inspections from the checklist, the service provider must perform commissioning tests to ensure all inter-connections of the components are satisfactory.

The commissioning tests comprise the following:

- PV module
- PV array
- Cable and wiring
- Inverter

- Array Junction Box/String Monitoring Box
- AC Distribution Box
- Weather Monitoring Station and PV Monitoring System
- Cable insulation test
- String fuse continuity & String Open circuit voltage test
- Isolation device functional test
- Inverter functional test
- DC Current test

Trial Run

Upon successful completion of testing and commissioning, the reliability of the system shall be tested using Performance Ratio (PR) test

During the Performance Ratio (PR) test, the following real time parameters must be sampled at one-minute intervals for at least seven consecutive days:

- Solar irradiance
- Ambient temperature
- Module temperature
- Wind speed
- DC voltage of each string
- DC current of each string
- AC voltage from each inverter
- AC current from each inverter

Following in-factory tests shall be witnessed by the Purchaser and/or his representative. Applicable standard G 59/2 BS EN 61000-3-3.

- Harmonic current emissions
- Voltage fluctuations and flicker
- Power factor
- DC Injection
- Under/over Frequency tests
- Under over voltage tests
- Loss of mains test
- Reconnection times

Following standards as a minimum:
EN 62109-1 2010 (Safety)
EN 61000-6-2:2005 (EMC compatibility)

Part II - TECHNICAL PROVISIONS

SECTION 8 –GALVANIZED IRON PIPES

8.1 General

The Contractor shall submit manufacture qualification details regularly engaged in manufacturing Galvanized iron pipes materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

8.2 Galvanized Iron Pipes and Fittings

The galvanized iron pipes shall conform to B.S. 1387 Specifications for "Steel Tubes and Tubular suitable for screwing to B.S. 21 pipe threads" and shall be of light grade or as specified in BoQ. All screwed pipes and sockets shall conform to B.S. 1740. A complete and uniform adherent coating of zinc white will be provided for galvanized iron pipes and fittings.

8.3 Approval of Materials

As soon as practicable but within 30 days after receipt of notice to proceed and before any materials or equipment are purchased, the Contractor shall submit for approval by the Engineer-in Charge a complete schedule, in triplicate, of materials and equipment to be incorporated in the work, together with the names and addresses of the manufacturers and their catalogue cuts, diagrams, drawings, and such other descriptive data as may be required by the Engineer-in Charge. No consideration will be given to partial lists submitted from time to time. Approval of materials and equipment under deviations from the specifications shall not be granted unless the attention of the Engineer-in-Charge has been directed to the specific deviations. Laboratory results and certifications, specified or otherwise required, shall be submitted prior to delivery of the material and equipment to site.

8.4 Excavation in Trenches and Backfilling

The trenches shall be set out to suit alignment of the pipe lines. The trenches shall be carefully trimmed at sides and bottom of that pipe lines when laid shall rest on the firm bed throughout the length. Shallow joint holes shall be left for the joint, where necessary. Where pipe line is to be laid in plains the depth of cover, i.e., the normal distance from ground level to the top of the pipe be kept at about 800 mm and shall not be less than 750 mm except due to special reasons where the Engineer-in-Charge directs in writing to the contrary.

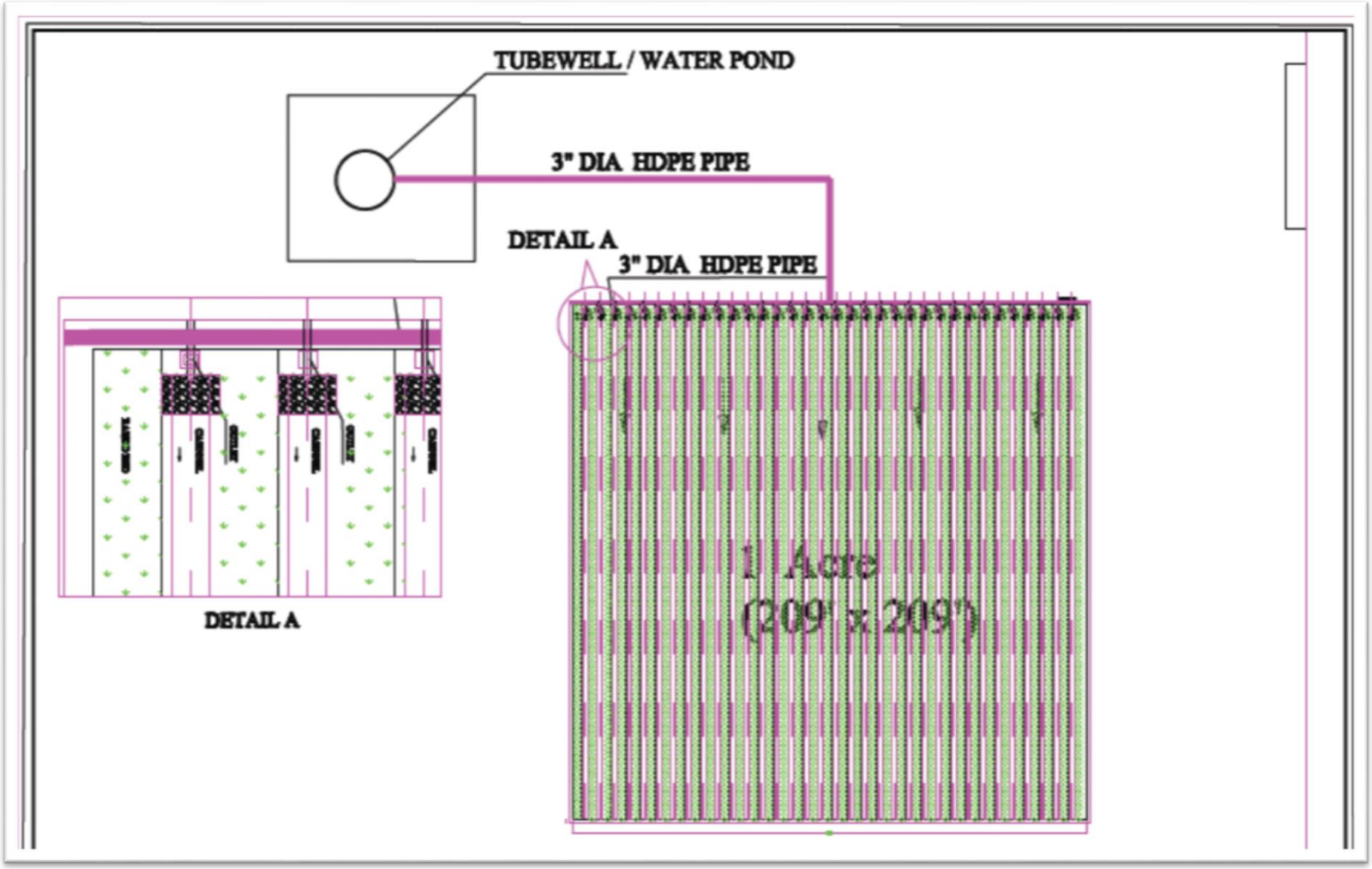
8.5 Measurement & Payment

The lengths shall be measured in running metre or running feet as per BoQ unit correct to a cm or inch for the finished work, which shall include pipe and fittings such as bends, tees, elbows reducers, crosses, plugs, sockets, nipples and nuts. All pipes and fittings shall be classified according to their diameters, method of jointing and fixing substance quality and finish. In case of fittings of an equal bore the pipe shall be described as including all cuttings and wastage. In case of fittings of unequal bore the largest bore shall be measured. The cost of fitting and specials shall be covered in the quoted unit rate in running meter or ft and no spate payment shall be made in this respect.

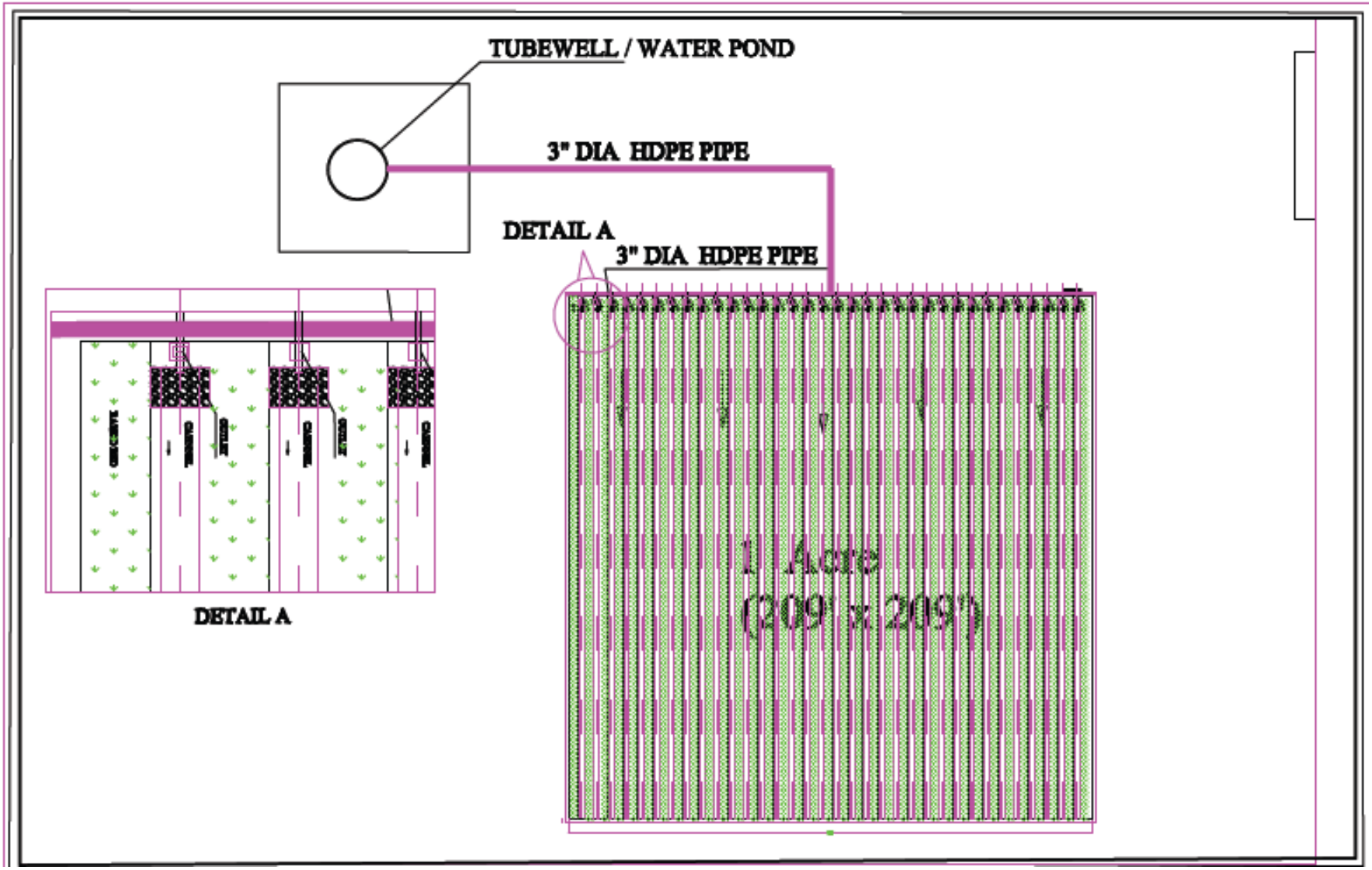
SECTION 5: DRAWINGS

List of Drawings

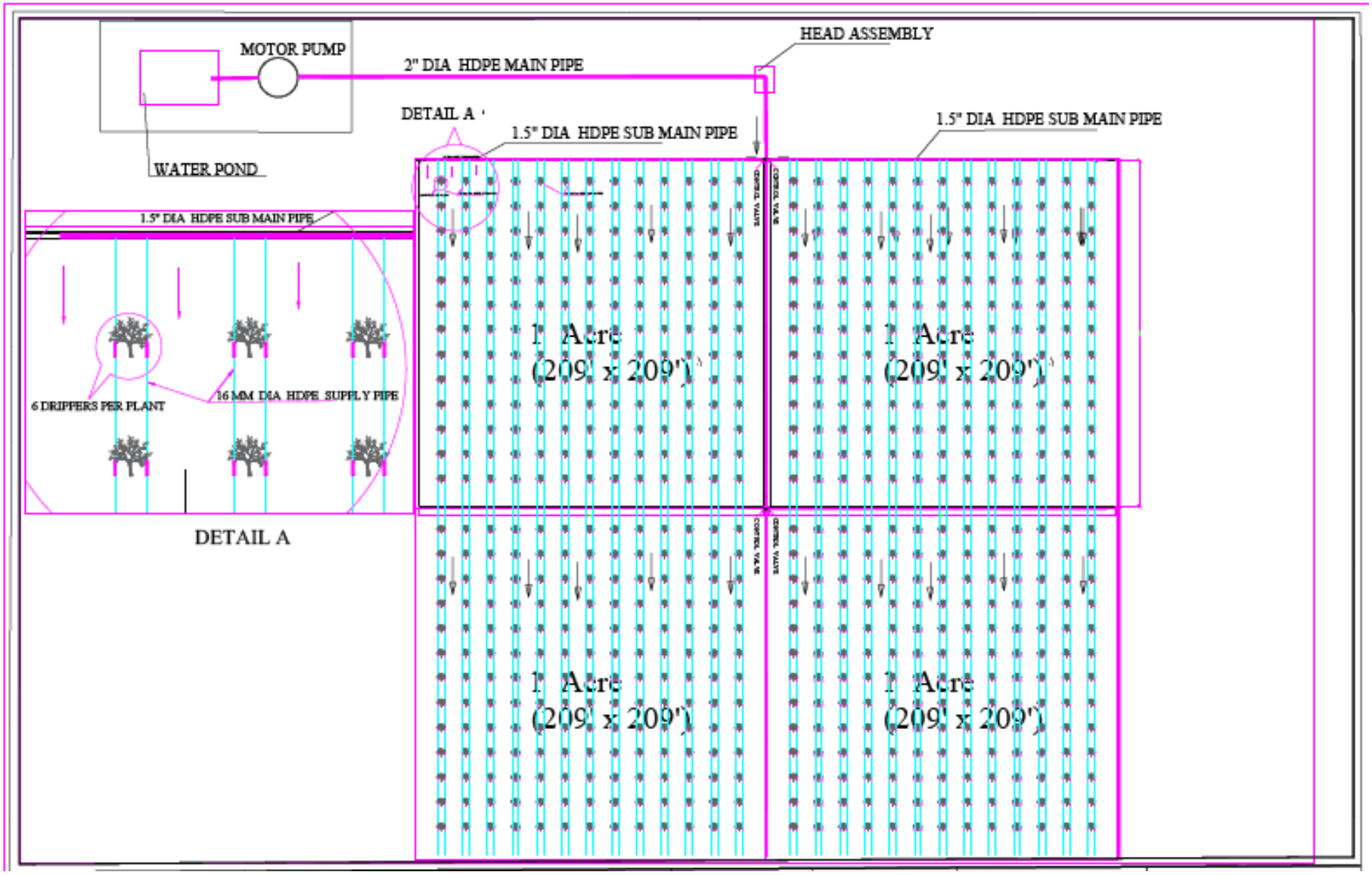
Drawing No.	Descriptions
Drawing 1	Demo Plot for Wheat (Typical Arrangement)
Drawing 2	Demo Plot for Wheat with Raised Bed Machine (Typical Arrangement)
Drawing 3	Demo Plot for Orchards (Typical Arrangement)
Drawing 4	Demo Plot for Tunnel (Plan Typical)
Drawing 5	Demo Plot for Tunnel (Sectional Views Typical)



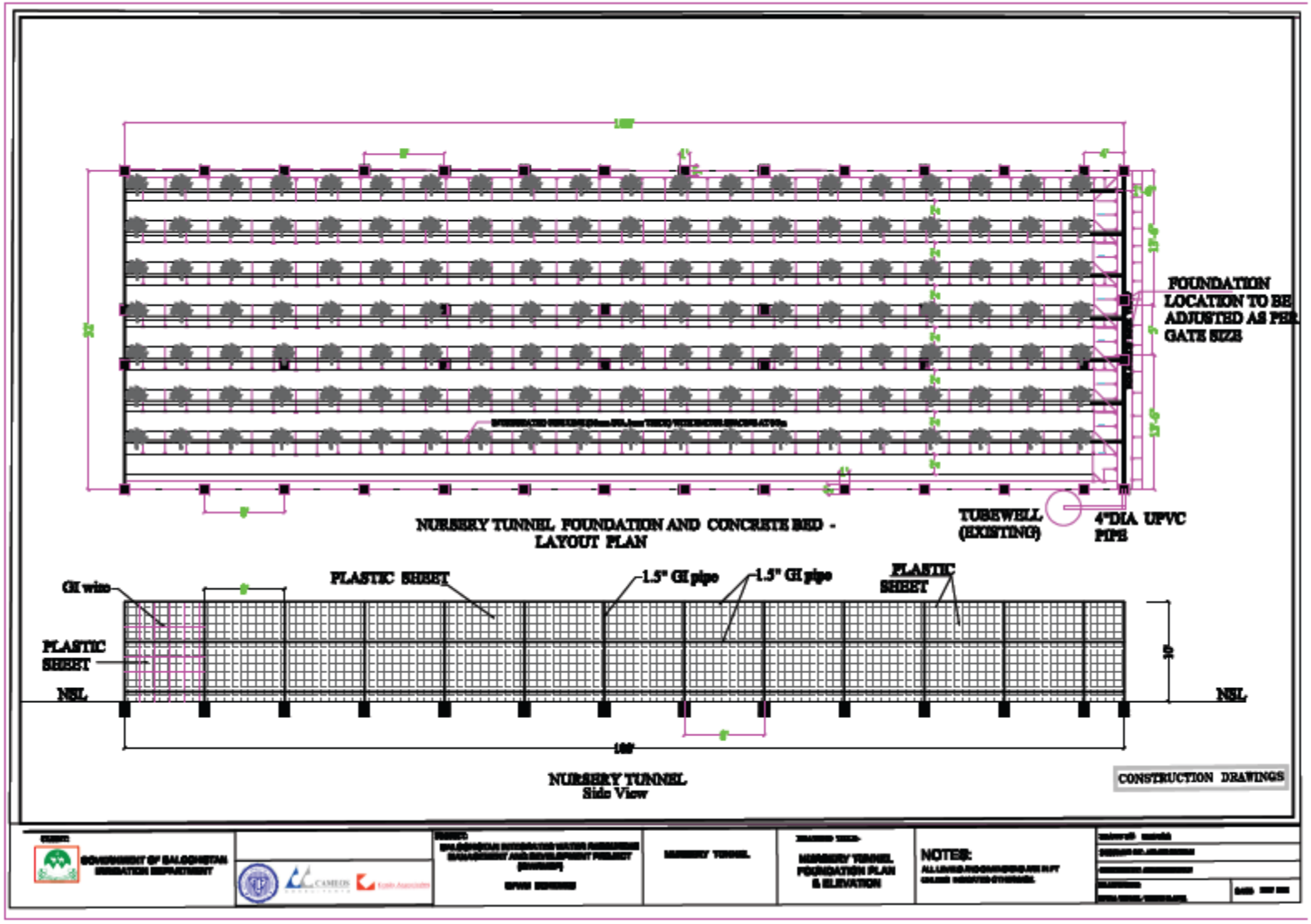
Drawing 1 - Demo Plot for Wheat (Typical Arrangement)



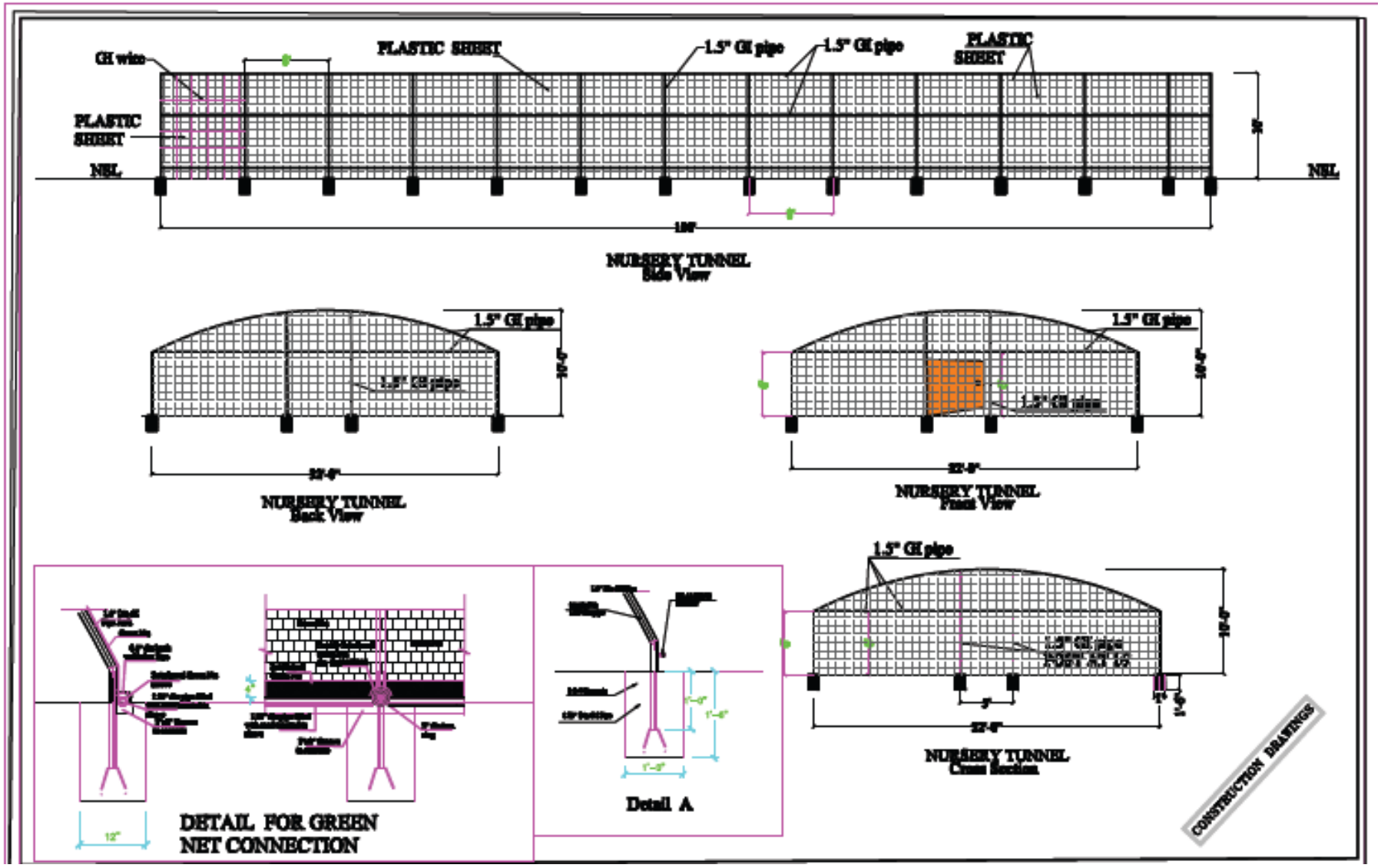
Drawing 2 –Demo Plot for Wheat with Raised Bed Machine (Typical Arrangement)



Drawing 3 –Demo Plot for Orchards (Typical Arrangement)



Drawing 4 –Demo Plot for Tunnel (Plan Typical)



Drawing 5 –Demo Plot for Tunnel (Sectional Views Typical)

SECTION 6: BILL OF QUANTITIES

BILL OF QUANTITIES - LOT 1

DEMONSTRATION PLOTS (WHEAT & COTTON)

NARI GORGE & MUSHKAF

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT (BIWRMDP)

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge/Mushkaf (Wheat/Cotton)

BILL OF QUANTITIES

General Abstract Lot-1

Bill No.	Description of Works	Amount (Pak Rs)
Bill -1	General	1,950,000
Bill -2	Implementation of ESMP Checklist	900,000
Bill -3	Demonstration Plots (Wheat) - Nari Gorge	
Bill -4	Demonstration Plots (Cotton) - Nari Gorge	
Bill -5	Demonstration Plots (Wheat) - Mushkaf	
Bill -6	Demonstration Plots (Cotton) - Mushkaf	
Grand Total - Lot 1 [Carried Forward to Contractor's Form of Bid]		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 1 - General Items

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
1.1	Providing all bonds and Insurances in accordance with the Conditions of Contract.	-	PS	150,000	150,000
1.2	Provision of one (1) 4WD vehicle / Jeep (1300cc), Jimny or Equivalent in good running condition for use by Supervision Staff of the Project Manager / Employer in accordance with specification during construction period.	-	PS	600,000	600,000
1.3	Provision of POL, Service, repair and maintenance costs for the vehicle provided under the contract BOQ item No 1.2, all in accordance with the specifications during construction period.	-	PS	360,000	360,000
1.4	Providing and transporting of raised bed machine and seed drill if required by Project Manager.	1	LS	25,000	25,000
1.5	Providing and transporting of Cotton Picker if required by the Project Manager.	1	LS	35,000	35,000
1.6	Provision of technical qualified firm services for providing technical inputs regarding water and soil sampling & testing and preparing analyses reports, designing and finalizing layout of each demonstration plot (Wheat & Cotton), seed selection, periodic inspection of crops at various stages of growth, recommendation on fertilizers & pesticides, providing training to the farmers, scheduling of water requirements and preparation of operation & maintenance manual.	-	LS	600,000	600,000
1.7	Soil & Water sampling & testing for each plot (Wheat & Cotton)	-	PS	60,000	60,000
1.8	Training Session: Trainings to 50 farmers - Nari Gorge	4	Event	15,000	60,000
1.9	Training Session: Trainings to 50 farmers - Mushkaf	4	Event	15,000	60,000
Total for Bill 1 (Carried to General Abstract Lot -1)					**1,950,000**

Note:

Payment for this bill items except Item 1.4, 1.5, 1.6, 1.8 & 1.9 is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1 - Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 2 - Implementation of ESMP Checklist

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
2.1	Development of Contractor's EMP including Traffic Management plan, Emergency Response Plan, OHS Plan, Waste Management, Pollution Prevention Plan and Pest management plan.	1	LS	150,000	150,000
2.2	Implementation of Traffic Management Plan	6	Month	5,000	30,000
2.3	Implementation of OHS Plan/OHS Trainings of Contractor Staff	6	Month	10,000	60,000
2.4	Provision and Use of PPEs to Staff	1	LS	30,000	30,000
2.5	Implementation of Pollution Prevention and Waste Management Plan	6	Month	10,000	60,000
2.6	Implementation of Pest Management Plan	6	Month	10,000	60,000
2.7	Environmental Supervisor	6	Month	50,000	300,000
2.8	First Aid Boxes (Using and Maintaining during the construction period)	1	No.	30,000	30,000
2.9	Environmental Testing (Quarterly testing of Air quality, Water Quality and Noise)	6	Samples	30,000	180,000
Total for Bill 2 (Carried to General Abstract Lot -1)					**900,000**

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 3 - Demonstration Plots (Wheat) - Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
3.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
3.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
3.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
3.4	Supply and application of seeds of Certified quality	50	kg		
3.5	Supply and application of farm yard manure	5	load		
3.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
3.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
3.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary below for details)					25
Total for 25 Acre of Plots (Carried to General Abstract Lot-1)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 4 - Demonstration Plots (Cotton) - Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
4.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
4.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
4.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
4.4	Supply of seeds of Certified approved quality	10	kg		
4.5	Supply and application of farm yard manure	5	load		
4.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
4.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
4.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary below for details)					24
Total for 24 Acre of Plots (Carried to General Abstract Lot-1)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF WHEAT / COTTON SIBI AT NARI BASIN PROVIDED BY WUAs.

S.No	Farmer Name	Site/Location
1	Malik Mujeeb Dehpal	Dehpal
2	Malik Akber Dehpal	Dehpal
3	Malik Sattar Dehpal	Dehpal
4	Dil Murad Bugti	Dehpal
5	Dr Jamal Marri	Bakhra Shakar Khan
6	Wadera Fida Rind	Bakhra
7	Wadera Khudda-e -dad Rind	Bakhra
8	Muhammad Khan Marghazani	Kach Welhari
9	Shakar Khan Marghazani	Kach Welhari
10	Haji Ikhtiar Khan	Kach Welhari
11	Jamal Khan	Kach Welhari
12	Malik Dur Muhammad Safi	Safi
13	Malik Sher Dil Bostanzai	Bostanzai
14	Malik Sarwer Khan Marghazani	Marghazani
15	Malik Faqeer Muhammad Shudanzai	Shudanzai
16	Malik Abdul Aziz Samezai	Samezai
17	Nazar Khan Marghazani	Marghazani
19	Behroz Marghazani	Marghazani
20	Alam Marghazani	Marghazani
20	Habib Nawaz Marghazani	Marghazani
21	Malik Asad Khan	Davi Marghazani
22	Ashraf Khan	Davi Marghazani
23	Hafizullah Khan	Davi Marghazani
24	Azizullah Khan	Davi Marghazani
25	Wali Muhammad Khan	Davi Marghazani
26	Javaid Murtaza	Gulu Sheher
27	Shadi Khan Noudhani	Gulu Sheher
28	Abdul Samad Usmani	Gulu Sheher
29	Shafi Muhammad Marghazani	Gulu Sheher
30	Haji Kamran Luni	Luni

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF WHEAT / COTTON SIBI AT NARI BASIN PROVIDED BY WUAs.

S.No	Farmer Name	Site/Location
31	Muhammad Hussain	Luni
32	Muhammad Sadique	Luni
33	Ahmad Khan Luni	Luni
34	Nawab Ghous Bakhsh Barozai	Kot Barozai
35	Saeed Khan Barozai	Kot Barozai
36	Ibraheem Khan Barozai	Kurak
37	Kamran Lehri	Kurak
38	Abdul Qayyum Lehri	Kurak
39	Saifullah Barozai	Kurak
40	Malik Ghulam Rasool	Kurak
41	Sardar Khuda e Dad Khajjak	Khajjak
42	Mujeeb Khajjak	Khajjak
43	Saeed Ahmad Khajjak	Khajjak
44	Qaim Khan Khetran	Khajjak
45	Malik Ahmad Khan	Khajjak
46	Dr Ismail	Khajjak
47	Muhammad Nawaz Gishkori	Mizri
48	Malik Shah murad	Mizri
49	Sarfaraz Khan	Marghazani

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 5 - Demonstration Plots (Wheat) - Mushkaf

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
5.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
5.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
5.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
5.4	Supply and application of seeds of Certified quality	50	kg		
5.5	Supply and application of farm yard manure	5	load		
5.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
5.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
5.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary below for details)					7
Total for 7 Acre of Plots (Carried to General Abstract Lot-1)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 1- Nari Gorge & Mushkaf (Wheat/Cotton)

Bill 6 - Demonstration Plots (Cotton) - Mushkaf

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
6.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
6.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
6.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
6.4	Supply of seeds of Certified approved quality	10	kg		
6.5	Supply and application of farm yard manure	5	load		
6.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
6.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
6.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary below for details)					7
Total for 7 Acre of Plots (Carried to General Abstract Lot-1)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF WHEAT / COTTON MUSHKAF AT NARI BASIN PROVIDED BY WUAs.

S.No	Farmer Name	Site/Location
1	Wadera Azam Khosa	Mushkaf
2	Maqbool Ahmad Khosa	Mushkaf
3	Muhammad Afzel Khosa	Mushkaf
4	Wadera Muhammad Hnaif	Mushkaf
5	Wadera Habib Khan	Mushkaf
6	Wadera Sagheer Hussain Khosa	Mushkaf
7	Wash Dil Bangulzai	Mushkaf
8	Takri Sher Ahmad Bangulzai	Mushkaf
9	Muhammad Alam Kurd	Mushkaf
10	Muhammad Ashraf Khosa	Mushkaf
11	Babu Ahmad Khan Khosa	Mushkaf
12	Nadir Khan Khosa	Mushkaf
13	Liaqat Ali Khosa	Mushkaf
14	Wadera Salam Khosa	Mushkaf

BILL OF QUANTITIES - LOT 2

DEMONSTRATION PLOTS (ORCHARD & TUNNELS)

NARI GORGE & MUSHKAF

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT (BIWRMDP)

Establishment of Demo Plots & Tunnel

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

BILL OF QUANTITIES

General Abstract Lot-2

Bill No.	Description of Works	Amount (Pak Rs)
Bill -1	General	980,000
Bill -2	Implementation of ESMP Checklist	900,000
Bill -3	Demonstration Plots (Orchards) - Nari Gorge	
Bill -4	Tunnel Farming - Nari Gorge	
Bill -5	Tunnel Farming - Mushkaf	
Grand Total –Lot 2 [Carried Forward to Contractor's Form of Bid]		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

BILL 1 - GENERAL ITEMS

BILL OF QUANTITIES

Item No.	Description	Unit	Quantity	Unit Rate (Pak Rs)	Amount (Pak Rs)
1.1	Providing all bonds and Insurances in accordance with the Conditions of Contract.	-	PS	200,000	200,000
1.2	Provision of technical qualified firm services for providing technical inputs regarding water and soil sampling & testing and preparing analyses reports, designing and finalizing layout of each demonstration plot (Orchards & Tunnels) and drip system, seed & plants selection, periodic inspection of plants at various stages of growth, recommendation on fertilizers & pesticides, providing training to the farmers, scheduling of water requirements and preparation of operation & maintenance manual.	-	LS	600,000	600,000
1.3	Soil & Water sampling & testing for each plot (Orchard/ Tunnel)	-	PS	60,000	60,000
1.4	Training Session: Trainings to 50 farmers - Nari Gorge	4	Event	15,000	60,000
1.5	Training Session: Trainings to 50 farmers - Mushkaf	4	Event	15,000	60,000
Total for Bill 1 (Carried to General Abstract Lot -2)					**980,000**

Note:
Payment for this bill items except Item 1.2, 1.4 & 1.5 is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 2 - Implementation of ESMP Checklist

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
2.1	Development of Contractor's EMP including Traffic Management plan, Emergency Response Plan, OHS Plan, Waste Management, Pollution Prevention Plan and Pest management plan.	1	LS	150,000	150,000
2.2	Implementation of Traffic Management Plan	6	Month	5,000	30,000
2.3	Implementation of OHS Plan/OHS Trainings of Contractor Staff	6	Month	10,000	60,000
2.4	Provision and Use of PPEs to Staff	1	LS	30,000	30,000
2.5	Implementation of Pollution Prevention and Waste Management Plan	6	Month	10,000	60,000
2.6	Implementation of Pest Management Plan	6	Month	10,000	60,000
2.7	Environmental Supervisor	6	Month	50,000	300,000
2.8	First Aid Boxes (Using and Maintaining during the construction period)	1	No.	30,000	30,000
2.9	Environmental Testing (Quarterly testing of Air quality, Water Quality and Noise)	6	Samples	30,000	180,000
Total for Bill 2 (Carried to General Abstract Lot -2)					**900,000**

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 3 - Demonstration Plots - Orchards - 2 Acre Plots – Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
3.1	Digging of pits 200 pits/ acres with an average of 15ft between plant to plant and 15 ft between row to row, size 3ft x 3ft and depth 3ft including dressing of excavated earth and Plantation into pits.	400	No.		
3.2	Supply and putting into pits approved quality of manure	8	load		
3.3	Supply and application of Certified quality DAP / NPK	20	Kg		
3.4	Supply and transport of Plants from approved source.	-	PS	160,000	160,000
3.5	Supply of Pesticides as per requirement	-	PS	100,000	100,000
3.6	Supply of spray machine (Electric)	1	No.		
Drip Irrigation System (6 Drippers per plant & Double lateral per plant row spacing 15 ft x 15 ft)					
3.7	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
3.8	Supply, Install, connect, test and commission of Solar panel & accessories.	2000	Watt		
3.9	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	2000	Watt		
3.10	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	80	Rft		
3.11	Providing at and fixing site Fertilizer Tank, confirming to ISO standard, Imported or approved equivalent (similar specifications), complete in all respects, Local Made. (Fertilizer Tank 60 liter)	1	No		
3.12	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 25 m^3/hr).	1	No		
3.13	Providing and fixing at site Ventury Assembly, confirming to ISO 15873 Imported or approved equivalent (similar specifications), complete in all respects (Ventury Assembly, 1").	1	No		
3.14	Supply of Pressure Gauges Glz: (O2.5".10 bars)	2	No		
3.15	Gate Valve, 2 inch (Schedule 80)-BS 5154	1	No		
3.15a	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	3	No		
3.16	Air Valve made of brass material, 1 inch according to specification.	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 3 - Demonstration Plots - Orchards - 2 Acre Plots – Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
3.17	Miscellaneous head unit fittings including fertigation manifold, NRV, fittings for pump, suction & delivery fittings, complete in all respect.	1	LS		
3.18	Excavation of trenches for water supply pipe lines including trimming, dressing sides, levelling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects including cost of back filling (Ordinary soil)	1110	Cft		
3.19	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution				
	(a) PVC Pipe, 2 inches Dia, C-Class	300	Rft		
	(b) PVC Pipe, 1.5 inches Dia, D-Class	440	Rft		
3.20	Providing and fixing at site Plain Drip Line, confirming to ISO- 8779, Imported or approved equivalent (similar specifications), complete in all respects (Drip Lateral Plain, 16 mm (Wall Thickness 1.2mm).	13124	Rft		
3.21	Providing and fixing at site Drippers, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects (8 LPH, PC)	2400	No		
3.22	Start Connecter / Rubber Gromate 16 mm	100	No		
3.23	Joiner 16 mm	100	No		
3.24	End Plug / Lateral Cap (16mm)	100	No		
3.25	Flush Valve (1.5 inch)	4	No		
3.26	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
3.27	Supply of recommended spars for two years operation	1	PS	25,000	25,000
Total for 2 Acre of Demonstration Plot - Orchards					
Deduct Farmer's share @ 155 man-days per 2 Acres in kind of labour resources by relevant beneficiary at the times when required by the Contractor					155,592
Total for 2 Acre of Plot after deducting Farmer's share					
Total Number of Plots (each plot - 2 Acre) as per beneficiary list below					5
Total for 5 Plots (Carried to General Abstract Lot-2)					

Notes:

- The land, irrigation water source and water storage pond shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF ORCHARD WITH HEIS SIBI AT NARI BASIN

S.No	Farmer Name	Site/Location
1	Kamran Lehri	Kurruk
2	Saifullah Barozai	Kurruk
3	Adeel Marri	Arrand
4	Imdad Marri	Arrand
5	Dr Jamal Marri	Bakhra

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
4.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
4.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
4.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
4.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
4.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
4.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
4.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
4.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
4.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
4.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
	Drip Line System - Single Integrated Drip Line per Row				
4.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 1-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
4.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		
4.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
4.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
4.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
4.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
4.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
4.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
4.19	Ball Valve, 1 inch, PN 10 (Schedule 80)-BS 5154	8	No		
4.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
4.21	Earth work excavation for lining of PVC Pipe line upto 1.5ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
4.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects. (Emitter spacing at 0.30 m).	700	Rft		
4.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
4.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
4.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
4.26	Supply and fixing of End Plug - 16 mm	10	No.		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Nari Gorge

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
4.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
4.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
4.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
4.30	Supply of spray machine	1	No.		
4.31	Supply of recommended spars for two years operation	-	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share					
Total Number of Tunnels (each Size: 100ft x 32 ft) as per beneficiary list below					3
Total for 3 Tunnels (Carried to General Abstract Lot-2)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR TUNNELS
SIBI AT NARI BASIN

S.No	Farmer Name	Site/Location
1	Malik Mujeeb Dehpal	Perak
2	Haji Kamran Luni	Luni
3	Tango Farm	Dephal

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Mushkaf

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
5.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
5.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
5.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
5.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
5.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
5.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
5.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
5.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
5.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
5.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
	Drip Line System - Single Integrated Drip Line per Row				
5.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 1-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
5.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Mushkaf

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
5.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
5.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
5.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
5.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
5.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
5.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
5.19	Ball Valve, 1 inch, PN 10 (Schedule 80)-BS 5154	8	No		
5.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
5.21	Earth work excavation for lining of PVC Pipe line upto 1.5ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
5.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, comfirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects (Emitter spacing at 0.30 m).	700	Rft		
5.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
5.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
5.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
5.26	Supply and fixing of End Plug - 16 mm	10	No.		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 2 - Demos at Nari Gorge & Mushkaf (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Mushkaf

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
5.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
5.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
5.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
5.30	Supply of spray machine	1	No.		
5.31	Supply of recommended spars for two years operation	-	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share					
Total Number of Tunnels (each Size: 100ft x 32 ft)					1
Total for 1 Tunnel (Carried to General Abstract Lot-2)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR TUNNELS

MUSHKAF AT NARI BASIN

S.No	Farmer Name	Site/Location
1	Maqbool Ahmad Khosa	Mushkaf

BILL OF QUANTITIES - LOT 3

DEMONSTRATION PLOTS (WHEAT/COTTON/ORCHARD/TUNNEL)

SEHAN

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT (BIWRMDP)

Establish Demo Plots & Tunnel

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

BILL OF QUANTITIES

General Abstract Lot-3

Bill No.	Description of Works	Amount (Pak Rs)
Bill -1	General	1,880,000
Bill -2	Implementation of ESMP Checklist	900,000
Bill -3	Demonstration Plots (Wheat) - Sehan	
Bill -4	Demonstration Plots (Cotton) - Sehan	
Bill -5	Demonstration Plots (Orchard) - Sehan	
Bill -6	Demonstration Plots (Tunnel) - Sehan	
Grand Total - Lot 3 [Carried Forward to Contractor's Form of Bid]		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

BILL 1 - GENERAL ITEMS

BILL OF QUANTITIES

Item No.	Description	Unit	Quantity	Unit Rate (Pak Rs)	Amount (Pak Rs)
1.1	Providing all bonds and Insurances in accordance with the Conditions of Contract.	-	PS	200,000	200,000
1.2	Provision of one (1) 4WD vehicle / Jeep (1300cc), Jimny or Equivalent in good running condition for use by Supervision Staff of the Project Manager / Employer in accordance with specification during construction period.	-	PS	600,000	600,000
1.3	Provision of POL, Service, repair and maintenance costs for the vehicle provided under the contract BOQ item No 1.2, all in accordance with the specifications during construction period.	-	PS	300,000	300,000
1.4	Providing and transporting of raised bed machine and seed drill if required by Project Manager.	1	LS	25,000	25,000
1.5	Providing and transporting of Cotton Picker if required by the Project Manager.	1	LS	35,000	35,000
1.6	Provision of technical qualified firm services for providing technical inputs regarding water and soil sampling & testing and preparing analyses reports, designing and finalizing layout of each demonstration plot (Wheat, Cotton, Orchard & Tunnel), seed & plants selection, periodic inspection of crops and Plants at various stages of growth, recommendation on fertilizers & pesticides, providing training to the farmers, scheduling of water requirements and preparation of operation & maintenance manual.	-	LS	600,000	600,000
1.7	Soil & Water sampling & testing for each plot (Wheat & Cotton)	-	PS	60,000	60,000
1.8	Training Session: Trainings to 50 farmers - Sehan	4	Event	15,000	60,000
	Total for Bill 1 (Carried to General Abstract Lot -3)				**1,880,000**

Note:

Payment for this bill items except Item 1.4, 1.5, 1.6 and 1.8 is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 2 - Implementation of ESMP Checklist

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
2.1	Development of Contractor's EMP including Traffic Management plan, Emergency Response Plan, OHS Plan, Waste Management, Pollution Prevention Plan and Pest management plan.	1	LS	150,000	150,000
2.2	Implementation of Traffic Management Plan	6	Month	5,000	30,000
2.3	Implementation of OHS Plan/OHS Trainings of Contractor Staff	6	Month	10,000	60,000
2.4	Provision and Use of PPEs to Staff	1	LS	30,000	30,000
2.5	Implementation of Pollution Prevention and Waste Management Plan	6	Month	10,000	60,000
2.6	Implementation of Pest Management Plan	6	Month	10,000	60,000
2.7	Environmental Supervisor	6	Month	50,000	300,000
2.8	First Aid Boxes (Using and Maintaining during the construction period)	1	No.	30,000	30,000
2.9	Environmental Testing (Quarterly testing of Air quality, Water Quality and Noise)	6	Samples	30,000	180,000
Total for Bill 2 (Carried to General Abstract Lot -3)					**900,000**

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 3 - Demonstration Plots (Wheat) - Sehan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
3.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
3.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
3.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
3.4	Supply and application of seeds of Certified quality	50	kg		
3.5	Supply and application of farm yard manure	5	load		
3.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
3.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
3.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					7
Total for 7 Acre of Plots (Carried to General Abstract Lot-3)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 4 - Demonstration Plots (Cotton) - Sehan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
4.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
4.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
4.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
4.4	Supply of seeds of Certified approved quality	10	kg		
4.5	Supply and application of farm yard manure	5	load		
4.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
4.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
4.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					7
Total for 7 Acre of Plots (Carried to General Abstract Lot-3)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF WHEAT / COTTON SEHAN AT NARI BASIN PROVIDED BY WUAs.

S.No	Farmer Name	Site/Location
1	Amir Zaman	Balawo
2	Kamal ud din	Makhtar I
3	Hameed Khan	Lagharra
4	Sarfaraz	Zezgai
5	Faizullah	Zezgai
6	Naik Muhammad	Lagharra
7	Abdul Ghafoor	Balawo
8	Mari	Hinda
9	Santullah	Balawo
10	Wali Muhammad	Killi Ghafar
11	Muhammad Din	Balawo
12	Nawab Shah	Balawo
13	Abdul Qadir	Balawo
14	Jalaluddin	Balawo

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT
Establishment of Demo Plots & Tunnels
Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)
Bill 5 - Demonstration Plots - Orchards 4 Acre Plot - Sehan
BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
5.1	Digging of pits 200 pits/ acres with an average of 15ft between plant to plant and 15 ft between row to row, size 3ft x 3ft and depth 3ft including dressing of excavated earth and Plantation into pits.	800	No.		
5.2	Supply and putting into pits approved quality of manure	15	load		
5.3	Supply and application of Certified quality DAP / NPK	40	Kg		
5.4	Supply and transport of Plants from approved source.	-	PS	320,000	320,000
5.5	Supply of Pesticides as per requirement	-	PS	200,000	200,000
5.6	Supply of spray machine (Electric)	2	No.		
	Drip Irrigation System (6 Drippers per plant & Double lateral per plant row spacing 15 ft x 15 ft)				
5.7	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
5.8	Supply, Install, connect, test and commission of Solar panel & accessories.	2000	Watt		
5.9	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	2000	Watt		
5.10	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	80	Rft		
5.11	Providing at and fixing site Fertilizer Tank, confirming to ISO standard, Imported or approved equivalent (similar specifications), complete in all respects, Local Made. (Fertilizer Tank 60 liter)	1	No		
5.12	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 25 m^3/hr).	1	No		
5.13	Providing and fixing at site Ventury Assembly, confirming to ISO 15873 Imported or approved equivalent (similar specifications), complete in all respects (Ventury Assembly, 1").	1	No		
5.14	Supply of Pressure Gauges Glz: (O2.5".10 bars)	2	No		
3.15	Gate Valve, 2 inch (Schedule 80)-BS 5154	1	No		
3.15a	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	5	No		
5.16	Air Valve made of brass material, 1 inch according to specification.	1	No		
5.17	Miscellaneous head unit fittings including fertigation manifold, NRV, fittings for pump, suction & delivery fittings, complete in all respect.	1	LS		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT
Establishment of Demo Plots & Tunnels
Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)
Bill 5 - Demonstration Plots - Orchards 4 Acre Plot - Sehan
BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
5.18	Excavation of trenches for water supply pipe lines including trimming, dressing sides, leveling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects including cost of back filling (Ordinary soil)	1770	Cft		
5.19	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution				
	(a) PVC Pipe, 2 inches Dia, C-Class	300	Rft		
	(b) PVC Pipe, 1.5 inches Dia, D-Class	880	Rft		
5.20	Providing and fixing at site Plain Drip Line, confirming to ISO- 8779, Imported or approved equivalent (similar specifications), complete in all respects (Drip Lateral Plain, 16 mm (Wall Thickness 1.2mm).	26248	Rft		
5.21	Providing and fixing at site Drippers, confirming to ISO-9261, Imported or approved equivalent (similar specifications), complete in all respects (8 LPH, PC)	4800	No		
5.22	Start Connecter / Rubber Gromate 16 mm	200	No		
5.23	Joiner 16 mm	200	No		
5.24	End Plug / Lateral Cap (16mm)	200	No		
5.25	Flush Valve (1.5 inch)	8	No		
5.26	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
5.27	Supply of recommended spars for two years operation	-	PS	50,000	50,000
Total for 4 Acre of Demonstration Plot - Orchards					
Deduct Farmer's share @ 243 man-days per 4 Acres in kind of labour resources by relevant beneficiary at the times when required by the Contractor					243,461
Total for 4 Acre of Plot after deducting Farmer's share					
Total Number of Plots (each plot - 4 Acre) as per attached farmers list below					5
Total for 5 Plots (Carried to General Abstract Lot-3)					

Notes:

- The land, irrigation water source and water storage pond shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF ORCHARD WITH HEIS SEHAN AT NARI BASIN

S. No.	Name of Farmer	Size / Area	Location/Village
1	Safdar Muhammad	4 Acr	Makhtar I
2	Bashir Ahmad	4 Acr	Makhtar I
3	Safar Khan	4 Acr	Balawo
4	Abdul Ghafar	4 Acr	Balawo
5	Ahga Muhammad	4 Acr	Hinda

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 6 - Demonstration Plots Tunnels (100ft x 32ft) - Sehan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
6.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
6.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
6.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
6.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
6.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
6.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
6.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
6.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
6.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
6.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
	Drip Line System - Single Integrated Drip Line per Row				
6.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 1-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
6.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 6 - Demonstration Plots Tunnels (100ft x 32ft) - Sehan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
6.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
6.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
6.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
6.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
6.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
6.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
6.19	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	8	No		
6.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
6.21	Earth work excavation for lining of PVC Pipe line upto 1.5ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
6.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects (Emitter spacing at 0.30 m).	700	Rft		
6.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
6.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
6.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
6.26	Supply and fixing of End Plug - 16 mm	10	No.		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 3 - Demos at Sehan (Wheat/Cotton/Orchard/Tunnel)

Bill 6 - Demonstration Plots Tunnels (100ft x 32ft) - Sehan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
6.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
6.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
6.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
6.30	Supply of spray machine	1	No.		
6.31	Supply of recommended spars for two years operation	-	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share					
Total Number of Tunnels (each Size: 100 ft x 32 ft) as per attached list below					2
Total for 2 Tunnels (Carried to General Abstract Lot-3)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS TUNNELS
SEHAN AT NARI BASIN

S. No.	Name of Farmer	Length	Location/Village	Tehsil
1	Umeed Khan	100x32	Makhtar I	Makhtar
2	Muhammad Ashraf	100x32	Makhtar I	Makhtar

BILL OF QUANTITIES - LOT 4

DEMONSTRATION PLOTS (WHEAT & COTTON)

GUNDACHA/NIMMI/SHEB E MAIDAN

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT (BIWRMDP)

Establish Demo Plots & Tunnel

Lot 4 - Gundacha/Nimmi/Shab Maidan (Wheat/Cotton)

BILL OF QUANTITIES

General Abstract Lot-4

Bill No.	Description of Works	Amount (Pak Rs)
Bill -1	General	2,020,000
Bill -2	Implementation of ESMP Checklist	900,000
Bill -3	Demonstration Plots (Wheat) - Gundacha	
Bill -4	Demonstration Plots (Cotton) - Gundacha	
Bill -5	Demonstration Plots (Wheat) - Nimmi	
Bill -6	Demonstration Plots (Cotton) - Nimmi	
Bill -7	Demonstration Plots (Wheat) - Sheb e Maidan	
Bill -8	Demonstration Plots (Cotton) - Sheb e Maidan	
Grand Total - Lot 4 [Carried Forward to Contractor's Form of Bid]		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

BILL 1 - GENERAL ITEMS

BILL OF QUANTITIES

Item No.	Description	Unit	Quantity	Unit Rate (Pak Rs)	Amount (Pak Rs)
1.1	Providing all bonds and Insurances in accordance with the Conditions of Contract.	-	PS	220,000	220,000
1.2	Provision of one (1) 4WD vehicle / Jeep (1300cc), Jimny or Equivalent in good running condition for use by Supervision Staff of the Project Manager / Employer in accordance with specification during construction period.	-	PS	600,000	600,000
1.3	Provision of POL, Service, repair and maintenance costs for the vehicle provided under the contract BOQ item No 1.2, all in accordance with the specifications during construction period.	-	PS	300,000	300,000
1.4	Providing and transporting of raised bed machine and seed drill if required by Project Manager.	1	LS	25,000	25,000
1.5	Providing and transporting of Cotton Picker if required by the Project Manager.	1	LS	35,000	35,000
1.6	Provision of technical qualified firm services for providing technical inputs regarding water and soil sampling & testing and preparing analyses reports, designing and finalizing layout of each demonstration plot (Wheat & Cotton), seed selection, periodic inspection of crops at various stages of growth, recommendation on fertilizers & pesticides, providing training to the farmers, scheduling of water requirements and preparation of operation & maintenance manual.	-	LS	600,000	600,000
1.7	Soil & Water sampling & testing for each plot (Wheat & Cotton)	-	PS	60,000	60,000
1.8	Training Session: Trainings to 50 farmers - Gundacha	4	Event	15,000	60,000
1.9	Training Session: Trainings to 50 farmers - Nimmi	4	Event	15,000	60,000
1.10	Training Session: Trainings to 50 farmers - Nari Sheb e Maidan	4	Event	15,000	60,000
	Total for Bill 1 (Carried to General Abstract Lot -4)				**2,020,000**

Note:

Payment for this bill items except Item 1.4, 1.5, 1.6, 1.8, 1.9 & 1.10 is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 2 - Implementation of ESMP Checklist

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
2.1	Development of Contractor's EMP including Traffic Management plan, Emergency Response Plan, OHS Plan, Waste Management, Pollution Prevention Plan and Pest management plan.	1	LS	150,000	150,000
2.2	Implementation of Traffic Management Plan	6	Month	5,000	30,000
2.3	Implementation of OHS Plan/OHS Trainings of Contractor Straff	6	Month	10,000	60,000
2.4	Provision and Use of PPEs to Staff	1	LS	30,000	30,000
2.5	Implementation of Pollution Prevention and Waste Management Plan	6	Month	10,000	60,000
2.6	Implementation of Pest Management Plan	6	Month	10,000	60,000
2.7	Environmental Supervisor	6	Month	50,000	300,000
2.8	First Aid Boxes (Using and Maintaining during the construction period)	1	No.	30,000	30,000
2.9	Environmental Testing (Quarterly testing of Air quality, Water Quality and Noise)	6	Samples	30,000	180,000
	Total for Bill 2 (Carried to General Abstract Lot -4)				**900,000**

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 3 - Demonstration Plots (Wheat) - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
3.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
3.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
3.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
3.4	Supply and application of seeds of Certified quality	50	kg		
3.5	Supply and application of farm yard manure	5	load		
3.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
3.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
3.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					20
Total for 20 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 4 - Demonstration Plots (Cotton) - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
4.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
4.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
4.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
4.4	Supply of seeds of Certified approved quality	10	kg		
4.5	Supply and application of farm yard manure	5	load		
4.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
4.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
4.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					34
Total for 34 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS (WHEAT/COTTON)
GUNDACHA AT PORALI BASIN

S.No	Farmer Name	Site/Location
Demonstration Plot (Wheat) at Gundacha - 2 Acres each Plot		
1	Mohammad Ismail	Gundacha
2	Abdul Sattar	Gundacha
3	Naseer Ahmed	Gundacha
4	Mohammad Asim	Gundacha
5	Abdul Aziz	Gundacha
6	Abdul Qadir	Gundacha
7	Manzoor Ahmed	Gundacha
8	Shafi Mohammad	Gundacha
9	Yahya khan	Gundacha
10	Sikandar Aslam	Gundacha
Demonstration Plot (Cotton) at Gundacha - 2 Acres each Plot		
1	Mohammad Yaqoob	Gundacha
2	Abdul Rasheed	Gundacha
3	Asgher	Gundacha
4	Mohammad Saleh	Gundacha
5	Murad Ali	Gundacha
6	Khalil ur Rehman	Gundacha
7	Abdul Qadir	Gundacha
8	Mohammad Sharif	Gundacha
9	Azeem khan	Gundacha
10	Tasawur Sarwar	Gundacha
11	Abdul Rehman	Gundacha
12	M Umar	Gundacha
13	Noor Mohammad	Gundacha
14	Abdulsattar	Gundacha
15	Meharullah	Gundacha
16	Bashir Ahmed	Gundacha
17	Asad ullah	Gundacha

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 5 - Demonstration Plots (Wheat) - Nimmi

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
5.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
5.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
5.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
5.4	Supply and application of seeds of Certified quality	50	kg		
5.5	Supply and application of farm yard manure	5	load		
5.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
5.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
5.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					18
Total for 18 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 6 - Demonstration Plots (Cotton) - Nimmi

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
6.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
6.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
6.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
6.4	Supply of seeds of Certified approved quality	10	kg		
6.5	Supply and application of farm yard manure	5	load		
6.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
6.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
6.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					18
Total for 18 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS (WHEAT/COTTON)
NIMMI AT PORALI BASIN

S.No	Farmer Name	Site/Location
Demonstration Plot (Wheat) at Nimmi - 2 Acres each Plot		
1	Mohammad Sadeeq	Nimmi
2	Naseer	Nimmi
3	Gulab Ali	Nimmi
4	Zafar	Nimmi
5	Wadera Mehmood	Nimmi
6	M Aslam	Nimmi
7	Mohammad Usman	Nimmi
8	Abdul Raoof	Nimmi
9	Abdul Haq	Nimmi
Demonstration Plot (Cotton) at Nimmi - 2 Acres each Plot		
1	Noora	Nimmi
2	M Hashim	Nimmi
3	Pir Mohammad	Nimmi
4	Nadir Khan	Nimmi
5	Moula Bukhsh	Nimmi
6	Araz Mohammad	Nimmi
7	Mohammad Aslam	Nimmi
8	Bashir Ahmed	Nimmi
9	Burhan Udin	Nimmi

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 7 - Demonstration Plots (Wheat) - Sheb e Maidan

BILL OF QUANTITIES

S.No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
7.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
7.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
7.3	Land preparation (conventional or with raised bed) including precision land leveling, tillage, etc. complete in all respect ready for sowing.	1	acre		
7.4	Supply and application of seeds of Certified quality	50	kg		
7.5	Supply and application of farm yard manure	5	load		
7.6	Supply and application of certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	0.5	Bag		
7.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
7.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 16 man-days per Acre in kind of labour resources at the times when required by the Contractor					16,496
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					6
Total for 6 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 4 - Gundacha/ Nimmi/ Shab e Maidan (Wheat/Cotton)

Bill 8 - Demonstration Plots (Cotton) - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
8.1	Trench excavation for pipeline from irrigation water source to the field	180	Cft		
8.2	Providing and Installing uPVC pipe IIL, Dadex or equivalent make registered with PSQCA and laying, cutting, jointing and testing uPVC pipe lines in trenches (75 mm inner dia, Class B).	100	Rft		
8.3	Land preparation including precision land leveling, tillage, planking, preparation of ridges complete in all respect ready for sowing.	1	acre		
8.4	Supply of seeds of Certified approved quality	10	kg		
8.5	Supply and application of farm yard manure	5	load		
8.6	Supply and application of Certified fertilizers:				
	(a) Urea	2	Bag		
	(b) DAP	1	Bag		
	(c) SOP	1	Bag		
	(d) Sulfur	1	Kg		
	(e) Zinc	6	liter		
8.7	Supply of Pesticides as per requirement	-	PS	1,500	1,500
8.8	Supply of Spray Pumps (Electric)	1	No		
Total for 1 Acre of Plot					
Deduct Farmer's share @ 17 man-days per Acre in kind of labour resources at the times when required by the Contractor					17,403
Total for 1 Acre of Plot after deducting Farmer's share					
Total Area of Demonstration plots (See list of beneficiary for details)					4
Total for 4 Acre of Plots (Carried to General Abstract Lot-4)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS (WHEAT/COTTON)

SHEB E MAIDAN AT PORALI BASIN

S.No	Farmer Name	Site/Location
Demonstration Plot (Wheat) at Sheb e Maidan - 2 Acres each Plot		
1	Mohammad Aslam	Sheb e Maidan
2	WADERA RAHEEM BUX	Sheb e Maidan
3	M ZAHID	Sheb e Maidan
Demonstration Plot (Cotton) at Sheb e Maidan - 2 Acres each Plot		
1	KHAIR BUX	Sheb e Maidan
2	LAL M	Sheb e Maidan

BILL OF QUANTITIES - LOT 5

DEMONSTRATION PLOTS (ORCHARDS & TUNNELS)

GUNDACHA/NIMMI/SHEB E MAIDAN

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT

AND DEVELOPMENT PROJECT (BIWRMDP)

Establish Demo Plots & Tunnel

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

BILL OF QUANTITIES

GRAND SUMMARY

Bill No.	Description of Works	Amount (Pak Rs)
Bill -1	General	1,040,000
Bill -2	Implementation of ESMP Checklist	900,000
Bill -3	Demonstration Plots (Orchards) - Gundacha	
Bill -4	Tunnel Farming - Gundacha	
Bill -5	Tunnel Farming - Nimmi	
Bill -6	Demonstration Plots (Orchards) - Sheb e Maidan	
Bill -7	Tunnel Farming - Sheb e Maidan	
Grand Total - Lot 5 [Carried Forward to Contractor's Form of Bid]		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

BILL 1 - GENERAL ITEMS

BILL OF QUANTITIES

Item No.	Description	Unit	Quantity	Unit Rate (Pak Rs)	Amount (Pak Rs)
1.1	Providing all bonds and Insurances in accordance with the Conditions of Contract.	-	PS	200,000	200,000
1.2	Provision of technical qualified firm services for providing technical inputs regarding water and soil sampling & testing and preparing analyses reports, designing and finalizing layout of each demonstration plot (Orchards & Tunnels) and drip system, seed & plants selection, periodic inspection of plants at various stages of growth, recommendation on fertilizers & pesticides, providing training to the farmers, scheduling of water requirements and preparation of operation & maintenance manual.	-	LS	600,000	600,000
1.3	Soil & Water sampling & testing for each plot (Wheat & Cotton)	-	PS	60,000	60,000
1.4	Training Session: Trainings to 50 farmers - Gundacha	4	Event	15,000	60,000
1.5	Training Session: Trainings to 50 farmers - Nimmi	4	Event	15,000	60,000
1.6	Training Session: Trainings to 50 farmers – Sheb e Maidan	4	Event	15,000	60,000
Total for Bill 1 (Carried to General Abstract Lot -5)					**1040,000**

Note:
Payment for this bill items except Item 1.2, 1.4, 1.5 and 1.6 is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT (BIWRMDP)

Establish Demo Plots & Tunnel

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

BILL OF QUANTITIES

Bill 2 - Implementation of ESMP Checklist

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
2.1	Development of Contractor's EMP including Traffic Management plan, Emergency Response Plan, OHS Plan, Waste Management, Pollution Prevention Plan and Pest management plan.	1	LS	150,000	150,000
2.2	Implementation of Traffic Management Plan	6	Month	5,000	30,000
2.3	Implementation of OHS Plan/OHS Trainings of Contractor Staff	6	Month	10,000	60,000
2.4	Provision and Use of PPEs to Staff	1	LS	30,000	30,000
2.5	Implementation of Pollution Prevention and Waste Management Plan	6	Month	10,000	60,000
2.6	Implementation of Pest Management Plan	6	Month	10,000	60,000
2.7	Environmental Supervisor	6	Month	50,000	300,000
2.8	First Aid Boxes (Using and Maintaining during the construction period)	1	No.	30,000	30,000
2.9	Environmental Testing (Quarterly testing of Air quality, Water Quality and Noise)	6	Samples	30,000	180,000
Total for Bill 2 (Carried to General Abstract Lot -5)					**900,000**

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3 - Demonstration Plots - Orchards - Gundacha

BILL OF QUANTITIES

Bill No.	Description	Amount (Pak Rs)
3.1	Demonstration Plots at Gundacha - Orchards 4 Acre Plots	
3.2	Demonstration Plots at Gundacha - Orchards 2 Acre Plots	
Total for Bill 3 (Carried to General Abstract Lot -5)		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.1 - Demonstration Plots - Orchards - 4 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
3.1.1	Digging of pits 200 pits/ acres with an average of 15ft between plant to plant and 15 ft between row to row, size 3ft x 3ft and depth 3ft including dressing of excavated earth and Plantation into pits.	800	No.		
3.1.2	Supply and putting into pits approved quality of manure	15	load		
3.1.3	Supply and application of Certified quality DAP / NPK	40	Kg		
3.1.4	Supply and transport of Plants from approved source.	-	PS	320,000	320,000
3.1.5	Supply of Pesticides as per requirement	-	PS	200,000	200,000
3.1.6	Supply of spray machine (Electric)	2	No.		
Drip Irrigation System (6 Drippers per plant & Double lateral per plant row spacing 15 ft x 15 ft)					
3.1.7	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
3.1.8	Supply, Install, connect, test and commission of Solar panel & accessories.	2000	Watt		
3.1.9	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	2000	Watt		
3.1.10	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	80	Rft		
3.1.11	Providing at and fixing site Fertilizer Tank, confirming to ISO standard, Imported or approved equivalent (similar specifications), complete in all respects, Local Made. (Fertilizer Tank 60 liter)	1	No		
3.1.12	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 25 m^3/hr).	1	No		
3.1.13	Providing and fixing at site Ventury Assembly, confirming to ISO 15873 Imported or approved equivalent (similar specifications), complete in all respects (Ventury Assembly, 1").	1	No		
3.1.14	Supply of Pressure Gauges Glz: (O2.5".10 bars)	2	No		
3.1.15	Gate Valve, 2 inch (Schedule 80)-BS 5154	1	No		
3.1.15a	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	5	No		
3.1.16	Air Valve made of brass material, 1 inch according to specification.	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.1 - Demonstration Plots - Orchards - 4 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
3.1.17	Miscellaneous head unit fittings including fertigation manifold, NRV, fittings for pump, suction & delivery fittings, complete in all respect.	1	LS		
3.1.18	Excavation of trenches for water supply pipe lines including trimming, dressing sides, leveling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects including cost of back filling (Ordinary soil)	1770	Cft		
3.1.19	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution				
	(a) PVC Pipe, 2 inches Dia, C-Class	300	Rft		
	(b) PVC Pipe, 1.5 inches Dia, D-Class	880	Rft		
3.1.20	Providing and fixing at site Plain Drip Line, confirming to ISO- 8779, Imported or approved equivalent (similar specifications), complete in all respects (Drip Lateral Plain, 16 mm (Wall Thickness 1.2mm).	26248	Rft		
3.1.21	Providing and fixing at site Drippers, confirming to ISO-9261, Imported or approved equivalent (similar specifications), complete in all respects (8 LPH, PC)	4800	No		
3.1.22	Start Connecter / Rubber Gromate 16 mm	200	No		
3.1.23	Joiner 16 mm	200	No		
3.1.24	End Plug / Lateral Cap (16mm)	200	No		
3.1.25	Flush Valve (1.5 inch)	8	No		
3.1.26	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
3.1.27	Supply of recommended spars for two years operation	-	PS	50,000	50,000
Total for 4 Acre of Demonstration Plot - Orchards					
Deduct Farmer's share @ 243 man-days per 4 Acres in kind of labour resources by relevant beneficiary at the times when required by the Contractor					243,461
Total for 4 Acre of Plot after deducting Farmer's share					
Total Number of Plots (each plot - 4 Acre) as per attached farmers list below					3
Total Bill 3.1 for 3 Plots (Carried to Summary Bill -3 of Lot 5)					

Notes:

- The land, irrigation water source and water storage pond shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.1 - Demonstration Plots - Orchards - 4 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.2 - Demonstration Plots - Orchards - 2 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
3.2.1	Digging of pits 200 pits/ acres with an average of 15ft between plant to plant and 15 ft between row to row, size 3ft x 3ft and depth 3ft including dressing of excavated earth and Plantation into pits.	400	No.		
3.2.2	Supply and putting into pits approved quality of manure	8	load		
3.2.3	Supply and application of Certified quality DAP / NPK	20	Kg		
3.2.4	Supply and transport of Plants from approved source.	-	PS	160,000	160,000
3.2.5	Supply of Pesticides as per requirement	-	PS	100,000	100,000
3.2.6	Supply of spray machine (Electric)	1	No.		
Drip Irrigation System (6 Drippers per plant & Double lateral per plant row spacing 15 ft x 15 ft)					
3.2.7	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
3.2.8	Supply, Install, connect, test and commission of Solar panel & accessories.	2000	Watt		
3.2.9	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	2000	Watt		
3.2.10	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	80	Rft		
3.2.11	Providing at and fixing site Fertilizer Tank, confirming to ISO standard, Imported or approved equivalent (similar specifications), complete in all respects, Local Made. (Fertilizer Tank 60 liter)	1	No		
3.2.12	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 25 m^3/hr).	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.1 - Demonstration Plots - Orchards - 4 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
3.2.13	Providing and fixing at site Ventury Assembly, confirming to ISO 15873 Imported or approved equivalent (similar specifications), complete in all respects (Ventury Assembly, 1").	1	No		
3.2.14	Supply of Pressure Gauges Glz: (O2.5".10 bars)	2	No		
3.2.15	Gate Valve, 2 inch (Schedule 80)-BS 5154	1	No		
3.2.15a	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	3	No		
3.2.16	Air Valve made of brass material, 1 inch according to specification.	1	No		
3.2.17	Miscellaneous head unit fittings including fertigation manifold, NRV, fittings for pump, suction & delivery fittings, complete in all respect.	1	LS		
3.2.18	Excavation of trenches for water supply pipe lines including trimming, dressing sides, leveling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects including cost of back filling (Ordinary soil)	1110	Cft		
3.2.19	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution				
	(a) PVC Pipe, 2 inches Dia, C-Class	300	Rft		
	(b) PVC Pipe, 1.5 inches Dia, D-Class	440	Rft		
3.2.20	Providing and fixing at site Plain Drip Line, confirming to ISO- 8779, Imported or approved equivalent (similar specifications), complete in all respects (Drip Lateral Plain, 16 mm (Wall Thickness 1.2mm).	13124	Rft		
3.2.21	Providing and fixing at site Drippers, confirming to ISO-9261, Imported or approved equivalent (similar specifications), complete in all respects (8 LPH, PC)	2400	No		
3.2.22	Start Connecter / Rubber Gromate 16 mm	100	No		
3.2.23	Joiner 16 mm	100	No		
3.2.24	End Plug / Lateral Cap (16mm)	100	No		
3.2.25	Flush Valve (1.5 inch)	4	No		
3.2.26	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
3.2.27	Supply of recommended spars for two years operation	1	PS	25,000	25,000
Total for 2 Acre of Demonstration Plot - Orchards					

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 3.1 - Demonstration Plots - Orchards - 4 Acre Plots - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
Deduct Farmer's share @ 155 man-days per 2 Acre in kind of labour resources by relevant beneficiary at the times when required by the Contractor					155,592
Total for 2 Acre of Plot after deducting Farmer's share					
Total Number of Plots (each plot - 2 Acre)					2
Total Bill 3.2 for 2 Plots (Carried to Summary Bill -3 of Lot 5)					

Notes:

- The land, irrigation water source and water storage pond shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS OF ORCHARD WITH HEIS

GUNDACHA AT PORALI BASIN (BILL 3.1 & 3.2)

S.No	Farmer Name	Site/Location
Demonstration plots at Gundacha - 4 Acres (BILL 3.1)		
1	Mohammad Asim	Gundacha
2	Nasrullah + Mehrullah & Shafi Muhammad Khan	Gundacha
3	Ghulam Nabi	Gundacha
Demonstration plots at Gundacha - 2 Acres (BILL 3.2)		
1	Abdul Sattar	Gundacha
2	Abdul Rehman	Gundacha

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
4.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
4.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
4.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
4.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
4.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
4.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
4.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
4.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
4.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
4.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
Drip Line System - Single Integrated Drip Line per Row					
4.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 1-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
4.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		
4.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
4.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
4.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
4.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
4.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
4.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
4.19	Ball Valve, 1 inch, PN 10 (Schedule 80)-BS 5154	8	No		
4.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
4.21	Earth work excavation for lining of PVC Pipe line upto 1.5 ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
4.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects. (Emitter spacing at 0.30 m).	700	Rft		
4.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
4.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
4.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
4.26	Supply and fixing of End Plug - 16 mm	10	No.		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 4 - Demonstration Plots Tunnels (100ft x 32ft) - Gundacha

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
4.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
4.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
4.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
4.30	Supply of spray machine	1	No.		
4.31	Supply of recommended spars for two years operation	1	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share					
Total Number of Tunnels (each Size: 100ft x 32 ft)					3
Total for 3 Tunnels (Carried to General Abstract Lot-5)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS TUNNELS

GUNDACHA AT PORALI BASIN

S.No	Farmer Name	Site/Location
1	Abdul Qadir	Gundacha
2	Mohammad Sadeeq	Gundacha
3	Nasrullah+Mehrullah	Gundacha

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Nimmi

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
5.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
5.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
5.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
5.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
5.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
5.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
5.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
5.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
5.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
5.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
	Drip Line System - Single Integrated Drip Line per Row				
5.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Nimmi

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
5.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		
5.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
5.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
5.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
5.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
5.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
5.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
5.19	Ball Valve, 1 inch, PN 10 (Schedule 80)-BS 5154	8	No		
5.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
5.21	Earth work excavation for lining of PVC Pipe line upto 1.5ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
5.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects (Emitter spacing at 0.30 m).	700	Rft		
5.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
5.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
5.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
5.26	Supply and fixing of End Plug - 16 mm	10	No.		
	Plantation Work				

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 5 - Demonstration Plots Tunnels (100ft x 32ft) - Nimmi

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
5.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
5.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
5.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
5.30	Supply of spray machine	1	No.		
5.31	Supply of recommended spars for two years operation	1	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share					
Total Number of Tunnels (each Size: 100ft x 32 ft)					2
Total for 2 Tunnels (Carried to General Abstract Lot-5)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS TUNNELS

NIMMI AT PORALI BASIN

S.No	Farmer Name	Site/Location
1	Nadir Khan	Nimmi
2	Moula Bukhsh	Nimmi

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 6 - Demonstration Plots - Orchards - 4 Acre Plots - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
6.1	Digging of pits 200 pits/ acres with an average of 15ft between plant to plant and 15 ft between row to row, size 3ft x 3ft and depth 3ft including dressing of excavated earth and Plantation into pits.	800	No.		
6.2	Supply and putting into pits approved quality of manure	15	load		
6.3	Supply and application of Certified quality DAP / NPK	40	Kg		
6.4	Supply and transport of Plants from approved source.	-	PS	320,000	320,000
6.5	Supply of Pesticides as per requirement	-	PS	200,000	200,000
6.6	Supply of spray machine (Electric)	2	No.		
Drip Irrigation System (6 Drippers per plant & Double lateral per plant row spacing 15 ft x 15 ft)					
6.7	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 2-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		
6.8	Supply, Install, connect, test and commission of Solar panel & accessories.	2000	Watt		
6.9	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	2000	Watt		
6.10	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	80	Rft		
6.11	Providing at and fixing site Fertilizer Tank, confirming to ISO standard, Imported or approved equivalent (similar specifications), complete in all respects, Local Made. (Fertilizer Tank 60 liter)	1	No		
6.12	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 25 m^3/hr).	1	No		
6.13	Providing and fixing at site Ventury Assembly, confirming to ISO 15873 Imported or approved equivalent (similar specifications), complete in all respects (Ventury Assembly, 1").	1	No		
6.14	Supply of Pressure Gauges Glz: (O2.5".10 bars)	2	No		
6.15	Gate Valve, 2 inch (Schedule 80)-BS 5154	1	No		
6.15a	Ball Valve, 2 inch, PN 10 (Schedule 80)-BS 5154	5	No		
6.16	Air Valve made of brass material, 1 inch according to specification.	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 6 - Demonstration Plots - Orchards - 4 Acre Plots - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Unit Rate (Pak Rs)	Amount (Pak Rs)
6.17	Miscellaneous head unit fittings including fertigation manifold, NRV, fittings for pump, suction & delivery fittings, complete in all respect.	1	LS		
6.18	Excavation of trenches for water supply pipe lines including trimming, dressing sides, leveling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects including cost of back filling (Ordinary soil)	1770	Cft		
6.19	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution				
	(a) PVC Pipe, 2 inches Dia, C-Class	300	Rft		
	(b) PVC Pipe, 1.5 inches Dia, D-Class	880	Rft		
6.20	Providing and fixing at site Plain Drip Line, confirming to ISO- 8779, Imported or approved equivalent (similar specifications), complete in all respects (Drip Lateral Plain, 16 mm (Wall Thickness 1.2mm).	26248	Rft		
6.21	Providing and fixing at site Drippers, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects (8 LPH, PC)	4800	No		
6.22	Start Connecter / Rubber Gromate 16 mm	200	No		
6.23	Joiner 16 mm	200	No		
6.24	End Plug / Lateral Cap (16mm)	200	No		
6.25	Flush Valve (1.5inch)	8	No		
6.26	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
6.27	Supply of recommended spars for two years operation	-	PS	25,000	25,000
Total for 4 Acre of Demonstration Plot - Orchards					
Deduct Farmer's share @ 243 man-days per 4 Acres in kind of labour resources by relevant beneficiary at the times when required by the Contractor					243,461
Total for 4 Acre of Plot after deducting Farmer's share					
Total Number of Plots (each plot - 4 Acre)					2
Total for 2 Plots (Carried to General Abstract Lot-5)					

Notes:

- The land, irrigation water source and water storage pond shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS ORCHARD WITH HEIS

SHEB E MAIDAN AT PORALI BASIN

S.No	Farmer Name	Plot Area	Site/Location
1	M Qasim	4 acre	Sheb e Maidan
2	Abdul Raheem	4 acre	Sheb e Maidan

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 7 - Demonstration Plots Tunnels (100ft x 32ft) - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Construction of Tunnel (Size: 100 ft x 32 ft)				
7.1	Dressing and leveling of earthwork for tunnel area	1600	Cft		
7.2	Earthwork excavation for foundation of pillars for nursery sheds including dressing and disposal of excavated material	84	Cft		
7.3	Providing and laying 1:2:4 PCC Concrete for filing in pits	84	Cft		
7.4	Providing, laying, cutting, jointing and testing G.I. pipe IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard including fixing in PCC, bending and all related works (Light duty, 1.25" (32 mm) Nominal dia, wall thickness 2.8 mm).	66	Rft		
7.5	Providing, laying, cutting, jointing and testing G.I. pipe for tunnel construction, IIL or equivalent of approved make registered with PSQCA complying with BS-1387 Standard, bending and all related works (Light duty, 1.5" (40 mm) Nominal dia, wall thickness 2.9 mm) including labour cost.	1324	Rft		
7.6	Drilling holes in pipes and inserting and fixing nut, bolts & clumps	54	No		
7.7	Providing and installing polythene sheet 0.16 mm thickness for laying under nursery shed roof (Double layer)	5960	Sft		
7.8	Wood lining work (wooden strips 3 inch wide) including fixing and clamps, screws, etc.	700	Rft		
7.9	Sliding arrangements for polythene on both long vertical sides	-	LS		
7.10	Providing and fixing road sign boards such as caution etc as approved by the Engineer with reflective paints, having superficial area of 1.125 sq.m including cost of post etc.	1	No		
Drip Line System - Single Integrated Drip Line per Row					
7.11	Providing and fixing at Site Electric Motor of KSB, Grandfos, Siemens or approved equivalent (similar specifications), complete in all respects including cost of pump, motor pump controller set including all ancillaries ready for installation (Power = 1-HP-Surface-DC Motor Pump Set & Motor Pump Controller Set).	1	No		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 7 - Demonstration Plots Tunnels (100ft x 32ft) - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
7.12	Supply, Install, connect, test and commission of Solar panel & accessories.	1000	Watt		
7.13	Supply, Install, connect, test and commission of Solar Mounting Structure & accessories (Movable).	1000	Watt		
7.14	Supply, Install, connect, test and commission of CABLES & accessories DC Cable 2.5mm2 Single Core	50	Rft		
7.15	Providing and fixing LDPE overhead tank manufactured by Dura or equivalent on top of any floor (500 gallons capacity)	1	No.		
7.16	Gate Valve, 1 inch (Schedule 80)-BS 5154	1	No		
7.17	Providing and fixing at site Disc Filter, confirming to ISO 9912 Imported or approved equivalent (similar specifications), complete in all respects (Discharge Capacity 20 m^3/hr).	1	No		
7.18	Providing, laying, cutting, jointing, testing and disinfecting PVC pipes confirming to BSS-3505/PS-3051 complete in all respects with fittings with pvc jointing solution (PVC Pipe, 1 inch Dia, C-Class)	60	Rft		
7.19	Ball Valve, 1 inch, PN 10 (Schedule 80)-BS 5154	8	No		
7.20	Providing and fixing at site Plain Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects	15	Rft		
7.21	Earth work excavation for lining of PVC Pipe line upto 1.5 ft depth in ordinary soil including cost of backfilling and dressing.	113	Cft		
7.22	Providing and fixing at site Integrated Drip Line 16 mm dia, 1 mm thickness, confirming to ISO- 9261, Imported or approved equivalent (similar specifications), complete in all respects. (Emitter spacing at 0.30 m).	700	Rft		
7.23	Supply and fixing of PE, Imported GTO - 16 mm	10	No.		
7.24	Supply and fixing of PE Imported Joiner - 16 mm	10	No.		
7.25	Supply and fixing of PE Imported Eng ring - 16 mm	10	No.		
7.26	Supply and fixing of End Plug - 16 mm	10	No.		

BALOCHISTAN INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Establishment of Demo Plots & Tunnels

Lot 5 - Demos at Gundacha/Nimmi/Sheb e Maidan (Orchard/Tunnel)

Bill 7 - Demonstration Plots Tunnels (100ft x 32ft) - Sheb e Maidan

BILL OF QUANTITIES

Item No.	Description	Quantity	Unit	Rate (Pak Rs)	Amount (Pak Rs)
	Plantation Work				
7.27	Supply and sowing of Certified quality of Seeds.	-	PS	50,000	50,000
7.28	Supply, transport & staking approved quality of manure and spreading into rows	2	load		
7.29	Supply of Pesticides as per requirement	-	PS	15,000	15,000
7.30	Supply of spray machine	1	No.		
7.31	Supply of recommended spars for two years operation	1	PS	50,000	50,000
Total for 1 No. Tunnel					
Deduct Farmer's share @ 185 man-days per tunnel in kind of labour resources to be provided by relevant beneficiary of tunnel at the times when required by the Contractor					185,169
Total for 1 No. Tunnel after deducting Farmer's share (Carried to General Abstract Lot-5)					

Notes:

- The land and irrigation water source shall be provided by relevant beneficiary of demonstration plot.
- Payment for Provisional Sum (PS) is subject to availing the facilities by the Client / Project Manager Site Staff and actual expenditure made, with an allowance of 20 % overheads for contractor including all taxes.

LIST OF FARMERS FOR DEMONSTRATION PLOTS TUNNELS

SHEB E MAIDAN AT PORALI BASIN

S.No	Farmer Name	Site/Location
1	Lal Muhammad	Sheb e Maidan

SECTION 7: SECURITY FORMS

Table of Forms

Annex A Form: Bid Security (Bank Guarantee)

Whereas, [name of Bidder] (hereinafter called "the Bidder") has submitted his Bid dated [date] for the construction of [name of Contract] (hereinafter called "the Bid").

Know all people by these presents that We [name of Bank] having our registered office at [address] (hereinafter called "the Bank") are bound unto name of Employer] (hereinafter called "the Employer") in the sum of [amount in words and figures denominated in Pak. Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions to Bidders.] for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors, and assigns by these presents.

Sealed with the Common Seal of the said Bank this [day] day of [month], [year].

The conditions of this obligation are:

(1) If, after Bid opening, the Bidder withdraws his Bid during the period of Bid validity specified in the Form of Bid; or

(2) If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of Bid validity:

(a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or

(b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders; or

(c) does not accept the correction of the Bid Price pursuant to Clause 27,

we undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer's having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date [number] days[1] after the deadline for submission of bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

Date _____ Signature of the Bank _____

Witness _____ Seal _____

_____
[Signature, name, and address]

[1] Usually 28 days after the end of the validity period of the Bid provided in the Invitation for Bids and Clause 15.1 of the Instruction to Bidders. The date should be inserted by the Employer before the bidding documents are issued.

Annex B Form: Performance Bank Guarantee (Unconditional)

To: [name and address of Employer]

Whereas [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. [Number] dated [date] to execute [name of Contract and brief description of Works] (hereinafter called "the Contract");

And whereas it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

And whereas we have agreed to give the Contractor such a Bank Guarantee;

Now therefore we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of [amount of Guarantee in words and figures denominated in Pak. Rupees, representing the percentage of the Contract Price specified in the Contract] such sum being payable in Pak. Rupees in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of [amount of Guarantee in words and figures denominated in Pak. Rupees, representing the percentage of the Contract Price specified in the Contract] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any such change, addition, or modification.

This Guarantee shall be valid until a date 28 days from the date of issue of the Certificate of Completion.

Signature and seal of the Guarantor _____

Name of Bank _____
Address _____
Date _____

Annex C Form: Bank Guarantee for Advance Payment

To: [name and address of Employer]

[name of Contract]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, Clause 51 ("Advance Payment") of the above-mentioned Contract, [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with [name of Employer] a Bank Guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of [amount of Guarantee in words and figures denominated in Pak. Rupees, representing the amount of the Advance Payment].

We, the [Bank or Financial Institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to [name of Employer] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding [amount of Guarantee in words and figures denominated in Pak. Rupees, representing the amount of the Advance Payment].

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between [name of Employer] and the Contractor, shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any such change, addition, or modification.

This Guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal: _____

Name of Bank/Financial Institution: _____
Address: _____
Date: _____