GOVERNMENT OF KHYBER PAKTUNKHWA

IRRIGATION DEPARTMENT

BID SOLICITATION DOCUMENTS

FOR

THE WORK OF

Name of Work:- **Construction of Irrigation Tube Wells / Lift Irrigation Schemes & Solarization of Existing Irrigation Tube Wells in Merged Areas AIP No. 2153/ 210588 (2025-26) (Solar Components)**

Sub Work: **Package-2 Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat**. **Sub Schemes: -** **(1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).

Estimated Cost: **23.516 (M)**

IRRIGATION DIVISION, DISTRICT ORAKZAI

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GOVERNMENT OF KHYBER PAKHTUNKHWA
IRRIGATION DIVISION DISTRICT ORAKZAI

NOTICE INVITING E-BIDDING (SINGLE STAGE TWO ENVELOPE E-PAD SYSTEM)

Irrigation Department, Government of Khyber Pakhtunkhwa, Orakzai Irrigation Division invites Technical (Electronic Bids) on Single Stage Two Envelope procedure for the following works from the eligible firms / contractors who have renewed their enlistment and PEC license in relevant category having of (EE-11, CE-04) for the year 2025-26, registered with the Khyber Pakhtunkhwa Revenue Authority (KAPRA) and on active tax payer list of Income Tax Department.

S#	Name of Work/Sub Work.	Estimated Cost Rs. (M)	2% E/ Money+ Stamp Duty (in Rs)
1	**Construction of Irrigation Tube Wells / Lift Irrigation Schemes & Solarization of Existing Irrigation Tube Wells in Merged Areas AIP No. 2153/ 210588 (2025-26) (Solar Components)**		
A	**Package-1** Construction of 01 No of Existing/ 09 Nos of New Solar Irrigation Tube Wells at District Orakzai. **Sub Schemes: -** **1**. Construction of Existing Solar Irrigation Tube Well at Ali Khel, **2.** Construction of New Solar Irrigation Tube Well at Kalaya, **3.** Construction of New Solar Irrigation Tube Well at Arkhi Pyala Mamozai, **4.** Construction of New Solar Irrigation Tube Well at Feroz Khel, **5.** Construction of New Solar Irrigation Tube Well at Husseini Ghari near Kadda Bazar, **6.** Construction of New Solar Irrigation Tube Well at Mani Khel, **7.** Construction of New Solar Irrigation Tube Well at Mishti 01, **8.** Construction of New Solar Irrigation Tube Well at Mula Khel, **9.** Construction of New Solar Irrigation Tube Well at Sheikhan, **10.** Construction of New Solar Irrigation Tube Well at Sra Khuna Sheikhan.	29.085	635850
B	**Package-2** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **Sub Schemes: -** **1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel.	23.516	515220

TERMS AND CONDITIONS

1. Last date & time for submission of Technical Bid and Financial Bid is **26-02-2026 12:00 Noon,** will be opened on the same day at 12:30 PM.
2. Bidding documents including instruction to bidders and Terms & Conditions can be downloaded from Irrigation Department website (www.irrigation.gkp.pk) and KPPRA website (kppra.gov.pk).
3. Original Call Deposit from schedule bank, attested copy of PEC registration, CNIC, NTN, KPRA Registration must be submitted in sealed envelope to the Executive Engineer, Irrigation Division, District Orakzai office through registered courier, so as to reach the office of the undersigned on or before the fixed date and time as mentioned above. Otherwise the bid will be considered as non-responsive.
4. For Additional Security in case of abnormally low bids KPPRA Notification S.R.O (14)/Vol:1- 24/2021-22, Dated: 10th May, 2022 shall be enforced.
5. Pre-bid meeting will be held on **18-02-2026** in the office of the undersigned.
6. As per KPPRA Notification No. S.R.O (29)/Vol:1-40/2025-26/699-711, dated: 29.10.2025 clause (3): All bidders shall enter the details of the bid security and where applicable, the additional security instrument in the E-PAK Acquisition and Disposal System (EPADS) at the time of bid submission. The original bid security and additional security instruments, details of which have already been entered in EPADS, shall be submitted to the procuring entity well before the closing date and time of bid submission. The procuring entity shall retain the original bid security and additional security instruments of all bidders until signing of the contract with the best evaluated bidder or till the bid validity period whichever is earlier.
   i. In case of failure to submit the original bid security and additional security instrument before the date and time, the procuring entity shall debar the bidder for a period of one (01) year.
   ii. In the case of violation for second time, blacklist him for a minimum period of three (03) years in accordance with Section 29 of the KPPRA Act read with Rule 44 of the Khyber Pakhtunkhwa Public Procurement of Goods, Works and Services Rules, 2014.
7. All the prevailing KPPRA rules / Act and other Govt: notifications issued from time to time shall be applicable.
8. The competent authority has the authority any bid or all the bids by having cogent reason.
9. Bid shall be accompanied with 0.03% of Estimated Cost as tender entry fee in a shape of separate CDR which is non-refundable. Non submission would lead to bid rejection.

EXECUTIVE ENGINEER

BID SOLICITATION DOCUMENTS

FOR THE WORKS, TENDER DATED SUBMISSION OF TECHNICAL BID IS 24-02-2026 12:00 PM & SUB MISSION OF FINANCIAL BID AT 04-03-2026 WILL BE OPENED ON THE SAME DAY AT 02:00 PM.

S.No	Name of Work / Sub Work.	E/Cost (M)
1	**Construction of Irrigation Tube Wells / Lift Irrigation Schemes & Solarization of Existing Irrigation Tube Wells in Merged Areas AIP No. 2153/ 210588 (2025-26) (Solar Components)**	
B	**Package-2** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **Sub Schemes: -** **1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel.	**23.516**

Contractor: _____

For the Work:_____

INSTRUCTIONS TO BIDDERS

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

A. GENERAL

IB.1 Scope of Bid

1.1 The Procuring Entity as defined in the Bidding Data hereinafter called "the Procuring Entity" invites bids for the construction and completion of each sub work tabulated in the title page and summarized in the Bidding Data hereinafter referred to as the "Works".

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

1.3 Throughout these bidding documents, the terms 'bid' and 'tender' and their derivatives (bidder / tenderer, bid / tender, bidding / tendering etc.) are synonymous and refer to sub work as per title page separately.

IB.2 Source of Funds

2.1 The Procuring Entity intends to execute the works from Provincial ADP / AIP Fund as tabulated in the title page.

IB.3 Eligible Bidders

3.1 This Invitation for Bids is open to all bidders meeting the following requirements which are considered to be mandatory and to be submitted on or before closing dated at order and making them eligible for participation.

a. Duly licensed by the Pakistan Engineering Council (PEC) in the category relevant to the value of the works with specialization code as mentioned in the invitation for E-Bidding.

b. Firms have not been blacklisted by any Govt: Organization or involved in such like litigations

c. Registered with KAPRA

d. NTN/Registration certificate from income Tax department along with up to date clearance certificate. The contractor must also be active on "Active Tax Payer list."

e. List of similar type and size of works under execution and completed during the last five years with equivalent cost to the subject bid. Two supportive certificates from the relevant department.

f. Enlistment with the Irrigation Department.

g. In case of Bid / Rate quoted by the bidder more than 10% below Engineer Estimate, the Additional Bid security shall be sought from the successful bidder only to the extent of bid more than 10% below on the Engineer estimate in the form of Percentage. The amount of Additional Bid Security shall be equal to the impact of financial difference occurring in the quoted rates beyond 10% below Engineer estimate. The bidder shall be bound to produce the Additional Bid security within 03 working days from the issuance of letter of acceptance failing which the procuring entity shall forfeit the bid security of successful bidder may also initiate legal proceedings against the bidder who repudiated the contract under KPPRA Procurement Rules.

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

IB.4 One Bid per Bidder

4.1 Not Applicable

IB.5 Cost of Bidding

5.1 The bidder shall bear all costs including bid solicitation documents fee Rs.500/- per set as mentioned in NIT (nominal so as to cover printing/reproduction and mailing costs or download the bidding solicitation documents from the website www.irrigation.gkp.pk) and other costs associated with the preparation and submission of its bid including the submitted Bid Securities and Additional Security (If applicable) and the Procuring Entity will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

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IB.6 Site Visit

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

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

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

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

1. Instructions to Bidders.
2. Bidding Data.
3. General Conditions of Contract, Part-I (GCC).
4. Particular Conditions of Contract, Part-II (PCC).
5. Specifications – Special Provisions.
6. Specifications - Technical Provisions.
7. Form of Bid & Appendices to Bid.
8. Bill of Quantities (Appendix-D to Bid).
9. Form of Bid Security.
10. Form of Contract Agreement.
11. Forms of Performance Security and Mobilization Advance Guarantee/Bond.
12. Drawings.

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

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Procuring Entity in writing at the Procuring Entity's address indicated in the Invitation for Bids. The Procuring Entity will respond to any request for clarification which he receives earlier than 7 days prior to the deadline for submission of bids.

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Copies of the Procuring Entities response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying it's Source.

IB.9 Amendment of Bidding Documents

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

9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Procuring Entity.

9.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Procuring Entity may extend the deadline for submission of bids in accordance with Clause IB.20 (10)

C. PREPARATION OF BIDS

IB.10 Language of Bid

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

IB.11 Documents Accompanying the Bid

11.1 Each bidder shall:

(a) submit a written power of attorney authorizing the signatory of the bid to act for and on behalf of the bidder;

(b) (i-v)Deleted / N.A

(c) furnish a technical proposal taking into account the various Appendices to Bid Specially the following (As per Engineer's directions):
Appendix-E to Bid Proposed Construction Schedule Appendix-F to Bid Method of Performing the Work Appendix-G to Bid List of Major Equipment Appendix-K to Bid Organization Chart for Supervisory Staff and other pertinent information such as mobilization program etc;

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

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

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

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

(d) all partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the

Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para(b) above as well as in the Form of Bid and in the Form of Contract Agreement (in case of a successful bid); and

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

11.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the Bidders' proposals to meet the technical specifications and the completion time referred to in Sub-Clause 1.2 hereof (If deemed necessary).

IB.12 Bid Prices

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

12.2 The bidders shall fill in rates premiums and prices for all items of the Works described in the Bill of Quantities. Premium/unit rate offered for an item shall be considered upto two significant decimals places for evaluation purposes. Items against which no premium/rate or price is entered by a bidder will not be paid for by the Procuring Entity when executed and shall be deemed covered by premium/rates and prices for other items in the Bill of Quantities. Corrections in premium/rates and prices, if any, shall be made by crossing out, initialing, dating and re-writing.

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, shall be considered by the bidder in quoting his bid on E-bidding System.

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

12.4 The premium/rates and prices quoted by the bidders are not subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 70 of the Conditions of Contract.

IB.13 Currencies of Bid and Payment

13.1 The unit rates/premium and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Procuring Entity's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. The proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a currency or currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid.

13.2 The rates of exchange to be used by the bidder for currency conversion shall be the TT&OD Selling Rates published or authorized by the State Bank of Pakistan prevailing on the date 28 days prior to the deadline for submission of bids.

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For the purpose of payments, the exchange rates used in bid preparation shall apply for the duration of the Contract.

IB.14 Bid Validity

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

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

IB.15 Bid Security

15.1 Each bidder shall furnish, as part of his bid, at the option of the bidder, a Bid Security in the amount stipulated in NIT in Pak. Rupees in the form of Deposit at Call [Deleted] 1 in fevour of the Procuring Entity. [The bid security shall be submitted from the account of the firm/bidder/contractor who submits the bid]

15.2 The Bid Security shall be in the form of Deposit at Call from a Scheduled Bank in Pakistan, in favour of the Procuring Entity.

15.3 Any bid not accompanied by an acceptable Bid Security & Additional Security (If Applicable) shall be rejected by the Procuring Entity as non-responsive.

15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible and those of first three may be retained till award of contract.

15.5 ["The bid security of the successful bidder shall be retained with the Procuring Entity till completion of the defect liability period and the amount of guarantee will be reduced by an equivalent amount".]

15.6 The Bid Security may be forfeited:

(a) if the bidder withdraws his bid except as provided in Sub-Clause 22.1;

(b) if the bidder does not accept the correction of his Bid Price pursuant to Sub-Clause 27.2 hereof; or

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

(i) furnish the required Performance Security; or

(ii) Sign the Contract Agreement.

(d) If the bidder fails to submit additional security as per KPPRA Notification No. KPPRA/M&E/Estt:/1-17/2019-20, dated June 12/06/2020

IB.16 Alternate Proposals by Bidder (Not Applicable)

16.1 Should any bidder consider that he can offer any advantages to the Procuring Entity by a modification to the designs, specifications or other conditions, he may, in addition to his bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant
Design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details / conditions, provided always that the total sum entered on the Form of Bid shall be that which represents complete compliance with the Bidding Documents.

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

IB.17 Pre-Bid Meeting

17.1 The Procuring Entity may, on his own motion or at the request of any prospective bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents or any other matter that may be raised at that stage. The date, time and venue of pre- bid meeting, if convened, is as stipulated in the NIT. All prospective bidders or their authorized representatives can attend such a pre- bid meeting.

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

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

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

IB.18 Format and Signing of Bid

18.1 Bidders are particularly directed that the amount entered on the Form of Bid shall be for performing the Contract strictly in accordance with the Bidding Documents. (In the instant case E-Bidding system is utilized)

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

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

18.4 Each bidder shall prepare by filling out the forms completely and without alterations one (1) original and number of copies, specified in the Bidding Data, of the documents comprising the bid as described in Clause IB.7 and clearly mark them "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

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

18.6 The bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Procuring Entity, or as are necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

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

18.8 Bidders should retain a copy of the Bidding Documents as their file copy.

D. SUBMISSION OF BIDS IB.19

Sealing and Marking of Bids

19.1 Each bidder shall submit his bid as under: (One original copy)

(a) ORIGINAL and each copy of the Bid shall be sealed and put in separate envelopes and marked as such containing the applicable deposit at calls, printed and signed copy of tender form from E-bidding System.

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

19.2 The inner and outer envelopes shall:

(a) be addressed to the Procuring Entity at the address provided in the Bidding data;

(b) bear the name and identification number of the contract as defined in the Bidding Data/Title page/NIT; and

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

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

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

IB.20 Deadline for Submission of Bids

20.1 (a) Complete Bids must be received by the Procuring Entity at the address specified no later than the time and date stipulated in the Bidding Data/NIT
In the event of the specified date for the submission of bids declared a Holiday for the Procuring Entity, the Bids will be received up to the appointed time on the next working day.

(b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation

and delivery of bids. No claims will be entertained for refund of such expenses.

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

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

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

IB.21 Late Bids

21.1 (a) any bid received by the Procuring Entity after the deadline for Submission of bids prescribed in Clause IB.20 will be returned Unopened to such bidder.

(b) Delays in the mail, delays of person in transit, or delivery of a bid to The wrong office or due to any other reason, shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

22.1 Any bidder may modify**,** substitute or withdraw his bid after bid submission provided that the modification, substitution or written notice of withdrawal is received by the Procuring Entity prior to the deadline or the extended deadline pursuant to clause IB.20.2, for submission of bids.

22.2 The modification, substitution or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" as appropriate.

22.3 No bid may be modified by a bidder after the deadline for submission of bids except in accordance with Sub-Clauses 22.1 and 27.2.

22.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

E. BID OPENING AND EVALUATION

IB.23 Bid Opening

23.1 The Procuring Entity will open all the bids received (except those received late), including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of bidders' or their representatives who choose to attend, at the time, date and location stipulated in the Bidding Data/Title page/NIT. In the event of the specified date for the opening of bids being declared a holiday for the Procuring Entity, the Bids will be opened at the appointed time and location on the next working day.

23.2 Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first. Bids for which an Acceptable notice of withdrawal has been submitted pursuant to Clause IB.22 Shall not be opened.

23.3 The bidder's name, total Bid Price and price of any Alternate Proposal(s), any discounts, bid modifications, substitution and withdrawals, the presence or absence of Bid Security and such other details as the Procuring Entity may consider appropriate, will be announced by the Procuring Entity at the opening of bids.

23.4 Procuring Entity may prepare minutes of the bid opening including the information disclosed to those present in accordance with the Sub-Clause 23.3.

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of the final result of the bid evaluation which may be done at least ten (10) days prior to issue of Letter of Acceptance and place the same on its and Authority's Website (KP-PPRA Rule-45). The announcement to all Bidders will include Comparative Statements and recommendations against all the bids evaluated. Any effort by a bidder to influence the Procuring Entity's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the bid evaluation report; however mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

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

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Procuring Entity will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.

26.2 A substantially responsive bid is one which (i) meets the eligibility criteria;
(ii) has been properly signed; (iii) is accompanied by the required Bid Security and (iv) conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation. A material
Deviation or reservation is one (i) which affect in any substantial way thescope, quality or performance of the Works; (ii) which limits in any substantial way,

inconsistent with the Bidding Documents, the Procuring Entity's rights or the bidder's obligations under the Contract; or (iii) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

I-12

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

IB.27 Correction of Errors

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

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

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

27.2 The amount stated in the Form of Bid will be adjusted by the Procuring Entity in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected bid price, his bid will be rejected and the Bid Security shall be forfeited in accordance with Sub-Clause 15.6(b) hereof.

IB.28 Evaluation and Comparison of Bids

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

28.2 In evaluating the bids, the Procuring Entity will determine for each bid the evaluated Bid Price by adjusting the Bid Price as follows:

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

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

(c) Making an appropriate adjustment for any other acceptable variation or deviation, including discounts or other price modification in the bids.

28.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.

I-13

28.4 In case of Bid / rate quoted by the bidder more than 10% below Engineer Estimate, the Additional Bid security shall be sought from the successful bidder only to the extent of bid more than 10% below on the Engineer estimate in the form of

Percentage. The amount of Additional Bid Security shall be equal to the impact of financial difference occurring in the quoted rates beyond 10% below Engineer estimate. The bidder shall be bound to produce the Additional Bid security within 03 working days from the issuance of letter of acceptance failing which the procuring entity shall forfeit the bid security of successful bidder may also initiate legal proceedings against the bidder who repudiated the contract under KPPRA Procurement Rules.

F. AWARD OF CONTRACT

IB.29 Award

29.1 Subject to Clauses IB.30 and IB.34, the Procuring Entity will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price**,** provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to Sub-Clause IB 29.2.

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

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

IB.30 Procuring Entity's Right to accept any Bid and to reject any or all Bids

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

I-14

IB.31 Notification of Award

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

31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, Procuring Entity may have clarification meetings to get clarification of any item in the bid evaluation report.

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

IB.32 Performance Security

32.1 The successful bidder shall furnish to the Procuring Entity a Performance Security in the form and the amount stipulated in the Bidding Data and the Conditions of

Contract plus additional security for unbalanced bids in accordance with Clause IB.28.4 within a period of 28 days after the receipt of Letter of Acceptance.

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

IB.33 Signing of Contract Agreement

33.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Procuring Entity will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.

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

IB.34 General Performance of the Bidders

The Procuring Entity reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Procuring Entity may in case of consistent poor performance of any Bidder as reported by the Procuring Entity's of the previously awarded contracts, inter alia, reject his bid and/or refer the case to the Pakistan Engineering Council (PEC) and KPPRA. Upon such reference, PEC / K P P R A in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

IB.35 Integrity Pact

The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bidder non- responsive.

IB.36 Instructions not Part of Contract

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

BIDDING DATA

Bidding Data

(This section should be filled in by the Procuring Entity before issuance of the Bidding Documents.) The following specific data for the Works to be bid shall complement, amend, or supplement the provisions in the Instructions to Bidders. Wherever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.
[Instructions are provided, as needed, in italics.]
Instructions to Bidders
Clause Reference

1.1 Name and address of the Procuring Entity:

CHIEF ENGINEER (MERGED AREA), IRRIGATION DEPARTMENT, PESHAWA THROUGH EXECUTIVE ENGINEER, IRRIGATION DIVISION ORAKZAI

1.1 Name of the Project:

AS PER NIT

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

Govt: of Khyber Pakhtunkhwa through Irrigation Department

8.1 Time limit for clarification:
[Minimum number of days to seek *clarification* by *the prospective bidder may be inserted as 05 days.]Prior to the dead line of the submission of bid.*

10.1 Bid language:

English/Urdu

11.1 (b) Prequalification Information to be updated:

Enlistment with Irrigation Department have valid E-bidding system login/password, Registration with PEC in the relevant categories (As per NIT), Registration with KPPRA and EPAD System.

11.1(c) Furnish Technical Proposal:

The bidder may submit a technical proposal in sufficient detail to demonstrate the adequacy of the bid in meeting requirements for timely completion of the Works.

BD-3

13.1 Bidders to quote entirely in Pak. Rupees on above/below premium on E-bidding system for each sub work separately

14.1 Period of Bid Validity:

120 days

15.1 Amount of Bid Security:

2% of Estimated Cost

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

Office of the Executive Engineer, Irrigation Division Orakzai,
Phone No: 0925-690184

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

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

As mentioned in the NIT
Office of the Executive Engineer, Irrigation Division Orakzai,
Phone No: 0925-690184.

19.2(b) Name and Number of the Contract:
As per title page / NIT

20.1(a) Deadline for submission of bids:

As per NIT

BD-4

23.1 Venue, time, and date of Bid opening:

Office of the Executive Engineer, Irrigation Division Orakzai,
Phone No: 0925-690184

32.1 Standard form and amount of Performance Security acceptable to the Procuring Entity:

A bank guarantee 10% of the contract price stated in the Letter of Acceptance from a scheduled bank.

FORM OF BID
AND
APPENDICES TO BID

FB-1

FORM OF BID

Bid Reference No. _____

NIT No. _____

Date of Opening No. _____

Work No. as per NIT. _____

To:

Executive Engineer
Irrigation Division,
District Orakzai.

Gentleman,

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

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

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

4. We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in Appendix-A to Bid.

5. We agree to abide by this Bid for the period of *120* days from the date fixed for Receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

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

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

Dated this _____day of_____20_____

Signature: _____

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

_____
(Name of Bidder in Block Capitals)
(Seal)

Address:_____
_____
_____

Witness:

Signature: _____

Name: _____

Address. _____
_____

Occupation _____

BA-1
Appendix-A to Bid

SPECIAL STIPULATIONS

Clause

Conditions of Contract

1.	Engineer's Authority to issue Variation in Emergency	2.1	15% of the Contract Price stated in the Letter of Acceptance.
2.	Amount of Performance Security	10.1	10% of Contract Price stated in the Letter Of Acceptance.
3.	Time for Furnishing Program	14.1	Within 20 days from the date of receipt of Letter of Acceptance.
4.	Minimum amount of Third Party Insurance		N/A
5.	Time for Commencement	41.1	Within 14 days from the date of receipt of Engineer's Notice to Commence which shall be issued within fourteen (14) days After signing of Contract Agreement.
6.	Time for Completion	43.1, 48.2	As per work order
7.	a) Amount of Liquidated Damages	47.1	Rs. 0.05% of E/C for each day of delay in completion of the Works subject to a maximum of 10% of Contract Price stated in the Letter of Acceptance.
	b) Amount of Bonus	47.3	N/A
8.	Defects Liability Period	49.1	180 days from the effective date of Taking Over Certificate.
9.	Percentage of Retention Money	60.2	8 % of the amount of Interim Payment Certificate.
10.	Limit of Retention Money	60.2	[8 %][4] of Contract Price stated in the Letter of acceptance.
11.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	Rs: 0.1 million minimum, however subject to availability of funds.
12	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Procuring	60.10	After release of funds and verification of work as per specification and due consideration of other works in the head and importance of each work (DDO Decision)
13	Mobilization Advance [* (Interest Free)][5]	60.12	N/A

* **Delete if alternative one is not adopted.**

BB-1
Appendix-B to Bid

FOREIGN CURRENCY REQUIREMENTS
(NOT APPLICABLE)

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

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

3. Table of Exchange Rates

Unit of Currency	Equivalent in Pak. Rupees
Not Applicable	----------

BC-1
Appendix-C to Bid

PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT
(NOT APPLICABLE)

The source of indices and the weightages or coefficients for use in the adjustment formula under Clause 70 shall be as follows:

(To be filled by the Procuring Entity).

Cost Element	Description	Weightages	Applicable index
1	2	3	4
(i)	Fixed Portion	0.350	
(ii)	Local Labour		Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
(iii)	Cement – in bags		" " "
(iv)	Reinforcing Steel		" " "
(v)	High Speed Diesel (HSD)		" " "
(vi)	Bricks		" " "
(vii)	Bitumen		" " "
(viii)			
	Total	1.000	

Notes:

1) Indices for "(ii)" to "(vii)" are taken from the Government of Pakistan Federal Bureau of Statistics, Monthly Statistical Bulletin. The base cost indices or prices shall be those applying 28 days prior to the latest day for submission of bids. Current indices or prices shall be those applying 28 days prior to the last day of the billing period.

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

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

(Procuring Entity's using this price adjustment provisions may add or delete any elements as deemed appropriate to the project.)

BD-1

Appendix-D to Bid

BILL OF QUANTITIES

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Conditions of Contract, Specifications (Technical & Materials Specifications of MRS) and Drawings, if any.

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

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

4. A rate/premium or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. Unit rates must be offered in two decimal places for an item. In case the bidder quotes rates for an item in more than two decimal places, the same shall be considered upto two significant decimal places for evaluation purposes. The cost of items against which the Contractor will have failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

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

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

7. Provisional sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with Sub-Clause 58.2 of Part I, General Conditions of Contract.

BD-2

Appendix-D to Bid

BILL OF QUANTITIES

THE BOQ SHALL BE FILLED IN HARD COPY AS PASTE IN THE BIDDING DOCUMENTS & ONLINE ON IRRIGATION DEPARTMENT WEBSITE, THE PROCURING ENTITY SHALL NOT BE LIABLE FOR THE ERRORS/MALFUNCTIONS OF THE E-BIDDING SYSTEM, LOSS OR NON-PROVISION OF EBIDDING SYSTEM LOGIN & PASSWORD

http://www.irrigation.gkp.pk

OR

http://www.irrigation.gkp.pk/tenders.php

NOTE: - Action will be taken in framing the ***Comparative Statement*** on those firms who fulfill the mandatory requirements as mentioned in the NIT and holding the Pakistan Engineering Council relevant categories *as per NIT, Registration with KPRA.*

BE-1

Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

(WINING BIDDR AT THE TIME OF SIGNING OF CONTRACT AGREEMENT)

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

	Description	**Time for Completion**
a)	Whole Works	_____ days
b)	Part-A	_____ days
c)	Part-B	_____ days
d)	_____	_____ days
e)	_____	_____ days

Signature: _____

Seal: _____

Dated: _____

BF-1

Appendix-F to Bid

METHOD OF PERFORMING THE WORK

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

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

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

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

4. The bidder work at site will be executed through a PEC registered Engineer.

Signature: _____

Seal: _____

Dated: _____

BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

The Bidder may provide on Sheet 2 of this Appendix a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.

Signature: _____

Seal: _____

Dated: _____

BG-2

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT

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

BJ-1

Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS
(SUB JECT TO AVAILIBILITY OF FUNDS, WORK DONE, IMPORTANCE)

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

Quarter/ Year/ Period	Amounts (1,000 Rs.)
1	2
1st Quarter	
2nd Quarter	
3rd Quarter	
4th Quarter	
5th Quarter	
6th Quarter	
7th Quarter	
8th Quarter	
9th Quarter	
Bid Price	

Signature: _____

Seal: _____

Dated: _____

BK-1

Appendix-K to Bid

ORGANIZATION CHART
FOR THE
SUPERVISORY STAFF AND LABOUR

BL-1
Appendix-L to Bid

(INTEGRITY PACT)

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

Contract No._____Dated _____
Contract Value: _____
Contract Title: _____

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

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

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

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

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

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

FORMS

BID SECURITY
PERFORMANCE SECURITY
CONTRACT AGREEMENT
MOBILIZATION ADVANCE GUARANTEE/BOND

BS-1

BID SECURITY
(Bank Guarantee)

Security Executed on _____
(Date)

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

Name of Principal (Bidder) with Address _____

_____

Penal Sum of Security Rupees. _____(Rs. _____)

Bid Reference No. _____

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

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

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

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

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

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

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

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

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

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

SURETY (Bank)

WITNESS: Signature _____

1. _____ Name _____

_____ Title _____

Corporate Secretary (Seal) Corporate Guarantor (Seal)

2. _____

_____

Name, Title & Address

PS-1

FORM OF PERFORMANCE SECURITY
(Bank Guarantee)

Guarantee No._____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Procuring Entity]

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

Name of Principal (Contractor) with address:_____

_____

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

_____

Letter of Acceptance No. _____Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the (hereinafter called the Procuring Entity) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Procuring Entity, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

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

_____(Name of Project).

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

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

PS-2

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

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

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

_____
Guarantor (Bank)

Witness:

1. Signature

_____
Corporate Secretary (Seal)

Name _____

Title _____

2. _____

_____
Name, Title & Address

_____
Corporate Guarantor (Seal)

CA-1

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day Of (month) 20____ between

Executive Engineer, Irrigation Division Orakzai

(hereafter called the "Procuring Entity") Of the one part and_____

(hereafter called the "Contractor") of the other part.

WHEREAS the Procuring Entity is desirous that certain Works, viz_____

_____

_____

should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesseth as follows:

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

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

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

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

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

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

Signature of the Contactor	Signature of Procuring Entity
_____	_____
(Seal)	(Seal)
Signed, Sealed and Delivered in the presence of:	
Witness:	Witness:
_____	_____
(Name, Title and Address)	(Name, Title and Address)

MG-1

MOBILIZATION ADVANCE GUARANTEE

……NOT APPLICABLE……

MG-2

GUARANTOR (BANK)

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

WITNESS

1. _____
   _____
   Corporate Secretary (Seal)

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

Copies of the FIDIC Conditions of Contract can be obtained by the bidder from: FIDIC Secretariat P.O. Box 86 1000 Lausanne 12 Switzerland e-mail: fidic.pub@fidic.org – FIDIC.org/bookshop

FEDERATION INTERNATIONAL DES INGENIEURS-CONSEILS

CONDITIONS OF CONTRACT FOR WORKS OF CIVIL ENGINEERING CONSTRUCTION

PART I GENERAL CONDITIONS
WITH FORMS OF TENDER AND AGREEMENT

FOURTH EDITION 1987
Reprinted 1988 with editorial amendments
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1000 Lausanne 12

Switzerland

e-mail fidic.pub@fidic.org-FIDIC org/bookshop

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PART II - PARTICULAR CONDITIONS OF CONTRACT

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

1.1 Definitions

(a) (i) The Procuring Entity is **Executive Engineer, Irrigation Division District Orakzai , Phone No.: 0925-690184**

(a) (iv) The Engineer is **Executive Engineer, Irrigation Division District Orakzai , Phone No.: 0925-690184** or any other competent person appointed by the Procuring Entity, and notified to the Contractor, to act in replacement of the Engineer. Provided always that except in cases of professional misconduct, the outgoing Engineers is to formulate his certifications/ recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

The following paragraph is added:

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

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

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

The following paragraph is added:

(b)(ix) "Program" means the program to be submitted by the Contractor in accordance with Sub-Clause 14.1 and any approved revisions thereto.

(e)(i) The text is deleted and substituted with the following:

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

2.1 Engineer's Duties and Authority

With reference to Sub-Clause 2.1(b), the following provisions shall also apply;

The Engineer shall obtain the specific approval of the Procuring Entity before carrying out his duties in accordance with the following Clauses:

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

(ii) Certifying additional cost determined under Sub-Clause 12.2 "Not Foreseeable Physical Obstructions or Conditions".

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

(iv) Any action under Clause 40 “Suspension”.

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

(vi) Any action under Clause 47 “Liquidated Damages for Delay” or Payment of Bonus for Early Completion of Works (PCC Sub-Clause 47.3).

(vii) Issuance of “Taking Over Certificate” under Clause 48.

(viii) Issuing a Variation Order under Clause 51,except:

a) in an emergency* situation, as stated here below, or

b) if such variation would increase the Contract Price by less than the amount stated in the Appendix-A to Bid.

(ix) Fixing rates or prices under Clause 52.

(x) Extra payment as a result of Contractor’s claims under Clause 53.

(xi) Release of Retention Money to the Contractor under Sub-Clause 60.3 “Payment of Retention Money”.

(xii) Issuance of “Final Payment Certificate” under Sub-Clause 60.8.

(xiii) Issuance of “Defect Liability Certificate” under Sub-Clause 62.1.

(xiv) Any change in the ratios of Contract currency proportions and payments thereof under Clause 72 “Currency and Rate of Exchange”.

(If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply with any such instruction of the Engineer. The Engineer may determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Procuring Entity.) However, responsibility of restoring damages to ongoing work will be within the contract price and liability of the contractor

2.2 Engineer's Representative

The following paragraph is added:

The Procuring Entity shall ensure that the Engineer's Representative is a Sub Divisional Officer or superior, posted by the competent authority (GOP).

The following Sub-Clauses 2.7 and 2.8 are added:

2.7 Engineer Not Liable

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

2.8 Replacement of the Engineer ~~(NOT APPLICABLE)~~

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

5.1 Language(s) and Law

(a) The Contract Documents, shall be drawn up in the English language.

(b) The Contract shall be subject to the Laws of Islamic Republic of Pakistan.

5.2 Priority of Contract Documents

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

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

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

The following Sub-Clauses 6.6 and 6.7 are added:

6.6 Shop Drawings (As per requirement of Engineer incharge, if required)

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

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

6.7 As-Built Drawings (As per requirement of Engineer incharge, if required)

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

10.1 Performance Security

The Contractor shall provide Performance Security to the Procuring Entity in the prescribed form. The said Security shall be furnished or caused to be furnished by the Contractor within 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be of an amount equal to 10% of the Contract Price stated in the Letter of Acceptance.

.

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

The following Sub-Clause10.4 is added:

[6] Words "(c) an insurance company having at least AA rating from PACRA/JCR" deleted by KPPRA Notification No. KPPRA/M&E/Estt:/1-4/2016 dated May 24, 2016.

10.4 Performance Security Binding on Variations and Changes

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

14.1 Program to be submitted

(If required) The program shall be submitted within 14 days from the date of receipt of Letter of Acceptance, which shall be in the form of:

a Bar Chart identifying the critical activities.

14.3 Cash Flow Estimate to be submitted

The detailed Cash Flow Estimate shall be submitted within 21 days from the date of receipt of Letter of Acceptance (Payment shall be subject to availability of fund, work done, other works, importance of works as deemed appropriate according to situation by the Procuring Entity)

The following Sub-Clause 14.5 is added:

14.5 Detailed Program and Monthly Progress Report

a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed program for the following:
As per written directions of Engineer's
(1) Execution of Works;
(2) Labour Employment;
(3) Local Material Procurement;
(4) Material Imports, if any; and
(5) Other details as required by the Engineer.

(b) During the period of the Contract, the Contractor shall submit to the Engineer not later than the 8th day of the following month, 5 copies each of Monthly Progress Reports covering:

(1) A Construction Schedule indicating the monthly progress in percentage;
(2) Description of all work carried out since the last report;
(3) Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his program of inspection and testing;
(4) Monthly summary of daily job record;
(5) Photographs to illustrate progress ;and
(6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.

(c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested. The

Daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment.
The following Sub-Clauses 15.2 and 15.3 are added:

15.2 Language Ability of Contractor's Representative

The Contractor's authorized representative shall be fluent in the English/Urdu/Pashto language.

15.3 Contractor's Representative

The Contractor's representative will be a professional Engineers working at site registered with the Pakistan Engineering Council.

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

The following Sub-Clauses 16.3 and 16.4 are added:

16.3 Language Ability of Superintending Staff of Contractor (N/A)

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English/Urdu/Pashto language.

16.4 Employment of Local Personnel

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

The following Sub-Clauses 19.3 and 19.4 are added:

19.3 Safety Precautions

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

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

The contractor shall provide all the safety gear to its employees and also put safety / diversion signs with messages for ease of public traffic movement etc. the contractor will also ensured safety measures to the skilled and unskilled labours during any sort of pandemic.

19.4 Lighting Work at Night

In the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

20.4 Procuring Entity's Risks

The Procuring Entity's risks are:

(a) insofar as they directly affect the execution of the Works in Khyber Pakhtunkhwa Province

(i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
(iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
(v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;

(b) loss or damage due to the use or occupation by the Procuring Entity of any Section or part of the Permanent Works, except as may be provided for in the Contract;

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

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

21.1 Insurance of Works and Contractor's Equipment

(Procuring Entity may vary this Sub-clause 1.1 (b))

21.4 Exclusions

The text is deleted and substituted with the following:

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

The following Sub-Clause 25.5 is added:

25.5 Insurance Company

The Contractor shall be obliged to place all insurances relating to the Contract (including, but not limited to, the insurances referred to in Clauses 21, 23 and 24) with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Procuring Entity.
Costs of such insurances shall be borne by the Contractor.
The following Sub-Clause 31.3 is added:

31.3 Co-operation with other Contractors

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

The following Sub-Clauses 34.2 to 34.12 are added:

34.2 Rates of Wages and Conditions of Labour

The Contractor shall pay rates of' wages and observe conditions of labour not less favorable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of labour which are not less favorable than the general level of wages and conditions observed by other Procuring Entities whose general circumstances in the trade or in industry in which the Contractor is engaged are similar. Minimum wage per day/month paid to the labor as notified by the labor department.

34.3 Employment of Persons in the Service of Others

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

34.4 Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and Maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

34.5 Health and Safety

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

34.6 Epidemics

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

34.7 Supply of Water

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

34.8 Alcoholic Liquor or Drugs

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

34.9 Arms and Ammunition

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

34.10 Festivals and Religious Customs

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

34.11 Disorderly Conduct

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

34.12 Compliance by Subcontractors

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

The following Sub-Clauses 35.2 and 35.3 are added:

35.2 Records of Safety and Health

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

35.3 Reporting of Accidents

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

The following Sub-Clause 36.6 is added:

36.6 Use of Pakistani Materials and Services

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

41.1 Commencement of Works

The text is deleted and substituted with the following:

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

The following Sub-Clause 47.3 is added:

47.3 Bonus for Early Completion of Works (Not Applicable)

The Contractor shall in case of earlier completion for either whole or part(s) of the Works pursuant to Sub-Clauses 48.1 and 48.2(a) respectively of the General Conditions of Contract, be paid bonus up-to a limit and at a rate equivalent to 50% of the relevant limit and rate of liquidated damages prescribed in Appendix-A to Bid "Special Stipulations".

48.2 Taking Over of Sections or Parts

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

51.2 Instructions for Variations

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

52.1 Valuation of Variations

In the tenth line, after the words "Engineer shall" the following is added:
Within a period not exceeding one-eighth of the completion time subject to a minimum of 28 days from the date of disagreement whichever is later.

53.4 Failure to Comply

This Sub-Clause is deleted in its entirety.

54.3 Customs Clearance

(Procuring Entity may vary this Sub-Clause)

54.5 Conditions of Hire of Contractor's Equipment

The following paragraph is added:
The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.
The following Sub-Clauses 59.4 & 59.5 are added:

59.4 Payments to Nominated Subcontractors

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

59.5 Certification of Payments & Nominated Subcontractors

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

a) submits reasonable evidence to the Engineer, or

b) i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and

ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement,

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

60.1 Monthly Statements

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

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

In Para (c) the words "the Appendix to Tender" are deleted and substituted with the words " Sub-Cause 60.11 (a)(6) hereof". (in case Clause 60.11 is applicable)

60.2 Monthly Payments

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

60.10 Time for Payment

The text is deleted and substituted with the following:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 47, be paid by the Procuring Entity to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Procuring Entity and Contractor(Subject to availability of fund, importance in relation to other works, decision of the Procuring Entity) or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 60 days (Subject to availability of fund, importance in relation to other works, decision of the Procuring Entity) after such Final Payment Certificate has been jointly verified by Procuring Entity and Contractor.

The following Sub-Clause 60.11 is added:

60.11 Secured Advance on Materials

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

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

(2) Such materials have been delivered to the Site and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer but at the risk and cost of the Contractor;

(3) The Contractor's records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records shall be available for inspection by the Engineer;

(4) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of materials and providing evidence of ownership and payment therefor;

(5) Ownership of such materials shall be deemed to vest in the Procuring Entity and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Procuring Entity; and

(6) The sum payable for such materials on Site shall not exceed 75 % of the (i) landed cost of imported materials, or (ii) ex-factory / ex-warehouse price of locally manufactured or produced materials, or (iii) market price of other materials.

(b) The recovery of Secured Advance paid to the Contractor under the above provisions shall be effected from the monthly payments on actual consumption basis or in installments as deemed appropriate by the Procuring Entity.

60.11 Financial Assistance to Contractor (NOT APPLICABLE)
(Appropriate alternative only to be retained)

Alternative One: Mobilization Advance (Subject to Availability/release of Funds)

(a) An interest-free Mobilization Advance 10-15 % of the Contract Price stated in the Letter of Acceptance shall be paid by the Procuring Entity to the Contractor in two equal parts

(b) upon submission by the Contractor of a Mobilization Advance Guarantee/ for the full amount of the Advance in the specified form from a Scheduled Bank in Pakistan :

(1) First part within 14 days after signing of the Contract Agreement or date of receipt of Engineer's Notice to Commence, whichever is earlier; and

(2) Second part within 42 days from the date of payment of the first part, subject to the satisfaction of the Engineer as to the state of mobilization of the Contractor.

(b) This Advance shall be recovered in equal installments; first installment at the expiry of third month after the date of payment of first part of Advance and the last installment two months before the date of completion of the Works as per Clause 43 hereof.

63.1 Default of Contractor

The following para is added at the end of the Sub-Clause:
Provided further that in addition to the action taken by the Procuring Entity against the Contractor under this Clause, the Procuring Entity may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time as well as under the prevailing rules of KPPRA.

65.2 Special Risks

The text is deleted and substituted with the following:
The Special Risks are the risks defined under Sub-Clause 20.4 sub paragraphs (a) (i) to (a) (v).

67.3 Arbitration

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

shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force.
The following paragraph is added:
The place of arbitration shall be office of the Executive Engineer, Irrigation Division District Orakzai.
If in conflict with KPPRA Act & Rules then KPPRA Act & Rules shall be followed.

68.1 Notice to Contractor

The following paragraph is added:
For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Procuring Entity and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

68.2 Notice to Procuring Entity and Engineer

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

a) The Procuring Entity :
Office of the Executive Engineer, Irrigation Division Orakzai,
Phone No: 0925-690184,

b) The Engineer *Executive Engineer, Irrigation Division Orakzai,*
Phone No: 0925-690184,,

c) Engrs Representative: -

Sub Divisional Officer,

70.1 Increase or Decrease of Cost

Sub-Clause 70.1 is deleted in its entirety, and substituted with the following:
(NOT APPLICABLE)

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

73.1 Payment of Income Tax

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

73.2 Customs Duty & Taxes
These shall be the responsibility of the contractor as per prevailing rules & law.

74.1 Integrity Pact

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

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;

(b) terminate the Contract; and

(c) Recover from the Contractor any loss or damage to the Procuring Entity as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

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

75.1 Termination of Contract for Procuring Entity's Convenience

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

(a) shall proceed as provided in Sub-Clause 65.7 hereof; and

(b) Shall be paid by the Procuring Entity as provided in Sub-Clause 65.8 hereof.

76.1 Liability of Contractor

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

77.1 Joint and Several Liability

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

78.1 Details to be Confidential

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

PART II –PARTICULAR CONDITIONS OF CONTRACT

SPECIFICATIONS-
SPECIAL PROVISIONS

Essential Material & Technical specification as per document at the following link are required:
https://www.cwd.gkp.pk/images/CSR/Technical-Specification-MRS-KPK-2022.pdf
https://www.cwd.gkp.pk/images/CSR/Material-Specifications-MRS-KPK-2022.pdf
any other specification

SPECIFICATIONS-
TECHNICAL PROVISIONS

Essential technical specification as per document at the following link are required:
https://www.cwd.gkp.pk/images/CSR/Technical-Specification-MRS-KPK-2022.pdf
https://www.cwd.gkp.pk/images/CSR/Material-Specifications-MRS-KPK-2022.pdf
any other specification

Construction of Irrigation Tube Wells / Lift Irrigation Schemes & Solarization of Existing Irrigation Tube Wells in Merged Areas AIP No. 2153/ 210588 (2025-26) (Solar Components)		
B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
1	**Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).
2	**Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel**,

Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
3	**Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
4	**Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)	
B	**Package-2** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **Sub Schemes: - (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).
5	**Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel**

Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**Package-2** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **Sub Schemes: -** **(1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
6	**Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**Package-2** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **Sub Schemes: -** **(1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
7	**Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
8	**Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

Construction of Irrigation Tube Wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas (AIP) ADP No: 2153 /210588 (2025-26) (Solar Components)		
B	**<u>Package-2</u>** Construction of 05 Nos of New Solar, 04 No of Existing Irrigation Tube Wells at TSD Darra Kohat. **<u>Sub Schemes: -</u> (1.** Construction of New Solar Irrigation Tube Well at Mani Khel Kaly Zarghon Khel, **2.** Construction of New Solar Irrigation Tube Well at Shapalkai Wall Zarghon Khel, **3.** Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel Darra Bazar, **4.** Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall, **5.** Construction of New Solar Irrigation Tube Well at Mari Khel Shaheed Talab Zarghon Khel, **6.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra bazar, **7.** Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel, **8.** Construction of Existing Solar Irrigation Tube Well at Chattar Galli Khel, **9.** Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel).	
9	**Construction Solarization of Existing Irrigation Tube Well at Ibrahim Khel.**	
Discharge (IGPH)		
Head (ft)		
Pump Setting (ft)		
Water Horse Power (WHP)		
Pump Efficiency (70% -- 80%)		
Motor Efficiency (%)		
Shaft Power (Pump HP)		
BREAK HOURSE POWER (with 20% safety factor)		
Say Motor Horse Power		
Motor Basic Input Power		
PV Derating Factor (30% -- 80%)		
Total PV Power (Watt) with Safety Factor		
PVC Generator Peak Power (Watts)	No of Pv Modules in String	
	No of String in Serries	
	Single PV Module Size (Watts)	
	Total PV Generation	
Motor Model Make, & HP		
Pump Model, Make & HP		
Inverter Make, Model & K.watt		
PV Module Make & Watt		

DRAWING

As per PC-I/T.S and subsequent sanctions as per site requirement

BILL OF QUANTITIES

(1. Construction of New Solar Irrigation Tube Well at Mani Khel Zarghon Khel)

Name of scheme: Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin of New Solarization Irrigation Tube well at Mani Khel Kaly Zarghon khel TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	7,985	104.17	831,797
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	30	363.34	10,900
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	140	460.93	64,530
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	7,985	20.39	162,814
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	7,985	22.19	177,187
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	7,985	3.92	31,301
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	7,985	3.92	31,301
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749
10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	140	944.63	132,248
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	140	2,858.78	400,229

12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	140	397.12	55,597
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	140	132.88	18,603
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	11.150	330.13	3,681
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	9.557	9,299.67	88,877
		Total				**2,345,244**
		Add Cost Factor i.e 2%				46,905
		G.Total				**2,392,149**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(2. Construction of New Solar Irrigation Tube Well at Shapalki Wall Zarghon Khel)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin of New Solarization Irrigation Tube well at Shapal kai wall Zarghon khel TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	7,985	104.17	831,797
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	30	363.34	10,900
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	140	460.93	64,530
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	7,985	20.39	162,814
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	7,985	22.19	177,187
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	7,985	3.92	31,301
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	7,985	3.92	31,301
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749

10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	140	944.63	132,248
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	140	2,858.78	400,229
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	140	397.12	55,597
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	140	132.88	18,603
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	11.150	330.13	3,681
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2.4).	M^3	9.557	9,299.67	88,877
					Total	**2,345,244**
					Add Cost Factor i.e 2%	46,905
					G.Total	**2,392,149**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(3. Construction of New Solar Irrigation Tube Well at Ajun Kaly Zarghon Khel)

Name of scheme: Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin of New Solarization Irrigation Tube well at Ajun Kaly Zarghon khel Bazar TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	7,985	104.17	831,797
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	30	363.34	10,900
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	140	460.93	64,530
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	7,985	20.39	162,814
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	7,985	22.19	177,187
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	7,985	3.92	31,301
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	7,985	3.92	31,301
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749
10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	140	944.63	132,248
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	140	2,858.78	400,229

12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	140	397.12	55,597
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	140	132.88	18,603
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	11.150	330.13	3,681
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	9.557	9,299.67	88,877
					Total	**2,345,244**
					Add Cost Factor i.e 2%	46,905
					G.Total	**2,392,149**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(4. Construction of New Solar Irrigation Tube Well at Ateri Wall Akhor Wall,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin of New Solarization Irrigation Tube well at Ateri Wall Akhor Wall TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	7,985	104.17	831,797
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	30	363.34	10,900
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	140	460.93	64,530
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	7,985	20.39	162,814
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	7,985	22.19	177,187
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	7,985	3.92	31,301
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	7,985	3.92	31,301
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749

10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	140	944.63	132,248
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	140	2,858.78	400,229
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	140	397.12	55,597
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	140	132.88	18,603
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	11.150	330.13	3,681
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	9.557	9,299.67	88,877
					Total	**2,345,244**
					Add Cost Factor i.e 2%	46,905
					G.Total	**2,392,149**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(5. Construction of New Solar Irrigation Tube Well Shaheed Talab Zarghon Khel,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin of New Solarization Irrigation Tube well at Meri Khel Shaheed Talab Zarghon Khel TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	7,985	104.17	831,797
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	30	363.34	10,900
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	140	460.93	64,530
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	7,985	20.39	162,814
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	7,985	22.19	177,187
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	7,985	3.92	31,301
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	7,985	3.92	31,301
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749
10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99 9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	140	944.63	132,248
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	140	2,858.78	400,229

12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	140	397.12	55,597
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	140	132.88	18,603
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	11.150	330.13	3,681
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	9.557	9,299.67	88,877
					Total	**2,345,244**
					Add Cost Factor i.e 2%	46,905
					G.Total	**2,392,149**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(6. Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Darra Bazar,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin Solarization of Existing Irrigation Tube well at Zarghon khel Darra bazar TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	10,000	104.17	1,041,700
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	70	363.34	25,434
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	120	460.93	55,312
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	10,000	20.39	203,900
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	10,000	22.19	221,900
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	10,000	3.92	39,200
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	10,000	3.92	39,200
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749

10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	120	944.63	113,356
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	120	2,858.78	343,054
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	120	397.12	47,654
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	120	132.88	15,946
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	4.500	330.13	1,486
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	37.500	9,299.67	348,738
					Total	**2,833,056**
					Add Cost Factor i.e 2%	56,661
					G.Total	**2,889,717**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(7. Construction of Existing Solar Irrigation Tube Well at Zarghon Khel Bazi Khel,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin Solarization of Existing Irrigation Tube well at Zarghon khel Darra Bazi Khel TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	10,000	104.17	1,041,700
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	70	363.34	25,434
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	120	460.93	55,312
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	10,000	20.39	203,900
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	10,000	22.19	221,900
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	10,000	3.92	39,200
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	10,000	3.92	39,200
9	24-50 a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP.	Set	1	332,748.59	332,749

10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	120	944.63	113,356
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	120	2,858.78	343,054
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	120	397.12	47,654
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	120	132.88	15,946
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard,soil or soft murum	M^3	4.500	330.13	1,486
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	37.500	9,299.67	348,738
					Total	2,833,056
					Add Cost Factor i.e 2%	56,661
					G.Total	2,889,717

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(8. Construction of Existing Solar Irrigation Tube Well at Chattar Guli Khel Jawaki,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin Solarization of Existing Irrigation Tube well at Chattar Gulli Khel JAWAKI TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	10,000	104.17	1,041,700
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	70	363.34	25,434
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	120	460.93	55,312
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	10,000	20.39	203,900
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	10,000	22.19	221,900
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	10,000	3.92	39,200
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	10,000	3.92	39,200
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749

10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	120	944.63	113,356
11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	120	2,858.78	343,054
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	120	397.12	47,654
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	120	132.88	15,946
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	4.500	330.13	1,486
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	37.500	9,299.67	348,738
					Total	**2,833,056**
					Add Cost Factor i.e 2%	56,661
					G.Total	**2,889,717**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

BILL OF QUANTITIES

(9. Construction of New Solar Irrigation Tube Well at Paya Ibrahim Khel Jawaki,)

Name of scheme Construction of Irrigation Tube wells / lift Irrigation schemes and Solarization of existing Irrigation Tube wells in Marged areas 210588

Sub Scheme : Constructioin Solarization of Existing Irrigation Tube well at Paya Ibrahim Khel JAWAKI TSD Darra

Sub Work: Estimate of Solarization of Tube Well

MRS 2022

S. No.	Ref: Schedule Item	Description	Unit	Quantity	Rate (Rs.)	Amount
1	26-01-d-01	Supply & Eriction of Solar PV module (Solar Panel) Mono-crystalline A-Grade (Per Watt) (as per approved specification)	Watt	10,000	104.17	1,041,700
2	26-01-b-02	Supply & Eriction of PVC flexible pipe "1.5 i/d.	M	70	363.34	25,434
3	26-01-g-04	Supply & Eriction 1X10 sq. mm flexible copper cable	M	120	460.93	55,312
4	26-01-h-01	Supply & Eriction MC4 connector (TUV approved)	Pair	10	342.92	3,429
5	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Watt	10,000	20.39	203,900
6	26-01-m-01	Supply & Eriction of hot dipped (80 microns Average) galvanised steel of minimum thickness of 12 SWG/2.64 mm channel/pipe or 8 SWG/4.06 mm angle.	Watt	10,000	22.19	221,900
7	26-01-n-02	Supply & Eriction of 1x1 ft 4 mm Copper Earthing Plate	Watt	10,000	3.92	39,200
8	26-01-n-03	Supply & Eriction of stainless steel nuts & bolts	Watt	10,000	3.92	39,200
9	24-50-a-01	Supply & Installation, testing and commissioning of Submersible Pump (ISO – 9906 Certified) Coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Motor Control Unit (equipped with UV/OV, dry run protection device, surge protection, phase reverse indicator) Complete in all accessories including NRV, Pressure Gauge, Sluice valve except column pipe and power cable with appropriate Head and Discharge : 10 HP,	Set	1	332,748.59	332,749
10	24-50-c-02	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x16 mm2	M	120	944.63	113,356

11	24-56-b	Supply & Fixing MS Column Pipe with flunges for Submersible Pump 3" (75 mm) Nominal Pipe Size 3/16" thick, 10' length	M	120	2,858.78	343,054
12	24-30-c-06	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (63 mm dia) PN-12.5	M	120	397.12	47,654
13	24-30-c-03	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE) Din-8074/Din-8075/ISO-4427 in trenches, complete in all respects except excavation. (32 mm dia) PN-12.5	M	120	132.88	15,946
14	03-25-c	Excavation in foundation of building, bridges etc: complete : complete in hard soil or soft murum	M^3	4.500	330.13	1,486
15	06-05-f	Plain Cement Concrete (PCC) including placing, compacting, finishing and curing (Ratio 1:2:4).	M^3	37.500	9,299.67	348,738
					Total	**2,833,056**
					Add Cost Factor i.e 2%	**56,661**
					G.Total	**2,889,717**

Sub Engineer
Irrigation Division
District Orakzai

Assistant Engineer
Irrigation Division
District Orakzai

GOVERNMENT OF KHYBER PAKHTUNKHWA
COMMUNICATION & WORKS DEPARTMENT
NO.SO(B)/II-10/Standardization//Solar Panels/PBC/2018-19/C&WD
Dated Peshawar the: 29/01/2019

To

1. Additional Secretary (Admn / Coord), FATA Secretariat Warsak Road Peshawar.
2. Director General M&E P&D Department, Peshawar.
3. Director Agriculture Engineering Tarnab Farm Peshawar.
4. Superintending Engineer, PHE Division Mardan, PHE Department.
5. Superintending Engineer PBC, C&W Department, Peshawar.
6. Director General PDA.
7. Chairman Electrical Engineering Department, University of Engineering & Technology Peshawar.
8. Executive Engineer Warsak Canal Division Peshawar, Irrigation Department.
9. Executive Engineer, Peshawar Division, PHE Department.
10. Deputy Director (PHA), ATI Campus Jamrod road Peshawar.
11. Executive Engineer PBC-II C&W Department.
12. Planning Officer, LG&RD Department.
13. Assistant Engr. CSR / MRS (Cell) C&W Department.
14. Manager Energy & Power Department Peshawar.
15. Deputy Secretary (Technical), Public Health Engineering Department, Peshawar.

Subject: REVISED TECHNICAL SPECIFICATIONS FOR SOLAR PANELS AND ALLIED EQUIPMENT (REV 2018).

I am directed to refer to the subject noted above and to enclose herewith approved Minutes of the standardization of revised technical specification for solar panels and allied equipment's (Rev 2018) meeting held on 11/01/2019 at 10:30 AM under the Chairmanship of Secretary C&W Department along with approved **"Revised specifications for supply and installations of 1).Solar Based Pumping System 2).Solar Buildings / Home Systems 3).Solar Street Lights", duly approved by Standardization Committee of Khyber Pakhtunkhwa** and approved pre-qualification proforma of solar panels for information and necessary action at your end, please.

(Engr. Muhammad Imran)
Section Officer (Buildings)

Endst: No. & Date Even:

Copy is forwarded for information to the:-

1. Chairman Pakistan Engineering Council (PEC) Building, Attaturk Avenue (East) G-5/2 P.O Box 1296, Islamabad.
2. Director Solar, Alternative Energy Development Board, Ministry of Energy / Power Division, Government of Pakistan, 2nd Floor, OPF Building, Shahrah e Jamhuriat, G5/2, Islamabad.
3. Manager Technical, National Energy Efficiency & Conservation Authority (NEECA), Near State Bank of Pakistan, NEECA Building, Sector G5/2, Islamabad.
4. Director Standards, Pakistan Standards & quality Control Authority, PSQCA Complex, Plot No. ST-7/A, Block No. 3 Scheme No. 36, Near Kamran Chowrangi, Gulistan E Jauhar, Karachi.
5. Member Custom Policy, Federal Board of Revenue (FBR), FBR House / Building, Opposite Supreme Court of Pakistan, Islamabad.
6. PS to Secretary C&W Department Peshawar.

Section Officer (Buildings)

Note: **"Revised specifications for supply and installations of 1).Solar Based Pumping System 2).Solar Buildings / Home Systems 3).Solar Street Lights"** is uploaded on C&W Department official website i-e cwd.gov.pk for easy receipt of the same.

MINUTES OF THE STANDARDIZATION OF REVISED TECHNICAL SPECIFICATION FOR SOLAR PANELS AND ALLIED EQUIPMENT'S (REV 2018).

A meeting of the committee regarding Standardization of Solar Panels & other allied works for the use in public infrastructure was held on **11/01/2019 at 10:30 AM** under the chairmanship of Secretary C&W Department in the committee room of this Department ***(List of participants attached).***

The meeting started with the recitation from the Holy Quran. While opening of discussion the Secretary C&W Department welcomed the participants and the Deputy Secretary (Technical) was asked to inform the forum regarding solar specifications.

The forum was briefed regarding the specification prepared by the sub-committee in its meeting held on 08/01/2019 under the chairmanship of Deputy Secretary (Technical) Public Health Engineering Department. Each and every item of Solar Panel with the allied equipment's have been discussed in detail certain changes proposed by the member were incorporated in the specification presented by the Chairman of the sub-committee. After detail deliberation the specification were approved unanimously and it was further decided to notify these specification in the best interest of public work keeping in view the works already approved or in the process of tendering which has been based on the previous specification notified vide No. SO(B)/II-10/Standardization/PBC/2016-17/C&WD dated 23/06/2017 to facilitate the executing agency in a right direction, therefore a gap of 3 months be kept in the implementation process. Hence these specification would be applicable which are to be tendered on are after 01/04/2019

Meeting ended with vote of thanks.

LIST OF PARTICIPANTS

UP GRADATION IN APPROVED SPECIFICATIONS OF SOLAR PANELS COMMITTEE MEETING SCHEDULED TO BE HELD ON 11/12/2018 AT 10:30 AM.

SUB HEAD: REVISED TECHNICAL SPECIFICATION FOR SOLAR PANELS AND ALLIED EQUIPMENT'S (REV 2018).

S.No.	Name of Officer/Official	Designation	Department	Signature
1.	Engr. Shahab Khattak	Secretary	C&W	
2.	Ishtiaq Ahmad	assistant engineer C&R/MRS cell	C&W	
3.	Amin-Zeb	Director	Housing	
4.	Sami ullah Kundi	Xen	Irrigation	
5.	Jehanzeb Khan	SDO	Irrigation	
6.	Engr. Nasir Zaman Khan	SO (Tech)	PHE Deptt	
7.	Engr M. Amjad Khan	DST (Tech	MMD	
8.	Mahmood ja Baba	Director	Agri Engg	
9.	Engr Qaiser Zaman	Superintending	Engineer MMD	
10.	Engr. Babar Nawaz	Assistant Director	M&E System, PED	
11.	Engr. Khurram Durrani	PO	Energy & Power Dept	
12.	Engr. Salman	Dy. Director	PDA (Elect)	
13.	SAUD KHAN	SDO PRC-II	C&WD	
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REVISED
SPECIFICATIONS
FOR
SUPPLY AND INSTALLATIONS OF

1. SOLAR BASED PUMPING SYSTEMS,
2. SOLAR BUILDINGS / HOME SYSTEMS.
3. SOLAR STREET LIGHTS

2019
Version-01

APPROVED BY STANDARIZATION COMMITTEE OF

KHYBER PAKHTUNKHWA

Executive Engineer Warsak Canals Division Peshawar

DIRECTOR Agril: Engineering Tarnab, Peshawar

SE(HQ)
CE(M.A)

Deputy Secretary (Tech:)
Public Health Engg: Department
Khyber Pakhtunkhwa

Superintending Engineer
PHE Circle Tribal
Districts Peshawar.

Assistant Director (M&E)

PDA

PD L&T Deptt

16/01/2019
Assistant Engineer
CSR/MRS Cell C&W
Department

16/01/2019
Chairman Electric & UED

XEN PBC-II

XEN (PHE)

EEP

A - SPECIFICATIONS FOR SOLAR SYSTEMS-COMMON PART

1. SOLAR PANELS:

a. The PV module(s) shall contain mono crystalline silicon Grade-A Solar cells. (N-Type Mono PV Cell Modules and Bifacial Double Glass Modules due to its better performance will be given preference).

b. The PV module should Work well with high-voltage input Inverters/ charge controllers (1000 Vdc).

c. The PV Panel must have clear anodized aluminium frame with Anti-reflective, hydrophobic, low-iron Tempered cover glass.

d. The Solar Modules shall meet the following valid IEC Standards or latest:
   - IEC 61215-1, IEC 61215-1-1, IEC 61215-2 :2016 (Design Qualification)
   - IEC61730-1:2016 (Safety - Requirements for construction)
   - IEC61730-2:2016 (Safety - Requirements for testing)
   - IEC TS-62804-1. (i.e: TUV PPP-58042 or Equivalent) Anti-PID Certification.
   - IEC 61701 Salt Mist Corrosion Resistance Test (Latest)
   - IEC 62716 Ammonia Corrosion Resistance Test (Latest)
   - IEC 60068-2-68 Sand and Dust Erosion Resistance Test.

e. Unique Serial number, Name / Logo of manufacturer and separate date of manufacturing (DD/MM/YYYY) should be laminated inside the module so as to be clearly visible from the front side.

f. A properly laminated sticker containing the following details should be available at the back side of the module.
   - Name of the manufacturer / distinctive logo.
   - Model Name and Type of Cell Technology.
   - Peak Watt Ratting (Wp) and Power Tolerance Range
   - Voltage (V_{mp}) and Current (I_{mp}) at STC
   - Open Circuit Voltage (Voc) and Short Circuit Current (Isc)
   - Maximum System Voltage (V_{dc}) (i.e: This should not be less than 1000 V_{dc})
   - Dimensions of PV Module
   - Test Standard(s) to which the module has been tested and certified.

g. Following essential technical parameters of solar panel/modules should be provided with each panel supplied as well as in the technical proposal.
   - I-V curve for the solar photovoltaic module/panel.
   - Date and year of obtaining IEC PV module standardization qualification certificate.
   - Electrical Data (i.e: Pmax, Voc/Vmp, Isc/Imp at nominal Cell Operating Temperature (NOCT).
   - PV Module efficiency at STC.
   - Working temperature range of PV Module.

h. Each panel should have factory equipped weather proof terminal junction box having at least IP67 protection with provision of opening for replacement of DC cables, blocking diodes and easy debugging if necessary.

i. Limited performance guarantee: panel power, in standard conditions, will not be less than 90% of nominal power by the end of 10 years of operation and at least 80% at the end of 25 years of operation with 25-year limited power warranty.

j. The PV Module should have at least 10-years warranty for any defects and efficiency as mentioned above. It should be provided On Stamp Paper Signed and Sealed by Contractor at the time of Handing/Taking Over.

k. The PV Module should have at-least 17.50 % Module efficiency with Positive Power Tolerance.

l. The PV modules offered should not be more than 12 months old from the date of issue of work order.
m. PV Module should have a Snow Load bearing of 5400 Pa and Wind Load Bearing of at least 2400 pa however if department deem appropriate may go for 3800 pa wind load depending upon their requirement.
n. The Solar Module should be free from visual and cosmetics defects.
o. The department/consultant on the expense of contractor/supplier shall verify Flash test reports with serial numbers from manufacturer for each panel (at the time of supply).
p. All information regarding solar panel with above mentioned featured data should be accessible and verifiable online on the manufacturer website.
q. IEC accredited lab test for solar panels is mandatory.
r. EL (Electro-luminous) test will be performed randomly for each individual project at the cost of contractor/supplier.

2. CABLE & WIRING:

a. The AC / DC cables should be made of 99.9% copper strands and Flexible.
b. From PV Panel to Junction Box, XLPE or XLPO insulated & XLPE/PVC Sheathed, UV stabilized single core, Double Insulated. Stranded /flexible cables (Conforming preferably to EN 50618 or IEC FDIS 62930) be used.
c. From JB to Inverter, the DC cable must have Single Core, double insulated and suitable for minimum 1000 V_{DC} transmission.
d. From Inverter to batteries, the DC cable can be single insulated, Single Core and suitable for minimum 300 V_{DC} transmission.
e. DC circuit breakers (not fuse) of ≥ Voc of String Voltage and suitable ampere rating (1.25 to 1.50 Times of Rated Current of all strings connected) must be installed between PV modules and controller / inverter.
f. AC Circuit Breaker (s) of suitable rating (1.25 to 1.50 Times of connected Load) must be installed between Controller / inverter to Load and Grid to Controller / Inverter.
g. AC / DC breakers should be marked with the manufacturer model number, rated voltage, ampere rating and batch/serial number.
h. DC / AC breakers rating should be approved from Engineer In-charge before installation at site.
i. To prevent solar panels from damage an appropriate size of DC Breaker / Fuse should be installed for each PV string and Surge Protection should be installed for combined Array (before Main DC Breaker / Inverter).
j. DC Breaker, AC Breaker & Change overs should be placed in an enclosure. All Enclosures / Junction boxes should be made from Hot Dipped Galvanized Sheets of minimum 16 SWG.
k. Cables shall be clearly labelled with essential electrical parameters including manufacturer name, Voltage Range, standards etc.
l. All DC Wiring shall be aesthetically neat and clean, over all wiring/connection losses shall not exceed 1% of the total rated output power.
m. All connections/ socket outlet among array, controller, inverters, batteries, and pumping set etc must be made in junction boxes of adequate protection level.
n. All wires/cables should be in standard flexible UV-Resistant conduits / HDPE of PN12, SDR 13.6, PE100 for outdoor installation & (2-3 feet deep) for underground wiring / Cabling and PVC ducts for indoor installation.
o. The DC Combiner Junction Box should be properly earthed including earthing of door as well.
p. The DC Combiner should contain proper bus bars of adequate size each for Positive, Negative and Earthing.

q. The Inverter Junction Box should be properly earthed as well as per vetted design of the Engineer in charge.
r. All wiring should be in proper conduit of capping casing. Wire should not be hanging loose.
s. All wires should be terminated properly by using lugs / thimble connectors / sleeves.
t. Distribution board must be installed with proper screws.
u. Electrical Hazards Safety Labels should be pasted on DC Combiner /VFD Enclosure / Charge Controller /Battery Enclosures.
v. Following lab tests are mandatory.
Conductor resistance test, Insulation resistance test, Pressure test, Spark test.
w. DC Cable from PV Module to Junction Box / Inverter for each string should be minimum size 6 mm^2.
x. DC Cable sizing (For Pumping Schemes) from Junction Box to Inverter as per details below;

S. No	Nos of Strings	Cable Size ((mm^2)	Remarks
1	1	6	If Cable length is >200 ft (One Sided) than cable size should also be increased accordingly.
2	2	10	
3	3	16	
4	4-5	25	
5	6-8	35	

3. PANEL MOUNTING & STRUCTURE:

a. The panel mounting and structure should be made of hot dipped (80 microns Average) galvanized steel of minimum thickness of **12 SWG / 2.64 mm Channel / Pipe or 8 SWG / 4.06 mm Angle** (Profile of channel and Sketch Attached for Reference).
b. A sketch of the mounting frame (As per Actual Site Requirements) showing dimensions of the frame parts should be provided at the time of supply.
c. PV to ground clearance must not be less than 1.5 feet. The height of the upper edge of the structure should not exceed 10 feet above the ground and 6 Feet for Roof Top Installations.
d. To avoid Shading, Distance between two rows of PV panels and from walls should be maintained at a minimum of 1.6 times the height of structure/walls.
e. The pit size for concrete works should be minimum 1.5x1.5x2 feet for each individual leg or 1.5x2.5x2 for double leg and the concrete should be extended at least 1 foot above the ground. The concrete ratio should be 1:2:4.
f. The Surface azimuth angle of PV Module 180° and the Tilt angle (slope) of PV Module should be 33°.
g. The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour.
h. Due to land Non-availability or any other problem, Structure design can be modified as per site requirement. Pole Mounted or manual Tracker Structure can be provided with the approval of Engineer In-charge.
i. Array fasteners (nut/bolts/washers) between PV Module and Structure shall be stainless steel. Washers should be installed on both sides of Module frame.
j. The minimum space between two PV Modules should be 2.54 cm (1 inch), to avoid air push over PV Modules.
k. Mechanism / arrangement for cleaning of PV Panels should be provided. i.e: Space and ladder between panels or at the back side of structure, so that the operator can safely climb and clean the panels.
l. All other array fasteners Structure shall be stainless steel or galvanized steel that provides the required mechanical strength.

m. The PV modules will be mounted on metallic structures at the inner holes for cantilevered installation, which will evenly distribute the load of the panel around the support structure on both sides and in the middle.

4. EARTHING/ GROUNDING:

a. The PV Panel frame and structure should be connected by the shortest practical route to an adequate earth contact (of Less than 5 Ohms Resistance) as per requirement of equipment manufacturer and site earth conditions, using an uninterrupted conductor. Grounding can reduce the risks of damage from lightning-induced surges.
b. The Sizing of Earthing conductor will be done as per NEC Table 250.122
c. The grounding conductor should be 99% Copper and PVC insulated / Bare Copper if installed underground along a defined path where size & Design shall be approved from Engineer In-charge before installation at site.
d. Motor, inverter, Battery / Battery Box (if required), Main Distribution Board should be connected to an adequate earth contact / Grounding.
e. Ground enhancement material (GEM) shall be used below and above the Earthing plate for proper grounding. Gravel or coarse sand shall be pour along with soil in the pit.
f. Grounding / Earthing plate should be made of Copper plate of 4mm thickness & Size minimum 1.0 x 1.0 Ft.
g. Grounding / Earthing conductor should be connected to the plate / Rode / GI Pipe by proper connector of minimum depth of 6 feet.
h. Alternatively Earthing Rod of suitable size and length can be installed. (Instead of Plate). If given / mentioned in the BOQ/Design and Engineer In-Charge Approval.
i. All nut / bolt and Earthing clamp shall be stainless steel or galvanized steel.

5. BATTERIES:

a. The battery should be Deep Cycle, GEL, OPzV/OPzS, Lithium LiFePO4, Lead Carbon Type or equivalent. (Note: Battery type shall be specified in the bidding documents.)
b. The battery must ensure safe and reliable operation in the whole range of ambient temperatures from -5° C to + 50° C.
c. The maximum permissible self-discharge rate should not be more than 5 percent of rated capacity per month at 25° C.
d. The battery shall have a certificate of compliances, issued by a recognized laboratory.
e. The Batteries should have three years Comprehensive replacement warranty.
f. The battery shall meet the requirements and recommendations given in IEC 61427, IEC 60896 21/22 (For VRLA) or equivalent. Lab Test Reports for battery cycle life should be provided.
g. The Battery must support parallel connection to increase capacity in case of future expansion. Each Battery should have following minimum information printed on battery:
   - Model Number, Serial Number and Type of battery.
   - Rated Voltage and Capacity (AH) at discharge rate of 10 Hours.
   - Origin of made.
   - Manufacturer Name with distinct logo.
h. The following information must be provided in the data sheet while submitting technical bid.
   - Certification/Test Standard(s) of the battery.
   - Information regarding cycles & self-discharge rate.
i. In case of rechargeable battery bank (having more than one battery), the interconnection shall be made using lead plated copper bus bars or properly insulated flexible copper conductors.
j. Battery disconnect switch / breaker of suitable size should be installed between batteries and inverter / charge controller.
k. The Battery must have Low self-discharge rate, No memory effect and No gassing.

5.1 GEL BATTERIES:

5.1.1 Cycle life of the GEL battery (12V) before 80% capacity of Initial Capacity must be minimum **1000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.1.2 Cycle life of the GEL battery (2V Cell) before 80% capacity of Initial Capacity must be minimum **1300** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.2 LEAD CARBON:

5.2.1 Cycle life of the Lead Carbon battery (12V) before 80% capacity of Initial Capacity must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.

5.2.2 Cycle life of the Lead Carbon battery (2V) before 80% capacity of Initial Capacity must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.

5.3 OPzV / OPzS BATTERIES:

5.3.1 Cycle life of the OPzV / OPzS battery (12V) before 80% capacity of Initial Capacity must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.3.2 Cycle life of the OPzV / OPzS battery (2V Cell) before 80% capacity of Initial Capacity must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.4 LITHIUM BATTERIES (LiFePO4):

5.4.1 Cycle life of the Lithium LiFePO4 battery before 80% capacity of Initial Capacity must be minimum **5750** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.

5.4.2 The battery must have Integrated Battery Management System (BMS) to ensure battery safety and reliability.

5.4.3 The BMS of the battery must have the following specifications:

- Temperature protection
- Over charge protection
- Low voltage disconnect
- High Voltage Disconnect
- Short circuit alarm function
- Self-balancing function

5.4.4 The LiFePO4 Battery must have LED status and alarm indication.

5.4.5 The charge and discharge rate of the battery must be designed at 0.2C minimum but capable of handling 0.5C charge and discharge currents.

Note:

- **Product brochure, catalogue and certificates must be attached with the Technical Bid.**

6. BOX / STAND FOR BATTERIES, SHS-INVERTER & CHARGE CONTROLLER:

a. The batteries should be housed in a vented compartment/stand that prevents users from coming in contact with battery terminals. This compartment/stand should be strong enough to accommodate the weight of the battery.

b. A mechanism to prevent opening and entry of the battery should be provided.

c. This compartment should be manufactured of mild steel of at least **18 SWG.**

d. The compartment should be powder coated paint.

e. The entire enclosure/stand must be constructed to last at least twenty years without maintenance and should be protected against corrosion. The enclosure should have a clean

and neat appearance. Battery Box /stand should be installed at a place in accordance with user's preference

7. LED FLOOD LIGHTS:

a. Solar Based LEDs/Light fixtures shall conform to the latest IEC/ISO internationally recognized standards.
b. LEDs/Light fixtures should not be Chip-on-board (COB) single chip type due to their poor heat dissipation.
c. LEDs/Light fixtures shall be modular type with proper heat sinks.
d. Solar based lights (LED fixtures etc) should provide at least 100 Lumen/watt.
e. The Color rendering Index (CRI) must be equal or greater than 70
f. LEDs/Light fixtures should be designed to deliver at least 10 years of service.
g. Complete lightening unit shall be weather proof (Protection Class IP65).
h. The output from the LEDs/Light fixtures should be constant throughout the duty cycle.

8. AC ENERGY EFFICIENT LED LIGHT BULBS:

Shape	Cap/Fitting/Base Type	Colour	Lumens Per Watt	Colour Temperature	Colour rendering index (CRI)	Life Time of Lamp (Hours)	Power Factor & Rated Voltage
Globe	E27	Cool or Warm White	Min 100W	2700K / 6500K	70	10,000	≥ 0.70 & 220 Vac

Note:

- LED Light Bulbs should be marked with the manufacturer model number, rated voltage, Wattage.

9. AC ENERGY EFFICIENT CEILING FANS:

Sweep		Rated Power	Speed			
Inches	MM	Watts	Rpm			
56	1400	50 Max	≥ 320			

a. 10% + in Power Consumption is Allowed as per PSQCA Standard
b. Rated Voltage: 230 V~ (±10V)
c. Rated Frequency: 50 Hz
d. Insulation Class: 155 (F) or better
e. Motor Core: Electrical Steel Sheet
f. Winding Wire: 99.99% Super Enamelled Copper CA Wire or 99.99% Pure Copper Wire.

Note:

- Energy efficient fan should be marked with the manufacturer model number, rated voltage, and wattage.

10. DC ENERGY EFFICIENT LED LIGHT BULBS:

a. The LED lamps must have luminous efficacy of at least 80 lm/W (at 25 °C ambient temperature).
b. The LED lamp must be protected against reversed polarity of the operation voltage.
c. Base shall be an E-27 thread type.
d. The emitted light shall be cool or warm white.

e. The wide angle shall be between 120° to 125°.
f. Operating Voltage 12Vdc / 24Vdc
g. Lamps should be marked with the manufacturer model number, rated voltage, wattage and date of manufacture or batch number.

11. DC CEILING FANS:

Sweep	Rated Power	Speed	Service Value	Operating Voltage
Inches	Watts	Rpm	Air Delivery/W	V
48 ((with Speed Control) Metal Blades	30-36	> =320 RPM	9.54	12 / 24

12. DC PEDISTAL FANS:

Sweep	Rated Power	Speed	Service Value	Operating Voltage
Inches	Watts	Rpm	Air Delivery/W	V
18 Inch (with Speed Control)	18-30 W	1250 RPM (Full Speed)	5.22	12 / 24

13. INVERTER BASED SPLIT AC

Inverter based AC with both heating and cooling option.

S.No	DESCRIPTION	UNIT	DETAILS
1	Compressor	Type	Multistage Rotary
2	Noise Level (Indoor)	Db (Max)	≤ 50
3	Voltage Range	Volts (Min & Max)	180 to 250 Vac

14. PVC CHANNEL DUCTS & PIPES

a. A product of good quality standard material standardized by the provincial standardization committee with suitable size to be provided / used, as per direction/approval of Engineer In-charge.
b. Ducting must be done with proper steel nails and clips.
c. All ducting (wiring) must be align.

15. FLEXIBLE PVC PIPE

a. The flexible PVC pipe should be of good quality material standardized by the provincial standardization committee with suitable size to be provided / used, as per direction/approval of Engineer In-charge.

16. CIVIL WORK:

The following Civil Works should be carried out for ground installation of SPV Modules/mounting structures.

a. Minor Cutting and clearing of trees/plantation to avoid shadows.
b. Civil work for earthing system as per the statutory requirements.

17. REFLECTIVE / INSULATING PAINT

The Roof Paint should be ultra-white, high reflective,100% acrylic elastomeric roof sealer designed for fixing leaks in roofs the paint should contain heat reflective pigments and additives that provide an excellent, highly protective barrier which reflects the sun's heat and destructive UV rays leaves a brilliant ultra-white finish, reducing surface heat absorption up 20°F.

DIRECTOR Agril: Engineering KPK Tarnab, Peshawar

Executive Engineer Warsak Canals Division

Deputy Secretary (Tech:) Public Health Engg: Department Khyber Pakhtunkhwa

The Reflective paint should comply with ASTM D6083, Fiber Reinforced for more protection, strength and durability which allows for contraction and expansion, Resists surface fungal growth.

18. WARRANTY/AFTER SALE SERVICE:

Three years Comprehensive Free Replacement, Repair and maintenance Warranty at site (Free of Cost) should be provided for all the components of Solar System. (if not mentioned separately otherwise)

B - SPECIFICATIONS FOR SOLAR PUMPING SYSTEMS

19. PUMP (SUBERSIBLE):

Pump should be supplied having standard ISO-9906 specifications. The pump must be submersible, made of stainless steel. The characteristic curves (Original from Manufacturer) showing the efficiency at duty point and performance of the pump should be provided in the technical proposal and also at the time of pre-supply testing. The quoted pump should be tested for its performance and certified as per ISO-9906 standard. The pump should be suitable for installation and operation in tube wells/dug wells/open well with clear water discharge. Pump shall comprise of bowl assembly and non-return valve as integral part of pump's parts. Pump and motor shall rigidly couple through NEMA standard coupling. The stage casings of pumps should be connected as per NEMA/ANSI/AWWA /ASTM/BSS standard. Each stage casing must have replaceable wear ring. The impellers shall be secured to the pump shaft with tapered conical sleeves pressed into the taper bore of impeller or impeller secured through chrome plated stainless steel hexagonal sleeves. Suction casing must be between pump and motor with suction strainer as protection of pump against coarse impurities of the liquid handled.

Specification for main components of the Pumps:

S.NO	Components	Specifications
1	Casing/Diffuser	The Casing/Diffuser should be in fabricated stainless steel AISI 304 / 316.
2	Impellers	Stainless steel AISI 304 / 316.
3	Driving Shaft	Stainless steel 304/420 / 316
4	Sleeves	Stainless steel AISI 329/ 304 / 316
5	Gaskets	Rubber Gaskets
6	Bearings	AISI 329 stainless steel
7	Coupling & Screen + Cable Guard	Stainless steel AISI 316/319/304/420
8	Non-Return Valve / Sluice Valve	As per British standard specifications (BSS), Minimum PN16 (16 Bar) or Above (As Per Site Requirements) PN Value / Bar Capacity of Valves must be more than Installed Pump Max/Shut-off Head Minus Static Water Level of Bore. (Leakages in Valves are NOT Acceptable).
9	Pressure Gauge	As per British standard specifications (BSS), having PSI or Bar scale (4 Inch Size), Liquid Filled, minimum 350 PSI Range, Looped Siphon tube Pipe, Stainless Steel/polypropylene Casing.
10	Clamps	Steel – Pressed
11	Pump Efficiency	**Minimum efficiency of the pump (For discharge of 3000 GPH and more) should be 70% ensured at duty point. (Duty Point of the Pump be preferably selected at the peak efficiency point or (Within ±10% of discharge) of Pump Peak efficiency Point)**

20. MOTOR:

The winding material should be 99.99% copper. The motor should have wet type, water cool rewind-able/repairable stator. The motor should have non-disposable/non-hermetically sealed winding. The insulation class of the winding material should be mentioned. For each model quoted, all the technical parameters such as rated voltage, power factor, efficiency, full load ampere, speed

and other similar parameters should be provided at the time of pre-supply testing. The testing report with all basic parameters should also be provided at the time of pre-supply testing.

The motor shall be manufactured in compliance with National Electrical Manufacturer Association (NEMA) standards. The motor shall be three-phase submersible and shall be capable of operating at rated voltage of 380 Volts at 50 Hz. The motor should be capable of operating with variable speed through V/F control. Winding of the motor shall of rewind able type with class – IC40 insulation and IP68 protection. The synchronous speed should be 2850-2950 RPM. Motor shall be capable of operating in well water with temperature normally start from 40°C. Motor should be designed for continuous operation. Motor must be filled with water without any chemical additives hazards to health for cooling. The motor must be properly protected against the entry of well water sand etc by double mechanical seal one is rotating and other stationary and must be made of Silicon carbide/ Tungsten carbide and must be protected with sand protection guards. All supports shall be high grade cast iron and stator outer side jacket body should be in stainless steel in AISI 304. The excessive pressure due to heating up of the filled water must be compensated by a pressure equalizing rubber diaphragm in the lower part of the motor. The axial thrust of the pump shall be countered by oscillating sliding block type thrust bearing. The thrust bearing of the motor should be able to bear a download thrust force from the water pump and the upward thrust force produced while starting the water pump. Motor in open well / water tank should be installed with cooling jacket / shroud / sleeve and when motor is installed in bore then installing of cooling jacket is also required. Motor shall be capable of maximum of 20 starts in an hour. Motor efficiency of motors 7.5 HP and above should not be less than 75% at Full Load and Motor Rated Voltage.

Technical specification of rewind-able wet stators, three phase squirrel cage water filled submersible motor.

S.No	Components	Specification
1.	Winding	Made of pure electrolyte copper and the winding insulation should be suitable for > 1000 Volts and must full fill resistant tests range.
2.	Stator	Energy efficient low-losses electrical magnetic sheet should be fixed in stainless steel casing. M800 or M600 magnetic sheet are preferable to use.
3.	Rotor	Energy efficient low-losses electrical magnetic sheet fixed with high grade copper bars. M800 or M600 magnetic sheets are preferable to use.
4.	Spline Shaft	AISI 420 stainless steel, flange dimension according to NEMA standard, over size design to ensure stiffness in severs condition.
5.	Shaft bearing	Water lubricated guide/general bearings fixed in upper and lower brackets should be made of metal impregnated carbon.
6.	Lower thrust bearing	Thrust sliding block bearings, self-aligning Mitchell type, should be able withstand **20000N** axial load
7.	Mechanical Seal (Stationary & Rotary	Silicon carbide or tungsten carbide mechanical seal.
8.	Cooling filling fluid	Water mixed with non-toxic anti-freeze provide cooling and lubrication also protect and prevent inside parts from corrosion.
9.	Degree of protection	IP68
10.	Insulation Class	Insulation Class B (130°C) NEMA Insulation Class F (155°C) NEMA or above Will be given

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		Preference.
11.	Voltage Tolerance	+6% to -10%
12.	Mounting position	Capable of both Vertical or horizontal Installation
13.	Class	IC40
14.	Maximum Immersion	150 Meters
15.	Starting per hour	20

21. SUBMERSIBLE FLATE ELECTRIC CABLE (4-Core):

The Submersible cable (4-Core) should be made of 99.9% copper strands with double PVC insulation for **1000Vac**, should be adequately flexible and environment friendly. Stranded and flexible insulated copper wires and cables must be used for all outdoor and indoor installations. The wiring that leads into the building shall be protected in a conduit. The cable must have undergone quality tests as per BSS standards. Cable size should be selected so that the Voltage drop Losses in the drop cable should not be more than 2.5%.

Following lab tests are mandatory.

- Conductor resistance test.
- Insulation resistance test.
- Pressure test.
- Spark test.
- Note: The Supplier should provide the quality tests certificates at the time of pre-supply testing and inspection.

22. COLUMN PIPE:

The column pipe shall be flanged ERW steel pipes confirming to ASTM designation A-53 with a minimum thickness of **3.6 / 4.0 mm (3.6 mm for pipes upto 2.5" dia and 4 mm for pipes above 2.5" dia)** and shall be painted with corrosion resistance paint of suitable thickness. Flanges thickness of 19-20 mm shall have grooves for cable passage. Each column pipe shall be complete with gaskets, bolts/studs, washers and nuts. All nuts, bolts, and washers shall be made of minimum A2 grade stainless steel.

The column pipe shall be supplied in interchangeable section having an approximate length of 10 feet column pipe shall be flanged perpendicular to the axis of pipe.

Column pipe size should be selected so that the Head Losses in the column pipe should not be more than 5%.

For Reference a table-1 is given below.

HDPE Pipe of ≥ 0.75 Inch diameter, SDR 13.6, PE100, conforming to ASTM F-2160 Standard without Joints to be installed/included along with and equal to Column pipe for confirming Water Level testing purpose.

FEATURES:

- Manufacturer's pipes should meet international standards like BSEN 10255 & ASTMA 53.
- Dimensional accuracy circularity and plan end cut should be observed,
- Weld strength of pipe and mechanical properties or raw material should be tested as per manufacturing standards.
- Pipes should be NDT tested (Non-destructive – Eddy current)
- Pipes should be hydrostatically pressure as per manufacturing standard.
- Pipes should be gone through straightening process to remove bendiness.

23. TOPSET:

Top set shall comprise of Bore covers plate, (covering bore hole completely and securely), installation/suspension clamps (2-Nos), sluice valve (BSS/ASTM), reflex valve (BSS/ASTM), Washout Valve approx. 3-4 feet above the ground (T-Connection For Testing Pump's discharge), connector and cable jointing material (Cable connection from motor to switching device shall be joint free), Liquid Filled Pressure gauge minimum 4 Inch diameter suitable / appropriate for the required head pressure and cable ties. Bore Cover Plate should have provision for water level testing facility (i.e: Hole for Sonic Water Level Meter / HDPE Pipe insertion)

For Cleaning of solar Panels, Plastic pressure pipe should be provided of suitable length to reach the furthest / last Solar Panel.

Every Water Supply Scheme should have a non-removable name plate fitted at suitable place / box having essential information and bearing the name of supplier, Consultant and client.

24. SOLAR PUMP INVERTER / CONTROLLER:

a. The solar pump inverter/controller should have built-in advance version of Auto MPPT controller, over load protection, Soft start/Soft Stop Features and Variable Frequency Drive (VFD) with integrated Gate Bipolar Transistors (IGBTs) of European, USA or Japanese origin or atleast equivalent.
b. The make and origin of the inverter/controller should be clearly mentioned in the catalog and submitted in the technical proposal.
c. The inverter offered should comply to or Equivalent standards:
    i. CE/RoHS
    ii. Low Voltage Directive 2014/35/EU
    iii. EMC Directive 2014/30/EU
    iv. IEC 62109-1 (Safety of Power Converters for use in PV Systems)
d. The complete datasheet showing all the electrical parameters like input & output voltage ranges should be provided in the technical bid.
e. All the electrical parameters like input & output voltage ranges, and efficiency should be provided at the time of pre-supply testing and inspection.
f. Efficiency of inverter should be 96% and above at Rated Capacity.
g. Efficiency of MPPT should be 98% and above.
h. The inverter < 25kW ingress protection of inverter must be minimum IP 65 Rating or above and for inverter ≥ 25kW ingress protection of inverter / enclosure will be minimum IP 54 Rating or above.
i. Inverter / Controller having the capability to run both on AC and DC Power would be given preference.
j. Inverter should have at least three (3) years product and performance warranty.
k. The Pump Controller/Inverter should have an ON/OFF Switch/Button to Start and Stop the Pump.
l. Inverter should have active RS232/485 etc communication port available, the Data available through this port can be used for Remote Monitoring.
m. Inverter circuit must include protection against:
    i. Over or Low voltages and currents beyond critical level of the inverters circuits.
    ii. Protection against accidental short circuits & reverse polarity connections.
    iii. Protection against lightning induced transients.
    iv. Over load protection.
    v. Low RPM Protection (i.e: Frequency < 30 Hz or as per pump characteristic curve) Motor Should Stop.
    vi. Dry run protection. (PF / Current Based).

25. dV/dT or Sine Filters With Inverter (VFD):

a. The use of load reactors increases the reliability, performance, and efficiency of VFD systems, extends the life of both drives and motors, and reduces the amount of energy consumed by the motor/drive system.
b. Output dV/dT or Sine Filters (between VFD and Motor) of appropriate size (for 3-phase ≥380Vac Motor of Class B Insulation) should be used where the cable length between motor and inverter is more than Fifty (50) Feet or as advised / recommended by the inverter manufacturer in their Technical Documentation. For Cable lengths of more than 150 meters sine filters should be used.
c. Filter should be enclosed in a vented box.
d. Filter Efficiency should be minimum 97%.
e. Filter should have a current rating of equal or greater than Motor FLA Rated Current.
f. Distance between filter and pumping inverter should not be more than 2 meters.
g. Motors with Insulation Class F, H or above are exempted from the requirement of dV/dT Filter.

26. SYSTEM DESIGN FOR PUMPING SYSTEM:

a. Suitable factor of safety should be applied while designing the system in order to have compensations for variations in irradiations.
b. For Fix Structure and Auto Tracker, the PV panel **peak power at STC (Wp) should be 75% more** than the Motor basic input power **(PV Loss Compensation Factor = 1.75)**.
c. For Auto /Manual Tracker, the PV panel **peak power at STC (Wp) should be 50% more** than the Motor basic input power **(PV Loss Compensation Factor = 1.5)** as per direction of Engineer Incharge
d. If Single Axis Auto Tracker Structure is installed on the above factor, then daily operational timings of pumping can be increased by 10-20%, as compared to fixed structure installation.

e. Total PV Power (Wp) (Imperial Gallons) = $\frac{Q\ \textbf{(iGPH)} * TDH\ (ft) * 746 * PV\ Loss\ Factor}{60 * \textbf{3300} * \eta_{pump} * \eta_{motor}}$

f. Total PV Power (Wp) (US-Gallons) = $\frac{Q\ \textbf{(US-GPH)} * TDH\ (ft) * 746 * PV\ Loss\ Factor}{60 * \textbf{3960} * \eta_{pump} * \eta_{motor}}$

g. Total PV Power (Wp) (Metric Units) = $\frac{Q\ \textbf{(m}^3\textbf{/hr)} * TDH\ (m) * 9.81 * 1000 * PV\ Loss\ Factor}{\textbf{3600} * \eta_{pump} * \eta_{motor}}$

h. Voltage (V_{mp}) of Each String of PV Panels should be as per details given below and String Voltage (V_{mp}) should be within the MPPT range of Inverter.
   i. For 380 V_{ac} 3-Phase Motor = 380 * 1.414 * 1.06 = 570 Vdc String, minimum
   ii. For 220 Vac 3-Phase Motor = 220 * 1.414 = 310 Vdc String.
   iii. Small Inverters (i.e: 3-Phase, 220 Vac) with voltage boost function are exempted from the above string voltage requirements. String can made as per boost Inverter / Controller recommended String DC Voltage and should not be less than 230Vdc in any case.

i. Details of each PV Panel string should be submitted in Technical proposal (i.e: Nos of total strings and Nos of PV panels in each string along with wattage and V_{mp} of each PV panel).
j. Unjustified Oversizing in PV Panels Wattage is not allowed.
k. To avoid any oversizing, all commercially available PV Panels should be considered.

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l. Solar Pump Inverter should have a kW capacity equal or greater than the Motor Rated Input Power.
m. Solar Pump Inverter / Controller Size (kW) ≥ (Motor Rated Power in kW / Motor Efficiency).
n. Solar Pump Inverter / Controller should have a current rating of 1.15 Times (minimum) of Motor FLA Rated Current.
o. Motor should not be loaded more than 90%. (i.e: Design / Calculated BHP should not be more than 90% of Motor Rated Horse Power)
p. Along with this specification, contractors should also follow manufacturer's recommendations for all major components of Solar Pumping System.
q. Requirement of Efficiency for Motor i.e. 75% will not apply on Motors smaller than or equal to 5.5HP and the requirement of efficiency for pump i.e. 70% will not apply on pumps having discharge equal to or lower than 3000 GPH.

27. PRESSURE PUMPS (UPTO 5.5 HP):

a. Submersible pump confirming to ISO-9906 Standard.
b. Pump + AC Motor (3-Phase-220V/380V) or DC Motor and Pump with Display Unit.
c. Solar pump inverter/controller should be MPPT based and Minimum Ingress Protection of IP65.
d. In case, where the column pipe diameter is less than or equal to 1.5-inch (For discharge equal or less than 6000 LPH and/or for Motor 4 HP and below), HDPE pipe of at least PN12 / SDR 13.6 / PE100 (For TDH of equal or less than 300 ft) without joint may be used instead of MS pipe for better economics and to avoid hydraulic losses. However stainless steel rope of minimum diameter of 6 mm (28 mm^2) for suspension of pump-set must be supplied with HDPE pipe. (Note: For TDH of more than 300 ft, HDPE Pipe type / thickness may be increased/changed accordingly)
e. Top set shall comprise of Suitable Galvanized stand (Design should be verified from Engineer In-Charge before start of work)
f. For Pressure Pumps ≤ 5.5 HP schemes, Solar Module efficiency requirement is minimum 16%. (Only for Cut Cells PV Modules or Cell Size of 5 Inches PV Modules).
g. Connection to overhead water storage tank. Top bend, S.S Fasteners & Erection clamps.
h. Civil work to protect borehole i/e foundation.
i. The pump should operate safely with Sand particles up to (50) gram/m^3.

28. DC SOLAR WATER PUMP-SETS (UPTO 5.5 HP)

a. DC Motor can also be provided for Equal or less than 5.5 HP.
b. Motor should be capable of both AC and DC operation. There must be auto power source recognition feature.
c. The motor should be brushless, permanent magnet type.
d. The Controller must have a display Unit, showing all essential parameters (i.e: Current, Voltage etc).
e. The Controller must be of MPPT type. MPPT efficiency should be equal or more than 98%
f. Pump should have auto and soft start / stop feature.
g. The pump-set should have following protections
   1. Dry Running Protection
   2. Reverse Polarity Protection
   3. Over phase protection
   4. Over Head Protection
   5. Lose Phase Protection
   6. Electronic Protection
   7. Over Current/ Overload Protection

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29. SOLAR AUTO TRACKER:

a. The solar tracker offered should be fully automatic and intelligent, and must be capable of Single axis tracking (from east to West) and should have its own power supply (PV Panel, Battery and Charge Controllers) other than PV Panel used for Pumping Setup.
b. Individual Auto-Tracker should be ≥ 4 kW each and Tracking Accuracy should be within ± 5°.
c. The auto Tracker should also have manual control mode to adjust the tracking angle manually. Structure Material Should be Hot Dipped Galvanized Steel (Minimum 80 Microns).
d. All nuts, bolts, washers and other fasteners for mounting structure shall be made of minimum A2 grade stainless steel.
e. Foundation and other details will be separately provided.
f. Three years Comprehensive Free Replacement, Repair and maintenance Warranty (Free of Cost) should be provided for all the components of auto Tracker (including Batteries).

30. PV MOUNTING FRAME WITH MANUAL TRAKERING :

Suitable for 2.5 or 3.5 KW PV Panels easily movable in multi directions having flanges with bearing balls ½" and having angle adjustment. Base steel cage ¾", MS rod 3.5 feet length with nut-bolts system for strong anchoring. Pillar pipe 6 mm with 5.5" dia, base plate 15"x15"x1/2" size with 04 numbers of supports. Support for PV, 5 mm thickness 4" dia pipe and 24"x12"x 1/4" side plates. MS Angle side bracing 2"x 2" x ¼". MS Angle frame 2"x 2" x ¼" for panel mounting. Steel structures/frames shall be powder coated. Galvanized nuts, bolts and washers for tracker fitting. Steel frame shall be properly designed and shall withstand wind speed/load of at least 130 km/hr and tough weather condition.

31. PRE-SUPPLY TESTING & INSPECTION:

The firm applying for the tender has to provide the recent test bed reports from the pump/motor manufacturer or any other third party as per ISO-9906 standard. Each of the offered pump set models must undergo these test prior to supply and installation, In order to ensure the quality and standard of the equipment contractor may be asked to provide test result conducted by third party for re-verification.

32. OPERATION AND MAINTENANCE MANUAL:

An Operation and Maintenance Manual, in English and Urdu language, should be prepared and provided by the contractor with the solar PV pumping system. The Manual should have information about solar energy, photovoltaic, modules, DC/AC motor pump set, tracking system (if any), mounting structures, electronics and switches. It should also have clear instructions about mounting of PV module, DO's and DONT's and on regular maintenance and Trouble Shooting of the pumping system. Name and address of the person or Centre to be contacted in case of failure or complaint should also be provided.

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C- SPECIFICATIONS FOR SOLAR HOMES & BUILDING SYSTEMS.

33. GRID TIE INVERTER (ON`-Grid without battery backup / Hybrid with battery backup)

1. UL-1741 Certified or IEC 62109-1 and IEC 62109-2 or Equivalent Certificates.
2. Minimum 95% Conversion Efficiency at Rated Capacity (High Frequency Inverters).
3. Minimum 87% Efficiency for Transformer based inverters (Low frequency Inverters).
4. The inverter should have built-in MPPT controller
5. The Priority of the inverter should be set that load will be running from the solar energy then Grid and in the end will be running from the Battery Backup.
6. Inverter (Hybrid Only) must be capable of configuring for Charging GEL, Lead Carbon, OPzV/OPzS Batteries and Lithium Iron Phosphate batteries (LiFePO4).
7. Hybrid Inverter (If Quoted along with Lithium Batteries) must be capable of communication with the BMS of Lithium Batteries.
8. Rated output voltage of inverter / Controller shall be pure sine wave AC.
9. Total harmonic distortion (THD) in AC output should not exceed 3% at rated capacity.
10. The degree of protection of the ON-Grid inverter Installation should be IP-65 rated and for indoor Hybrid Inverter installation, the IP rating should be IP-20 or above.
11. Wide input voltage range capability. (i.e: Voltage Range can be adjustable / selectable)
12. Natural convection cooling for maximum reliability
13. Outdoor enclosure for unrestricted use under any environmental conditions
14. Capability to connect external sensors for monitoring environmental conditions.
15. The output of the inverter must synchronize automatically its AC output to the exact AC voltage and frequency of the grid.
16. The Inverter should have the capability of Parallel operation upto three units. (Only For projects, where more than one inverter should be installed).
17. Inverter should have active RS232/485 etc communication port, the Data available through this port can be used for Remote Monitoring.
18. Liquid crystal display should at least be provided on the inverters front panel or on separate data logging/display device to display following
    a. DC Input Voltage
    b. DC Input current
    c. AC Power output (kW)
    d. Current time and date
    e. Temperatures (C)
    f. Converter status
19. Inverter circuit must include protection against:
    - Over or Low voltages and currents beyond critical level of the inverters circuits.
    - Protection against accidental short circuits.
    - Protection against lightning induced transients.
    - Over load protection.

34. OFF-GRID / HYBRID INVERTER:

1. The Inverter must be pure sine wave output suitable for 220 Volt, 50 Hz.
2. Inverter must be capable of configuring for Charging GEL, Lead Carbon, OPzV/OPzS Batteries and Lithium Iron Phosphate batteries (LiFePO4).
3. The Inverter / system must have a MPPT Solar Charge Controller.
4. Minimum 92% Conversion Efficiency at Rated Capacity (High Frequency Inverters).
5. Minimum 87% Efficiency for Transformer based inverters (Low frequency Inverters).
6. Total harmonic distortion (THD) in AC output should not exceed 3% at rated capacity.

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7. The inverter must be user programmable for selecting PV, Grid and Battery Priority as well as Built-in programmed and user defined voltage and current settings of the charge controller for GEL, Lead Carbon, OPzV/OPzS batteries and Lithium Iron Phosphate batteries (LiFePO4).
8. The Inverter must have Protective function limits for:
    a. AC under voltage protection
    b. AC over voltage protection
    c. Battery under voltage Alarm
    d. Low Voltage Disconnect
    e. High Voltage Disconnect
    f. Overload and Short Circuit Protection
    g. Over Temperature Protection
9. The inverter must be ISO 9001, ISO 14001 and CE Certified.
10. The inverter must have IEC 62109-1 and IEC 62109-2, or Equivalent Certificates.
11. The degree of protection of the outdoor inverter Installation should be IP-55 rated and for indoor Inverter installation, the IP rating should be IP-20 or above.
12. Wide input voltage range capability.
13. Inverter should have active RS232/485 etc communication port, the Data available through this port can be used for Remote Monitoring.
14. Inverter (If Quoted along with Lithium Batteries) must be capable of communication with the BMS of Lithium Batteries.

Note:

- Product Brochure, Catalog and certificates must be attached with the Technical Bid.

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D - SPECIFICATIONS FOR SOLAR STREET LIGHTS

35. SOLAR STREET / ROAD LIGHT SYSTEM DESIGN:

a. Assessment of Wattage of the LED Luminaire, Pole Height, Pole thickness, Pole top diameter, Pole base diameter, Base plate size, Base Plate thickness, Stiffener size, Stiffener thickness, Pole arm design, Pole Arm Length, Pole arm thickness, Pole arm diameter, Pole arm Placement / Fixing position, RCC foundation size, Anchor / J-bolt size, Steel Rebars cage (Mesh) and Number of Poles (Pole to Pole distance) should be according to the design provided / approved by the Engineer In-charge.
b. Round Conical or Octagonal Hot Dipped Galvanized Pole of average 80 Microns should be installed.
c. All Nuts, Bolts and Washers should be stainless steel.
d. Pole base plate should be tightened in between two stainless steel nuts and washers (one nut and washer at upper and one nut and washer at lower side of the base plate).
e. All Anchor / J-bolt shall be in level and align to each other.
f. All Anchor / J-bolt shall be galvanized.
g. All Anchor / J-bolt shall have at least 150 mm minimum threads.
h. All poles shall be installed on levelling nuts secured to the anchor bolts and with locking nuts on the top of the base flange.
i. The concrete ratio should be 1:2:4 for RCC foundation.
j. Proper sketches of Pole, base plate, RCC Foundation and Steel Rebars cage (Mesh) should be provided and approved from Engineer In-charge.
k. In order to focus on winter sun availability and Easy cleaning of Solar panel from dust etc with Rain water, Solar Panels should be installed at 180° Azimuth Angle and the Tilt angle (slope) of PV Module should be between 45° ±5° (Only for Solar Street Lights).

36. LED SOLAR ROAD/STREET LIGHT FIXTURE:

1. LED Efficacy must be greater than or equal to 130 Lumens/Watt.
2. The fixture must be IP-66 Rated or above.
3. The Color temperature of the LED should be Pure white in the range of 5000-6000 K.
4. The LED Light distribution must be IESNA Type-II
5. The LED must be suitable for working Temperature from -40 ~ + 60°C with relative humidity of 15% ~ 90%
6. The Color rendering Index (CRI) must be equal or greater than 70.
7. The LED Light Fixture must be LM79 and LM80 Tested.
8. LEDs/Light fixtures should not be Chip-on-board (COB) single chip type due to their poor heat dissipation.
9. LEDs/Light fixtures shall be modular type with proper heat sinks.
10. The output from the LEDs/Light fixtures should be constant throughout the duty cycle
11. LED Life should be greater or equal to than 50,000 Hours.
12. The LED Light Fixture must have the following certification:
    - ISO 9001
    - ISO 14001
    - CE (EMC and LVD) Certified or equivalent.
    - International standard Certifications

Note: Product Brochure, Catalog and certificates must be attached with the Technical Bid

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37. SOLAR CHARGE CONTROLLER (FOR STREET / ROAD LIGHTS):

a. The charge controller must be suitable for the required battery voltage, auto voltage recognition feature and capable of charging OPzV & Lithium Ferrous Phosphate (LiFePO4) Batteries
b. The charge controller must be IP-67 rated or above for outdoor installation
c. The charge controller must be Remote Controlled for parameter setting. The system must have the following feature:
   - *Remote Parameter Setting and Monitoring*
   - *Remote control of the Lights (on/off, timer setting etc)*
d. The charge controller must have MPPT Technology
e. The charge controller must have at-least three stage Flexible dimming function (0-100%).
f. The Maximum power point tracking (MPPT) efficiency should be minimum 97%.
g. It must have temperature compensation for charging batteries in higher temperatures.
h. Charge controller must have the following protections:
   - PV Short circuit
   - PV reverse polarity
   - PV over voltage
   - PV over current
   - Battery over charging
   - Battery over discharging
   - Battery reverse polarity protection
   - Load short circuit
   - Load overload protections
i. It must have proper heat sink to dissipate excessive heat
j. The charge controller must have protection for reverse flow of current through the PV modules
k. Controller should have active port for GSM based communication for Remote Monitoring.
l. Mid Night based timing controller will be preferred.
m. The Solar Charge controller must have the following certification:
   - ISO 9001
   - CE Certified

Note: Product Brochure, Catalog and certificates must be attached with the Technical Bid

38. Battery and Controller Box:

a. The battery box should be made of Hot Dipped Galvanized Sheet of average 80 Microns.
b. The battery box must have vented compartment having inverted louvers.
c. For Pole Mounted batteries Battery boxes must be made of minimum 16 SWG sheet and must have proper locking arrangement for protection against theft.
d. For underground battery installation, the battery box should be made of minimum 16 SWG sheet and should be properly sealed to ensure protection against water. Proper cable glands and packing material should be used to ensure water proofing of the box.
e. The battery and Controller Box should be at least IP65 ingress protection.

39. Electric Cable:

The specifications of Electric cables are as under:

a. Flexible copper cable of proper size along with MC-4 connectors (TUV Approved) from solar panel to charge controller and charge controller to battery as well as to light fixtures.
b. The cables should be made of minimum 99.9% Pure copper cable

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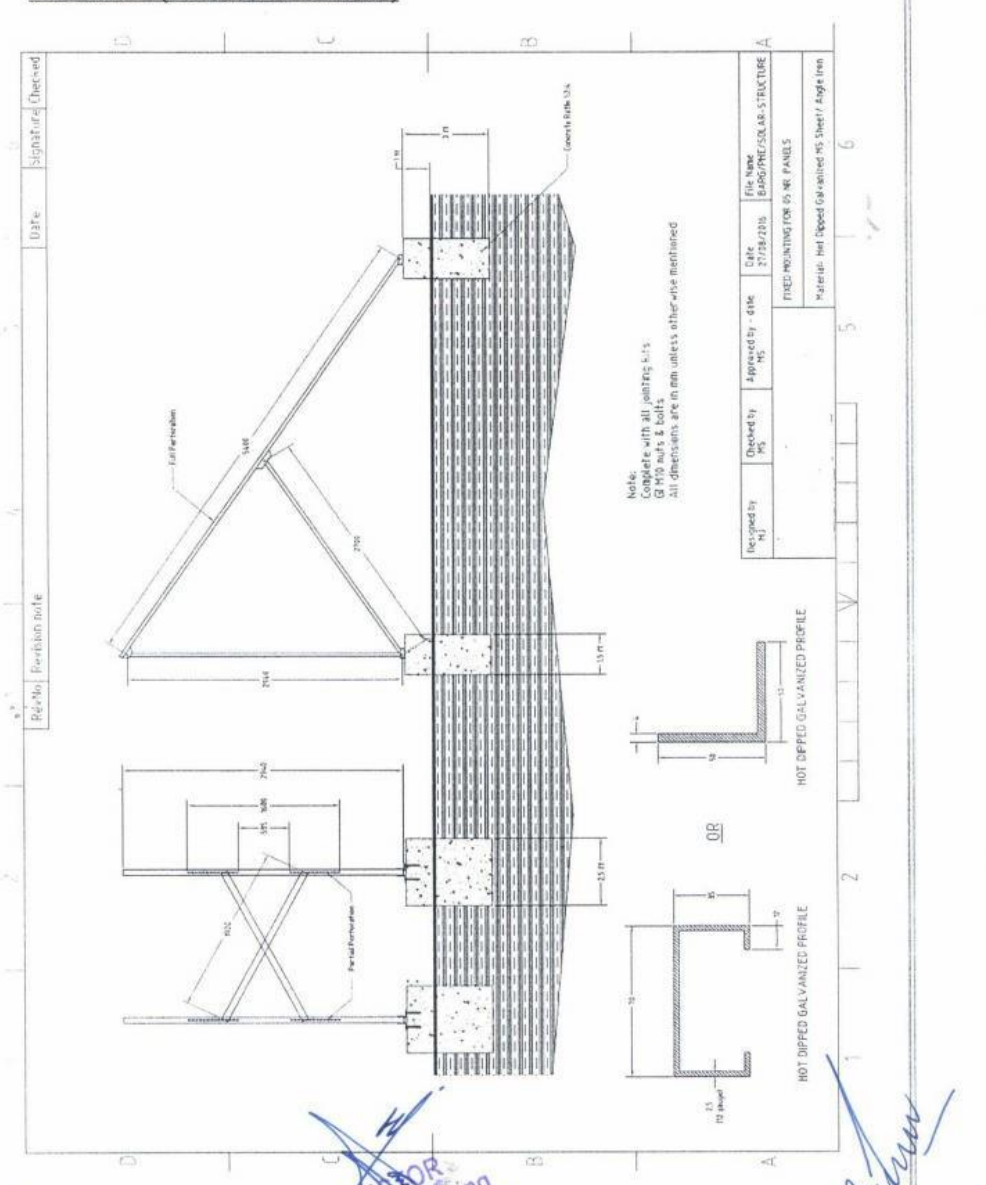
ANNEXURE-1 (STRUCTURE DRAWING)



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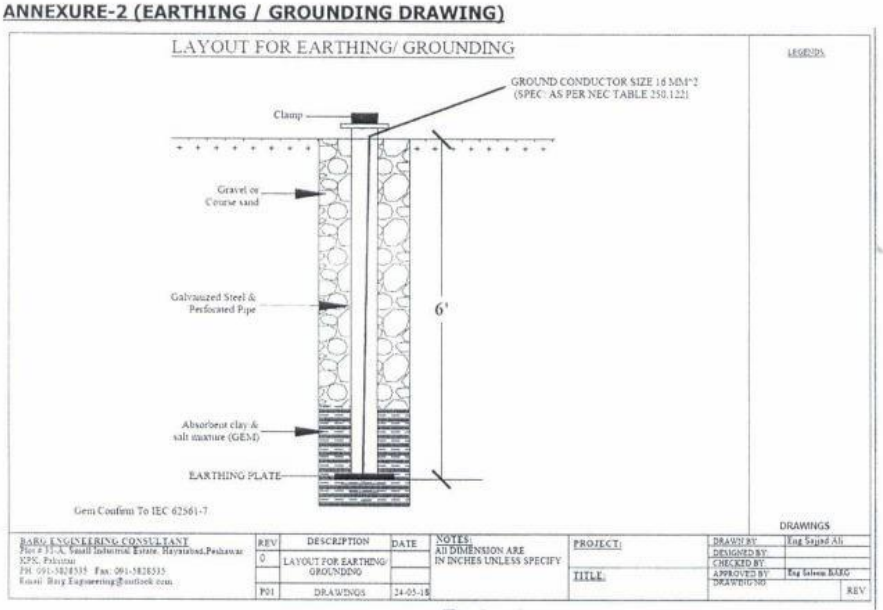
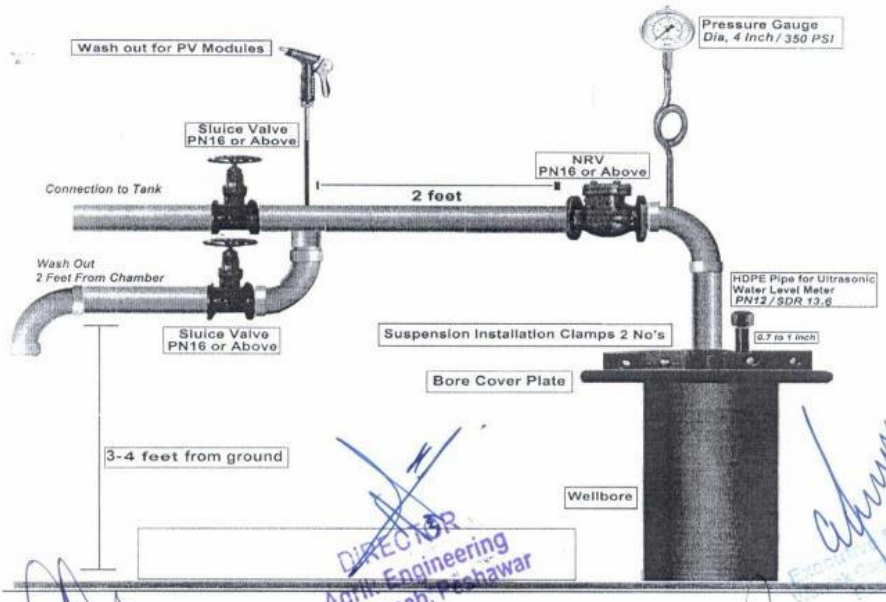
ANNEXURE-2 (EARTHING / GROUNDING DRAWING)



ANNEXURE-3 TOPSET LAYOUT:



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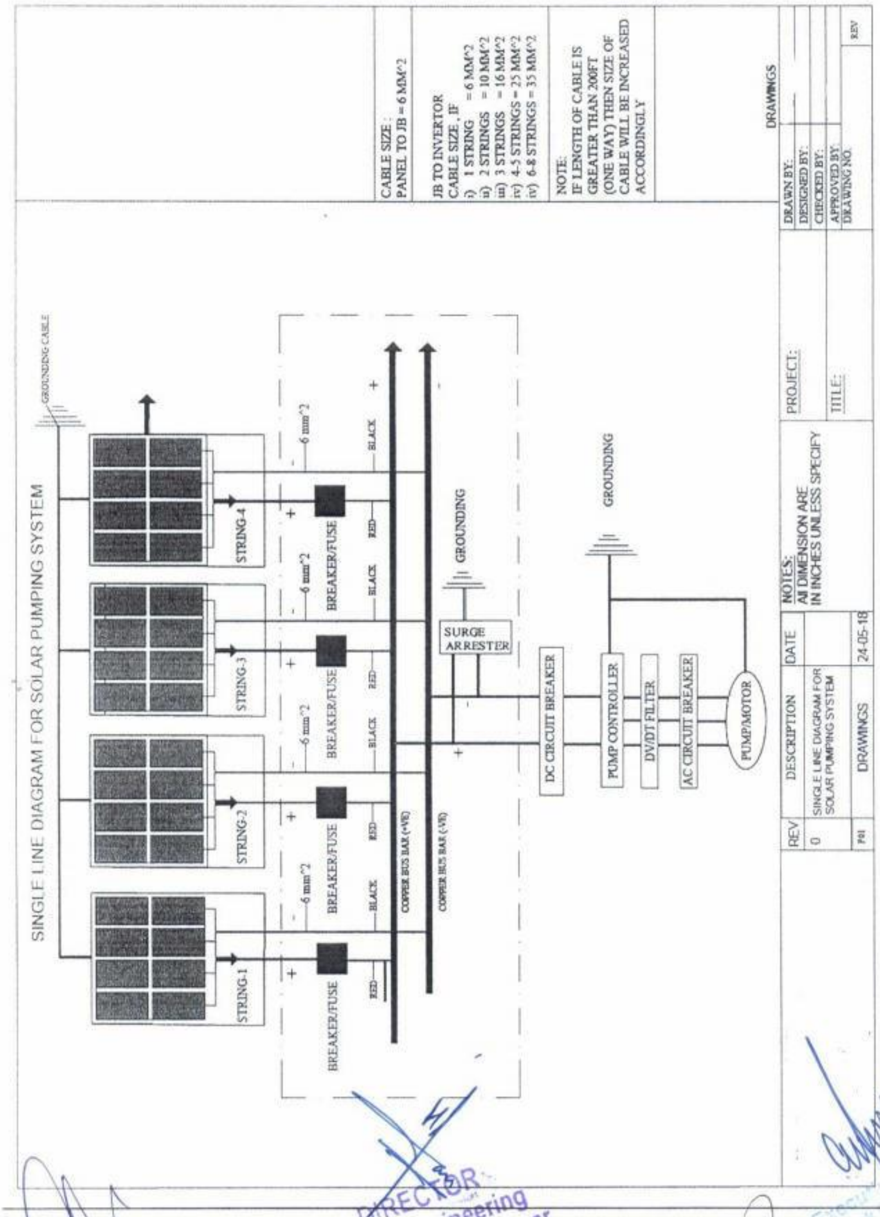
ANNEXURE-4 (SYSTEM SINGLE LINE DIAGRAM-PUMPING)



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