GOVERNMENT OF KHYBER PAKHTUNKHWA
IRRIGATION DEPARTMENT

BID SOLICITATION DOCUMENTS
(SINGLE STAGE SINGLE ENVELOP)

FOR
(SOLAR WORK)

S. No	Name of Work/Sub Work	E/ Cost Rs in (M)
I	**Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2025-26.**	
1.	Solarization of Irrigation Tubewell KFD-16 in District Peshawar (Solar Work).	3.3
2.	Solarization of Irrigation Tubewell KFD-05 in District Peshawar (Solar Work).	3.3
3.	Solarization of Irrigation Tubewell KFD-20 in District Peshawar (Solar Work).	3.3
II	**Rehabilitation of Irrigation Tubewells / Lift Irrigation Schemes & Solarization in Tubewell Irrigation Division Peshawar ADP No. 1769/160282 during 2025-26.**	
1.	Installation of Solar Based Irrigation Tubewell at Village Tela Band Ghalib Khel in District Peshawar (Solar Work).	4.2
2.	Installation of Solar Based Irrigation Tubewell at Zaman Kalay Bajoro Area Tehsil Tangi District Charsadda (Solar Work).	4.2

NAME OF CONTRACTOR: _____

TUBE WELLS IRRIGATION DIVISION PESHAWAR.

OFFICE OF THE EXECUTIVE ENGINEER
TUBEWELLS IRRIGATION DIVISION PESHAWAR.
Phone No. 091-9222731 Email:tidpeshawar001@gmail.com
Twitter: Tubwells Irrigation Divn Peshawar Facebook: Tubewells Irrigation Peshawar

No. 886 /5-M(i). Dated Peshawar the 10 /09/2025

To,

The Director,
Information Department,
Govt: of Khyber Pakhtunkhwa,
Peshawar.

Subject: **NOTICE FOR INVITING E-BIDDING.**
(SINGLE STAGE SINGLE ENVELOP PROCEDURE) & (E-PAD SYSTEM).

Enclosed find herewith 01 No Notice Inviting (E-PAD System). Tender for publication in at least one English and one Urdu daily newspaper with nationwide circulation as per clause 19 of the KPPRA rules 2014, please.

The bill of cost may be sent in duplicate for early payment please.

Encl:-As above.

EXECUTIVE ENGINEER

Copy along with its enclosure is forwarded to the:-

1. Director Planning and Monitoring Cell Government of Khyber Pakhtunkhwa Irrigation Department Peshawar for information.
2. Assistant Director (Web), Office of the Secretary Irrigation Peshawar with request to upload the Notice Inviting Tender on the stated web site www.irrigation.gkp.pk.please.
3. Managing Director Khyber Pakhtunkhwa public procurement Regulation Authority Peshawar KPPRA for uploading the same at your web site please.
4. Sub Divisional Officers Tubewells Irrigation Sub Division Peshawar for information please. They are requested to submit B.O.Qs of the attached work immediately please.
5. D.A.O/ H.C/ H.D (Local) for information.
6. Contract Agreement File.

EXECUTIVE ENGINEER

NOTICE FOR INVITING E-BIDDING
SINGLE STAGE SINGLE ENVELOP PROCEDURE (E-PAD SYSTEM)

Tubewells Irrigation Division Peshawar Irrigation Department, Government of Khyber Pakhtunkhwa, invites electronic Bids from the eligible firms / contractors in accordance with KPPRA Procurement Rules 2014 on single stage single envelop procedure for the following

S.No	Name of Work	E/ Cost Rs in (M)	2% E/Money with Stamp duty. (Rs)	PEC Relevant Code & Category
Name of Work: Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2024-25.				
1.	Solarization of Irrigation Tubewell KFD-16 in District Peshawar (Solar Work & Boundary wall).	3.3	70000/-	CE-09 CE-10 EE-11
2.	Solarization of Irrigation Tubewell KFD-05 in District Peshawar (Solar Work & Boundary wall).	3.3	70000/-	CE-09 CE-10 EE-11
3.	Solarization of Irrigation Tubewell KFD-20 in District Peshawar (Solar Work & Boundary wall).	3.3	70000/-	CE-09 CE-10 EE-11
Name of Work: Rehabilitation of Irrigation Tubewells / Lift Irrigation Schemes & Solarization in Tubewell Irrigation Division Peshawar ADP No. 1769/160282 during 2024-25.				
1.	Installation of Solar Based Irrigation Tubewell at Village Tela Band Ghalib Khel in District Peshawar (Solar Work).	4.2	88000/-	CE-09 CE-10 EE-11
2.	Installation of Solar Based Irrigation Tubewell at Zaman Kalay Bajoro Area Tehsil Tangi District Charsadda (Solar Work).	4.2	88000/-	CE-09 CE-10 EE-11

TERMS AND CONDITIONS

1. Bid Solicitation Documents containing all the terms and conditions and other relevant instructions and Eligibility criteria for the works can be downloaded from the department and or KPPRA websites (www.irrigation.gkp.pk) / (www.kppra.gov.pk).
2. Electronic bidding shall be done on **"Above / Below system"** on BOQ / Engineer's estimate.
3. All bidder are required to have valid registration with Khyber Pakhtunkhwa Revenue Authority.
4. The bidder shall submit 02% bid security, of the estimated cost as mentioned above, in the shape of deposit (Original) from scheduled banks in the name of Executive Engineer Tubewells Irrigation Division Peshawar.
5. Non-refundable bidding entry fee @0.03% of tender cost in shape of call deposit separately may be furnished (in original) to this office in the name of Executive Engineer, Tubewells Irrigation Division, Peshawar.

6. Notifications issued by KPPRA pertaining to procurement process issued from time to time shall be applicable.
7. If the evaluated electronic bid costs of two or more bidders are equal, then the successful bidder will be declared through draw / toss.
8. Pre-bid meeting will be held on 26-09-2025 at 12:00 PM in the office of the Executive Engineer Tubewells Irrigation Division Peshawar.
9. The Last date & time for Submission of the Bid along with relevant documents is 06-10-2025 up to 12:30 PM which will be opened on the same day at 01:00 PM in the office of the undersigned in presence of Contractor and their representatives who wishes to attend.
10. Bid security of 1st, 2nd and 3rd lowest bidders will be retained by the employer till the approval of bids by the competent Authority.
11. All Govt: Notifications/ Rules/Taxes updated from time to time shall be applicable.
12. The Bid will be received thought courier as per NIT time, date and venue. Further Bids submitted through telegraph, telex, fax or e-mail shall not be considered.
13. Notifications issued by KPPRA pertaining to procurement process issued from time to time shall be applicable and notification No. S.R.O. (14)/Vol: 1-24/2021-22, dated 10-05-2022 / 6058-71.

EXECUTIVE ENGINEER.

BASED ON

STANDARD FORM OF BIDDING DOCUMENTS

FOR

PROCUREMENT OF WORKS

(For Smaller Contracts)
Under Rs.45 million

Notified vide Notification No. KPPRA/M&E/SBDs/1-1/2015
Dated Peshawar the May 03, 2016

KHYBER PAKHTUNKHWA PUBLIC PROCUREMENT REGULATORY AUTHORITY (KPPRA)

SUMMARY OF CONTENTS

Subject

INVITATION
FOR
BIDS

KPPRA NOTOFICATION
(Updated from Time to Time)

GOVERNMENT OF KHYBER PAKHTUNKHWA,
KHYBER PAKHTUNKHWA
PUBLIC PROCUREMENT REGULATORY AUTHORITY

Peshawar, the May 10, 2022 /6058-71

NOTIFICATION

S.R.O. (14)/Vol: 1-24/2021-22: In exercise of the powers conferred under Section 35-A of the Khyber Pakhtunkhwa Public Procurement Regulatory Authority Act, 2012 (Khyber Pakhtunkhwa Act No. XI of 2012) the Authority has been pleased to issue the following regulation, namely: -

1. **Short title and commencement.-** (i) This regulation may be called the Khyber Pakhtunkhwa Public Procurement Regulation No. XIV 2022.

(ii) This shall come into force at once.

2. **Matters pertaining to Additional Security in case of abnormally low bids.-** This regulation relates to the matters pertaining to Additional Security submitted by the bidders in procurement of works.

i. The contractors quoting their bids up to a limit of 10% below Engineer estimate shall submit bid security @ 2% only of Engineer Estimate.

ii. The contractors quoting their bids more than 10% below upto 20% below on Engineers' Estimate shall submit along with their bids 8% Additional Security of Engineer's Estimated cost in addition to 2% bid security. If the bid is not accompanied with the required amount of additional security then it will be considered as non-responsive and the 2% bid security shall be forfeited in favour of Government and the second lowest bidder and so on will be considered accordingly.

iii. **[Similarly, a contractor quoting bid more than 20% below shall submit with his bid an additional security on Engineer's Estimated cost equal to the differential amount of submitted bid and Engineers' Estimate along with detailed rate analysis]**[1]. In case of more than 20% below bids, if the bid is not accompanied by the detailed rate analysis and / or required amount of additional security, then the said bid shall be considered as non-responsive. All the securities submitted along with such non-responsive bid shall be forfeited in favour of Government and the 2nd lowest bidder and so on will be considered accordingly.

iv. In case detailed rate analysis submitted with the bids is, in view of the Procuring Entity, not convincing, the Head of the Procuring Entity may declare such bid as non-responsive without any forfeiture of bid securities and record reasons thereof.

v. The procuring entity may offer the contract to next lowest bidder after due diligence in the context of financial difference between such two bids or may advertise procurement opportunity afresh.

[1] Differential amount; if a contractor quote, e.g. 25% below engineer estimate bid then he has to deposit along with his bid 2% bid security and 25% additional security of engineer estimate.

vi. After commencements of work by the successful bidder, the procuring entity may replace the Additional Security with a bank guarantee of the same amount from the scheduled bank; if the already deposited security is not in the form of bank guarantee.

vii. The Additional Security shall be released to the contractor in four installments i.e. 1st installment of 25% to be released upon completion of 25% of the project, 2nd installment of 25% to be released upon completion of 50% of the project, 3rd installment of 25% to be released upon completion of 75% of the project and the 4th installment of 25% to be released after 100% completion of the project.

viii. All previous orders, instructions and regulations issued regarding additional security shall stand superseded.

-SD-
Managing Director
KPPRA

ENDST: No. As above: **Peshawar, the May 10, 2022**

Copy forwarded to:-

1. The Additional Chief Secretary (P&D) Department, Govt. of Khyber Pakhtunkhwa.
2. The Administrative Secretaries (C&W, Irrigation, Public Health Engineering and Local Government, Elections & Rural Development Department) Khyber Pakhtunkhwa with request to circulate the same to their downstream formations for compliance.
3. The Principal Secretary to Governor, Khyber Pakhtunkhwa.
4. The Principal Secretary to Chief Minister, Khyber Pakhtunkhwa.
5. The Inspector General of Police, Khyber Pakhtunkhwa.
6. The Secretary Provincial Assembly, Khyber Pakhtunkhwa.
7. The Accountant General, Khyber Pakhtunkhwa.
8. The Registrar, Peshawar High Court, Peshawar.
9. All Commissioners and Deputy Commissioners in Khyber Pakhtunkhwa.
10. PSO to Chief Secretary, Govt. of Khyber Pakhtunkhwa.
11. All Heads of Autonomous/Semi-Autonomous Bodies in Khyber Pakhtunkhwa.
12. Director, Treasuries & Accounts with request to circulate the same to all DAOs & Treasuries Officers in Khyber Pakhtunkhwa.
13. The Section Officer (Admn), Finance Department, Govt. of Khyber Pakhtunkhwa with respect to his office letter No. SO(A)/FD/1-40/2022, dated 22.04.2022.
14. Manager, Stationery and Printing Press Khyber Pakhtunkhwa, for printing in the official gazette.

SANA ULLAH
Assistant Director (M&E), KPPRA

INSTRUCTIONS
TO BIDDERS
&
BIDDING DATA

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 SCOPE OF BID & SOURCE OF FUNDS

1.1 SCOPE OF BID

As per NIT

1.2 SOURCE OF FUNDS

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

IB.2 ELIGIBLE BIDDERS

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

a. Duly licensed by the Pakistan Engineering Council (PEC) in the appropriate category for value of Works i.e Specialization code (mentioned as per NIT).
b. Duly enlisted with the Provincial Govt. (Works Deptt:).
c. Registration with Federal Board of Revenue/ NTN Registration/ Sales Tax/ Income Tax Department with online active status.
d. Registration with Khyber Pakhtunkhwa Revenue Authority (Active Tax Payer).

e. The bid will be received thought courier as per NIT time, date and venue. Further Bids submitted through telegraph, telex, fax or e-mail shall not be considered.
f. Valid System Design must be submitted otherwise the bid will be Non-responsive. **(Note: Over system design not valid)**
g. Performance curves at STC for motor and pumping machinery should be provided along with original catalog for each work separately.
h. Warranty period of the following items should be provided on judicial stamp papers.
a. Solar panel etc will be 20 years and Defect liability period of Electrical / Mechanical works will be 2 years.
b. Inverter should have at least two (02) years product & performance warranty.
c. Two (02) years comprehensive free replacement, repair & maintenance warranty (Free of cost) should be provided for all the components of solar system.

IB.3 COST OF BIDDING

3.1 The bidder shall bear all costs including bid solicitation documents fee (nominal so as to cover printing/reproduction and mailing costs) 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.

B. BIDDING DOCUMENTS

IB.4 CONTENTS OF BIDDING DOCUMENTS

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

1. Instructions to Bidders & Bidding Data

2. Form of Bid & Schedules to Bid Schedules to Bid comprise the following:

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

3. Conditions of Contract & Contract Data
4. Standard Forms:
   i. Form of Bid Security
   ii. Form of Performance Security. (As per KPPRA Rules)
   iii. Form of Bank Guarantee for Advance Payment. (N.A)
5. Specifications (As per SBD/ NIT)
6. Drawings, if any (As per SBD/ NIT)

IB.5 CLARIFICATION OF BIDDING DOCUMENTS

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

5.2 The Engineer/Procuring Entity will respond to any request for clarification which it receives earlier than seven (7) days prior to the deadline for the submission of Bids. Copies of the Engineer/Procuring Entity's response will be forwarded to all prospective bidders, at least five (5) days prior to dead line for submission of Bids, who have received the Bidding Documents including a description of the enquiry but without identifying its source.

IB.6 AMENDMENT OF BIDDING DOCUMENTS

6.1 At any time prior to the deadline for submission of Bids, the 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.

6.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 6.1 hereof, and shall be communicated in writing to all purchasers of the BiddingDocuments. Prospective bidders shall acknowledge receipt of each addendum in writing to the Procuring Entity.

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

C. PREPARATION OF BID

IB.7 LANGUAGE OF BID

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

IB.8 DOCUMENTS COMPRISING THE BID

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

a. Covering Letter
b. Form of Bid duly filled, signed and sealed, in accordance with Sub-Clause IB.14.3 (financial bid shall be submitted through E-bidding System of Irrigation Department).
c. Schedules (A to F) to Bid duly filled and initialed, in accordance with the instructions contained therein & in accordance with Sub-Clause IB14.3. (As per BSD/NIT)
d. Bid Security furnished in accordance with Clause IB.13 as well as bid solicitation documents fee as per Clause IB 3.1. (As per BSD/NIT)
e. Power of Attorney in accordance with Sub-Clause IB 14.5. (Where applicable)
f. Documentary evidence in accordance with Clause IB.11. (Where applicable)
g. Documentary evidence in accordance with Clause IB.12. (Where applicable)

IB.9 SUFFICIENCY OF BID

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

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

IB.10 BID PRICES, CURRENCY OF BID & PAYMENT

10.1 The bidder shall fill up the Schedule of Prices (Schedule A to Bid) indicating the premiums/unit rates and prices of the Works to be performed under the Contract. Unit rate offered for an item shall be considered upto two significant decimal places (if applicable) for evaluation purposes by the Procuring Entity. Prices in the Schedule of Prices shall be entered keeping in view the instructions contained in the Preamble to Schedule of Prices.

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

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

IB.11 DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS

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

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

IB.12 DOCUMENTS ESTABLISHING WORKS CONFORMITY TO BIDDING DOCUMENTS

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

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

IB.13 BIDDING SECURITY

13.1 Each bidder shall furnish, as part of his bid, at the option of the bidder, a Bid Security in the amount stipulated in NIT in Pak. Rupees in the form of Deposit at Call [Deleted][1] in favour of the Procuring Entity. [The bid security shall be submitted from the account of the firm/bidder/contractor who submits the bid]2 (KPPRA Notification No. S.R.O. (14)/Vol: 1-24/2021-22, Dated Peshawar, the 10th May 2022 /6058-71) shall be applicable.

13.2 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Procuring Entity as non-responsive.(KPPRA rules 2014 as amended up to dated)

13.3 The bid securities of unsuccessful bidders will be returned as promptly as possible and top three retained till seven (7) days after award of contract to the successful bidder or on the expiry of validity of Bid Security whichever is earlier. (As per BSD/NIT)

13.4 ["The bid security of successful bidder 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".][3]

13.5 The Bid Security may be forfeited:

a. if a bidder withdraws his bid during the period of bid validity; or
b. if a bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) hereof; or
c. in the case of a successful bidder, if he fails to:
i. furnish the required Performance Security in accordance with Clause IB.21, or
ii. sign the Contract Agreement, in accordance with Sub-Clauses IB.20.2 & 20.3.
iii. Submit additional security as per KPPRA Notification No. S.R.O. (14)/Vol: 1-24/2021-22, Dated Peshawar, the 10th May 2022 /6058-71

IB.14 VALIDITY OF BIDS, FORMAT, SIGNING AND SUBMISSION OF BIDs

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

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

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

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

1 Inserted by KPPRA Notification No. KPPRA/M&E/Estt:/1-12/2017-18 dated April 05, 2018.
2 Substituted by KPPRA Notification No. KPPRA/M&E/Estt:/1-4/2016 dated May 24, 2016.

original shall prevail. (As original will be suffice)

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

14.6 The Bid shall be delivered in person, through courier service or sent by registered mail, or as specifically instructed by the Procuring Entity otherwise, at the address to Procuring Entity as given in Bidding Data. (As per NIT)

D. SUBMISSION OF BID

IB.15 DEADLINE FOR SUBMISSION, MODIFICATION & WITHDRAWAL OF BIDs

15.1 Bids must be received by the Procuring Entity at the address/provided in Bidding Data not later than the time and date stipulated therein & NIT. In the event of the specified date for the submission of bids declared a holiday for the Employer, the Bids will be received up to the appointed time on the next working day.

15.2 The bid will be received thought courier as per NIT time, date and venue. Further Bids submitted through telegraph, telex, fax or e-mail shall not be considered.

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

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

15.5 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security pursuant to Sub-Clause IB.13.5(a).

E. BID OPENING AND EVALUATION

IB.16 BID OPENING, CLARIFICATION AND EVALUATION

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

16.2 The bidder's name, Bid Prices, any discount, the presence or absence of Bid Security, and such other details as the Procuring Entity at its discretion may consider appropriate, will be announced by the Procuring Entity at the bid opening. The Procuring Entity willrecord the minutes of the bid opening. Representatives of the bidders who choose to attend shall sign the attendance sheet.Any Bid Price or discount which is not read out and recorded at bid opening will not be taken into account in the evaluation of bid.

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

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

b. Arithmetical errors will be rectified on the following basis:
If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between the words and figures the amount in words shall prevail. If there is a discrepancy between the Total Bid price entered in Form of Bid and the total shown in Schedule of Prices-Summary, the amount stated in the Form of Bid will be corrected by the Procuring Entity in accordance with the Corrected Schedule of Prices.
If the bidder does not accept the corrected amount of Bid, his Bid will be rejected and his Bid Security forfeited.

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

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

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

a. Technical Evaluation

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

b. Financial Evaluation

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

16.8 **Evaluated Bid Price**

In evaluating the bids, the Engineer/Procuring Entity will determine for each bid in addition to the Bid Price, the following factors (adjustments) in the

manner and to the extent indicated below to determine the Evaluated Bid Price:

i. Making any correction for arithmetic errors pursuant to Sub-Clause 16.4 hereof.

ii. Making an appropriate price adjustment for any other acceptable variation or deviation.

iii. Making an appropriate price adjustment for deviations in terms of Payments (if any and acceptable to the Procuring Entity).

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

16.9 **Evaluation Methods**

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

i. **Price Adjustment for Technical Compliance**

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

ii. **Price Adjustment for Commercial Compliance**

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

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

IB.17 PROCESS TO BE CONFIDENTIAL

17.1 Subject to Sub-Clause IB.16.3 heretofore, no bidder shall contact Engineer/Procuring Entity on any matter relating to its Bid from the time of the Bid opening to the time the bid evaluation result is announced by the Procuring Entity. The evaluation result may be announced at least ten (10) days prior to award of Contract. The announcement to all bidders will be Tentative E-bid Comparative Statement.

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

F. AWARD OF CONTRACT

IB.18 QUALIFICATION

18.1 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 requirethe 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.

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

IB.19 AWARD CRITERIA & PROCURING ENTITY'S RIGHT

19.1 Subject to Sub-Clause IB.19.2, 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 qualified to satisfactorily perform the Contract in accordance with the provisions of Clause IB.18.

19.2 Notwithstanding Sub-Clause IB.19.1, the Procuring Entity reserves the right to accept orreject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract (acceptance of a bid or proposal rule 47(1)), without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the Procuring Entity's action except that the grounds for its rejection of all bids shall upon request be communicated, to any bidder who submitted a bid, without justification of the grounds. Notice of the rejection of all the bids shall be given promptly to all the bidders.

IB.20 NOTIFICATION OF AWARD & SIGNING OF CONTRACT AGREEMENT

20.1 Prior to expiration of the period of bid validity prescribed by the Procuring Entity, the Procuring Entity will notify the successful bidder in writing ("Letter of Acceptance") that his bid has been accepted.

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

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

IB.21 PERFORMANCE SECURITY

(As per KPPRA Rules 2014)

IB.22 INTEGRITY PACT

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

BIDDING DATA

INSTRUCTIONS TO BIDDERS

Clause Reference

1.1 **Name of Procuring Entity**

Executive Engineer, Tube wells Irrigation Division Peshawar.

Brief Description of Works

Developmental

5.1 **a. Procuring Entity's address:**

Executive Engineer, Tube wells Irrigation Division Peshawar.

b. Engineer's address:

Executive Engineer, Tube wells Irrigation Division Peshawar
Phone No. 091-9222731, Email:tidpeshawar001@gmail.com

10.3 Bid shall be quoted entirely in Pak. Rupees (Above/Below) on applicable schedule and non-Schedule items. The payment shall be made in Pak. Rupees for work done on release of funds, subject to fulfillment of Codal Formalities, Technical Sanction, Agreement sanction, complying of Material & Technical specifications.

11.2 The bidder/manufacturer has the financial, technical and production capability necessary to perform the Contract i.e., Registration with PEC in relevant category & financial limit as noted in NIT and BSD, Registration with KPRA, Enlistment with Irrigation Department Khyber Pakhtunkhwa, has been issued E-bidding Login & Password.

12.1 a. Essential technical specification as per document at the following link are required:

https://www.finance.gkp.pk/attachments/032e8420a37611ec83c625b66397c1ee/download (Technical Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

Essential Material specification as per document at the following link are required:

https://www.finance.gkp.pk/attachments/032b21c0a37611eca4e0b55aac984a07/download (Material Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

b. Complete set of tentative technical specifications as per Approved PC-I/T.S/BOQ

13.1 **Amount of Bid Security**

2% of Estimated Cost& as per KPPRA Notification No. S.R.O. (14)/Vol: 1-24/2021-22: Dated Peshawar, the 10th May 2022 /6058-71

14.1 **Period of Bid Validity**

90 Days

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

One original

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

Executive Engineer, Tube wells Irrigation Division, Peshawar.
Phone No. 091-9222731, Email:tidpeshawar001@gmail.com

15.1 **Deadline for Submission of Bids**

As per NIT

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

Executive Engineer, Tube Wells Irrigation Division Peshawar
Warsak Road Kababian Peshawar.
Time: As per NIT
Date: As per NIT

16.4 **Responsiveness of Bids**

i. The Bid is valid till required period,
ii. The Bid prices are firm during currency of contract (if it is a fixed price bid)
iii. Completion period offered is within specified limits or as noted in NIT/SBD
iv. The Bidder/Manufacturer is eligible to Bid and possesses the requisite experience, capability and qualification. (As per SBD)
v. The Bids are generally in order, etc.
vi. The bid will be received thought courier as per NIT time, date and venue

16.9 **Price Adjustment:**

(NOT APPLICABLE)

FORM OF BID AND SCHEDULES TO BID

FORM OF BID

(LETTER OF OFFER)

Bid Reference No. _____

NIT No. _____

Date of Opening No. _____

Work No. as per NIT. _____

_____
(Name of Works)

To

Executive Engineer,
Tube Wells Irrigation Division,
Peshawar.

Gentlemen,

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

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

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

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

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

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

7. We undertake, if our Bid is accepted, to execute the Performance Securityreferred to in Conditions of Contract for the due performance of the Contract & as per KPPRA Notification No. S.R.O. (14)/Vol: 1-24/2021-22: Dated Peshawar, the 10th May 2022 /6058-71.

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

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

Dated this_____day of _____, 20

Signature _____
in the capacity of _____duly authorized to sign bid for and on behalf of

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

Address
_____

_____

_____

Witness:

(Signature)_____

Name:_____NIC No._____
Address
_____

_____

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

SCHEDULES TO BID INCLUDE THE FOLLOWING:

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

SCHEDULE OF PRICES

THE BOQ SHALL BE FILLED 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

*SPECIFIC WORKS DATA

THE CONTRACTOR SHALL FOLLOW MATERIAL SPECIFICATIONS AS PER:
https://www.finance.gkp.pk/attachments/032e8420a37611ec83c625b66397c1ee/download
(Technical Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

THE CONTRACTOR SHALL FOLLOW TECHNICAL SPECIFICATIONS AS PER:
https://www.finance.gkp.pk/attachments/032b21c0a37611eca4e0b55aac984a07/download
(Material Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

FOR SCHEDULE ITEMS AND INDUSTRY STANDARDS SHALL BEADOPTED/FOLLOWED FOR NON-SCHEDULE ITEMS

SCHEDULE – C TO BID

WORKS TO BE PERFORMED BY SUBCONTRACTORS

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

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

Note:

1. No change of Sub-Contractors shall be made by the bidder without prior approval of the Procuring Entity.

2. The truthfulness and accuracy of the statement as to the experience of Sub-Contractors is guaranteed by the bidder. The Procuring Entity's judgment shall be final as to the evaluation of the experience of Sub-Contractors submitted by the bidder.

3. Statement of similar works shall include description, location & value of works, year completed and name & address of the clients.

PROPOSED PROGRAM OF WORKS

Bidder may provide a program in a bar-chart showing the sequence of work items by which he proposes to complete the Works of the entire Contract. The program should indicate the sequence of work items and the period of time during which he proposes to complete the Works including the activities like designing, schedule of submittal of drawings, ordering and procurement of materials, manufacturing, delivering, construction of civil works, erection, testing and commissioning of Works to be supplied under the Contract.

Signature: _____

Seal: _____

Dated: _____

METHOD OF PERFORMING WORKS

(NOT APPLICABLE)

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

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.
- A list of all major items of constructional and erectional plant, tools and vehicles proposed to be used in delivering/carrying out the Works at Site
- The procedure for installation of equipment and transportation of equipment and materials to the site.

Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

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

Without limiting the generality of the foregoing, [name of the Bidder] 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 Government of Khyber Pakhtunkhwa , except that which has been expressly declared pursuant hereto.

[name of the Bidder] 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 GoKP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of the Bidder] 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 GoKP under any law, contract or other instrument, be voidable at the option of GoKP.

Notwithstanding any rights and remedies exercised by GoKP in this regard, [name of the Bidder] agrees to indemnify GoKP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoKP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of the Bidder] 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 GoKP.

Name of the Procuring Entity:	Name of the Bidder:
_____	_____
Signature: ……	Signature: ……
[Seal]	[Seal]

CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 **Definitions**

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

The Contract

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

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

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

Persons

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

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

1.1.6 "Party" means either the Procuring Entity or the Contractor.

Dates, Times and Periods

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

1.1.8 "Day" means a calendar day

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

Money and Payments

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

Other Definitions

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

1.1.12 "Country" means the Islamic Republic of Pakistan.

1.1.13 "Province" means Khyber Pakhtunkhwa.

1.1.14 "Procuring Entity's Risks" means those matters listed in Sub-Clause 6.1.

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

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

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

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

1.1.19 "Variation" means a change which is instructed by the Engineer/Procuring Entity under Sub-Clause 10.1.

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

1.1.21 "Engineer" means the person, if any, notified by the Procuring Entity to act as Engineer for the purpose of the Contract and named as such in Contract Data.

1.2 **Interpretation**

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

1.3 **Priority of Documents**

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

1.4 **Law**

The law of the Contract is the relevant Law of Khyber Pakhtunkhwa Province,

1.5 **Communications**

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

1.6 **Statutory Obligations**

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

2. THE PROCURING ENTITY

2.1 **Provision of Site**

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

2.2 **Permits etc.**

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

2.3 **Engineer's/Procuring Entity's Instructions**

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

2.4 **Approvals**

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

3. ENGINEER'S/PROCURING ENTITY'S REPRESENTATIVES

3.1 **Authorized Person**

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

3.2 **Engineer's/Procuring Entity's Representative**

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

4. THE CONTRACTOR

4.1 **General Obligations**

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

4.2 **Contractor's Representative**

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

4.3 **Subcontracting**

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

4.4 **Performance Security**

As per KPRA Rules 2014

5. DESIGN BY CONTRACTOR

5.1 **Contractor's Design**

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

5.2 **Responsibility for Design**

The Contractor shall remain responsible for his bided design and the design under this Clause, both of which shall be fit for the intended purposes defined in the Contract and he shall also remain responsible for any infringement of any patent or copyright in respect of the same. The Procuring Entity shall be responsible for the Specifications and Drawings.

6. PROCURING ENTITY'S RISKS

6.1 **The Procuring Entity's Risks**

The Procuring Entity's Risks are:-

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

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

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

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

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

f. Use or occupation by the Procuring Entity of any part of the Works, except as may be specified in the Contract**;**

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

h. A suspension under Sub-Clause 2.3 unless it is attributable to theContractor's failure; and

i. Physical obstructions or physical conditions other than climatic conditions, encountered on the Site during the performance of the Works, for which theContractor immediately notified to the Procuring Entity and accepted by the Procuring Entity.

7. TIME FOR COMPLETION

7.1 **Execution of the Works**

The Contractor shall commence the Works on the Commencement Date and shall proceed expeditiously and without delay and shall complete the Works, subject to Sub-Clause 7.3 below, within the Time for Completion.

7.2 **Program**

Within the time stated in the Contract Data, the Contractor shall submit to the Engineer/Procuring Entity a program for the Works in the form stated in the Contract Data.

7.3 **Extension of Time**

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

7.4 **Late Completion**

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

8. TAKING-OVER

8.1 **Completion**

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

8.2 **Taking-Over Notice**

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

9. REMEDYING DEFECTS

9.1 **Remedying Defects**

The Contractor shall for a period of 120 days from the date if issue of the Certificate of Completion carries out, at no cost to the Procuring Entity, repair and rectification work which is necessitated by the earlier execution of poor quality of work or use of below specifications material in the execution of Works and which is so identified by the Procuring Entity/Engineer in writing within the said period. Upon expiry of the said period, and subject to the Contractor's faithfully performing his aforesaid obligations, the Procuring Entity/Engineer shall issue a Maintenance Certificate whereupon all obligations of the Contractor under this Contract shall come to an end.Failure to remedy any such defects or complete outstanding work within a reasonable time shall entitle the Procuring Entity to carry out all necessary works at the Contractor's cost. However, the cost of remedying defects not attributable to the Contractor shall be valued as a Variation.

9.2 **Uncovering and Testing**

The Engineer/Procuring Entity may give instruction as to the uncovering and/or testing of any work. Unless as a result of an uncovering and/or testing it is established

that the Contractor's design, Materials, Plant or workmanship are not in accordance with the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 10.2.

10. VARIATIONS AND CLAIMS

10.1 **Right to Vary**

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

10.2 **Valuation of Variations**

Variations shall be valued as follows:

a. At a lump sum price agreed between the Parties, or
b. where appropriate, at rates in the Contract, or
c. in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which
d. at appropriate new rates, as may be agreed or which the Engineer/Procuring Entity considers appropriate, or
e. if the Engineer/Procuring Entity so instructs, at day work rates set out in the Contract Data for which the Contractor shall keep records of hours of labour and Contractor's Equipment, and of Materials, used.

10.3 **Early Warning**

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

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

10.4 **Valuation of Claims**

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

10.5 **Variation and Claim Procedure**

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

11. CONTRACT PRICE AND PAYMENT

11.1 **a. Terms of Payments**

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 7.4 of Conditions of Contract (CoC) 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, or, in the case of the Final Certificate referred to in Sub Clause 11.5 of CoC, within 60 days after such FinalPayment Certificate has been jointly verified by Procuring Entity and Contractor; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project. In the event of the failure of the Procuring Entity to make payment within the times stated, the Procuring Entity shall pay to the Contractor compensation at the 28 days rate of KIBOR+2% per annum in local currency and LIBOR+1% for foreign currency, upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 12.2 CoC. (N/A)

b. Valuation of the Works

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

11.2 **Monthly Statements**

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

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

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

11.3 **Interim Payments**

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

11.4 **Retention**

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

11.5 **Final Payment**

Within twenty-one (21) days from the date of issuance of the Maintenance Certificate the Contractor shall submit a final account to the Engineer to verify and the Engineer shall verify the same within fourteen (14) days from the date ofsubmission and forward the same to the Procuring Entity together with any documentation reasonably required to enable the Procuring Entity to ascertain the final contract value.Within sixty (60) days from the date of receipt of the verified final account from the Engineer, the Procuring Entity shall pay to the Contractor any amount due to the Contractor. While making such payment the Procuring Entity may, for reasons to be given to the Contractor in writing, withhold any part or parts of the verified amount.

11.6 **Currency**

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

12. DEFAULT

12.1 **Default by Contractor**

If the Contractor abandons the Works, refuses or fails to comply with a valid instruction of the Engineer/Procuring Entity or fails to proceed expeditiously and without delay, or is, despite a written complaint, in breach of the Contract, the Procuring Entity may give notice referring to this Sub-Clause and stating the default. If the Contractor has not taken all practicable steps to remedy the default within fourteen (14) days after receipt of the Procuring Entity's notice, the Procuring Entity may by a second notice given within a further twenty-one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site leaving behind any Contractor's Equipment which the Procuring Entity instructs, in the second notice, to be used for the completion of the Works at the risk and cost of the Contractor.

12.2 **Default by Procuring Entity**

If the Procuring Entity fails to pay in accordance with the Contract, or is, despite a written complaint, in breach of the Contract, the Contractor may give notice referring to this Sub-Clause and stating the default. If the default is not remedied within fourteen (14) days after the Procuring Entity's receipt of this notice, the Contractor may suspend the execution of all or parts of the Works.
If the default is not remedied within twenty-eight (28) days after the Procuring Entity's receipt of the Contractor's notice, the Contractor may by a second notice given within a further twenty-one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site.

12.3 **Insolvency**

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

12.4 **Payment upon Termination**

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

a. Any sums to which the Contractor is entitled under Sub-Clause 10.4,
b. Any sums to which the Procuring Entity is entitled,
c. if the Procuring Entity has terminated under Sub-Clause 12.1 or 12.3, the Procuring Entity shall be entitled to a sum equivalent to twenty percent (20%) of the value of parts of the Works not executed at the date of the termination, and
d. if the Contractor has terminated under Sub-Clause 12.2 or 12.3, the Contractor shall be entitled to the cost of his demobilization together with a sum equivalent to ten percent (10%) of the value of parts of the Works not executed at the date of termination.

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

13. RISKS AND RESPONSIBILITIES

13.1 **Contractor's Care of the Works**

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

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

13.2 **Force Majeure**

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

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

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

a. Any sums to which the Contractor is entitled under Sub-Clause 10.4,
b. The cost of his demobilization, and
c. less any sums to which the Procuring Entity is entitled.

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

14. INSURANCE

14.1 **Arrangements**

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

14.2 **Default**

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

15. RESOLUTION OF DISPUTES

15.1 **Engineer's Decision**

If a dispute of any kind whatsoever arises between the Procuring Entity and the Contractor in connection with the Works, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the twenty-eight (28) days after the day on which he received such reference, the Engineer shall give notice of his decision to the Procuring Entity and theContractor. Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence, and the Contractor and the Procuring Entity shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided in an arbitral award.

15.2 **Notice of Dissatisfaction**

If a Party is dissatisfied with the decision of the Engineer or if no decision is given within the time set out in Sub-Clause 15.1 hereabove, the Party may give notice of dissatisfaction referring to this Sub-Clause within fourteen (14) days of receipt of the decision or the expiry of the time for the decision. If no notice of dissatisfaction is given within the specified time, the decision shall be final and binding on the Parties. If notice of dissatisfaction is given within the specified time, the decision shall be binding on the Parties who shall give effect to it without delay unless and until the decision of the Engineer is revised by an arbitrator.

15.3 **Arbitration**

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

15.4 **Resolution of Dispute in Absence of The Engineer.**

In case no Engineer has been appointed, the dispute, if any, between the Procuring Entity and the Contractor in connection with the Works, shall first be tried to be resolved amicably. In case the dispute could not be resolved amicably, it shall be settled as per provision of Arbitration Act-1940.

16. INTEGRITY PACT

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

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

CONTRACT DATA

(Note: Except where otherwise indicated, all Contract Data should be filled in by the Procuring Entity prior to issuance of the Bidding Documents.)

Sub-Clauses of Conditions of Contract

1.1.3 **Procuring Entity's Drawings, if any**
As per PC-I/T.S/B.O.Q

1.1.4 **Procuring Entity**
Means **Executive Engineer, Tube wells Irrigation Division Peshawar.**

1.1.5 **The Contractor**
Means**M/S _____ Govt: Contractor**

1.1.7 **Commencement Date**
Means the date of issue of Engineer's Notice toCommencewhich shall be issued within fourteen (14) days of the signing of the Contract Agreement.

1.1.9 **Time for Completion**
As per Work order

1.1.20 **Engineer,**
Executive Engineer (Concerned)

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

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

(The Procuring Entity may add, in order of priority, such other documents as form part of the Contract. Delete the document, if not applicable)

2.1 **Provision of Site:**
On the Commencement Date by the Sub Divisional Officer (Concerned)

3.1 **Authorized person:**
Executive Engineer, Tube wells Irrigation Division Peshawar.

3.2 **Name and address of Engineer's/Procuring Entity's representative**
Executive Engineer, Tube Wells Irrigation Division, Peshawar.

Warsak Road Kababian Peshawar.

4.4 **Performance Security:**
As per KPPRA Rules 2014.

5.1 **Requirements for Contractor's design (if any):**
Specification Clause No's_____N/A_____

7.2 **Program:**
Time for submission:
Within fourteen (14) days* of the Commencement Date.

Form of program:
(Bar Chart)

7.4 Amount payable due to failure to complete shall be 0.05% per day up to a maximum of(10%) * of sum of Contract Price.
(Usually, the liquidated damages are set between 0.05% and 0.10 percent perday.)

9.1 **Period for remedying defects**
03 Months after final measurement date

10.2 (e) **Variation procedure:**
Daywork rates_____N/A_____(details)

11.1 ***(a)** **Terms of Payments**
Payment of Contract Price shall be made in the following manners**:**
--------N.A--------

***(b)** **Valuation of the Works:**
i. Lump sum price_____(details), or
ii. Lump sum price with schedules of rates _____ (details), or
iii. Lump sum price with bill of quantities_____(details), or
iv. Re-measurement with estimated/bid quantities in the Schedule of Prices_____(details), or/and
v. Cost reimbursable_____(details)

11.2 (b) **Percentage of value of Materials and Plant (for day work ifapplicable):**
Materials eighty (80%)*
Plant ninety (90%)*

11.3 **Percentage of retention:**
Eight (08%)

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

14.1 **Insurances:**

i. **Type of cover**
The Works

ii. **Amount of cover**
The sum stated in the Letter of Acceptance plus fifteen percent (15%)

iii. **Type of cover**
Contractor's Equipment:

iv. **Amount of cover**

Full replacement cost

* (Procuring Entity to amend as appropriate)

Type of cover

Third Party-injury to persons and damage to property

_____

(The minimum amount of third-party insurance should be assessed by the Procuring Entity and entered).

Workers:

_____

_____

Other cover*:

_____

(In each case name of insured is Contractor and Procuring Entity)

14.2 **Amount to be recovered**

Premium plus _____ percent (____%).

15.3 **Arbitration**

Place of Arbitration: The Grievance redressal mechanism as per KPPRA shall be applicable, only. / Arbitration Act 1940 & place shall be Peshawar, KP.

STANDARD FORMS

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

FORM OF BID SECURITY

(Bank Guarantee)

Guarantee No._____

Executed on _____

(Letter by the Guarantor to the Procuring Entity)

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

Name of Principal (Bidder) with address:_____

_____

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

_____

Bid Reference No._____ Date of Bid _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal, we the Guarantor above-named are held and firmly bound unto the _____, (hereinafter called The "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 principal has submitted the accompanying Bid numbered and dated as above for_____ (Particulars of Bid) to the said Procuring Entity; andWHEREAS, the Procuring Entity has required as a condition for considering the said Bid that the principal furnishes a Bid Security in the above said sum to the Procuring Entity, conditioned as under:

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

(2) that in the event of;

- (a) The principal withdraws his Bid during the period of validity of Bid, or
- (b) The principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) of Instructions to Bidders, or
- (c) failure of the successful bidder to
  - (i) furnish the required Performance Security, in accordance with Sub-Clause IB-21.1 of Instructions to Bidders, or
  - (ii) sign the proposed Contract Agreement, in accordance with Sub-Clauses IB-20.2 & 20.3 of Instructions to Bidders,

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

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

PROVIDED THAT the Guarantor shall forthwith pay to the Procuring Entity the said sum stated above 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 Guarantor at its address given above.

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

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

_____
Guarantor (Bank)

Witness:

1._____

_____
Corporate Secretary (Seal)

2._____

_____
(Name, Title & Address)

1.Signature_____

2. Name_____

3. Title_____

Corporate Guarantor (Seal)

FORM OF PERFORMANCE SECURITY

(Bank Guarantee)

Guarantee No._____
Executed on _____

(Letter by the Guarantor to the Procuring Entity)

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

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 accepted 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 the 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 9, Remedying Defects, of Conditions of Contract are fulfilled.

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

We, _____ (the Guarantor), waiving all objections and 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, for 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 bounded 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._____

_____
Corporate Secretary (Seal)

2._____

_____
(Name, Title & Address)

1.Signature_____

2. Name_____

3. Title_____

_____
Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____day of _____ 20 _____ between Executive Engineer, Tube Wells Irrigation Division, Peshawar. (Hereinafter called the "Procuring Entity") of the one part and

_____

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

WHEREAS the Procuring Entity is desirous that certain Work/s, 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 witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders, shall be deemed to form and be read and construed as part of this Agreement, viz:

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

3. In consideration of the payments to be made by the 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 within 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 Contract Agreement to be executed on the day**,** month and year first before written in accordance with their respective laws.

Signature of the Contactor_____ _____(Seal)

Signature of the Procuring Entity_____ _____(Seal)

Signed, Sealed and Delivered in the presence of:

Witness: Witness:

_____ _____

(Name, Title and Address) (Name, Title and Address)

FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No._____

Executed on_____

(Letter by the Guarantor to the Procuring Entity)

WHEREAS the Executive Engineer, Tube Well Irrigation Division, Peshawar.(Hereinafter called the Procuring Entity) has entered into a Contract for _____ _____ _____ (Particulars of Contract), with _____ _____ (hereinafter called the Contractor).

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

AND WHEREAS the Procuring Entity has asked the Contractor to furnish Guarantee to secure the advance payment for the performance of his obligations under the said Contract.

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

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

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

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

This Guarantee shall expire not later than _____by which date we must have received any claims by registered letter, telegram, telex or e-mail.

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

_____
Guarantor (Bank)

Witness:

1._____

_____
Corporate Secretary (Seal)

2._____

_____
(Name, Title & Address)

1.Signature_____

2. Name_____

3. Title_____

_____
Corporate Guarantor (Seal)

SPECIFICATIONS

Note for Preparing the Specifications

Standard technical specification as per document at the following link are required:
https://www.finance.gkp.pk/attachments/032e8420a37611ec83c625b66397c1ee/download
(Technical Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

Standard material specification as per document at the following link are required:
https://www.finance.gkp.pk/attachments/032b21c0a37611eca4e0b55aac984a07/download
(Material Specification on MRS 20241st BI ANNUAL/BOQ) for the following sub works.

Sr. #	Scheme Name	Discharge (IGPH)	Total Dynamic Head (Feet)	Pump Setting (Feet)	Water Horse Power (WHP) / Hydraulic Power	Pump Efficiency (%) (75% -- 80%)	Motor Efficiency (%)	Shaft Power (HP)	BREAK HOURSE POWER (BHP with 20% safety factor)	Say Motor Horse Power	Motor Basic Input Power (Watt)	PV De-rating Factor (%) (50%)	Total PV Power (Watt) with Safety Factor	PV Generator Peak Power (Watts)				Motor Model Make, & HP	Pump Model, Make, HP & DN	Inverter Make, Model & K.Watt	PV Module Make & Watt
														No of String in Parallel	No of String in Series	Single PV Module Size (Watts)	Total PV Generation				
A) Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2025-26																					
1.	KFD-05	10000	70	100																	
2	KFD-16	10000	70	100																	
3	KFD-20	10000	70	100																	
B) Rehabilitation of Irrigation Tubewells / Lift Irrigation Schemes & Solarization in Tubewell Irrigation Division Peshawar ADP No. 1769/160282 during 2025-26																					
4	Tela band ghalib khel	7000	377	380																	
5	Bajoro Area Tehsil	14000	211	160																	

BILL OF QUANTITIES Work. 1

Name of Work	**Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2025-26.**
Sub Work	**Solarization of Irrigation Tubewell KFD-20 in District Peshawar(Solar Work & Boundary wall).**

S.No.	Item Code	Item Name	Unit	Qty	Price	Total
1	03-25-b	Excavation in foundation of building, bridges etc complete : in ordinary soil	m3	38.99	243.91	9,510.05
2	06-03-b	Cement Concrete (brick/stone ballast, 1.5" to 2"/nullah shingle well graded and cleaned) in foundation & plinth (Ratio 1:4:8)	m3	13.42	4663.21	62580.28
3	07-04- a-05	1st class brick work in foundation and plinth in Cement, sand mortar 1:6	m3	23.58	8919.77	210328.177
4	06-26- b-02	Damp proof course of cem. conc. 1:2:4 including bitumen coat, 1 layer polythene & 2 coats bitumen (2" thick)	m2	20.90	979.46	20470.71
5	03-18-a	Filling, watering and ramming earth under floor with surplus earth from foundation, etc	m3	33.98	77.66	2638.89
6	07-05- a-05	1st class brick work in ground floor Cement, sand mortar 1:6	m3	42.68	9584.29	409057.50
7	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	m3	1.02	7783.07	7938.73
8	25-45-b	Supplying and Fixing 18 SWG MS Sheet Gate with angle iron frame (2"x2"x3/16") with side window, lock, painting etc	m2	7.43	9560.87	71037.26
9	11-18-b	Cement pointing struck joints, on walls, upto 20' height : Ratio 1:3	m2	167.23	303.25	50712.50
10	11-09-b	Cement plaster 1:4 upto 20' height 1/2" thick	m2	183.67	286.75	52667.37
11	28-17-a	Providing and Fixing barbed wire fencing with 4 horizontal & 2 cross wires : Without PCC base	m	91.44	1617.60	147913.34
12	06-07- a-03	RCC in roof slab, beam, column & other structural members, insitu or precast. (1:2:4)	m3	3.87	9203.68	35618.24
13	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	0.04	141789.80	5671.59
14	26-01-r	Supply and Erection of PV MOUNTING FRAME WITH MANUAL TRAKERING	kW	11.19	29276.46	327603.59
15	26-01- d-01	Supply and Erection of Solar PV Module (Solar Panel) Mono-crystalline A-Grade (per Watt) (As per Approved Specifications)	Watt	73.58	12490.00	919014.20
16	15-09-d	Supply and Erection MS sheet box of 16 SWG, 4"deep with 3/16" thick bakelite sheet top etc. complete : 8"x10"	Each	3.00	403.10	1209.30
17	15-71-d	Supply and Erection single phase imported auto circuit breaker 30 Amp.	Each	9.00	934.80	8413.20
18	26-01- g-04	Supply and Erection 1x10 sq.mm flexible copper cable	m	73.15	349.84	25590.80

19	26-01- g-03	Supply and Erection 1x6 sq.mm single core (XPLE/XPLO insulated/PCV sheathed) flexible copper cable	m	36.58	228.30	8351.21
20	26-01- b-03	Supply and Erection PVC flexible pipe : 2" i/d	m	36.58	396.57	14506.53
21	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Per Watt	7500.00	16.95	127125.00
22	15-70-c	Supply and Erection transpower auto circuit breaker 3-phase, 400V fungus moisture proofing : 100 Amp.	Each	1.00	8107.25	8107.25
23	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,	Each	1.00	327088.50	327088.50
24	24-50- c-01	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x10 mm2	Meter	30.48	635.75	19377.66
25	ns - 217396	Supply and Fixing MS Column pipe with flanges for submerssible pump : 5" (125 mm) Nominal Pipe Size (NPS), 3/16" thick, 10' length.	Mtr	28.35	3627.08	102827.72
26	27-48	Rubber packing 1/32" to 1/16"thick	No.	9.00	98.16	883.44
27	15-72-f	Supply & erection of Nut & Bolt (2"x5/8')	Each	54.00	212.86	11494.44
28	ns - 217395	Supplying and Fixing MS Suspension Clamp 3/8" thick for housing pipe : 5" i/d.	Each	2.00	717.98	1435.96
29	ns - 217394	Supply and fixing bore cover plate (2 pieces) 3/8" thick arangment holes for column and cable, hole one inches i/c for inspection of water level in Tube well.	Job	1.00	2000.00	2000.00
30	15-53	Special earthing of iron/metal clad switches etc with copper wire No. 8 SWG in GI pipe 1/2" dia	Each	1.00	15997.96	15997.96
31	15-11- b-07	Supply & Erection of Change over switch 200 Amp	Each	1.00	24194.00	24194.00
32	24-48-a	Supply and installation of manually controlled voltage regulator oil cooled with 99.9% copper winding, and independed control regulator on each phase 20-30 KVA	Each	2.00	95845.13	191690.26
33	ns - 217393	Supply & Fixing A-Grade Ground Solar Stand (Galvanized iron 12/14Gauge) for Solar Panels with nut bolts & Rawal Bolts with all respect.	watt	300.00	7.00	2100.00
34	26-01- g-09	Supply and Erection 2x4 sq.mm flexible copper cable	m	22.86	308.67	7056.20

35	15-79-b	Supply and Fixing PVC conduit for surface wiring (dura duct) 1" including all charges for nail screws etc	m	21.34	102.21	2181.16
36	15-71-a	Supply and Erection single phase imported auto circuit breaker 6 Amp.	Each	4.00	648.00	2592.00
37	26-01- f-02	Supply and Erection of 12 V VRLA AGM Battery per AH	AH	150.00	293.60	44040.00
38	26-01- e-03	Supply and Erection of MPPT Solar Light Charge Controller (20 Amps, 12/24 V) with all sort of electronic protections	No	1.00	11743.86	11743.86
39	26-01-o	Supply and Erection of BOX / STAND for Batteries SHS Inverter & Charge Controller	Watt	300.00	6.26	1878.00
40	26-01-l-02	Supply and Erection of DC CEILING FANS 48 inch 30-36 W	No	1.00	4583.20	4583.20
41	ns - 217392	Supply and Erection of DC ENERGY EFFICIENT LED LIGHT BULBS (10-20 Watt)	Each	4.00	182.00	728.00
					Total:	**3299958.08**
					Grand Total in Million	**3.300**

Note: - Any other item of work crop up during execution will be paid on M.R.S 2024 1st Bi .The Quantities are liable to be increased or decreased during execution.

Sub Divisional Officer,
Tubewells Irrigation Sub Division,
Peshawar.

Contractor Premium S.I……% Above / Below

Contractor Premium N.S.I……% Above / Below

Contractor Signature.....

Sub Engineer

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

BILL OF QUANTITIES Work. 2

Name of Work		**Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2025-26.**				
Sub Work		**Solarization of Irrigation Tubewell KFD-16 in District Peshawar(Solar Work & Boundary wall).**				
S.No.	**Item Code**	**Item Name**	**Unit**	**Qty**	**Price**	**Total**
1	03-25-b	Excavation in foundation of building, bridges etc complete : in ordinary soil	m3	38.99	243.91	9,510.05
2	06-03-b	Cement Concrete (brick/stone ballast, 1.5" to 2"/nullah shingle well graded and cleaned) in foundation & plinth (Ratio 1:4:8)	m3	13.42	4663.21	62580.28
3	07-04- a-05	1st class brick work in foundation and plinth in Cement, sand mortar 1:6	m3	23.58	8919.77	210328.177
4	06-26- b-02	Damp proof course of cem. conc. 1:2:4 including bitumen coat, 1 layer polythene & 2 coats bitumen (2" thick)	m2	20.90	979.46	20470.71
5	03-18-a	Filling, watering and ramming earth under floor with surplus earth from foundation, etc	m3	33.98	77.66	2638.89
6	07-05- a-05	1st class brick work in ground floor Cement, sand mortar 1:6	m3	42.68	9584.29	409057.50
7	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	m3	1.02	7783.07	7938.73
8	25-45-b	Supplying and Fixing 18 SWG MS Sheet Gate with angle iron frame (2"x2"x3/16") with side window, lock, painting etc	m2	7.43	9560.87	71037.26
9	11-18-b	Cement pointing struck joints, on walls, upto 20' height : Ratio 1:3	m2	167.23	303.25	50712.50
10	11-09-b	Cement plaster 1:4 upto 20' height 1/2" thick	m2	183.67	286.75	52667.37
11	28-17-a	Providing and Fixing barbed wire fencing with 4 horizontal & 2 cross wires : Without PCC base	m	91.44	1617.60	147913.34
12	06-07- a-03	RCC in roof slab, beam, column & other structural members, insitu or precast. (1:2:4)	m3	3.87	9203.68	35618.24
13	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	0.04	141789.80	5671.59
14	26-01-r	Supply and Erection of PV MOUNTING FRAME WITH MANUAL TRAKERING	kW	11.19	29276.46	327603.59
15	26-01- d-01	Supply and Erection of Solar PV Module (Solar Panel) Mono-crystalline A-Grade (per Watt) (As per Approved Specifications)	Watt	73.58	12490.00	919014.20
16	15-09-d	Supply and Erection MS sheet box of 16 SWG, 4"deep with 3/16" thick bakelite sheet top etc. complete : 8"x10"	Each	3.00	403.10	1209.30
17	15-71-d	Supply and Erection single phase imported auto circuit breaker 30 Amp.	Each	9.00	934.80	8413.20
18	26-01- g-04	Supply and Erection 1x10 sq.mm flexible copper cable	m	73.15	349.84	25590.80

19	26-01- g-03	Supply and Erection 1x6 sq.mm single core (XPLE/XPLO insulated/PCV sheathed) flexible copper cable	m	36.58	228.30	8351.21
20	26-01- b-03	Supply and Erection PVC flexible pipe : 2" i/d	m	36.58	396.57	14506.53
21	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Per Watt	7500.00	16.95	127125.00
22	15-70-c	Supply and Erection transpower auto circuit breaker 3-phase, 400V fungus moisture proofing : 100 Amp.	Each	1.00	8107.25	8107.25
23	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,	Each	1.00	327088.50	327088.50
24	24-50- c-01	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x10 mm2	Meter	30.48	635.75	19377.66
25	ns - 217396	Supply and Fixing MS Column pipe with flanges for submerssible pump : 5" (125 mm) Nominal Pipe Size (NPS), 3/16" thick, 10' length.	Mtr	28.35	3627.08	102827.72
26	27-48	Rubber packing 1/32" to 1/16"thick	No.	9.00	98.16	883.44
27	15-72-f	Supply & erection of Nut & Bolt (2"x5/8')	Each	54.00	212.86	11494.44
28	ns - 217395	Supplying and Fixing MS Suspension Clamp 3/8" thick for housing pipe : 5" i/d.	Each	2.00	717.98	1435.96
29	ns - 217394	Supply and fixing bore cover plate (2 pieces) 3/8" thick arangment holes for column and cable, hole one inches i/c for inspection of water level in Tube well.	Job	1.00	2000.00	2000.00
30	15-53	Special earthing of iron/metal clad switches etc with copper wire No. 8 SWG in GI pipe 1/2" dia	Each	1.00	15997.96	15997.96
31	15-11- b-07	Supply & Erection of Change over switch 200 Amp	Each	1.00	24194.00	24194.00
32	24-48-a	Supply and installation of manually controlled voltage regulator oil cooled with 99.9% copper winding, and independed control regulator on each phase 20-30 KVA	Each	2.00	95845.13	191690.26
33	ns - 217393	Supply & Fixing A-Grade Ground Solar Stand (Galvanized iron 12/14Gauge) for Solar Panels with nut bolts & Rawal Bolts with all respect.	watt	300.00	7.00	2100.00
34	26-01- g-09	Supply and Erection 2x4 sq.mm flexible copper cable	m	22.86	308.67	7056.20
35	15-79-b	Supply and Fixing PVC conduit for surface wiring (dura duct) 1" including all charges for nail screws etc	m	21.34	102.21	2181.16

36	15-71-a	Supply and Erection single phase imported auto circuit breaker 6 Amp.	Each	4.00	648.00	2592.00
37	26-01- f-02	Supply and Erection of 12 V VRLA AGM Battery per AH	AH	150.00	293.60	44040.00
38	26-01- e-03	Supply and Erection of MPPT Solar Light Charge Controller (20 Amps, 12/24 V) with all sort of electronic protections	No	1.00	11743.86	11743.86
39	26-01-o	Supply and Erection of BOX / STAND for Batteries SHS Inverter & Charge Controller	Watt	300.00	6.26	1878.00
40	26-01-l-02	Supply and Erection of DC CEILING FANS 48 inch 30-36 W	No	1.00	4583.20	4583.20
41	ns - 217392	Supply and Erection of DC ENERGY EFFICIENT LED LIGHT BULBS (10-20 Watt)	Each	4.00	182.00	728.00
					Total:	**3299958.08**
					Grand Total in Million	**3.300**

Note: - Any other item of work crop up during execution will be paid on M.R.S 2024 1st Bi .The Quantities are liable to be increased or decreased during execution.

Contractor Premium S.I……% Above / Below

Contractor Premium N.S.I……% Above / Below

Contractor Signature.....

Sub Divisional Officer,
Tubewells Irrigation Sub Division,
Peshawar.

Sub Engineer

Annex-A

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

BILL OF QUANTITIES Work. 3

Name of Work	**Solarization, Improvement, Rehabilitation, Augmentation of Existing Tubewell District Peshawar ADP No. 2263/210426 during 2025-26.**
Sub Work	**Solarization of Irrigation Tubewell KFD-05 in District Peshawar(Solar Work & Boundary wall).**

S.No.	Item Code	Item Name	Unit	Qty	Price	Total
1	03-25-b	Excavation in foundation of building, bridges etc complete : in ordinary soil	m3	38.99	243.91	9,510.05
2	06-03-b	Cement Concrete (brick/stone ballast, 1.5" to 2"/nullah shingle well graded and cleaned) in foundation & plinth (Ratio 1:4:8)	m3	13.42	4663.21	62580.28
3	07-04- a-05	1st class brick work in foundation and plinth in Cement, sand mortar 1:6	m3	23.58	8919.77	210328.177
4	06-26- b-02	Damp proof course of cem. conc. 1:2:4 including bitumen coat, 1 layer polythene & 2 coats bitumen (2" thick)	m2	20.90	979.46	20470.71
5	03-18-a	Filling, watering and ramming earth under floor with surplus earth from foundation, etc	m3	33.98	77.66	2638.89
6	07-05- a-05	1st class brick work in ground floor Cement, sand mortar 1:6	m3	42.68	9584.29	409057.50
7	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	m3	1.02	7783.07	7938.73
8	25-45-b	Supplying and Fixing 18 SWG MS Sheet Gate with angle iron frame (2"x2"x3/16") with side window, lock, painting etc	m2	7.43	9560.87	71037.26
9	11-18-b	Cement pointing struck joints, on walls, upto 20' height : Ratio 1:3	m2	167.23	303.25	50712.50
10	11-09-b	Cement plaster 1:4 upto 20' height 1/2" thick	m2	183.67	286.75	52667.37
11	28-17-a	Providing and Fixing barbed wire fencing with 4 horizontal & 2 cross wires : Without PCC base	m	91.44	1617.60	147913.34
12	06-07- a-03	RCC in roof slab, beam, column & other structural members, insitu or precast. (1:2:4)	m3	3.87	9203.68	35618.24
13	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	0.04	141789.80	5671.59
14	26-01-r	Supply and Erection of PV MOUNTING FRAME WITH MANUAL TRAKERING	kW	11.19	29276.46	327603.59
15	26-01- d-01	Supply and Erection of Solar PV Module (Solar Panel) Mono-crystalline A-Grade (per Watt) (As per Approved Specifications)	Watt	73.58	12490.00	919014.20
16	15-09-d	Supply and Erection MS sheet box of 16 SWG, 4"deep with 3/16" thick bakelite sheet top etc. complete : 8"x10"	Each	3.00	403.10	1209.30
17	15-71-d	Supply and Erection single phase imported auto circuit breaker 30 Amp.	Each	9.00	934.80	8413.20
18	26-01- g-04	Supply and Erection 1x10 sq.mm flexible copper cable	m	73.15	349.84	25590.80

19	26-01- g-03	Supply and Erection 1x6 sq.mm single core (XPLE/XPLO insulated/PCV sheathed) flexible copper cable	m	36.58	228.30	8351.21
20	26-01- b-03	Supply and Erection PVC flexible pipe : 2" i/d	m	36.58	396.57	14506.53
21	26-01-i-04	Supply and Erection of 3 Phase 220/380V Solar Pump inverter (MPPT) 7.5 KW and above	Per Watt	7500.00	16.95	127125.00
22	15-70-c	Supply and Erection transpower auto circuit breaker 3-phase, 400V fungus moisture proofing : 100 Amp.	Each	1.00	8107.25	8107.25
23	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,	Each	1.00	327088.50	327088.50
24	24-50- c-01	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x10 mm2	Meter	30.48	635.75	19377.66
25	ns - 217396	Supply and Fixing MS Column pipe with flanges for submerssible pump : 5" (125 mm) Nominal Pipe Size (NPS), 3/16" thick, 10' length.	Mtr	28.35	3627.08	102827.72
26	27-48	Rubber packing 1/32" to 1/16"thick	No.	9.00	98.16	883.44
27	15-72-f	Supply & erection of Nut & Bolt (2"x5/8')	Each	54.00	212.86	11494.44
28	ns - 217395	Supplying and Fixing MS Suspension Clamp 3/8" thick for housing pipe : 5" i/d.	Each	2.00	717.98	1435.96
29	ns - 217394	Supply and fixing bore cover plate (2 pieces) 3/8" thick arangment holes for column and cable, hole one inches i/c for inspection of water level in Tube well.	Job	1.00	2000.00	2000.00
30	15-53	Special earthing of iron/metal clad switches etc with copper wire No. 8 SWG in GI pipe 1/2" dia	Each	1.00	15997.96	15997.96
31	15-11- b-07	Supply & Erection of Change over switch 200 Amp	Each	1.00	24194.00	24194.00
32	24-48-a	Supply and installation of manually controlled voltage regulator oil cooled with 99.9% copper winding, and independed control regulator on each phase 20-30 KVA	Each	2.00	95845.13	191690.26
33	ns - 217393	Supply & Fixing A-Grade Ground Solar Stand (Galvanized iron 12/14Gauge) for Solar Panels with nut bolts & Rawal Bolts with all respect.	watt	300.00	7.00	2100.00
34	26-01- g-09	Supply and Erection 2x4 sq.mm flexible copper cable	m	22.86	308.67	7056.20

35	15-79-b	Supply and Fixing PVC conduit for surface wiring (dura duct) 1" including all charges for nail screws etc	m	21.34	102.21	2181.16
36	15-71-a	Supply and Erection single phase imported auto circuit breaker 6 Amp.	Each	4.00	648.00	2592.00
37	26-01- f-02	Supply and Erection of 12 V VRLA AGM Battery per AH	AH	150.00	293.60	44040.00
38	26-01- e-03	Supply and Erection of MPPT Solar Light Charge Controller (20 Amps, 12/24 V) with all sort of electronic protections	No	1.00	11743.86	11743.86
39	26-01-o	Supply and Erection of BOX / STAND for Batteries SHS Inverter & Charge Controller	Watt	300.00	6.26	1878.00
40	26-01-l-02	Supply and Erection of DC CEILING FANS 48 inch 30-36 W	No	1.00	4583.20	4583.20
41	ns - 217392	Supply and Erection of DC ENERGY EFFICIENT LED LIGHT BULBS (10-20 Watt)	Each	4.00	182.00	728.00
					Total:	**3299958.08**
					Grand Total in Million	**3.300**

Note: - Any other item of work crop up during execution will be paid on M.R.S 2024 1st Bi .The Quantities are liable to be increased or decreased during execution.

Contractor Premium S.I……% Above / Below

Contractor Premium N.S.I……% Above / Below

Contractor Signature.....

Sub Divisional Officer,
Tubewells Irrigation Sub Division,

Peshawar.

Sub Engineer

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

BILL OF QUANTITIES Work. 4

Name of Work: Rehabilitation of Irrigation Tubewells / Lift Irrigation Schemes & Solarization in Tubewell Irrigation Division Peshawar ADP No. 1769/160282 during 2025-26.

Sub Work: Installation of Solar Based Irrigation Tubewell at Village Tela Band Ghalib Khel in District Peshawar (Solar Work).

Dischrge: 7000 Head 377

S. No	Item Code	Item Name	Unit	Qty	Price	Total
1.	24-93-e	Supply & Installation, testing and commissioning of Solar Submersible Pump (ISO - 9906 Certified) coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Solar Pump Controller, du/dt filter Complete in all accessories including cooling jackets, NRV, Pressure Gauge, Sluice valves (02 Nos) except column pipe and power cable for discharge greater than 3000 iGPH and output capacity greater than 10 WHP and up to 15 WHP (As per Approved Technical Specifications)	WHP	13.33	79,486.02	1065907.53
2.	24-95-e	Supply & Installation, testing and commissioning of complete Solar PV Generator including A-Grade Mono Crystalline PV Modules ,Fixed Mounting Structure and Foundation Civil work, Junction Boxes, Fuses, DC Breakers, Wiring complete upto Solar Pump Inverter, sized at a sizing factor of 1.75 capable of operating its intended solar pump having discharge greater than 3000 iGPH and output capacity greater than 10 WHP and up to 15 WHP (As per Approved Technical Specifications)	WHP	13.33	183,308.31	2593812.57
3.	24-56-a	Supply and Fixing MS Column pipe with flanges for submersible pump : 4" (75 mm) Nominal Pipe Size (NPS), 3/16" thick, 10' length	Mtr	118.8662	4,388.97	383978.79
4.	24-50-c-01	Supply and installation of Submersible Flat Cable made of 99.9% copper, coated with double PVC as per BSS Standards, 3x10 mm2	Mtr	123.44	1,423.64	156205.55
					Total Rs.	**4,200,479.71**
					Rs. In Million	**4.200**

Note: - Any other item of work crop up during execution will be paid on M.R.S 2024 1st Bi .The Quantities are liable to be increased or decreased during execution.

Contractor Premium S.I……% Above / Below

Contractor Premium N.S.I……% Above / Below

Contractor Signature.....

Sub Divisional Officer,
Tubewells Irrigation Sub Division,
Peshawar.

Sub Engineer

Annex-A

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

BILL OF QUANTITIES Work. 5

Name of Work: Rehabilitation of Irrigation Tubewells / Lift Irrigation Schemes & Solarization in Tubewell Irrigation Division Peshawar ADP No. 1769/160282 during 2025-26.

Sub Work: Installation of Solar Based Irrigation Tubewell at Zaman Kalay Bajoro Area Tehsil Tangi District Charsadda (Solar Work).

Dsicharge: 14000 Head 211

S. No	Item Code	Item Name	Unit	Qty	Price	Total
1.	24-93-e	Supply & Installation, testing and commissioning of Solar Submersible Pump (ISO - 9906 Certified) coupled with Submersible rewind-able Electric Motor with AC winding and all accessories like Solar Pump Controller, du/dt filter Complete in all accessories including cooling jackets, NRV, Pressure Gauge, Sluice valves (02 Nos) except column pipe and power cable for discharge greater than 3000 iGPH and output capacity greater than 10 WHP and up to 15 WHP (As per Approved Technical Specifications)	WHP	79,486.02	14.92	1,124,727.18
2.	24-95-e	Supply & Installation, testing and commissioning of complete Solar PV Generator including A-Grade Mono Crystalline PV Modules ,Fixed Mounting Structure and Foundation Civil work, Junction Boxes, Fuses, DC Breakers, Wiring complete upto Solar Pump Inverter, sized at a sizing factor of 1.75 capable of operating its intended solar pump having discharge greater than 3000 iGPH and output capacity greater than 10 WHP and up to 15 WHP (As per Approved Technical Specifications)	WHP	183,308.30	14.92	2,593,812.45
3.	24-56-a	Supply and Fixing MS Column pipe with flanges for submersible pump: 4"(125 mm) Nominal Pipe Size (NPS),3/16" thick 10' length	Mtr	4,388.97	48.765	438,886.09
4.	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	Mtr	1,423.64	48.77	133,636.69
					Total Rs.	**4,204,346.79**
					Rs in million.	**4.20**

Note: - Any other item of work crop up during execution will be paid on M.R.S 2024 1st Bi .The Quantities are liable to be increased or decreased during execution.

Contractor Premium S.I……% Above / Below

Contractor Premium N.S.I……% Above / Below

Contractor Signature.....

Sub Divisional Officer,
Tubewells Irrigation Sub Division,
Peshawar.

Sub Engineer

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

BILL OF QUANTITIES
FOR
SOLAR ENERGY BASED SCHEMES/ PROJECTS/ WORKS ETC

Name of Work:

S.No.	Item Description	Units Rate (Rs.) Including Installation Price (A)	Quantity (B)	Total Amount (Rs.) (AXB)
1.				
2.				
3.				
4.and so on				
TOTAL AMOUNT (RS.)				

Note: - Following information is to be provided by the bidder, otherwise bid shall be declared as non-responsive. (Must be duly supported by evidence of exemption.)	
Amount Exempted from Federal GST(PKR)	
Amount Chargeable to % Federal (FBR) Sales Tax on Goods (PKR)	
Amount Chargeable to % Provincial (KPRA) Sales Tax on Services (PKR)	
Provincial (KPRA) Sales Tax on Services @ % (PKR)	
Any other applicable Tax(PKR)	
TOTAL AMOUNT (RS.)	

Engineer Incharge /Authorized Person
with Seal

Contractor
With Seal

GOVERNMENT OF KHYBER PAKHTUNKHWA
COMMUNICATION & WORKS DEPARTMENT

Dated Peshawar the 30/07/2025

NOTIFICATION:

NO.SO(B)/II-10/Solar-Panels/PBC/2025-26/C&WD: In pursuance of the decisions of the Standardization Committee notified vide P&D Department letter No: Chief/INF/P&D/601/03/2017/378-483 dated 21/02/2017 in its meetings held on 22/05/2025, 02/06/2025, 08/07/2025, & 21/07/2025, the competent Authority upon the recommendations of the committee regarding up-gradation / revision of specifications for solar panels & allied equipment's notified vide this Department Notification No. SO(B)II-10/Standardization/2024-25/C&WD dated 23/05/2025 , has been pleased to approved the **"Revised Specifications For Supply & Installations of: (i) Solar based Pumping Systems (ii) Soar Buildings/ Home Systems (iii) Solar Street Lights"** attached as **"Annex-A"**.

SECRETARY C&W DEPARTMENT

Endst: NO.SO(B)II-10/ Solar-Panels/PBC/2025-26/C&WD. Dated 30/07/2025

Copy forwarded to the:-

1. All Administrative Secretaries, Government of Khyber Pakhtunkhwa.
2. All Chief Engineers C&W Department.
3. Chief Engineer (Renewable), PEDO Peshawar.
4. Project Director (Solar), PEDO Peshawar.
5. Superintending Engineer, PHE Department.
6. Superintending Engineer (HQ), Irrigation Department.
7. Director Engineering, Agriculture Department.
8. Director IT, C&W Department to upload the Revised Specifications on C&W website, please.
9. Deputy Director (Tech), PHE Department.
10. Senior CPO, Energy & Power Department.
11. PS to Secretary Communication & Works Department, Peshawar.
12. Master file.

SECTION OFFICER (BUILDINGS)

Annex-A

REVISED SPECIFICATIONS FOR SUPPLY AND INSTALLATIONS OF:

- **SOLAR BASED PUMPING SYSTEMS**
- **SOLAR BUILDINGS / HOME SYSTEMS**
- **SOLAR STREET LIGHTS**

Year 2025
Version-02
Dated: 08-07-2025

ALL DEPARTMENTS OF
GOVERNMENT OF KHYBER PAKHTUNKHWA

A-SPECIFICATIONS FOR SOLAR SYSTEMS-COMMON PART

1. SOLAR PANELS:

a. The PV module(s) shall contain N-Type Mono crystalline silicon Grade-A Solar cells (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 (≥1500 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 61215-1:2021, IEC 61215-1-1:2021 & IEC 61215-2:2021) (Design Qualification)
- IEC61730-1:2023 (Safety - Requirements for construction)
- IEC61730-2:2023 (Safety - Requirements for testing)
- IEC TS-62804-1-1:2020 (i.e.: TUV PPP-58042B or Equivalent) Anti-PID Certification.
- IEC 61701:2020 Salt Mist Corrosion Resistance Test.
- IEC 62716 Ammonia Corrosion Resistance Test (Latest).
- IEC 60068-2-68 (PPP 59022A) 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 / Factory Acceptance Test (FAT), for Verification of Manufacturing Facility / Process and Product.

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)
- Minimum System Voltage (V_{dc}) (i.e.: ≥ 1500 Vdc)
- 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 Stamped by Contractor) at the time of Handing/Taking Over or signing of contract agreement.

k. The PV modules shall have a minimum efficiency of 22.0%, along with positive power tolerance. However, for solar street lighting projects, a module efficiency of 17.5% with positive power tolerance shall remain acceptable.

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 minimum Snow Load bearing of 5400 Pa and Wind Load Bearing of 2400 pa however if department deem appropriate may go for 3800 pa wind loads depending upon their requirement.

n. The Solar Module should be free from visual and cosmetics defects.

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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 Certification should be accepted only from an IEC accredited lab for Solar Panels.
r. Electroluminescence (EL) test may be performed randomly for each project at the cost of contractor/supplier.

Note: For the purpose of verification/ third party validation the Electroluminescence (EL) and Flash testing of randomly sampled PV modules should be conducted.

2. CABLES, WIRING AND PROTECTION DEVICES:

a. The AC/DC cables shall be made of 99.9% (allowing a tolerance of ±0.1%) copper strands and flexible.
b. From PV Panel to Junction Box / T-Branch / Inverter, use single-core, double-insulated (UV-stabilized cables with XLPO insulation and XLPO/PVC sheathing). Cables must be stranded or flexible type and shall preferably conform to EN 50618 or IEC FDIS 62930 standards.
c. From JB to Inverter, the DC cable must have Single core, double insulated and suitable for minimum ≥ 1500 V_{DC} transmission.
d. From Inverter to batteries, the DC cable can be single insulated, Single Core and suitable for minimum ≥ 600 V_{DC} transmission.
e. DC circuit breakers / 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 Junction box. For outdoor installation Junction boxes should be Hot Dipped Galvanized with minimum thickness of 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 & (1-3 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 third party lab tests are mandatory:
Conductor resistance test, Insulation resistance test, Pressure test & Spark test, copper purity test, cable size test or any other necessary tests recommended by Engineer.
w. DC Cable from PV Module to Junction Box / Inverter for each string should be 6 mm^2.

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x. DC Cable Sizing from Junction Box to Inverter (up to cable length of 200 ft) as per details below;

S. No	Nos of Strings	Cable Size ((mm²)	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	

y. Over Voltage / Current Protection Device may be installed between Utility & Inverter.

z. Surge Protection may be installed for combined Array (before Main DC Breaker / Inverter).

aa. Cable colour coding should be adopted in accordance with relevant international standards.

Note: To ensure compliance with the above specification, the Conductor resistance test, Insulation resistance test, Pressure test, Spark test, copper purity test & cable size test may be conducted through any accredited laboratory in Pakistan.

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 Channel / Pipe or 8 SWG Angle** (Sketch and Profile of channel / Angle is 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 1.0 feet. The height of the upper edge of the structure should be up to 10 feet above the ground / 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. PV shading analysis may be conducted using Helioscope, SketchUp, PVSOL, PVsyst, or any other suitable software or tool.

e. For ground-mounted installations, the concrete foundation pit size shall be a minimum of 1.5 ft x 1.5 ft x 2.0 ft for each individual leg, or 1.5 ft x 3.0 ft x 2.0 ft for a double-leg structure. The concrete must extend at least 1.0 ft above the ground level. For rooftop installations, the civil foundation blocks for each individual leg should be approximately 0.7 ft to 1.0 ft (length) × 0.7 ft to 1.0 ft (width) × 0.7 ft to 1.0 ft (depth), depending on structural requirements. The concrete mix ratio shall be 1:2:4 for all civil works.

f. The Surface azimuth angle of PV Module 180° ± 30° and the Tilt angle (slope) of PV Module be preferably 33° ± 15°. As per site requirements, further azimuth / tilt angle changes (if required) can be made with the approval of Engineer In-charge.

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 or H beam Mounting Structure with (Enamel Paint & Red -Oxide) 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 (Non-Magnetic). 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 / 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 (Non-Magnetic) or Hot Dipped galvanized steel that provides the required mechanical strength. Washers should be installed on both sides.

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.

n. All fabrication work (welding, cutting, or drilling) and structural modifications must be completed prior to the galvanization.

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Note: For strength and durability of the Mounting Structure the stress & strain test may be conducted from any accredited laboratory of Pakistan.

4. **EARTHING/ GROUNDING:**
   a. The PV panel frame, supporting structure, electrical cabinet, protection devices, and all associated equipment should be grounded using the shortest practical route to an effective earth point with a low resistance (ohmic) value, in accordance with the equipment manufacturer's recommendations and site-specific soil conditions. An uninterrupted grounding conductor shall be employed to maintain electrical continuity. Effective grounding significantly reduces the risk of damage from lightning-induced surges and electrical faults.
   b. The Sizing of Earthing conductor will be done as per NEC Table 250.122 (Mentioned at Appendix-VI).
   c. The grounding conductor should be 99.9% (allowing a tolerance of ±0.1%) 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 poured 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 / Rod / GI Pipe by proper connector of minimum depth of 6 feet.
   h. All nut / bolt and Earthing clamp shall be stainless steel or galvanized steel or any other material as per approval of Engineer In-Charge.
   i. Alternatively, Earthing Rod/Plate of suitable size and length can be installed, if given / mentioned in the BOQ/Design and Engineer In-Charge Approval.

   Note: The copper purity test for the Earthing Rod/ Plate/ Cable may be conducted through any accredited laboratory in Pakistan.

5. **BATTERIES:**
   a. The battery should be Deep Cycle, GEL, OPzV/OPzS, Lithium LiFePO4, Sodium-ion, Lead Carbon, Super Capacitor based Battery or equivalent.
   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. Deleted
   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/Cell cycle life (All Batteries Type) should be provided.
   g. The Battery must support parallel and series connection to allow for capacity expansion in the future. Each Battery should have followed minimum information printed on battery:
      - Model Number, Serial Number and Type of battery.
      - Rated Voltage and Capacity (AH) at 25°C at discharge rate of 10 Hours.
      - Origin of made.
      - Manufacturer Name / 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.

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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.

Note: The battery Capacity (kWh) test along with charge & discharge curves may be conducted through any accredited laboratory in Pakistan.

5.1 GEL BATTERIES:

5.1.1 Cycle life of the GEL battery (12V) must be minimum **1000** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.1.2 Cycle life of the GEL battery (2V Cell) must be minimum **1300** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.1.3 The Batteries should have two-years Comprehensive replacement warranty.

5.2 LEAD CARBON:

5.2.1 Cycle life of the Lead Carbon battery (12V) must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.2.2 Cycle life of the Lead Carbon battery (2V) must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.2.3 The Batteries should have two-years Comprehensive replacement warranty.

5.3 OPzV / OPzS BATTERIES:

5.3.1 Cycle life of the OPzV / OPzS battery (12V) must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.3.2 Cycle life of the OPzV / OPzS battery (2V Cell) must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 0.1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.3.3 The Batteries should have two-years Comprehensive replacement warranty.

5.4 LITHIUM BATTERIES (LiFePO4):

5.4.1 Cycle life of the Lithium LiFePO4 battery must be minimum 5750 cycles @ 50% depth of discharge (DOD) at discharge rate of 0.5C@25°C (before reaching 80% capacity of its Initial Capacity).

5.4.2 The battery shall comply with the requirements and recommendations outlined in IEC 62619:2022 issued by a recognized and accredited laboratory.

5.4.3 Lab test reports from a third-party laboratory verifying the claimed battery/cell cycle life shall be provided.

5.4.4 The LiFePO4 battery shall be covered by a comprehensive replacement warranty for a minimum of five (05) years.

5.4.5 The battery shall be equipped with an integrated Battery Management System (BMS) (Preferably active BMS) to ensure operational safety, reliability and communication with inverter or Charge Controller.

5.4.6 The BMS of the battery must have the following features but not limited to:

- Temperature protection
- Over charge protection
- Low voltage disconnects
- High Voltage Disconnect
- Short circuit alarm function

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- Self-balancing function
- Over-current protection
- Over-discharge protection

5.4.7 The LiFePO4 Battery must have LCD status and alarm indication.

5.4.8 The battery pack shall have a minimum ingress protection rating of IP30 or higher.

5.4.9 The charge and discharge rate shall be designed for 0.5 C minimum, but the battery must be capable of handling 1 C charge and discharge rates.

5.4.10 The battery shall be equipped with communication ports such as CAN/CAN/RS485/RS232 OR EQUIVALENT (one port for monitoring settings/data integration and one port for communication with inverter/Charge controller). Additionally, the BMS may have a wireless communication capability, such as Bluetooth, for monitoring, settings adjustment, and calibration purposes.

5.4.11 The above-mentioned specifications and details shall be clearly included in the data sheet, user manual, and all other relevant supporting documents submitted as part of the bid.

5.5 SUPER CAPACITOR BASED BATTERY BANK:

5.5.1 Cycle life of the Super Capacitor based must be minimum **0.1 million** cycles @ **100%** depth of discharge (DOD) at discharge rate of 1C@25°C (before reaching 80% capacity of its Initial Capacity).

5.5.2 The battery must have **an Active** Integrated Battery Management System (BMS) to ensure battery safety and reliability.

5.5.3 The Battery must have a Display LED for battery Voltage, Amperes etc and should have alarm indications.

5.5.4 The charge and discharge rate of the battery must be designed at **1C minimum** and also capable of handling **continuously 1C Charge** and discharge currents.

5.5.5 Warranty of battery for free repair & replacement should be minimum **Five years.**

5.5.6 Nominal Temperature for Super Capacitor battery shall be minimum -10 to +55 degree Celsius.

5.5.7 Super Capacitor battery shall be Non-flammable. (i.e.: Super Capacitor Cells should be non-petroleum based).

Note:

- **Product brochure, Catalogue and certificates must be attached with the Technical Bid.**
- Battery Capacity test should be conducted by the contractor through accredited third-party laboratories within Pakistan

6. BOX / STAND FOR BATTERIES, CHARGE CONTROLLER/INVERTER AND PROTECTION DEVICES:

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 locking mechanism shall be provided to restrict unauthorized access to the battery compartment.

c. The enclosure shall be manufactured from mild steel of at least **18 SWG** thickness.

d. The cabinet shall be hot-dip galvanized or powder-coated or Enamel Paint with Red Oxide, as mentioned in the BOQ.

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. The entire enclosure/stand must have a neat, clean, and professional appearance, and the battery box/stand should be installed at a location suitable to the user's preference.

f. The cabinet must be insulated with rubber corks/covers at each cabinet leg to prevent direct contact with metal surfaces, ground, or other objects, enhancing safety and stability.

g. The cabinet shall have a designated area for mounting a user manual or instruction guide, along with the Site ID label.

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h. Provisions shall be made for the installation of protection devices such as fuses, breakers, and disconnect switches, as well as a clearly marked earthing point.
i. All internal wiring shall be done in proper ducts and labeled for easy identification and maintenance.
j. The cabinet shall include designated areas for labeling/stickering of all internal and external components for quick reference and identification.
k. The cabinet shall incorporate sufficient ventilation slots or louvers to allow for natural airflow and heat dissipation, while protecting against dust and moisture.
l. Cable glands shall be provided at appropriate locations to ensure secure and protected cable entry/exit.
m. The design shall feature rounded corners or edge protectors to reduce injury risk during handling or maintenance.
n. The cabinet shall have minimum Ingress protection of IP-21 or above.
o. The cabinet may optionally support transparent panels to facilitate visual inspection and operational visibility.
p. Pre-drilled mounting holes or brackets shall be available inside the cabinet for optional installation of circuit protection accessories.
q. Clear and permanent safety signage such as polarity indicators, high voltage warnings, and earthing symbols on steel stamp shall be displayed on cabinet.
r. Cabinets shall be properly wrapped and protected before shipment from the warehouse to the site to prevent any unnecessary damage during transportation and handling.
s. The cabinet shall be installed with a minimum clearance of one foot above the finished floor level to ensure protection against moisture, dust, and other potential hazards.
t. The Cabinet for modular installation should be in racks with proper insulation (preferably rubber insulation).

6. (A) SOLAR CHARGE CONTROLLER (FOR SOLAR DC SYSTEM):

a. The controller shall support multiple battery types, including:
   - Flooded Lead-Acid (FLA)
   - GEL
   - Absorbent Glass Mat (AGM)
   - OPzV
   - OPzS
   - Lithium Iron Phosphate (LiFePO4)/Super Capacitor
b. The charge controller shall be certified in compliance with international safety and performance standards, including but not limited to:
   - IEC 62109-1/ IEC 62509
c. The controller shall meet the following Ingress Protection (IP) ratings:
   - IP30 or higher for indoor installation
   - IP65 or higher for outdoor installation
d. The controller shall utilize Single MPPT (Maximum Power Point Tracking) technology to optimize solar input performance.
e. The MPPT tracking efficiency shall be ≥ 99%, and the overall energy conversion efficiency shall be ≥ 95%.
f. The controller shall include automatic temperature compensation functionality to adjust charging parameters based on ambient temperature conditions, protecting battery health.
g. The device shall provide comprehensive protection features, including but not limited to:
   - PV short-circuit protection
   - PV reverse polarity protection
   - PV over-voltage protection
   - PV over-current protection
   - Battery overcharging protection
   - Battery over-discharging protection
   - Battery reverse polarity protection
   - Load short-circuit protection
   - Overload protection
   - Reverse current flow protection from battery to PV modules

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h. The controller shall be equipped with an efficient thermal management system, including a properly dimensioned passive or active heat sink, to maintain safe operating temperatures.
i. The charge controller shall include an CAN/RS485/RS232 OR EQUIVALENT communication port as standard. Support for additional communication protocols such as CAN, RS232, Wi-Fi, or Bluetooth shall be considered an added advantage.
j. The controller shall be capable of operating in battery-less mode, delivering power to DC loads directly from PV modules where applicable.
k. The controller shall be capable of communicating with LiFePO4 batteries via compatible communication interfaces, ensuring seamless integration with Battery Management Systems (BMS).
l. The controller shall feature a digital interface, either integrated (LCD) or external, capable of displaying real-time operational parameters including:
   - PV voltage and current
   - Battery voltage and current
   - State of Charge (SOC) Preferred
   - Load status
   - Faults and alarms
m. The controller may support data logging and remote monitoring features through compatible software or web-based platforms.
n. The controller shall support user-configurable charging algorithms or automatic detection for the connected battery type.
o. Operating temperature range shall be -20°C to +60°C.
p. The charge controller should allow for wall, DIN-rail, or panel mounting, with proper size and clearly labelled wiring terminals. Mounting accessories should be included.

Note: The efficiency test along with all protection features test may be conducted from the accredited laboratory in Pakistan.

6. (B) **<u>All-in-One/Solar kit/Standalone Solar Systems must include the following features:</u>**

a. The all-in-one solar solution must include an MPPT charge controller (DC) or a hybrid inverter (AC), a LiFePO4 battery, and properly sized protection devices (breakers/fuses) for the PV modules, battery bank, and load connections, as per requirements and specifications in Section A (2). The type of solution—whether DC or AC—shall be specified in the BoQ.
b. BMS (preferably active) communication between LiFePO4 Battery and MPPT Charge Controller/ Hybrid Inverter.
c. Heat dissipation with proper heat sinks and cooling fans equipped with a fan controller must be available in case of IP-30 enclosure with proper heat sinks mechanism must be adopted.
d. USB Mobile Charging Port must be available.
e. The all-in-one must have individual ports for various load connectivity.
f. DC All-in-One/Solar kit/Standalone Solar Systems, shall comply with relevant and applicable IEC standards (IEC 62257-9-5:2024) or latest.
g. The All-in-one shall be equipped with communication port such as CAN/RS485/RS232 or equivalent for monitoring settings/data integration. Additionally, the BMS may have a wireless communication capability, such as Bluetooth, for monitoring, settings adjustment, and calibration purposes.
h. The All-in-one shall feature a digital interface, either integrated LCD/ LED, capable of displaying real-time operational parameters including:
   - PV voltage and current
   - Battery voltage and current
   - State of Charge (SOC)
   - Load status
   - Faults and alarms
   - Any other parameters as per project requirement
i. Wide PV voltage input range to support various panel configurations under IEC standards.
j. The all-in-one enclosure shall be manufactured from mild steel of at least 16 SWG thickness for durability and rigidity.
k. The all-in-one enclosure shall be hot-dip galvanized/ Powder-coated/ Enamel Paint with Red Oxide with technical parameters tag including Brand Name, Product name, Model, Serial number,

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Manufacturing date, Input/ Output Power range, Input/ Output Voltage range, Input/ Output current range and Battery capacity.

l. The enclosure must be insulated with rubber corks/ covers at each enclosure leg to prevent direct contact with metal surfaces, ground, or other objects, enhancing safety and stability.
m. The all-in-one enclosure design shall feature rounded corners or edge protectors to reduce injury risk during handling or maintenance.
n. The all-in-one enclosure shall be properly packed and protected prior to shipment from the manufacturer's warehouse to the site, to prevent any damage during transportation and handling.
o. The requirements for LiFePO4, MPPT Charge Controller (DC) / Hybrid inverter (AC) detail are as under:

(1) Battery Bank (LiFePO4):

a. Cycle life of the Lithium LiFePO4 battery must be minimum 5750 cycles @ 50% depth of discharge (DOD) at discharge rate of 0.5C@25°C (before reaching 80% capacity of its Initial Capacity).
b. Lab test reports from a third-party accredited laboratory verifying the claimed battery/cell cycle life shall be provided.
c. The maximum permissible self-discharge rate shall not exceed 5% of the rated capacity per month at 25°C.
d. The LiFePO4 battery shall be covered by a comprehensive replacement warranty for a minimum of five (05) years.
e. The battery shall be equipped with an integrated Battery Management System (BMS) (Preferably active BMS) to ensure operational safety, reliability and communication with MPPT Charge Controller/On-Grid Hybrid solar system.
f. The BMS of the LiFePO4 battery must have the following features but not limited to:
   - Temperature protection
   - Over charge protection
   - Low voltage disconnects
   - High Voltage Disconnect
   - Short circuit alarm function
   - Self-balancing function
   - Over-current protection
   - Over-discharge protection
g. The charge and discharge rate shall be designed for 0.5 C minimum, but the battery must be capable of handling 1 C charge and discharge rates.

(2) In case of DC all-in-one/solar kit/standalone solar systems:

a. The controller shall be capable of communicating with LiFePO4 batteries via compatible communication interfaces, ensuring seamless integration with Battery Management Systems (BMS).
b. The controller shall utilize Single MPPT (Maximum Power Point Tracking) technology to optimize solar input performance.
c. The controller shall include automatic temperature compensation functionality to adjust charging parameters based on ambient temperature conditions, protecting battery health.
d. The device shall provide comprehensive protection features, including but not limited to:
   - PV over-voltage protection
   - PV over-current protection
   - Battery overcharging protection
   - Battery over-discharging protection
   - Battery reverse polarity protection
   - Short Circuit Protection for PV, battery bank and load connections
   - Overload protection
   - Reverse polarity protection for PV & battery bank connections
   - Low Voltage Disconnect (LVD) and Reconnect (LVR) to protect battery from deep discharge and allow safe reconnection
e. The controller shall be equipped with an efficient thermal management system, including a properly dimensioned passive or active heat sink, to maintain safe operating temperatures.

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f. The controller shall be capable of operating in battery-less mode, delivering power to DC loads directly from PV modules where applicable.
g. The controller shall support data logging and remote monitoring features through compatible software or web-based platforms.
h. The controller shall support user-configurable charging algorithms or automatic detection for the connected battery type.
i. The MPPT tracking efficiency shall be ≥ 99%, and the overall energy conversion efficiency shall be ≥ 95%.

(3) In case of AC all-in-one/solar kit solar systems:

a. The inverter shall be capable of communicating with LiFePO4 batteries via compatible communication interfaces, ensuring seamless integration with Battery Management Systems (BMS).
b. Minimum 95% Conversion Efficiency at Rated Capacity (High Frequency Inverters).
c. The Maximum power point tracking MPPT efficiency ≥ 99%, and converter efficiency ≥ 92%.
d. The inverter should have built-in single MPPT controller.
e. Hybrid Inverter (If quoted along with Lithium Batteries) may be capable of communication with the BMS of Lithium Batteries.
f. Rated output voltage of inverter / Controller shall be pure sine wave AC.
g. Total harmonic distortion (THD) in AC output should not exceed 3% at rated capacity.
h. Wide input voltage range capability. (i.e.: Voltage Range can be adjustable / selectable)
i. The device shall provide comprehensive protection features, including but not limited to:
   - PV over-voltage protection
   - PV over-current protection
   - Battery overcharging protection
   - Battery over-discharging protection
   - Battery reverse polarity protection
   - Short Circuit Protection for PV, battery bank and load connections
   - Overload protection
   - Reverse polarity protection for PV & battery bank connections
   - Low Voltage Disconnect (LVD) and Reconnect (LVR) to protect battery from deep discharge and allow safe reconnection.

6. (C) BRACKET FAN SPECIFICATIONS:

a. Fan Size: 14-16 inches
b. Sweep Size: 350 mm
c. Air Delivery: Minimum 75 m³/min
d. Service Value: Minimum 1.65
e. Operating Voltage: 230V ±10%
f. Frequency: 50 Hz
g. Insulation Class: Class 155 (F-class) for safe and reliable operation
h. Bracket Fan should be marked with the manufacturer name, model number, rated voltage & Wattage

6. (D) AUTO VOLTAGE STABILIZER:

a. The stabilizer shall operate automatically and may be either block-based or servo-based (preferred). The type and size of the stabilizer shall be specified in the Employer's Requirements.
b. The winding material of the transformer core and all internal wiring shall have a minimum copper purity of 99.9%, with an allowable tolerance of ±0.1%. A copper purity test certificate from a government-approved laboratory must be provided.
c. A circuit breaker of appropriate rating (1.25 to 1.50 times of the input utility/grid current) shall be installed between the grid and the stabilizer for protection.
d. The stabilizer should automatically cut off the power if the grid or utility input voltage is ≥270V.
e. A three-pin plug and switch shall be installed on the output side of the stabilizer for operational convenience and safety.
f. The stabilizer must be compatible with a frequency range of 50 Hz to ensure proper functioning in local grid conditions.
g. The stabilizer shall maintain an efficiency of not less than 90% at any point when the input voltage is ≥ 120V.

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h. At input voltage of ≥120V, the stabilizer must be capable of running at 50% of its rated capacity (in Watts)
i. The stabilizer shall be capable of providing a regulated output voltage in the range of 210V to 250V when the input voltage is ≥120V.
j. The stabilizer must have digital Voltmeter for both input and output measurement.
k. The stabilizer must have the exhaust fan installed inside and shall have automatic temperature control through imbedded sensors.
l. The block-based stabilizer must have relays capable of handling voltage fluctuations, ensuring fast response times to protect the load, and shall feature high-quality contacts, thermal resistance, and best coil insulation.
m. The stabilizer may be equipped with LED indicators to display system faults and warnings for ease of monitoring and maintenance.

Note: The copper purity test from any accredited laboratory of Pakistan.

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 120 Lumen/watt.
e. The Colour 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 IP67).
h. The output from the LEDs/Light fixtures should be constant throughout the duty cycle.

8. AC ENERGY EFFICIENT LED LIGHT BULBS:

a. Cap/Fitting/Base Type: E27
b. Colour Temperature: Cool White
c. Luminous Efficacy: Minimum 120 lumens per watt (L/W)
d. Lamp Life Time: ≥ 10,000 hours
e. Power Factor: ≥ 0.90
f. Rated Voltage: 220–230 Vac
g. Rated Power: 14 to 18 Watts
h. Must be NEECA certified.
i. LED Light Bulbs should be marked with the manufacturer name, model number, rated voltage & Wattage as per NEECA guidelines.

9. AC ENERGY EFFICIENT CEILING FANS:

a. Must have rated Power: 45 to 55 Watts
b. Sweep Size: 54" to 56"
c. Rated Voltage: 220–230 Vac (±10V)
d. Service value (m3/min/W): ≥ 4.5
e. Insulation Class: ≥ 155 (F-Class)
f. Noise Level: Should be within acceptable comfort levels
g. ±10% variation in power consumption is allowed as per PSQCA/NEECA standard
h. Motor Core: Made of electrical steel sheet
i. Winding Wire: 99.9% super enamelled copper CA wire or 99.9% pure copper wire
j. The fan must be energy-efficient and clearly marked with the manufacturer's model number, rated voltage, and wattage as per NEECA guide line.
k. Must be NEECA certified.

10. DC ENERGY EFFICIENT LED LIGHT BULBS:

a. The LED lamps must have luminous efficacy of at least 100 Lumens/Watt.
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 degree to 125 degree.

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f. Operating Voltage 12Vdc / 24Vdc.
g. Lamps should be marked with the manufacturer model number, rated voltage, wattage and or batch number.

11. DC CEILING FANS:

Sweep	Rated Power	Speed	Operating Voltage
Inches	Watts (± 10%)	RPM	V
48"-56" (with Speed Control)	18-60 (W) BLDC	≥ 320 RPM	12 / 24 V

12. DC PEDESTAL FANS:

Sweep	Rated Power	Speed	Operating Voltage
Inches	Watts (± 10%)	RPM	V
≥ 18" Inch (with Speed Control)	18-60 (W)	≥ 1250 RPM (Full Speed)	12 / 24 V

13. INVERTER BASED SPLIT AC

Inverter based AC with both heating and cooling option.

S. No.	DESCRIPTION	UNIT	DETAILS
1	Split AC	EER	≥ 4 Star Energy efficient
2	Noise Level (Indoor)	Db (Max)	≤ 50
3	Voltage Range	Volts (Min & Max)	180 to 270 Vac

14. PVC CHANNEL DUCTS & PIPES

a. A product of good quality standard material from standardized firms/manufacturers with suitable size to be provided / used, as per direction / approval of Engineer In-charge.
b. Ducting must be done with proper steel nails/ screws and clips.
c. The PVC duct shall be flame retardant.
d. All ducting (wiring) must be aligned.

15. FLEXIBLE PVC PIPE

a. The flexible PVC pipe should be of good quality material from standardized firms/manufacturers with suitable size should 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.

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.

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18. WARRANTY:

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)

18. (A) OPERATION AND MAINTENANCE MANUAL:

An Operation and Maintenance Manual, in English / Urdu language, should be prepared and provided by the contractor with the solar PV 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 Solar System (Inverter etc). Name and address of the person or Centre to be contacted in case of failure or complaint should also be provided.

18. (B) STANDARDIZATION PRODUCTS:

a. Preference shall be given to standardized products approved by the C&W Department, provided they meet the minimum technical requirements outlined in the approved solar specifications.
b. Only products from the Original Manufacturer shall be accepted. The contractor shall submit authentic brochures/data sheets and valid certifications clearly indicating the name of the original manufacturer.

18. (C) EXCEPTIONS AND VARIATIONS:

Any exceptions or variations to the specified requirements must be explicitly declared by the Engineer In-Charge in accordance with Section 27 of the Khyber Pakhtunkhwa Public Procurement Regulatory Authority (KPPRA) Act, as amended. The scope, justification, and rationale for each exception or variation shall be clearly documented and supported by relevant data.

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Chief Engineer (RE/PPP)
PEDO, Peshawar

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B-SPECIFICATIONS FOR SOLAR PUMPING SYSTEMS

19. PUMP (SUBMERSIBLE):

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	As per British standard specifications (BSS),
9	Pressure Gauge	N/A
10	Clamps	Steel – Pressed
11	Pump Efficiency	**Minimum efficiency of the pump (For discharge of more than 3000 iGPH) should be 70% ensured at duty point. (Duty Point of the Pump be preferably selected at the peak efficiency point or (Within ±20% 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 rewindable/repairable stator. The motor should have non-disposable/non-hermetically sealed winding / High Efficiency Water Cooled Rewindable Permanent Magnet Synchronous motors can be supplied for enhanced efficiency and other added advantages. 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 - 415 Volts at 50 Hz - and 100 Hz in case of Permanent Magnet motor. (or as per VFD / Motor requirements). The motor should be capable of operating with variable speed through V/F control or Sensorless Vector Control. Winding of the motor shall of rewindable type with class – IC40 insulation and IP68 protection. The synchronous speed should be 2850-3000 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 additive's 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

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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 downward 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.

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 M800 or superior 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 M800 or superior fixed with high grade copper bars or High-Grade Neodymium (or equivalent or better) Permanent Magnets in case of Permanent Magnet motor.
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 **15500/20000N** 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 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	Motor shall be capable of 10 starts in an hour.
16.	Motor Efficiency	Efficiency of motors 7.5 HP and above should not be less than 75% at Full Load and Motor Rated Voltage.

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%.

Refer to Table-02 For Cable Sizing.

Following lab tests are mandatory.

- Conductor resistance test.
- Insulation resistance test.

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- 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 up to 2.5" dia and 4 mm for pipes above 2.5")** 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%.
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.

TABLE-01: COLUMN PIPE SIZE WITH MAXIMUM DISCHARGE.

Column Pipe Diameter (Inch/mm)	TYPE	COLUMN PIPE DIMENSIONS (Minimum)	MAX DISCHARGE ALLOWED	
			Litres / Hour	iGPH
25 mm	HDPE	PN12 / SDR 13.6 / PE100	1,300	286
32 mm	HDPE	PN12 / SDR 13.6 / PE100	2,300	506
40 mm	HDPE	PN12 / SDR 13.6 / PE100	4,650	1,023
50 mm	HDPE	PN12 / SDR 13.6 / PE100	8,250	1,815
2"	MS	3.6 / 4 MM Thickness	12,000	2,640
2.5"	MS	3.6 / 4 MM Thickness	21,000	4,619
3"	MS	≥ 4 MM Thickness	33,500	7,369
4"	MS	≥ 4 MM Thickness	70,000	15,398
5"	MS	≥ 4 MM Thickness	124,000	27,276
6"	MS	≥ 4 MM Thickness	200,000	43,994

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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).

- **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).

- **Pressure Gauge**
  As per British standard specifications (BSS), having PSI or Bar scale (4 Inch Size), Liquid Filled, minimum 500 PSI Range or Above (As per Site Requirement), Looped Siphon tube Pipe, Stainless Steel/polypropylene Casing.

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 at least equivalent.
b. The make and origin of the inverter/controller should be clearly mentioned in the catalogue 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 inverter's circuits.
   ii. Protection against accidental short circuits & reverse polarity connections.
   iii. Protection against lightning induced transients.
   iv. Over load protection.

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PEDO Peshawar

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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).

n. In case of Permanent Magnet Motor. The inverter shall be capable of operating motors through V/F Control and sensor-less vector speed/ torque control; and shall have the feature of auto-learning necessary motor parameters.

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

a. The use of load reactors (dV/dT Filter) 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 Fixed Structure, 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)** or as per approval of Engineer In charge.

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) = $\frac{\text{Q (iGPH)} * \text{TDH (ft)} * 746 * \text{PV Loss Factor}}{60 * 3300 * \eta_{pump} * \eta_{motor}}$

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

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

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 and DC Motors 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 240Vdc 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.

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).

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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 satisfy 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 (UP TO 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 50 mm (For discharge equal or less than 8250 LPH and/or for Motor 5.5 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. deleted
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 (UP TO 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 (BLDC), 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

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 ≥ 6 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. All Structure Material Should be Hot Dipped Galvanized Steel (Minimum 80 Microns).

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c. The auto Tracker should also have manual control mode to adjust the tracking angle manually. All Structure Material Should be Hot Dipped Galvanized Steel (Minimum 80 Microns) or epoxy coating with red oxide (as per direction of Engineer incharge).
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 TRACKING:

a. Suitable for Up to 6.5 KW PV Panels easily movable in multi directions having flanges with bearing balls 7/16" and having angle adjustment.
b. Base steel cage 7/8", MS rod 3.5 feet length with nut-bolts system for strong anchoring.
c. Pillar pipe 5 mm with 6" dia, base plate 15"x15"x16mm size with 04 numbers of supports.
d. Support for PV, 4mm thickness 5" dia pipe and 24"x$6^{1/2}$"x1/4" side plates.
e. MS I Beam/Garder side bracing 3"x7"x1/8". C Channel frame 3"x1½"x1/8" for panel mounting.
f. Steel structures/frames shall be enamelled paint with lead oxide.
g. Galvanized nuts, bolts and washers for tracker fitting.
h. Steel frame shall be properly designed and shall withstand wind speed/load of at least 130km/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 tests 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. (Deleted As repetition of Section A, serial 18 (A))

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) may 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 inverter Installation should be IP-65 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 up to three units. (Only For projects, where more than one inverter should be installed).
17. Inverter should have active CAN/RS485/RS232 or equivalent 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 inverter's circuits.
    - Protection against accidental short circuits.
    - Protection against lightning induced transients.
    - Over load protection.
20. The Maximum power point tracking MPPT efficiency ≥ 99%, and converter efficiency up to 98% of MPPT charge controller.
21. The inverter shall be equipped with certified anti-islanding protection in compliance with international standards (e.g., IEEE 1547, IEC 62116), to ensure immediate disconnection from the grid during outages or abnormal grid conditions.

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) (If Applicable).
3. The Inverter / system must have a MPPT Solar Charge Controller.

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Solar Energy, PEDO Peshawar

Chief Engineer (RE/PPP)
PEDO Peshawar

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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.
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 62109-0 1 and IEC 62109-2, or Equivalent Certificates.
11. The degree of protection of the inverter Installation should be IP-65 or above.
12. Wide input voltage range operation capability. (i.e.: at least 170 V to 270V for Operation)
13. Inverter should have active CAN/RS485/RS232 or equivalent 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.
15. Inverter settings be preferably password protected.
16. Inverter should be capable of battery less operation (preferred or as per BoQ requirement).
17. Discharge Current should be preferably programmable (i.e.: discharge battery Current can be limited to user desired values).
18. The Maximum power point tracking MPPT efficiency ≥ 99%, and converter efficiency up to 96% of MPPT charge controller.

Note:

The THD (Total Harmonic Distortion), inverter capacity and efficiency may be conducted from the accredited laboratory in Pakistan.

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Project Director (SOLAR)
Solar Energy, PEDO Peshawar

Chief Engineer (RE/PPP)
PEDO, Peshawar

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D-SPECIFICATIONS FOR SOLAR STREET LIGHTS

35. SOLAR STREET / ROAD LIGHT SYSTEM DESIGN:

a. The 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 distances), 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 Colour 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 Colour 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, Catalogue and certificates must be attached with the Technical Bid

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 Flooded, GEL, AGM, OPzV, OPzS & Lithium Ferrous Phosphate (LiFePO4) Batteries.
b. The charge controller must be IP-67 rated or above for outdoor installation

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Solar Energy, PEDO Peshawar

Chief Engineer (RE/PPP)
PEDO, Peshawar

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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 and Automatic Battery Voltage Recognition.
e. The charge controller must have at-least three stage Flexible dimming function (0-100%).
f. The Maximum power point tracking MPPT efficiency ≥ 99.0%, and converter efficiency up to 98%
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, Catalogue 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. Stand deleted.
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. (Deleted As repetition of Section A (2)).

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Solar Energy, PEDO Peshawar

Chief Engineer (RE/PPP)
PEDO, Peshawar

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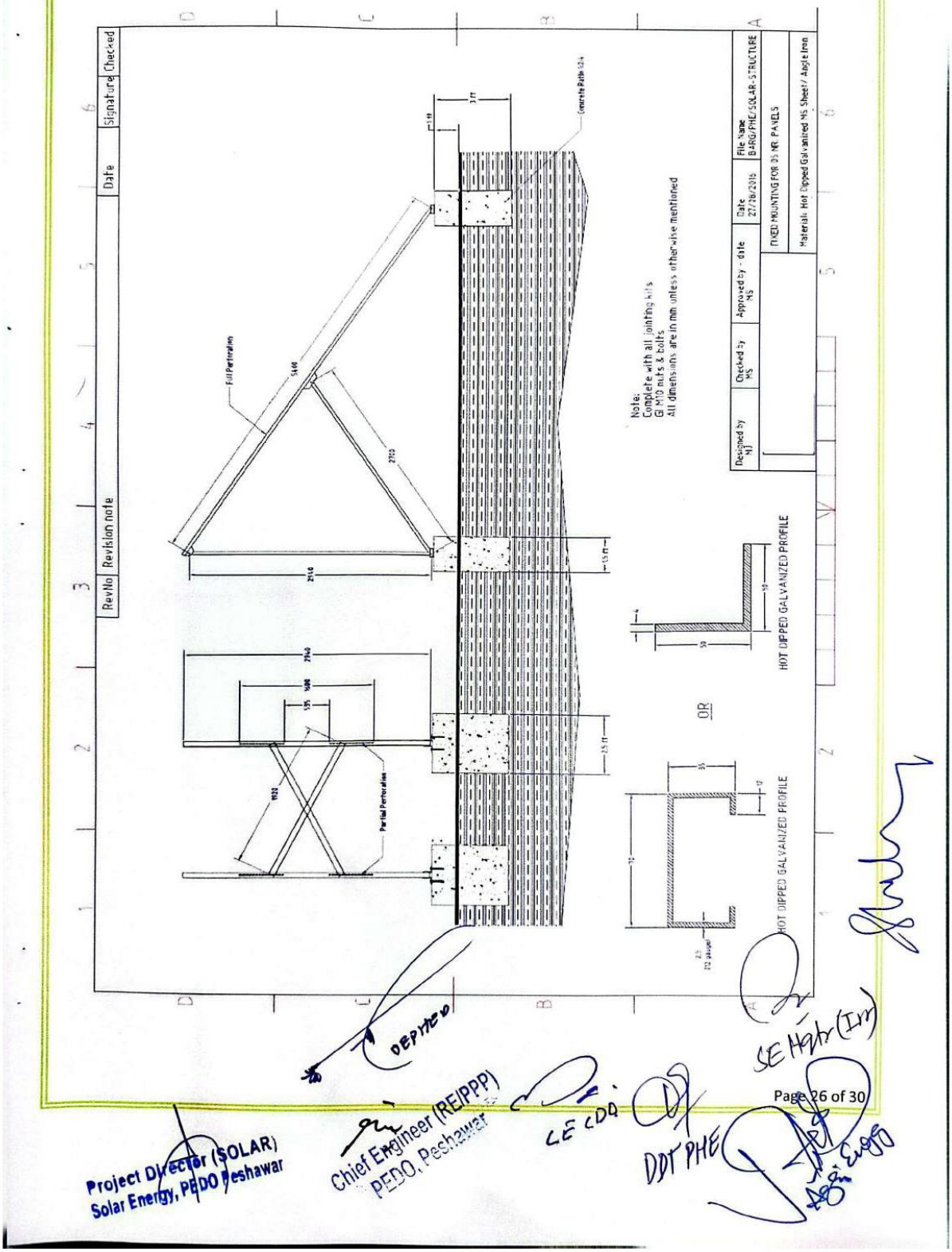
APPENDIX-I
(STRUCTURE DRAWING)



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Solar Energy, PEDO Peshawar

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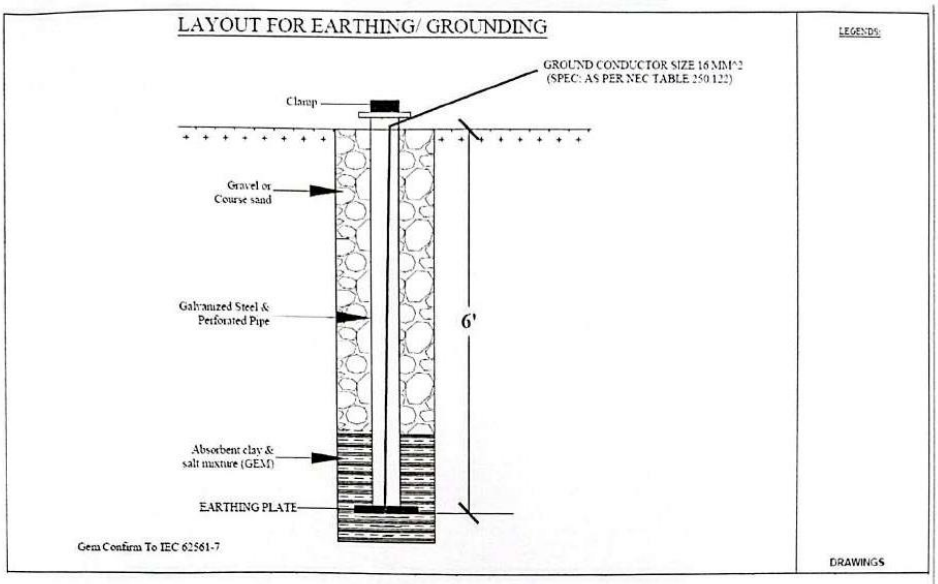
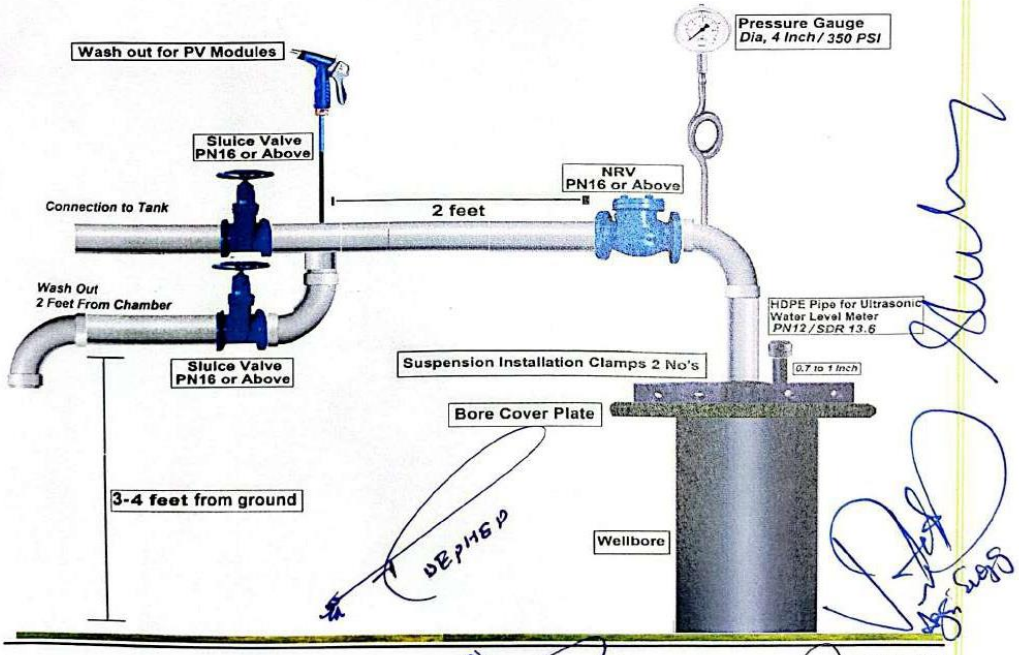
APPENDIX-II
(EARTHING / GROUNDING DRAWING)



APPENDIX-III TOPSET LAYOUT:



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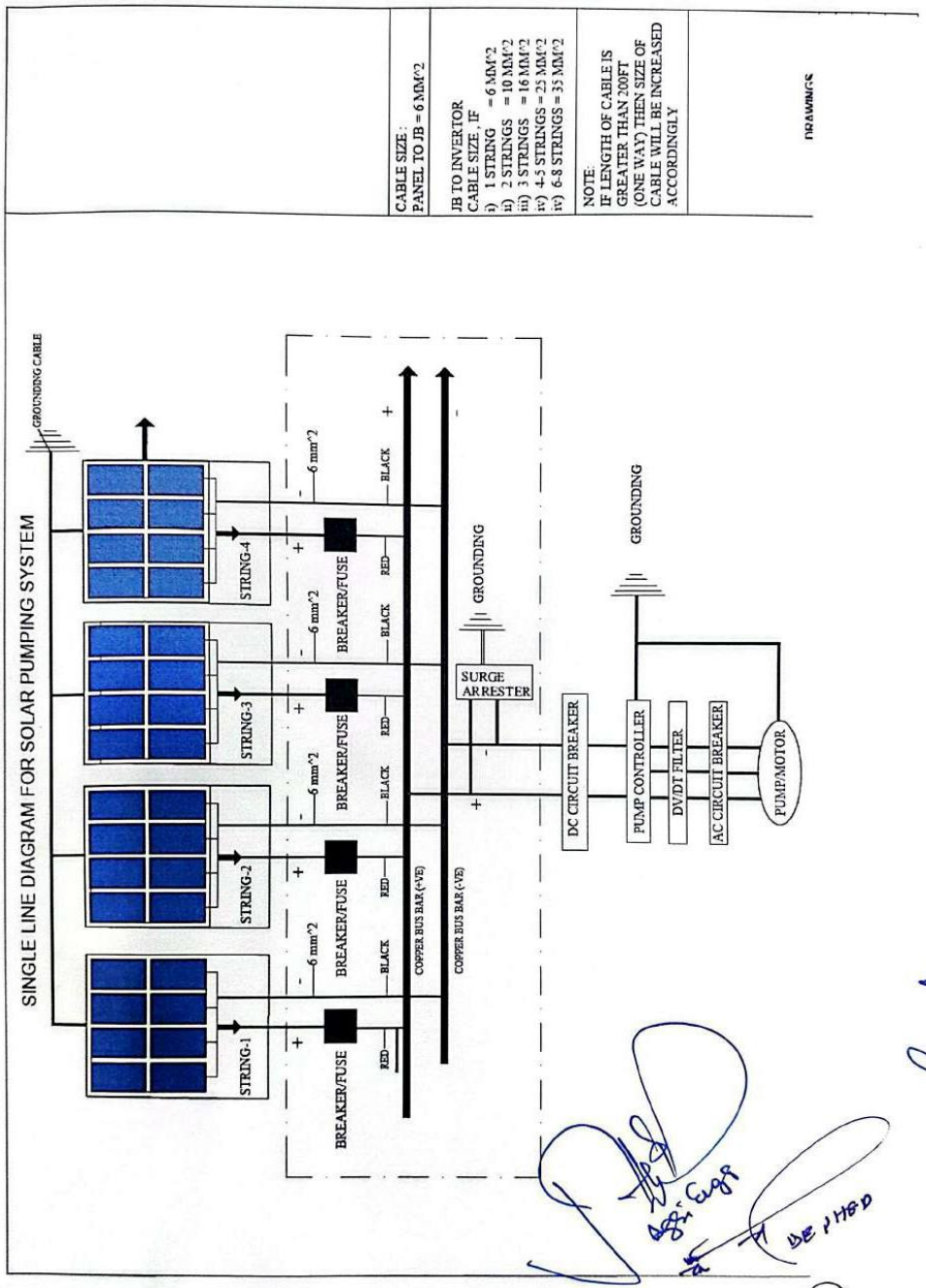
APPENDIX-IV
(SYSTEM SINGLE LINE DIAGRAM-PUMPING)



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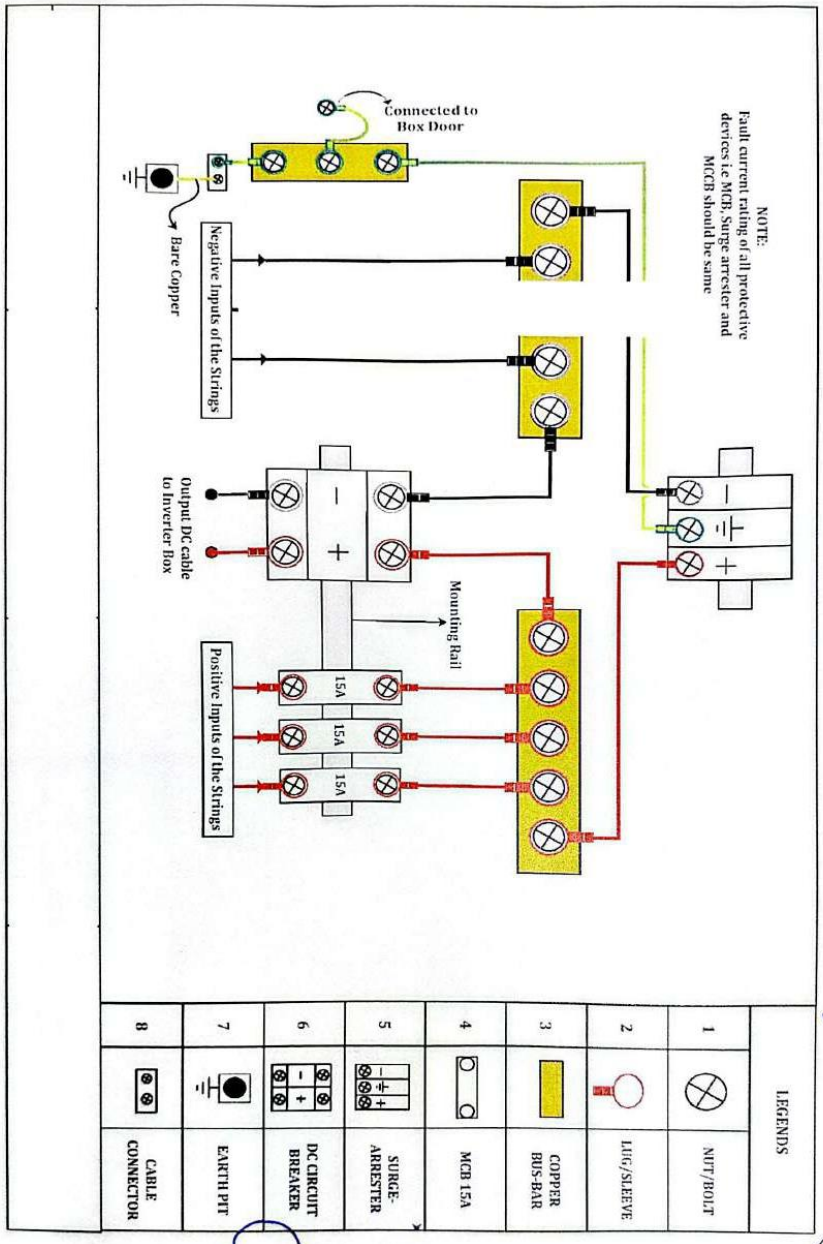
APPENDIX-V
(JUNCTION/COMBINER BOX SCHEMATICS DIAGRAM)



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APPENDIX-VI

MINIMUM SIZE OF BONDING/EQUIPMENT GROUNDING/GROUNDING ELECTRODE CONDUCTORS AND GROUND BUS

Table 250.122 Minumum Size Equipment Grounding Conductors for Grounding Raceway and Equipment

Rating or Setting of Automatic Overcurrent Device in Circuit Ahead of Equipment, Conduit, etc., Not Exceeding (Amperes)	Copper	Aluminum or Copper-Clad Aluminum
15	14	12
20	12	10
30	10	8
40	10	8
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1
500	2	1/0
600	1	2/0
800	1/0	3/0
1000	2/0	4/0
1200	3/0	250
1600	4/0	350
2000	250	400
2500	350	600
3000	400	600
4000	500	800
5000	700	1200
6000	800	1200
	Size (AWG or kcmil)	

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