

**GOVERNMENT OF KHYBER PAKHTUNKHWA
IRRIGATION DEPARTMENT**



**INSTALLATION OF SOLAR AUGMENTATION / IRRIGATION
TUBE WELLS IN KHYBER PAKHTUNKHWA.
ADP NO.2191/160513 (2021-22)**

Installation of One No. Irrigation Tube Well in UC Amma Khel District Tank
(Supply of Solar System & Pumping Machinery along with all accessories.)

**(TECHNICAL BID & SPECIFICATIONS)
BIDDING DOCUMENTS**

Issued to _____



Executive Engineer
Gomal Zam Irrigation Division
DIKhan

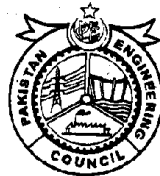

Executive Engineer
Gomal Zam Irrigation Division
D.I.Khan

**STANDARD FORM OF BIDDING DOCUMENTS
FOR
PROCUREMENT OF WORKS
(Electrical & Mechanical)**

**Available on PEC website (www.pec.org.pk)
and PPRA website (www.ppra.org.pk)**

(Harmonized with PPRA Rules)

June 11, 2007



**PAKISTAN ENGINEERING COUNCIL
ISLAMABAD**

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**NOTIFICATION NO. 8(60)WR/PC/2008 DATED 12th FEBRUARY, 2008
PLANNING & DEVELOPMENT DIVISION
GOVERNMENT OF PAKISTAN**

PREFACE

1. Pakistan Engineering Council (PEC) being the statutory regulatory body has been entrusted to regulate the engineering profession in Pakistan. It has carried out standardization of “country specific” documents to regulate and streamline hiring of engineering consultancy services and procurement of works in line with advice by Planning Commission, Govt of Pakistan in 1996. Standard Form of Bidding Documents (Electrical & Mechanical) is one such document prepared by a team of experts comprising employers, constructors and consultants. A part of this document titled – “Pakistan Standard Conditions of Contract” after approval by the Executive Committee of Pakistan Engineering Council was printed in Dec 92. It was reprinted in July 93 incorporating editorial amendments and was then issued to various organizations in the country. With the passage of time, this document was developed into a complete bidding document which was notified for implementation by Government of Pakistan. On the basis of feedback received from the users of this document and comments from PPRA in September 2005, it is revised upto June 11, 2007. It is expected that use of this document will provide an equitable and just basis of contract agreements for procurement of electrical and mechanical works in line with the international practice and relevant PEC Bye-laws thus minimizing ambiguities and likely contractual disputes.
2. This document is primarily based on the Bidding Documents prepared by WAPDA and comprises Instructions to Bidders.
3. This document incorporates FIDIC General Conditions of Contract for Electrical and Mechanical Works (1987 Edition reprinted 1988 with editorial amendments), Particular Conditions of Contract and sample Schedules required for bidding.
4. This document is to be used for all projects with estimated value of more than Rs. 25 Million. Current revision of this document is based on Public Procurement Rules 2004 and users feedback.
5. This document has been approved by ECNEC in its meeting on 12th November, 2007. The document has been notified by Planning Commission, Government of Pakistan vide Notification No. 8(60)WR/PC/2008 dated 12th February, 2008. It is, therefore, mandatory for all engineering organizations and departments at Federal and Provincial level and district governments to use this document for procurement of electrical and mechanical works funded locally and/or through donor agencies.
6. Any suggestions for improvement shall be appreciated. These may be addressed to Registrar, PEC, Ataturk Avenue, G-5/2, Islamabad (e-mail: registrar@pec.org.pk).

**INSTRUCTIONS TO
USERS OF THIS
DOCUMENT**

INSTRUCTIONS TO USERS OF THIS DOCUMENT

(Not to be included in Bidding Documents)

As stated in Clause IB.5 of Instructions to Bidders, the complete Bidding Documents shall comprise ten (10) items listed therein including any addendum to Bidding Documents issued in accordance with Clause IB.7. The Standard Form of Bidding Documents, in addition to “Invitation for Bids” include the following:

1. Instructions to Bidders with Appendices
2. Forms of Bid & Schedules to Bid

Schedules to Bid are the following:

- (i) Schedule A: Specific Works Data
- (ii) Schedule B: Work to be Performed by Subcontractors
- (iii) Schedule C: Proposed Programme of Works
- (iv) Schedule D: Deviations from Technical Provisions
- (v) Schedule E: Deviations from Contractual Conditions
- (vi) Schedule F: Method of Performing Works
- (vii) Schedule G: Proposed Organization
- (viii) Schedule H: Integrity Pact
3. Schedule of Prices
4. Preamble to Conditions of Contract
5. General Conditions of Contract
6. Particular Conditions of Contract
7. Standard Forms

Forms include the following:

- (i) Form of Bid Security
- (ii) Form of Contract Agreement
- (iii) Form of Performance Security
- (iv) Form of Bank Guarantee/Bond for Advance Payment
8. Specifications - Special Provisions
9. Specifications - Technical Provisions
10. Drawings

The Instructions to Bidders can be used as given. User may have to make changes in the text under some special circumstances. However, blank spaces in Instructions to Bidders are required to be filled by the Employer/Engineer on bid to bid basis before issuance of Bidding Documents.

The General Conditions of Contract should be retained as such except otherwise as amended by the Pakistan Engineering Council (PEC) and indicated by the PEC either in the Particular Condition of Contract (PCC) or in the Instructions to Users. Any Further change in Clauses of Particular Conditions of Contract mentioned in “Paragraph D” hereinafter should be made with care.

The user is required to prepare the following for completion of the Bidding Documents:

- (i) Particular Conditions of Contract (As instructed herein)
- (ii) Schedules to Bid
- (iii) Schedule of Prices
- (iv) Specifications – Special Provision
- (v) Specifications – Technical Provisions
- (vi) Drawings

The user's attention is drawn to the Preface and it is emphasized that while preparing remaining part of Particular Conditions of Contract, no Clause of Particular Conditions of Contract prepared by PEC should be deleted or amended except as indicated by the PEC and that the changes included in Particular Conditions of Contract should be such as not to change the spirit of the document.

A. Invitation for Bids

1. The "Invitation for Bids" is meant for publication in the national/ international newspapers and Irrigation Website as well as on KPPRA Website in case of Federal Procuring Agencies and for other additional distribution to be decided by the Employer as notice for calling of bids. All the blank spaces are to be filled in by the Employer.

The eligible bidders are defined in Clause 2 of Instructions to Bidders. Text of Sub-Clause 2.1 para (b) can be amended by the Employer on bid to bid basis.

2. The notice should be published so as to give the prospective bidders sufficient working period for preparation and submission of bids which may be 42 to 154 days depending on the size of the Works.
3. If the Works are not financed from loan/credit, Item 1 of Invitation to Bidders should be modified accordingly.
4. The non-refundable fee for the sale of Bidding Documents should be nominal so as to cover reproduction and mailing costs and to ensure that only bonafide bidders will apply.
5. The amount of Bid Security should be a lump sum figure ranging from 1% to 3% of the likely cost of the Works or a percentage ranging from 1% to 3% of the Bid Price and should be the same as given at Sub-Clause 15.1 of Instructions to Bidders.
6. The venue and time of receipt of bids and the venue and time of opening of bids are to be entered in the last para of the Invitation to Bidders. However, date for the receipt and opening of bids shall be same.

B. Instructions to Bidders

1. If the Works are not financed from a loan/credit Sub-Clause 1.2 of Instructions to Bidders should be modified accordingly by the Employer.
2. The Employer shall fill in the blank spaces in Instructions to Bidders.

3. Sub-Clause 11.4 and para a(vi) of Sub-Clause 24.1 of Instructions to Bidders may be retained or modified by the Employer in accordance with his requirements.
4. Sub-Clauses 12.1 & 12.2 of Instructions to Bidders may be retained or modified by the Employer in accordance with the availability of Financing.
5. Referring to Sub-Clause 15.1 of Instructions to Bidders amount of Bid Security be filled in by the Employer as a lump-sum figure ranging from 1% to 3% of the likely cost of Works or a percentage ranging from 1% to 3% of Bid Price.
6. Referring to Sub-Clause 16.1 of Instruction to Bidders, the period of bid validity may range from 56 to 182 days depending upon the size of the Works. Number of days would be filled in as per Employer's requirements.
7. Sub-Clause 26.3(iv) of Instructions to Bidders may be modified by the Employer in case deviation in Payment Schedule is not acceptable.
8. Referring to Sub-Clause 26.3(v) of Instructions to Bidders the Employer may insert the number of days depending upon his requirement for late delivery.
9. Referring to Sub-Clause 10.2 and Clause 27 the award and its computation is subject to change as per policy of the Federal Government as applicable on the date of bid opening.

C. Preamble To Conditions of Contract

1. All blank spaces in the Preamble are to be filled in by the Employer to complete this document. Where detailed elaborations required the same may be done in the PCC
2. The minimum amount of third party insurance should be assessed by the Employer and entered in the Preamble.
3. The time for completion of the whole of the Works should be assessed by the Employer and entered in the Preamble.
4. The amount of liquidated damages per day of delay and amount of bonus, if applicable, shall be entered by the Employer in the Preamble.

The amount of the liquidated damages for each day of delay in completion of the whole of the Works, or if applicable for any Section thereof, shall be a sum equal to 10% of the likely cost of the Works divided by one-fourth of the number of days specified as completion time.

D. Particular Conditions of Contract

1. Referring to Sub-Clause 5.3 of GCC, the Employer may add, in order of priority, such other documents as form part of the Contract. If other documents, additional to those mentioned under Sub-Clause 5.1 of Instructions to Bidders, are listed to form part of the Bidding Documents, the Employer should include such other documents in the Form of Contract Agreement and in the order of priority under Sub-Clause 5.3 of PCC.

2. Sub-Clauses 6.6, 6.9, 6.10, 16.5, 33.3, 35.1, 43.1, 43.2, 43.3 47.1 and 48.1 may be further modified accordingly by the Employer/Engineer.
3. General Conditions of Contract and Particular Conditions of Contract prepared by the PEC should be incorporated in the Bidding Documents/Contract without any change. Any amendment and/or additions to the Conditions of the Contract that are specific to a given Bid/Contract should be included by the user in relevant Clauses of Particular Conditions of Contract.
4. Terms of Payment as Sub-Clause 33.1 should be prepared and incorporated in Particular Conditions of Contract by the Employer/ Engineer.
5. The Employer should state the Currencies of Payment(s) in Particular Conditions of Contract.
6. The Employer should develop the formula and other factors based on “Standard Procedure and Formulae for Price Adjustment” prepared by PEC.

E. Schedules to Bid

Specimen of Schedules to Bid is provided in this document as sample. Employer/Engineer can add/delete/modify as per his requirement.

F. Special Provisions

To be prepared and incorporated by the Employer/Engineer. (to include site conditions, facilities provided etc. but not to include any provision of Conditions of Contract.)

G. Technical Provisions

To be prepared and incorporated by the Employer/Engineer. (Specifications shall allow the widest possible competition and shall not favour any single contractor or supplier nor put others at a disadvantage. Specifications shall be generic and shall not include references to brand names, model numbers, catalogue numbers or similar classifications. However, if the Employer is convinced that the use of or a reference to a brand name or catalogue number is essential to complete an otherwise incomplete specification, such use or reference shall be qualified with the words “or equivalent”.)

H. Drawings

To be prepared and incorporated by the Employer/Engineer.

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**INVITATION
FOR BIDS**


Executive Engineer
Gomal Zam Irrigation Division
D.I.Khan

GOVERNMENT OF KHYBER PAKHTUNKHWA
IRRIGATION DEPARTMENT
NOTICE INVITING E-BIDDING
(SINGLE STAGE TWO ENVELOP SYSTEM)

Irrigation Department Govt. of Khyber Pakhtunkhwa invites Technical and Financial (Electronic Bids) Proposal on the basis of Single Stage Two Envelop procedure for the following work from the eligible firms / contractors who have renewed their enlistment and PEC license in relevant category for Solar (EE-11) for the year 2021-22, registered with Khyber Pakhtunkhwa Revenue Authority (KPPRA) and on active tax payer list of income tax Department.

Work No.	Work Name	Earnest Money (Rs.)	Required PEC Category	Last date / time of submission of Tenders Forms.	Date/ Time of Opening of (Technical Bid)	Time Limit
INSTALLATION OF SOLAR AUGMENTATION / IRRIGATION TUBE WELLS IN KHYBER PAKHTUNKHWA. ADP NO.2191/160513 (2021-22) Sub Work:-						
1.	Installation of One No. Irrigation Tube Well in UC Amma Khel District Tank <i>(Supply of Solar System & Pumping Machinery along with all accessories.)</i>	02% of the Estimated Cost	EE-11	07/06/2022 Time 12:00 PM	07/06/2022 Time 12:30 PM	As per BOQ/ Work Order

Terms & Conditions for E-Bidding:-

- Bidding Documents including instruction to bidders, Terms and conditions and Evaluation Criteria can be downloaded from Irrigation Department Website (www.irrigation.gkp.pk) and KPPRA official Website.
- Technical design should be based on Hydraulic parameter of the scheme provided in the bidding documents and rates should be quoted accordingly in bidding documents.
- Two percent (02%) Bid Security/Earnest Money + Stamp duty of the Estimated cost from the account of firm/ bidder/ contractor who submits the bid must be accompanied with the tender document / Quotation through any scheduled bank in favor of **Executive Engineer, Gomal Zam Irrigation Division, DIKhan**. Failure to submit the 2% CDR will lead to rejection of the bid.
- Technical bid should be in sealed envelope clearly marked "Technical Bid" and shall be submit through courier before closing time.
- Financial bid shall be filled online as per E-bidding procedure and hard copy submitted in sealed envelope clearly marked Financial Bid. Complete bids must reach the concerned offices on or before the fixed date/ time.
- The bidders who quote their bids / rates more than 10% below on Engineer's Estimate shall submit along with their bid and additional security as per KPPRA Notification No. S.R.O (14) / Vol: 1-24/2021-22, dated 10-05-2022.
- Financial electronic bids will be opened after approval of technical evaluation report.
- Bid security of the 1st, 2nd and 3rd lowest electronic bidder for the specific work may be retained by the Department till one week after issuance of LOA.
- The employer has the authority to reject any bid or all the bids assigning cogent reasons.

EXECUTIVE ENGINEER
Gomal Zam Irrigation Division DIKhan


Executive Engineer
Gomal Zam Irrigation Division
D.I.Khan

**INSTRUCTIONSTO
BIDDERS**

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INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid and Source of Funds

Scope of Bid

Irrigation Department through Executive Engineer, Gomal Zam Irrigation Division (hereinafter called “the Employer”) wishes to receive bids for the following scope of work:

Supply & Installation of Solar pumping machinery along with all accessories including specified pipe, pump, solar panels, stands with foundations, inverters, wiring/circuits etc for operationalization of solar irrigation tubewell for specified discharge, head, pump setting & drawdown etc. complete in all respects and to the satisfaction of the Employer

(Brief description of the Works)

Bidders must quote for the complete scope of work. Any bid covering partial scope of work will be rejected as non-responsive, pursuant to Clause IB.24.

Source of Funds

The Employer has applied for / received a loan/credit from Provincial ADP Khyber Pakhtunkhwa

(Name of the Loan / Credit giving agency / GOP / Provincial Government / Any other)

in the various currencies towards the cost of the Each Project as per NIT & title page and it is intended that part of the proceeds of this loan / credit will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.2 Eligible Bidders

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 relevant to the value of the Works & Field of specialization.
- c) duly enlisted with the Employer in relevant category and field of specialization

IB.3 Eligible Goods and Services

All Goods and ancillary Services to be supplied under this Contract shall have their origin in eligible countries listed in Appendix ‘A’ to Instructions to Bidders and all expenditures made under the Contract will be limited to such Goods and Services.

For purpose of this Clause, “origin” means the place where the Goods are mined, grown or produced or from where the ancillary services are supplied.
Goods are

produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

The origin of Goods and Services is distinct from the nationality of the Bidder.

IB.4 Cost of Bidding

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

B. BIDDING DOCUMENTS

IB.5 Contents of Bidding Documents

In addition to Invitations for Bids, the Bidding Documents are those stated below, and should be read in conjunction with any Addendum issued in accordance with Clause IB.7.

1. Instructions to Bidders with Appendices
2. Form of Bid & Schedules to Bid

Schedules to Bid are the following:

- (i) Schedule A: Specific Works Data
 - (ii) Schedule B: Work to be Performed by Subcontractors
 - (iii) Schedule C: Proposed Programme of Works
 - (iv) Schedule D: Deviations from Technical Provisions
 - (v) Schedule E: Deviations from Contractual Conditions
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Forms include the following:
 - (i) Form of Bid Security
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 - (iv) Form of Bank Guarantee/Bond for Advance Payment
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 9. Specifications - Technical Provisions
 10. Drawings

The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the

bidders own risk. Pursuant to Clause IB.24, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.6 Clarification of Bidding Documents

6.1 A prospective bidder requiring any clarification(s) in respect of the Bidding Documents may notify the Employer with a copy to the Engineer in writing or by telex or fax at the address:

Office of the Executive Engineer, Gomal Zam Irrigation Division DIKhan opposite Peshawar High Court Bench at DIKhan

Employer will examine the request for clarification of the Bidding Documents which it receives not later than twenty eight (28) days prior to the deadline for the submission of bids and if needed will issue the clarification/amendment of the Bidding Documents at least fourteen (14) days before the date of submission of Bids (without identifying the source of enquiry) to all prospective bidders who have purchased the Bidding Documents.

IB.7 Amendment of Bidding Documents

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

Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof, and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer. The bidder shall also confirm in the Form of Bid that the information contained in such addenda have been considered in preparing his bid.

To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may at its discretion extend the deadline for submission of bids in accordance with Clause IB.19.

C. PREPARATION OF BIDS

IB.8 Language of Bid

8.1 The Bid prepared by the Bidder and all correspondence and documents relating to the Bid, exchanged by the Bidder and the Engineer 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.9 Documents Comprising the Bid

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

- (a) Covering Letter

- (b) Form of Bid duly filled, signed and sealed, in accordance with Clause IB.17.
- (c) Schedules (A to H) to Bid duly filled and signed, in accordance with the instructions contained therein.
- (d) Schedule of Prices completed in accordance with Clauses IB.11 and 12.
- (e) Bid Security furnished in accordance with Clause IB.15.
- (f) Power of Attorney in accordance with Clause IB 17.5.
- (g) Joint Venture Agreement (if applicable).
- (h) Documentary evidence established in accordance with Clause IB.13 that the bidder is eligible to bid and is qualified to perform the contract if its bid is accepted.
- (i) Documentary evidence established in accordance with Clause IB.14 that the Goods and ancillary Services to be supplied by the bidder are eligible Goods and Services and conform to the Bidding Documents.
- (j) Bidders applying for eligibility for domestic preference in bid evaluation shall supply all information & evidence to establish the claim for domestic preference required to satisfy the criteria for eligibility as described in Clause IB.27. The particulars for domestic Goods prescribed in Appendix C to these Instructions shall also be filled in to substantiate claim for domestic preference.
- (k) Any other documents prescribed in Particular Conditions of Contract or Technical Provisions to be submitted with the bid.

IB.10 Form of Bid and Schedules

The bidder shall complete, sign and seal the Form of Bid, Schedules (A to H, or as modified) to Bid and Schedule of Prices furnished in the Bidding Documents and shall also enclose other information as detailed in Clause IB.9.

For the purpose of granting a margin of domestic preference pursuant to Clause IB.27, the Employer/Engineer will classify the bids, when submitted in one of three groups as follows:

- (a) **Group 'A' Bid.** (i) For Goods for which labour, raw materials and components from within Pakistan account for at least 20% of the ex-factory bid price of the products offered (ii) For Goods for which labour, raw materials and components from within Pakistan account for over 20% and up to 30% of the ex-factory bid price of the products offered (iii) For Goods for which labour, raw materials and components from within Pakistan account for over 30% of the ex-factory bid price of the products offered.
- (b) **Group 'B' Bid.** For Goods manufactured in Pakistan for which the domestic

value added in the manufacturing cost is less than 20% of the ex-factory bid price; and

- (c) **Group ‘C’ Bid.** For Goods of foreign origin.

In preparing their bids, the bidders, whether local or foreign, shall enter in the Schedule of Prices ex-factory price for indigenously manufactured products and CIF price as well as customs duty and sales tax and other import charges for products to be imported from outside Pakistan.

IB.11 Bid Prices

The bidder shall fill up the Schedule of Prices attached to these documents indicating the unit rates and prices of the Works to be performed under the Contract. Prices on the Schedule of Prices shall be entered keeping in view the instructions contained in the Preamble to the Schedule of Prices.

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

The bidder’s separation of price components in accordance with Sub-Clause 11.1 above, will be solely for the purpose of facilitating the comparison of bids by the Employer/Engineer and will not in any way limit its right to contract on any of the terms offered.

Unless otherwise stipulated in the Conditions of Contract, prices quoted by the bidder shall remain fixed during the bidder’s performance of the Contract and not subject to variation on any account. When the bidders are required to quote only fixed price(s) a bid submitted with an adjustable price quotation will be treated as non-responsive and rejected, pursuant to Clause IB.24.

Any discount offered shall be valid for at least the period of validity of the bid. A discount valid for lesser period shall be considered null and void.

IB.12 Currencies of Bid

Prices shall be quoted in the following currencies:

The prices shall be quoted in the Pak. Rupees.

~~Further, a bidder expecting to incur a portion of its expenditure in the performance of the Contract in more than one currency (but use no more than 3 foreign currencies), and wishing to be paid accordingly, shall so indicate in its bid.~~

The currencies of payment shall be as stated in Particular Conditions of Contract. However, provisions in Sub-Clauses 12.1 & 12.2 above, shall not in any way constitute a contractual or legal binding on the Employer for the payment in the currencies required by the Contractor.

IB.13 Documents Establishing Bidder's Eligibility And Qualifications

Pursuant to Clause IB.9, 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.

The documentary evidence of the bidder's eligibility to bid shall establish to the Employer's satisfaction that the bidder, at the time of submission of its bid is from an eligible source country as defined under Clause IB.2.

The documentary evidence of the bidder's qualification to perform the Contract if its bid is accepted, shall establish to the Employer's/Engineer's satisfaction:

- (a) that, in the case of a bidder offering to supply Goods under the Contract which the bidder did not manufacture or otherwise produce, the bidder has been duly authorized by the Goods manufacturer or producer to supply the Goods to Pakistan;
 - (b) that the Bidder/Manufacturer has the financial, technical and production capability necessary to perform the Contract; and
 - (c) that, in the case of a bidder not doing business within Pakistan the bidder is or will be (if successful) represented by an agent in Pakistan equipped and able to carry out the Supplier's maintenance, repair and spare parts stocking obligations prescribed by the Conditions of Contract and/or Technical Provisions.
- (a) Bidder/Manufacturer must possess and provide evidence of the following experience.

As per Schedule – I to bid

The Bidder shall certify the capacity and capability of the plant (from which Goods are now offered) for manufacturing, quality assurance and testing facilities, qualified man-power and production/delivery of quality materials according to bid specifications and delivery requirements. Besides, such plant should have produced same items for at least a number of years and such Goods shall have proven successful in the field for at least a number of years and the bidder shall submit with the bid all necessary documentation in this regard. The Employer/Engineer will have the right to verify the particulars regarding the plant and other related information furnished with the bid and the joint venture as well as the partners thereof shall be liable for disqualification in the event of any mis-statement/mis-representation on their part.

The bidder shall furnish documentary evidence of qualification on the Form "Evidence of Bidder's Capability" (Appendix B to these Instructions)

- (b) The bidder should have an average annual turnover in the last five years equal

to or more than the Total Bid Price or as specified in Schedule – I to Bid. Alternately, the bidder should have successfully completed in the last five years any specific project having value equal to or higher than the total Bid Price or as specified in Schedule – I to Bid.

Joint Venture

In order for a Joint Venture to qualify:

- (a) At least one of the partners of joint venture shall satisfy the relevant experience criteria specified in Sub-Clause 13.4(a) hereinabove.
- (b) All firms comprising the joint venture shall be legally constituted and shall meet the eligibility requirement of Sub-Clause 2.1 hereof.
- (c) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally to Employer for the execution of the entire Contract in accordance with the Contract terms and conditions and a statement to this effect shall be included in the authorization mentioned under para (f) below as well as in the Form of Bid and Form of Contract Agreement (in case of a successful bidder).
- (d) The Form of Bid, and in the case of successful bidder, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners.
- (e) One of the joint venture partners shall be nominated as being in-charge and this authorisation shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners.
- (f) The partner-in-charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture.
- (g) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partner without prior written consent of the Employer.

The Bidder shall propose, in order of his priority; plant, equipment or goods of not more than three Manufacturers. Employer at his own jurisdiction will evaluate the plant, equipment or goods of only one of such Manufacturers.

IB.14 Documents Establishing Goods' Eligibility and Conformity to Bidding Documents

Pursuant to Clause IB.9, the bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the Bidding Documents of all Goods and Services which the bidder proposes to perform under the Contract.

The documentary evidence of the Goods and Services eligibility shall establish to the Employer's satisfaction that they will have their origin in an eligible source country as defined under Clause IB.3. A certificate of origin issued at the time of shipment will satisfy the requirements of the said Clause.

The documentary evidence of the Goods and Services' conformity to the Bidding Documents may be in the form of literature, drawings and data and shall furnish:

- (a) A detailed description of the Goods, essential technical and performance characteristics.
- (b) Complete set of technical information, description data, literature and drawings as required in accordance with Schedule A to Bid, Specific Works Data. This will include but not be limited to the following:
 - (i) A sufficient number of drawings, photographs, catalogues, illustrations and such other information as is necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the Goods to be furnished.
 - (ii) Details of equipment and machinery with capacity.
 - (iii) Any other information which is required for evaluation purposes.
- (c) A clause-by-clause commentary on Technical Provisions, provided with the Bidding Documents, demonstrating the Goods' and Services' substantial responsiveness to those Specifications or a statement of deviations and exceptions to the provisions of the Technical Provisions as required in Schedule D to Bid.

For purpose of the commentary to be furnished pursuant to Sub-Clause 14.3(c) above, the Bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, designated by the Engineer in the Technical Provisions are intended to be descriptive only and not restrictive. The bidder may substitute alternative standards, brand names and/or catalogue numbers in its bid, provided that it demonstrates to the Engineer's satisfaction that the substitutions are substantially equivalent or superior to those designated in the Technical Provisions. Copies of the standards proposed by the bidder other than those specified in the Bidding Documents shall be furnished.

IB.15 Bid Security

Each bidder shall furnish, as part of his bid, a Bid Security in the amount of Pak. Rupees equal to 2% of the Estimated cost and 8% additional security if the bid is more than 10% below the estimated cost.

The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call by a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan.

The Bid Security is required to protect the Employer against the risk of bidder's conduct which would warrant the security's forfeiture, pursuant to Sub-Clause 15.7 hereof.

Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive, pursuant to Clause IB.24.

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

The Bid Security of the successful bidder will be returned after successful completion of work and lapse of security period.

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 24.2 hereof; or
- (c) in the case of a successful bidder, if he fails to sign the Contract Agreement, in accordance with Clause IB.35.
- (d) in violation of any standing rules/laws and terms and conditions defined in the NIT.

IB.16 Validity of Bids

Bids shall remain valid for 90 days after the date of bid opening as prescribed in Clause IB.19.

In exceptional circumstances prior to expiry of original bid validity period, the Employer may request the bidders to extend the period of validity for a specified additional period which shall in no case be more than the original bid validity period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiture of his Bid Security. A bidder agreeing to the request will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects in which case, the Employer will be obligated to compensate the bidders, upon substantiation for their increase in costs (if it is a fixed price bid).

IB.17 Format and Signing of Bid

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

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

No alteration is to be made in the Form of Bid nor in the Schedules thereto 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.

Each bidder shall prepare one (1) Original Copy, of the documents comprising the bid

as described in Clause IB.9 and clearly mark it appropriately. In the event of discrepancy the original shall prevail.

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

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

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

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

D. SUBMISSION OF BIDS

IB.18 Sealing and Marking of Bids

Each bidder shall submit his bid as under:

- (a) ORIGINAL COPY of the Bid shall be separately sealed and put in separate envelopes and marked as such.
- (b) The envelopes containing the ORIGINAL COPY will be put in one sealed envelope and addressed / identified as given in Sub- Clause 18.2 hereof.

The inner and outer envelopes shall;

- (a) be addressed to the Employer at the address given in Sub-Clause 6.1 heretofore.
- (b) bear the Project name, Loan No., Bid No. and Date of opening of Bid.
- (c) provide a warning not to open before the time and date for bid opening.

The Bid shall be delivered in person or sent by registered mail at the address to Employer as given in Sub-Clause 6.1 heretofore.

In addition to the identification required in Sub-Clause 18.2 hereof, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause IB.20.

If the outer envelope is not sealed and marked as above, the Employer will assume no

responsibility for the misplacement or premature opening of the bid.

IB.19 Deadline for Submission of Bids

- 19.1 (a) Bids must be received by the Employer at the address specified in Sub-Clause 6.1 hereof not later than the time and date stipulated in the Invitation for Bids.
- (b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids.
- (c) Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.
- (d) Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by messenger.

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

The Employer may, at his discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause IB.7, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.20 Late Bids

- 20.1 (a) Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.19 will be returned unopened to such bidder.
- (b) Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.21 Modification, Substitution and Withdrawal of Bids

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

The modification, substitution or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.18 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL", as appropriate.

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 Clause IB.15.

E. BID OPENING AND EVALUATION

IB.22 Bid Opening

A committee consisting of nominated members by the Employer and by the Engineer will open the bids, including withdrawals, substitution and modifications made pursuant to Clause IB.21, in the presence of bidders' representatives who choose to attend, at the time, date and location stipulated in the Invitation for Bids.

The bidders' representatives who are present shall sign in a register evidencing their attendance.

Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first and the name of the Bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.21 shall not be opened.

The bidder's name, Bid Prices, unit rates, any discount and price of any Alternate Proposal(s), bid modifications, substitutions and withdrawals, the presence or absence of Bid Security, and such other details as the Employer at its discretion may consider appropriate, will be announced by the Employer at the bid opening. The Employer will record minutes of bid opening.

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.

Discounts offered for lesser period than the bid validity shall not be considered in evaluation.

IB.23 Clarification of Bids

23.1 To assist in the examination, evaluation and comparison of Bids the Engineer 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.

IB.24 Preliminary Examination & Determination of Responsiveness of Bids

Prior to the detailed evaluation of bids, pursuant to Clause IB.26,

- (a) the Engineer will examine the Bids to determine whether;
 - (i) the Bid is complete and does not deviate from the scope,
 - (ii) any computational errors have been made,
 - (iii) required sureties have been furnished,
 - (iv) the documents have been properly signed,
 - (v) the Bid is valid till required period,

- (vi) the Bid prices are firm during currency of contract if it is a fixed price bid,
- (vii) completion period offered is within specified limits,
- (viii) the Bidder/Manufacturer is eligible to Bid and possesses the requisite experience,
- (ix) the Bid does not deviate from basic technical requirements and
- (x) the Bids are generally in order.

(b) A bid is likely not to be considered, if;

- (i) it is unsigned,
- (ii) its validity is less than specified,
- (iii) it is submitted for incomplete scope of work,
- (iv) it indicates completion period later than specified,
- (v) it indicates that Works and materials to be supplied do not meet eligibility requirements,
- (vi) it indicates that Bid prices do not include the amount of income tax,

(c) A bid will not be considered, if;

- (i) it is not accompanied with bid security,
- (ii) it is submitted by a bidder who has participated in more than one bid,
- (iii) it is received after the deadline for submission of bids,
- (iv) it is submitted through fax, telex, telegram or email,
- (v) it indicates that prices quoted are not firm during currency of the contract whereas the bidders are required to quote fixed price(s),
- (vi) the bidder refuses to accept arithmetic correction,
- (vii) it is materially and substantially different from the Conditions/Specifications of the Bidding Documents.

Arithmetical errors will be rectified on the following basis:

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

Prior to the detailed evaluation, pursuant to Clause IB.26 the Employer/Engineer will determine the substantial responsiveness of each Bid to the Bidding Documents. For purpose of these Clauses, a substantially responsive Bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations.

A material deviation or reservation is one

- (i) which affects in any substantial way the scope, quality or performance of the

Works.

- (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; or
- (iii) whose rectification/adoption would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

The Employer's/Engineer's determination of a Bid's responsiveness will be based on the contents of the Bid itself without recourse to extrinsic evidence.

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.

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

IB.25 Conversion to Single Currency

25.1 To facilitate evaluation and comparison, the Employer/Engineer will convert, all Bid Prices expressed in the amount in various currencies in which Bid Price is payable, to Pak. Rupees at the Telegraphic Transfer and Over Draft (TT&OD) composite (selling) exchange rates published/authorized by State Bank of Pakistan and applicable to similar transactions, on the date of the opening of Bids.

IB.26 Detailed Evaluation of Bids

The Employer/Engineer will evaluate and compare only the bids previously determined to be substantially responsive pursuant to Clause IB.24 as per requirements given hereunder.

Evaluation and Comparison of Bids

- (a) Bids will be evaluated for each item and/or complete scope of work.
- (b) **Basis of Price Comparison**
The prices will be compared on the basis of the Evaluated Bid Price pursuant to Para (e) herein below.
- (c) **Technical Evaluation**
It will be examined in detail whether the Goods offered by the bidder comply with the Technical Provisions of the Bidding Documents. For this purpose, the bidder's data submitted with the bid will be compared with the specific work data prescribed by the Employer and technical features/criteria of the Goods detailed in the Technical Provisions. Other technical information submitted with the bid regarding the Scope of Work will also be reviewed.
- (d) **Commercial Evaluation**
It will be examined in detail whether the bids comply with the commercial/contractual conditions of the Bidding Documents. It is expected that no major deviation/stipulation shall be taken by the bidders.

- (e) **Evaluated Bid Price**
 In evaluating the bids, the Employer will determine for each bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Bid Price:
- (i) making any correction for errors pursuant to Sub-Clause 24.2 hereof.
 - (ii) excluding Provisional Sums, if any, but including priced Daywork.
 - (iii) making an appropriate adjustment for any other acceptable variation or deviation.

Evaluation Methods
 (NOT
 APPLICABLE)

Pursuant to Sub-Clause 26.2, Para (e)(iii) following evaluation methods for price adjustments will be followed:

- (a) Price Adjustment for Completeness in Scope of Work
 - (b) Price Adjustment for Technical Compliance
 - (c) Price Adjustment for Commercial Compliance
 - (d) Price Adjustment for Deviations in Terms of Payment
 - (e) Price Adjustment for completion Schedule
- (i) **Price Adjustment for Completeness in Scope of Work**
 In case of omission in the scope of work of a quoted item no price adjustment for the omitted item(s) shall be applied provided that the Bidder has mentioned in his bid that the same is covered in any other item.

The price adjustment shall not justify any additional payment by the Employer. The price(s) of omitted item(s) shall be deemed covered by other prices of the Schedule of Prices.

- (ii) **Price Adjustment for Technical Compliance**

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

- (iii) **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 will be added to the Corrected Total Bid Price for comparison purpose only. Adjustment for commercial compliance will be based on Corrected Total Bid Prices.

- (iv) **Price Adjustment for Deviation in Terms of Payment**

If a bid deviates from the terms of payment/payment conditions as specified in the Conditions of Contract and if such deviation is considered acceptable


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 Gomal Zam Irrigation Division
 D.I.Khan

the Employer, mark-up earned for any earlier payments involved in the terms outlined in the Bid as compared to those stipulated in the Conditions of Contract shall be calculated at the following mark-up rates:

- for foreign currency component: _____ per annum
(insert rate)
- for local currency component: _____ per annum
(insert rate)

and shall be added to the Corrected Total Bid Price for comparison purposes only.

(v) Price Adjustment for Completion Schedule

Bids indicating completion in advance of the dates stated in Preamble to Conditions of Contract, no credit will be given in this evaluation.

Bids indicating completion period later than the period set out in Preamble to Conditions of Contract shall be adjusted in the evaluation by adding a factor of 0.05% of the Corrected Total Bid Price for each calendar day of completion later than specified period of the completion.

Bids indicating completion beyond _____ days later
(insert number)

than the dates set out in Preamble to Conditions of Contract, shall not be considered and rejected as non responsive.

If the bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Schedule of Prices to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.34 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

IB.27. Domestic Preference

In the comparison of evaluated Bids, the Goods manufactured in Pakistan, will be granted a margin of preference in accordance with the following procedures, provided the bidder shall have established to the satisfaction of Employer that the manufacturing cost of such Goods includes a domestic value addition equal to at least 20% of the ex-factory Bid price of such Goods. Bidders applying for domestic preference shall fill in Appendix C to these Instructions to substantiate their claim.

The Employer/Engineer will first review the Bids to determine, the Bid group classification in accordance with Sub-Clause 10.2 hereof.

The comparison shall be Ex-factory price of the Goods to be offered from within Pakistan (such prices to include all costs as well as custom duties and taxes paid or payable on raw materials and components incorporated or to be incorporated in the Goods) and the DDP (CIF + Customs duty, sales tax and other import charges) Pakistan seaport price of the Goods to be offered from outside Pakistan.

The lowest evaluated bid of each Group shall first be determined by comparing all evaluated bids in each Group among themselves taking into account:

- (a) In the case of Goods manufactured in Pakistan, sales tax, local body charges and other similar taxes which will be payable on the furnished Goods in Pakistan.
- (b) In the case of Goods of foreign origin offered from abroad, customs duties, sales tax and other import charges which will be payable on furnished Goods in Pakistan.
- (c) In the case of Goods of foreign origin already located in Pakistan, customs duty, sales tax and import charges on CIF price as applicable for Sub-Clause 27.4(b) here above.

The price preference to Group A bids will be:

- (i) 15% of the ex-factory bid price, if the value addition through indigenous manufacturing is at least 20%;
- (ii) 20% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 20% and up to 30%; and
- (iii) 25% of the ex-factory bid price, if the value addition through indigenous manufacturing is over 30%.

The applicable price preference i.e., as per Sub-Clause 27.5 here above will be applied to Group A Bid by reducing the ex-factory bid price.

IB.28 Process to be Confidential

- 28.1 Subject to Clause 23 heretofore, no Bidder shall contact Employer and/or Engineer on any matter relating to its Bid from the time of the Bid opening to the time the bid evaluation result is announced by the Employer. The evaluation result shall be announced at least ten (10) days prior to award of Contract. The announcement to all bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated.
- 28.2 Any effort by a Bidder to influence Employer and/or Engineer 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 the procurement process.

F. AWARD OF CONTRACT

IB.29. Post-Qualification/Single Stage Two envelop

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

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

The determination will take into account the bidder's financial, technical and production capabilities as per Schedule – I to Bid. It will be based upon an examination of the documentary evidence of the bidder's qualification submitted under Appendix B to Instructions to Bidders "Evidence of Bidder's Capability" by the bidder pursuant to Clause IB.13, as well as such other information as required under the Bidding Documents.

An affirmative determination will be a pre-requisite for award of the Contract to the lowest evaluated bidder. A negative determination will result in rejection of that bidder's bid in which event, Employer will proceed to undertake a similar determination of the next lowest evaluated bidder's capabilities to perform the Contract satisfactorily.

IB.30 Award Criteria

- 30.1 Subject to Clause IB.32, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be qualified to satisfactorily perform the Contract in accordance with the provisions of Clause IB.29.

IB.31 Employer's Right to Vary Quantities

31.1 Employer reserves the right at the time of award of Contract to increase or decrease by upto 15% the quantity of goods and services specified in the Schedule of Prices without any change in the unit price or other terms and conditions.

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

Notwithstanding Clause IB.30, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the Employer's action except that the grounds for its rejection shall upon request be communicated, to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

No negotiations with the bidder having been evaluated as lowest responsive or any other bidder shall be permitted. However, the Employer may have clarification meeting(s) to get clarify any item(s) in the bid evaluation report.

IB.33 Notification of Award

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

The Letter of Acceptance and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the Bidder till signing of the formal Contract Agreement.

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

IB.34 Performance Security

The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period of twenty eight (28) days after the receipt of Letter of Acceptance.

Failure of the successful bidder to comply with the requirements of Sub-Clause IB.34.1 or Clause IB.35 or Clause IB.43 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.35 Signing of Contract Agreement

Within fourteen (14) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send to the successful bidder the Form of Contract Agreement provided in the Bidding Documents, duly filled in and incorporating all agreements between the parties for signing and return it to the Employer.

The formal Agreement between the Employer and the successful bidder shall be executed within fourteen (14) days of the receipt of such Form of Contract Agreement by the successful bidder from the Employer.

G. ADDITIONAL INSTRUCTIONS

IB.36 Instructions not Part of Contract

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

IB.37 Contract Documents

37.1 The Documents which will be included in the Contract are listed in the Form of Contract Agreement set out in these Bidding Documents.

IB.38 Sufficiency of Bid

38.1 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. Except insofar as it is otherwise expressly provided in the Contract, the rates and prices entered in the Schedule of Prices shall cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works.

IB.39 One Bid per Bidder

39.1 Each bidder shall submit only one bid either by himself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid (other than alternatives pursuant to Clause IB.41) will be disqualified and bids submitted by him shall not be considered for evaluation and award.

IB.40 Bidder to Inform Himself

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. This shall include but not be limited to the following:

- (a) inquiries on Pakistani Income Tax/Sales Tax to the Commissioner of the Income Tax and Sales Tax, Khyber Pakhtunkhwa, Pakistan.
- (b) inquiries on customs duties and other import taxes, to the concerned authorities of Customs and Excise Department.

- (c) information regarding port clearance facilities, loading and unloading facilities, storage facilities, transportation facilities and congestion at Pakistan seaports.
- (d) investigations regarding transport conditions and the probable conditions which will exist at the time the Goods will be actually transported.

IB.41 Alternate Proposals by Bidder

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

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

IB.42 Local Conditions

42.1 Bidder must verify and supplement by his own investigations the information about site and local conditions.

IB.43 Integrity Pact

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

**Appendix A to
Instructions to Bidders**

NAME OF ELIGIBLE COUNTRIES

All countries of the World with whom Islamic Republic of Pakistan has commercial relations.

EVIDENCE OF BIDDER'S CAPABILITY

[Note: Bidders to provide the following information with the bid separately and indicate herein its references where this information is available.]

Sr.No.	Information to be Supplied	Bid References
1.	Name of bidder, business address and country of incorporation.	
2.	Type of firm whether individually owned, partnership, corporation or joint venture and the names of its owners or partners.	
3.	The annual reports or qualification statements giving general description of the firm, sort of business carried out, balance sheets, profit and loss statements, turn over and business done by the firm, duly authenticated, for the last three (3) years. Audited Balance Sheets for the preceding 3 years and projected assets and liabilities for the next 2 years shall be provided.	
4.	Location and address of manufacturing facilities.	
5.	Full description of factories owned and the annual manufacturing capacities of various items made therein.	
6.	Details of the factory or factories where the offered equipment is proposed to be manufactured. This description should include the facilities and capacities of the particular factories including testing facilities and the processes used in manufacturing and testing. Where parts or components are purchased from outside, the details of equipment purchased and the names and experience record of the suppliers.	

Sr.No.	Information to be Supplied	Bid References
7.	Detailed description of the quality control testing and research facilities. If the equipment is manufactured under license, the name of the licensor and details of the licensing arrangements, such as the duration of the license, the facilities provided to the bidder by the licensor and whether future improvements are available or not etc. A copy of the license agreement may be attached.	
8.	Names, qualifications and experience of the key technical personnel.	
9.	The time since the manufacturer has been in this business and the time since he has been doing work of similar nature.	
10.	The time since the particular equipment offered has been manufactured and the time for which it has been in service. The manufacturer shall have the following experience. _____ _____ _____ (List the equipment and experience required)	
11.	Reference lists of similar works done by the bidder in its country and abroad indicating the name of customer, description and quantity of product, year of supply and the approximate value.	
12.	Details of projects under execution and future contractual commitments (for each partner, in case of a joint venture).	
13.	Banking reference, names of banks and addresses may be given to whom reference regarding financial capability of the bidder may be made, with authority to make inquiries from the bidder's bankers and clients regarding any financial and technical aspects (for each partner, in case of a joint venture).	

Sr.No.	Information to be Supplied	Bid References
14.	Information on any litigation or arbitration resulting from contracts completed or under execution by the bidder over the last ten (10) years. The information shall indicate the parties concerned, the matter of dispute, the disputed amounts and the result thereof (for each partner, in case of a joint venture).	

**Appendix C to
Instructions to Bidders**

Domestic Goods (Value added in Pakistan)

[Bidders claiming eligibility for domestic preference should fill in for supply items only, all columns hereunder and provide necessary documentation to substantiate their claim]

Sr. No.	Description of Indigenous Goods	Unit	Qty	Total Price of Goods Ex-Factory (Pak Rs.)	Domestic value added in the manufacturing cost as percentage of Ex-Factory Price	Amount of value addition (Pak Rs.)
1	2	3	4	5	6	7
Total in columns 5 & 7						

Computations:

- | | |
|--|--------------|
| A. Total amount of Value Addition (from Col.7) | Rs _____ |
| B. Total Ex-Factory Price of Indigenous Goods (from Col.5) | Rs _____ |
| C. Total DDP Price of imported supply items | Eqv.Rs _____ |
| D. Total Price of supply items [B+C] | Eqv.Rs _____ |
| E. % of value addition = [(A/D)x100] | _____ % |
| F. Domestic Preference =(15,20 or 25)% of B | Rs _____ |

BILL OF QUANTITIES (BOQ)

Bill of Quantities (BOQ) based on bifurcation of taxable and tax exempted items.

BILL OF QUANTITIES FOR SOLAR ENERGY BASED SCHEMES / PROJECTES / WORKS ETC				
INSTALLATION OF SOLAR AUGMENTATION / IRRIGATION TUBE WELLS IN KHYBER PAKHTUNKHWA. ADP NO.2191/160513 (2021-22) Sub Work:- (01/01) Installation of One No. Irrigation Tube Well in UC Amma Khel District Tank (Supply of Solar System & Pumping Machinery along with all accessories.)				
S.No.	Item Description	Unit Rates (Rs.) Including installation Price (A)	Quantity (B)	Total Amount (Rs.) (A&B)
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)				
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				
TOTAL AMOUNT (RS.)				

FORM OF BID AND SCHEDULES TO BID

FORM OF BID
(LETTER OF OFFER)

Bid Reference No. _____

(Name of Works)

To:

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Conditions of Contract, Specifications, Drawings, 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 _____ 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 comprising Foreign Currency Component of _____ (_____) and Local Currency Component 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 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 whole of the Works comprised in the Contract within the time(s) stated in Preamble to the Conditions of Contract.
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 Security referred to in Clause 10 of Conditions of Contract for the due performance of the Contract.

8. We understand that you are not bound to accept the lowest or any Bid you may receive.
9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a Bid for the Works.
10. We confirm, if our Bid is accepted, that all partners of the joint venture shall be liable jointly and severally for the execution of the Contract and the composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer. (Please delete in case of Bid from a single firm).

Dated this _____ day of _____ 20_____

Signature _____ in the capacity of _____ duly

authorized to sign bids for and on behalf of _____

(Name of Bidder in Block Capitals)
(Seal)

Address

Witness:

(Signature) _____

(Name) _____

Address: _____

Occupation _____

SCHEDULES TO BID INCLUDE THE FOLLOWING:

- Schedule A to Bid: Specific Works Data
- Schedule B to Bid: Work to be Performed by Subcontractors
- Schedule C to Bid: Proposed Programme of Works
- Schedule D to Bid: Deviations from Technical Provisions
- Schedule E to Bid: Deviations from Contractual Conditions
- Schedule F to Bid: Method of Performing Works
- Schedule G to Bid: Proposed Organisation
- Schedule H to Bid: Integrity Pact

SCHEDULE – A TO BID

SPECIFIC WORKS DATA

(Proforma for specific Data to be prepared and incorporated by the Employer which will be filled in by the bidders)
As per Schedule – I to bid

SCHEDULE – B TO BID

WORK 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.

<u>Items of Work to be Sub-Contracted</u>	<u>Name and address of Sub-Contractor</u>	<u>Statement of similar works previously executed (attach evidence)</u>
---	---	---

NOT APPLICABLE

Note:

1. No change of Sub-Contractor shall be made by the bidder without prior approval of the Employer.
2. The truthfulness and accuracy of the statement as to the experience of Sub-Contractors is guaranteed by the bidder. The Employer'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 work, year completed and name & address of the clients.

SCHEDULE – C TO BID

PROPOSED PROGRAMME OF WORKS

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

NOT APPLICABLE

SCHEDULE – D TO BID

**DEVIATIONS
FROM
TECHNICAL PROVISIONS**

It is presumed that the bidder shall not take any deviation. However, if he intends to take deviations to the specified terms, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications
---------	--------------------------	---------------------------

[Note: Attach additional sheets, if necessary]

SCHEDULE – E TO BID

**DEVIATIONS
FROM
CONTRACTUAL CONDITIONS**

It is presumed that the bidder shall not take any deviation. However, if he intends to take deviations to the specified Contractual/Commercial Conditions, those must be listed in the space provided below:

Sr. No.	Clause No. / Section No.	Deviations/Clarifications
---------	--------------------------	---------------------------

NOT APPLICABLE

[Note: Attach additional sheets, if necessary]

SCHEDULE – F TO BID

METHOD OF PERFORMING WORKS

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

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.
- A list of all major items of constructional and erection plant, tools and vehicles proposed to be used in carrying out the Works at Site, including number of each kind, make, type, capacity of all equipment, working condition, which shall be deployed by him for Civil Work and Erection, Testing and Commissioning of the Works, in sufficient detail to demonstrate fully that the equipment will meet all the requirements of the Technical Provisions.
- The procedure for installation of equipment and transportation of equipment and materials to the site.
- Details regarding mobilisation in Pakistan, the type of facilities including personnel accommodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.
- Organisation chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

SCHEDULE – H TO BID

(INTEGRITY PACT)

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

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

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

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

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

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

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

Name of Buyer:
Signature:
[Seal]

Name of Seller/Supplier:
Signature:
[Seal]


Executive Engineer
Gomal Zam Irrigation Division
D.I.Khan

SCHEDULE OF PRICES

	Description	Page No.
1.	Preamble to Schedule of Prices	47
2.	Schedule of Prices	
	2. (a) Summary of Bid Prices	56
	2. (b) Equipment, Erection, Testing & Commissioning	57
	2. (c) Civil Works	58
	2. (d) Daywork	59
	2. (e) Additional Recommended Erection and Testing Equipment & Maintenance Tools	60
	2. (f) Additional Recommended Spare Parts	61

1. PREAMBLE TO SCHEDULE OF PRICES

1. General

The Schedule of Prices shall be read in conjunction with the Conditions of Contract together with the Specifications and Drawings.

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

2. Description

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

The quantities shown in the Schedule of Prices are estimated quantities only as an indication of the Scope of Work to enable the bidder to bid for different items of the Works for his estimate of costs. The estimated quantities shall be used for comparing the bids. It is, however, to be noted that in the event of any increase or decrease in the quantity of any item of Works and subject to provisions of the Conditions of Contract herein, the actual quantities executed will be paid.

3. Units & Abbreviations

Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the Systeme Internationale d' Unites (SI Units).

The following abbreviations shall be used in the Schedule of Prices:

	<u>Abbreviation</u>
Foreign Currency Component	FCC
Local Currency Component	LCC
United States Dollars	US\$
Pakistani Rupees	PKR/Rs
Number	No.
Kilometer	km
Kilogram	Kg
Cubic Meter	Cu.m
Provisional Sum	PS
Percent	%

4. Rates and Prices

Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the work

set forth or implied in the Contract; except for the amounts reimbursable to the Contractor under the Contract.

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

All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date twenty eight (28) days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder.

~~Additional/reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed/deducted as per provisions of the Conditions of Contract.~~

The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Schedule of Prices, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

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

The bidder shall be deemed to have obtained all information as to port clearance facilities and charges, loading and unloading facilities and charges, storage facilities and charges, transportation facilities and charges, congestion and/or other conditions to be expected at Karachi Port and or any other seaport of Pakistan and all requirements related thereto.

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

The bidder shall be deemed to have included all clearing, forwarding and other incidental costs in this regard in his bid. The Contractor will have the option to use either Karachi Port or or any other seaport of Pakistan.

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

5. Bid Prices

Break-up of Bid Prices

The various elements of Bid Prices shall be quoted as detailed below:

a) FOB Port of Shipment

The bidder shall quote prices for FOB Port of Shipment for all individual items and for each sub-total of Plant, Erection Equipment and Spare Parts to be supplied from outside Pakistan on FOB (Port of Shipment) basis. The FOB Port of Shipment price shall include the cost of the following:

- i) Design, manufacture, finishing, factory testing, packing for transport and all transportation costs incurred in placing the Plant, Erection Equipment and Spare Parts and other materials on board the vessel.
- ii) Provision of clean on-board bills of lading.
- iii) Export taxes, fees or charges levied on exporting Plant, Erection Equipment and Spare Parts and other materials in the country of origin, in the case of Plant imported to Pakistan.
- iv) Provision of certificates of origin, consular invoices (if required) or any other documents issued in the country of origin.

b) Insurance & Shipping

i) Insurance

The bidder shall quote prices for insurance cover from ex-factory/ ex-works to the Site for the sub-totals of the Plant, Erection Equipment, Spare Parts and other materials to be imported for the Contract. Such prices shall include all insurance costs covering the responsibility for all loss or damages while loading, unloading, storing and trimming on board or on inland carrier and transportation to Site.

The prices for transportation/marine insurance cover shall be quoted on the basis of insurance through insurers from any country(ies) of the world acceptable to the Employer.

ii) Shipping

The bidder shall quote prices for shipping from port of shipment to the port of entry in Pakistan for the sub-totals of the Plant, Erection Equipment, Spare Parts and other materials to be imported for the Contract in Pakistan. Such prices shall include all marine transportation costs including ocean freight and other charges, etc.

The prices for shipping/marine transportation shall be quoted for shipment through reputed shipping lines including Pakistan National Shipping Corporation (PNSC).

Cost of shipment(s) effected by the Contractor at his option by aircraft shall be deemed to be included in the Total Bid Price.

c) CIF (Pakistan Seaport) Price

CIF (Pakistan Seaports) price will be the total of FOB price, insurance and shipping prices, described hereabove.

d) Customs Duties

Customs duty for Plant, Erection Equipment, Spare Parts and other materials, if any, offered from outside Pakistan shall also include sales tax, import duty and other import charges.

e) DDP (Pakistan Seaport) Price

DDP (Pakistan Seaport) price will be the total of CIF price and customs duties, described hereabove.

f) Ex-factory Price for Local Goods

The bidder shall quote prices for Local Goods, materials (other than materials required for civil works such as concrete and reinforcement etc. Cost of which will be included in the price of civil works) and equipment in the relevant column of Ex-Factory (Pakistan) of "Schedule of Prices". Such prices shall include:

- i) Design documentation, drawings, drafting, planning services, manufacturing, testing and packing of finished goods ready for delivery to Site.
- ii) All custom duties, sales tax and other taxes already paid or payable on the components and raw materials used in the manufacture or assembly of Local Goods, materials and equipments.

g) Insurance of Local Goods

Insurance of Local Goods and other materials from factory to Site shall include all insurance costs covering the responsibility of all losses or damages, while loading, unloading, storing, trimming on the carrier and transporting to Site. Checking and verifying of consignments, issuance of receiving reports and damage reports (when applicable) shall be the Contractor's responsibility. The cost of insurance shall be quoted on the basis of insurance through National Insurance Company (NIC) of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

h) Local Transport

Inland transportation for the Plant, Erection Equipment and Spare Parts shall be the Contractor's responsibility in respect of:

- i) the Plant, Erection Equipment, Spare Parts and other materials offered from outside Pakistan; from the port of entry in Pakistan to the storage area at the Site, and
- ii) indigenous Plant, Erection Equipment, Spare Parts and other materials if any, offered from within Pakistan; from the factory in Pakistan to the storage area at the Site, and

all charges occurring therefrom including octroi, zila tax, fees etc. and charges for loading, forwarding and unloading expenses shall be borne by the Contractor. Unloading at the Site, handling of the Plant, Erection Equipment, Spare Parts and other materials to the designated point of Site storage, checking and verifying all shipments received against shipping documents, issue of all receiving reports and issues of damage reports (when applicable) shall be the Contractor's responsibility.

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

i) Erection & Other Work

The bidder shall quote prices for Erection & Other Work (foreign and local currency portion) for the sub-totals of the Plant at the Site. Such prices shall include the costs of handling of the Plant and other materials from Site storage to point of final installation, erection, installation, testing, commissioning including all inspection, reliability tests, the cost of foreign and local erection staff and labour, tools and equipment, etc. It shall also cover the services of qualified representative(s) of the supplier(s) of Plant or adviser(s) to assure proper erection and commissioning of the Plant. The price shall also include cost of arranging insurances in respect of Contractor's operations in Pakistan which insurances shall be effected by the Contractor with the National Insurance Company (NIC) of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Total Bid Price

The total of bid prices under local currency columns in the Schedule of Prices shall be entered in the Summary of Bid Prices. The unit rates and prices and lumpsum amount entered in the Schedule of Prices will be the rates at which

the Contractor will be paid, and shall be deemed to be the full inclusive value of the work including all costs of performing the Works such as overheads, income tax, super tax, profits, costs of accepting the general risks, liabilities and obligations set forth or implied in the Contract except for the amounts reimbursable, if any, to the Contractor under the Contract. The rates shall also include Contractor's cost for providing Performance Security and other Bank Guarantees required for performance of the Contract.

6. Erection and Testing Equipment and Maintenance Tools

In the Schedule of Prices, under Erection and Testing Equipment & maintenance tools the Employer has drawn up a list of Erection and Testing Equipment and Maintenance Tools along with estimated quantities. The bidder shall enter the price only in FOB price column for all individual items and shall give the break-up of the prices into FOB Port of Shipment, Shipping to wharf at the port of entry in Pakistan, Insurance to Site and Local Transport in Pakistan against each sub-total. These Erection and Testing Equipment and Maintenance Tools shall be furnished and the cost included in the Bid Price.

The Employer shall have the option of ordering additional quantities of these essential Erection and Testing Equipment and Maintenance Tools, at the unit rates entered in the Schedule of Prices no later than one year after the Commencement Date.

The unit rate for any item shall be computed by dividing the total amount by the quantity of that item.

The bidder shall also list, in the space provided in the Schedule of Prices, Additional Recommended Erection and Testing Equipment and Maintenance Tools, any Erection and Testing Equipment and Maintenance Tools which he recommends be provided for the Works, in addition to those already specified by the Employer in the Schedule of Prices. The bidder shall enter against each such item, its recommended quantity, and price. The cost of such Additional Recommended Erection and Testing Equipment and Maintenance Tools will not be taken into account in the evaluation of bids.

The Additional Recommended Erection and Testing Equipment and Maintenance Tools may be selected by the Engineer/Employer and the Contract Price will be adjusted in accordance with the prices set against those items in the Schedule of Prices.

7. Spare Parts

In the Schedule of Prices, under Spare Parts, the Employer has drawn up a list of spare parts along with estimated quantities. The bidder shall enter the price only in FOB price column for all individual items and shall indicate the break-up of price into FOB Port of Shipment, Shipping to wharf at the port of entry in Pakistan, Insurance to Site and Local Transport in Pakistan against each sub-total. These spare parts shall be furnished and the cost included in the Bid

Price.

The successful Bidder shall prepare and at the time of preparation of Letter of Acceptance submit to the Employer the unit rates of all individual items of the spare parts. The unit rates of the spare parts for the required quantities shall give a total cost equal to the amount entered in the Schedule of Price for spare parts.

The Employer shall have the option of ordering additional quantities of these essential spare parts, at the unit rates entered in the Schedule of Prices, no later than one year after the Commencement Date.

The unit rate for any item shall be computed by dividing the total amount by the quantity of that item.

The Bidder shall also list in the space provided in the Schedule of Prices any Spare Parts which he recommends be provided for the Works, in addition to those specified by the Employer in the Schedule of Prices. The Bidder shall enter against each such item, its recommended quantity, rate and price. The cost of such Additional Recommended Spare Parts will not be considered in the evaluation of bids.

The Additional Recommended Spare Parts may be selected by the Engineer/ Employer and the Contract Price will be adjusted in accordance with the prices set against those items in the Schedule of Prices.

8. Reimbursable Costs

If provided in the Particular Conditions of Contract, the Contractor shall be reimbursed the actual amounts (without any overhead charges and profits) disbursed by him in respect of non-exempt Pakistani customs, import duties, and taxes, levied upon Plant, Erection Equipment and Spare Parts imported directly by him or his subcontractors into Pakistan for the purpose of this Contract for incorporation in the Works.

The bidder shall recognize such elements of the costs which he expects to incur in the performance of the Works and which are reimbursable, and he shall not include any such costs in the rates and amounts entered in the Schedule of Prices.

9. Provisional Sums

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

DAYWORK SCHEDULE

1. General

Work shall not be executed on a Daywork basis except by written Order of the Engineer. The rates for Daywork items entered in the Schedule of Prices shall apply to any quantity of Daywork ordered by the Engineer. Nominal quantities have been indicated against each item of Daywork, and the extended total for Daywork shall be carried forward as a provisional sum to the Summary of Bid Prices.

2. Daywork - Labour

In calculating payments due to the Contractor for the execution of Daywork, the hours for labour shall be reckoned from the time of arrival of the labour at the job Site to execute the particular item of Daywork to the time of departure, but excluding meal breaks and rest periods. Only the times of classes of labour directly doing work ordered by the Engineer and for which they are competent to perform shall be measured.

The time of Plant Erectors or other expatriate supervisory personnel shall not be measured unless their time on Site is extended by Variation Order. The rates entered by the Bidder for these categories shall be daily rates inclusive of all allowances and overheads.

For labour other than Plant Erectors or other expatriate supervisory personnel, the Contractor shall be entitled to payment in respect of the total time that labour is employed on Daywork, calculated at the basic rates entered by him in the Schedule of "Daywork Rates – Labour" together with an additional percentage payments on basic rates representing the Contractor's profit, overheads, etc., as described below:

- a) The basic rates for labour shall cover all direct costs to the Contractor, including (but not limited to) the amount of wages paid to such labour, transportation time, overtime, subsistence allowances and any sums paid to or on behalf of such labour for social benefits in accordance with Pakistan Labour laws. The basic rates will be payable in Pak. Rupees only, and
- b) The additional percentage payment to be quoted by the Bidder and applied to costs shall be deemed to cover the Contractor's overheads, profits, superintendence, liabilities and insurances and allowances to labour, timekeeping and clerical and office work, the use of consumable stores, water, lighting and power; the use and repair of staging, scaffolding, workshops and stores, portable power tools, manual plant and tools; supervision by the Contractor's staff, foremen and other supervisory personnel; and charges incidental to the foregoing. Payments under this item shall be made in foreign currency and local currency at the percentages entered in the Daywork Schedule.

Rates entered in the Daywork Schedule shall apply to labour of trade and qualification as described and to labour of other trades with similar skill and qualification.

3. Daywork - Contractor's Equipment

The Contractor shall be entitled to payments in respect of Contractor's Equipment already on Site and employed on Daywork at the basic rental rates entered by him in the "Schedule of Daywork Rate - Contractor's Equipment". The said rates shall be deemed to include complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants and other consumables and all overheads, profit and administrative costs related to the use of such equipment.

In calculating the payment due to the Contractor for Contractor's Equipment employed on Daywork, only the actual number of working hours will be eligible for payment, except that, where applicable and agreed with the Engineer, the travelling time from the part of the Site where the Contractor's Equipment was located when ordered by the Engineer to be employed on Daywork and the time for the return journey thereto shall be included for payment.

The rental rates for Contractor's Equipment employed on Daywork shall be stated in Pakistani Rupees but payments to the Contractor will be made in local and foreign currencies according to the rates entered in the Schedule.

4. Daywork-Materials

The Contractor shall be entitled to the following payments in respect of materials used for Daywork (except for materials for which the cost is included in the percentage addition to labour costs) which are actually incorporated into the Works:

- a) The net cost of such materials delivered to warehouse or workyard area or storage area at the Site. Such cost shall be calculated by the Contractor on the basis of the invoiced price and freight and insurance as certified by the Engineer on the basis of invoices produced.
- b) Percentage addition, in local and/or foreign currency, of such net cost of materials to cover the Contractor's handling charges, overheads and profits.

Payment of the net cost to the Contractor of Daywork materials shall be made in the same currency as the invoice. Payment of the addition for handling charges, overheads and profit shall be in local and/or foreign currency as entered in the Schedule of Daywork - Materials.

2. (a) SCHEDULE OF PRICES – SUMMARY OF BID PRICES

Item No.	Description	TOTAL PRICE	
		Foreign Currency Component	Local Currency Component
2(b)	Equipment (at Site), and Erection, Testing & Commissioning.		
2(c)	Civil Works		
2(d)	Day Work		
Total Bid Price (The amount to be entered in Paragraph 1 of the Form of Bid) (In Words)			

(Note: Total Price, in each currency, shall be provided in figures as well as in words)

**2. (b) SCHEDULE OF PRICES – EQUIPMENT,
ERECTION, TESTING & COMMISSIONING**

Item No.	Description	Unit	Qty	Unit Rate										Total Price			
				Foreign Currency Component						Local Currency Component				Foreign Currency Component	Local Currency Component		
				FOB Price	Shipping	Insurance	CIF Pak Sea Port	Erection & Other Work	Total	Customs Duty for Col No.8	Ex-Factory Pakistan (For Local Goods)	Local Transport	Erection & Other Work			Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1.	Main Plant																
2.	Erection & Testing Equipment & Maintenance Tools (Mandatory)																
3.	Spare Parts (Mandatory)																
4.	Provisional Sum																
Total (to be carried to Summary of Bid Price)																	

[Note: Ref: Col. 12 above, the bidder claiming margin of domestic preference for Goods manufactured in Pakistan shall also fill Appendix C to Instructions to Bidders.]

2. (c) SCHEDULE OF PRICES – CIVIL WORKS

Item No.	Description	Unit	Qty	Volume of Concrete per Foundation (m ³)	Weight of Steel per Foundation (kg)	Unit Rate of Concrete per m ³ (Rs.)	Unit Rate of Steel per kg (Rs.)	Unit Rate per Foundation (Rs.)	Total (Pak. Rupees)
Total (to be carried to Summary of Bid Price)									

**2. (d) SCHEDULE OF PRICES
DAYWORK**

Item No.	Description	Nominal Quantity	UNIT RATE		TOTAL AMOUNT	
			FCC	LCC (PKR)	FCC	LCC (PKR)
1.	Daywork-Labour					
2.	Daywork - Contractor's Equipment					
3.	Daywork – Materials					
Total (to be carried to Summary of Bid Price)						

**2. (e) SCHEDULE OF PRICES – ADDITIONAL
RECOMMENDED ERECTION AND TESTING EQUIPMENT &
MAINTENANCE TOOLS**

1. The bidder shall propose in the space provided, a detailed list of Erection and Testing Equipment & Maintenance Tools which are recommended by him in addition to those specified by the Employer under Schedule 2(b) above.
2. The purchase of additional recommended Erection and Testing Equipment & Maintenance Tools would be at the discretion of the Employer and the cost of such equipment will not be taken into consideration in the evaluation of bids. However, the Contract Price will be adjusted to include the cost of additional Erection and Testing Equipment & Maintenance Tools which are selected by the Employer.
3. The list of Erection and Testing Equipment & Maintenance Tools shall include description as well as quantity of each item and the unit rate and prices for the total quantity proposed for each item of Erection and Testing Equipment & Maintenance Tools.

Item No.	Description	Unit	Qty	Unit Rate									Total Price		
				Foreign Currency Component					Local Currency Component				Foreign Currency Component	Local Currency Component	
				FOB Price	Shipping	Insurance	CIF Pak Sea Port	Total	Customs Duty for Col No.8	Ex-Factory Pakistan (For Local Goods)	Local Transport	Total			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1.	Erection Equipment														
2.	Testing Equipment														
3.	Maintenance Tools														
Total (not to be carried to Summary of Bid Price)															

**2. (f) SCHEDULE OF PRICES – ADDITIONAL
RECOMMENDED SPARE PARTS**

1. The bidder shall propose in the space provided, a detailed list of Spare Parts which are recommended by him in addition to those specified by the Employer under Schedule 2(b) above.
2. The purchase of additional recommended Spare Parts would be at the discretion of the Employer and the cost of such equipment will not be taken into consideration in the evaluation of bids. However, the Contract Price will be adjusted to include the cost of additional Spare Parts which are selected by the Employer.
3. The list of Spare Parts shall include description as well as quantity of each item and the unit rate and prices for the total quantity proposed for each item of Spare Parts.

Item No.	Description	Unit	Qty	Unit Rate									Total Price		
				Foreign Currency Component					Local Currency Component				Foreign Currency Component	Local Currency Component	
				FOB Price	Shipping	Insurance	CIF Pak Sea Port	Total	Customs Duty for Col No.8	Ex-Factory Pakistan (For Local Goods)	Local Transport	Total			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Total (not to be carried to Summary of Bid Price)															

**PREAMBLE
TO
CONDITIONS OF CONTRACT**

PREAMBLE TO CONDITIONS OF CONTRACT

[This Preamble must be completed before issuance of Bidding Documents and shall contain essential requirements of General Conditions of Contract & Particular Conditions of Contract.]

Commencement Date	Sub-Clause 1.1.1.(i) The date for commencement of the Works is as per work order
Defect Liability Period	Sub-Clause 1.1.11 The Defect Liability Period is 02 years.
The Employer	Sub-Clause 1.1.12. The Employer is Executive Engineer, Gomal Zam Irrigation Division, DIKhan opposite Peshawar High Court Bench at DIKhan
The Engineer	Sub-Clause 1.1.15. The Engineer is Sub Divisional Officer (Concerned), office of the Executive Engineer, Gomal Zam Irrigation Division, DIKhan opposite Peshawar High Court Bench at DIKhan
Time for Completion	Sub-Clause 1.1.35. The Time for Completion is as per work order from the Commencement Date.
Warranty Period	Sub-Clause 1.1.40. The Warranty Period is 02 years for (goods/equipment)
Engineer's Duties & Authorities	Sub-Clause 2.1 Amount of Variation Order in emergency is as per site requirement
Confirmation in Writing	Sub-Clause 2.6 (i) If the Contractor shall require the confirmation it shall be notified to the Engineer within 14 days. (ii) Engineer shall confirm the decision/instruction within 14 days.
Ruling Language	Sub-Clause 5.1. The version in English language (ruling language) shall prevail.
Day to Day Communications	Sub-Clause 5.2. The language for day to day communications is English.
As-Built Drawings	Sub-Clause 6.10 As-Built drawings shall be provided to the Engineer within 10 days from the date of issue of Taking Over Certificate.
General Obligations	Sub-Clause 8.1 Detail of Erection and Testing Equipment and Maintenance Tools is given herein below: As per site requirement
Programme to be Furnished	Sub-Clause 12.1. The Programme must be submitted in the form of <u>N/A</u>
Electricity Water, Gas and Other Services	Sub-Clause 14.3. Supplies on the Site are: All items including installation complete in all respect
Employer's Equipment	Sub-Clause 14.4. The following Employer's equipment is available for use by the Contractor under the Employer's operation: N/A

Notices to Employer and Engineer	Sub-Clause 49.2. The address of the Employer for notices is: <u>Office of the Executive Engineer, Gomal Zam Irrigation Division, DIKhan opposite Peshawar High Court Bench at DIKhan</u> The address of the Engineer for notices is: <u>Sub Divisional Officer (Concerned), Office of the Executive Engineer, Gomal Zam Irrigation Division, DIKhan opposite Peshawar High Court Bench at DIKhan</u>
Disputes & Arbitration	Sub-Clause 50.4 Venue of Arbitration shall be DIKhan, Pakistan.
Applicable Law	Sub-Clause 51.1. The applicable law is <u>Prevailing Pakistan</u> law.
Procedural Law for Arbitration	Sub-Clause 51.2. The procedural law for arbitration is <u>Prevailing Pakistan</u>
Language and Place of Arbitration	Sub-Clause 51.3. The language of arbitration is <u>English</u> language. The place of arbitration is DIKhan, Pakistan

GENERAL CONDITIONS OF CONTRACT

[Notes on the Conditions of Contract

The Conditions of Contract comprise two parts:

- (a) **General Conditions of Contract**
- (b) **Particular Conditions of Contract**

Over the years, a number of “model” General Conditions of Contract have evolved. The one used in these Standard Bidding Documents was prepared by the International Federation of Consulting Engineers (Federation Internationale des Ingenieurs-Conseils, or FIDIC), and is commonly known as the FIDIC Conditions of Contract. (The used version is the 1987 edition, reprinted in 1988 with editorial amendments.)

The FIDIC Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract, and cannot be used without major modifications for other types of contract, such as lump sum, turnkey, or target cost contracts.

The standard text of the General Conditions of Contract chosen must be retained intact to facilitate its reading and interpretation by bidders and its review by the Employer. Any amendments and additions to the General Conditions, specific to the contract in hand, should be introduced in the Particular Conditions of Contract.

The use of standard conditions of contract for all electrical/mechanical Works will ensure comprehensiveness of coverage, better balance of rights or obligations between Employer and Contractor, general acceptability of its provisions, and savings in time and cost for bid preparation and review, leading to more economic prices.

The FIDIC Conditions of Contract are copyrighted and may not be copied, faxed, or reproduced. Without taking any responsibility of its being accurate, Pakistan Engineering Council with prior consent of FIDIC Secretariat, has reproduced herein the FIDIC General Conditions of Contract for reference purpose only which cannot be used by the users for preparing their bidding documents. The bidding document may include a purchased copy, the cost of which can be retrieved as part of the selling price of the bidding document. Alternatively, the FIDIC Conditions of Contract can be referred to in the bidding documents, and the bidders are advised to obtain copies directly from FIDIC.*

* Add the following text if the bidding documents, as issued, do not include a copy:

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

FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland

fidic.pub@fidic.org – FIDIC.org/bookshop]

The “**CONDITIONS OF CONTRACT FOR ELECTRICAL AND MECHANICAL WORKS**” section from page 71-141 has been removed as FIDIC doesn't allow it to be copied. Download the PDF version of this document from PICC website to view it completely OR Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat

P.O. Box 86

1000 Lausanne 12

Switzerland

e-mail: fidic.pub@fidic.org – FIDIC.org/bookshop]

PART-II: PARTICULAR CONDITIONS OF CONTRACT
(Mandatory Provisions- not to be amended/substituted except where indicated by PEC)

PART-II: PARTICULAR CONDITIONS OF CONTRACT

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PART-II: PARTICULAR CONDITIONS OF CONTRACT

Definitions

The text of Sub-Clause 1.1.1 is deleted and substituted by the following:

“Commencement Date” means the date specified in the Preamble to Conditions of Contract.

The text of Sub-Clause 1.1.2 is deleted and substituted by the following:

“Conditions” means the Preamble to Conditions of Contract, General Conditions of Contract and Particular Conditions of Contract.

Sub-Clause 1.1.3

At the end of Sub-Clause the following is added:

“Any subsequent document mutually agreed and signed by the Employer and the Contractor, shall be the part of the Contract.”

The text of Sub-Clause 1.1.5 is deleted and substituted by the following:

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

Sub-Clause 1.1.11

The Defects Liability Period is the period mentioned in the Preamble to Conditions of Contract.

Sub-Clause 1.1.15

The following is added at the end of Sub-Clause:

“or any other competent person appointed by the Employer as his replacement.”

Sub-Clause 1.1.23

The following paragraph is added:

The word “Goods” is synonymous with “Plant.”

The text of Sub-Clause 1.1.27 is deleted and substituted by the following:

“Schedule of Prices” means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Bid or revised and mutually agreed and forming a part of the Contract documents.

Sub-Clause 1.1.33

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

The following Sub-Clauses are added:

1.1.38 “Month” means calendar month according to Gregorian calendar.

1.1.39 “Operation and Maintenance Manuals” has the meaning described in Sub-Clause 6.6.

1.1.40 “Warranty Certificate” means the certificate against specified goods/equipment, for the period mentioned in the Preamble to Conditions of Contract, to be issued by the Contractor that the goods/equipment supplied under the Contract are new, unused and incorporate all recent improvements in design and materials unless provided otherwise in the Contract and that the Contractor will be responsible for making good or replacing any defective goods/equipment during the Warranty Period specified in the Preamble to Conditions of Contract which should commence after expiry of Defect Liability Period.

Sub-Clause 1.1.41

The word “Part II” stated in FIDIC Conditions of Contract is synonymous with the word “Particular Conditions of Contract”.

Sub-Clause 1.6 Cost, Overhead Charges and Profit

The last sentence “Any profit _____ stated in the Preamble” is deleted and substituted by the following:

“Any profit entitlement shall be added to cost at the percentage stated in the Bid and agreed in the Contract Agreement.”

Sub-Clause 2.1 Engineer’s Duties

The text of Sub-Clause 2.1 is deleted and substituted by the following:

“The Engineer shall carry out the duties specified in the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. The Engineer is required to obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses of General Conditions of Contract:

- (a) approval of Subcontractor under Sub-Clause 4.1,
- (b) certifying additional sums under Sub-Clause 5.4,
- (c) certifying additional costs under Sub-Clauses 11.3 & 12.3,
- (d) certifying any cost under Sub-Clause 14.6,
- (e) approval of extension of time under Clause 26,
- (f) issuing a Taking-Over Certificate under Sub-Clause 29,
- (g) issuing a Defects Liability Certificate under Sub-Clause 30.11,
- (h) issuing a Variation Order under Clause 31,
- (i) fixing rates or prices under Clauses 31 and 34,
- (j) certifying additional costs under Sub-Clause 44.5 and
- (k) certifying additional costs under Sub-Clause 47.2;

Except for such variations pursuant to Sub-Clause 31.1 of the GCC which may be necessary in an emergency affecting safety of life, the works or of adjoining property.”

Except as expressly stated in the Contract the Engineer shall have no authority to relieve the Contractor of any of his obligations under this Contract.”

Sub-Clause 2.6 Confirmation in Writing

- (i) In line 3 after the words “undue delay” the following is added:
“but not after the number of days mentioned in the Preamble to Conditions of Contract from the instruction or decision.”
- (ii) At the end of Sub-Clause 2.6, the following is added:
“The Engineer shall confirm or otherwise within the period mentioned in the Preamble to Conditions of Contract from the receipt of requirement(s) from the Contractor.”

Sub-Clause 2.7 Disputing Engineer’s Decisions and Instructions

The following text is deleted:
“If either party in accordance with the Contract.”

Sub-Clause 2.8 Replacement of Engineer

The text of Sub-Clause 2.8 is deleted and substituted by the following:

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

Sub-Clause 2.9 Engineer Not Liable

Sub-Clause 2.9 is added as follows:

“Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of remaining materials and equipment for the Works and parts thereof and complete the remaining erection works and testing and commissioning in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under this Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any of the works. However the Contractor shall be compensated if any loss/damage is occurred due to the decision of the Engineer.”

Sub-Clause 4.2 No Contractual Relation between Subcontractor and the Employer

Sub-Clause 4.2 is added as follows:

Nothing contained in the Contract Documents shall create any contractual relation between any Subcontractor and the Employer.

Sub-Clause 5.3 Priority of Contract Documents

Sub-Clause 5.3 is deleted and substituted by the following:

“Unless otherwise provided in the Contract the priority of the Contract Documents shall be as follows:

1. The Contract Agreement (if completed)
2. The Letter of Acceptance
3. The completed Form of Bid
4. Preamble to Conditions of Contract
5. The Particular Conditions of Contract
6. The General Conditions of Contract
7. The priced Schedule of Prices
8. The completed Schedules to Bid
9. The Specifications
10. The Drawings
- 11.(Any other document)

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by drawing(s) of a later date regardless of scale. All drawings and specifications shall be interpreted in conformity with the Contract Agreement and these conditions.”

Sub-Clause 5.4 Documents Mutually Explanatory

The text appearing in the last line after the words “the Contract Price” is deleted.

Sub-Clause 6.2 Consequences of Disapproval of Contractor's Drawings

Full stop is deleted and the following words are added at the end of Sub-Clause:
“for the approval of the Engineer. However, the Contractor shall not be entitled for time extension on this account.”

Sub-Clause 6.6. Operation and Maintenance Manuals

Paras 2&3 are deleted and the following text is added at the end of Para 1 of Sub-Clause:

“The Operation and Maintenance Manuals shall include full instructions for the operation, servicing and maintenance of the Plant, not only during the period of the Contractor's liability but more particularly during its operating life.

The directions shall be set out simply, clearly and systematically. This may be divided into two volumes if desirable, one for operation and the second for servicing and maintenance (in sub-volumes for major items of Plant).

The operational data shall include a complete physical and functional description of the Plant (in sub-volumes for major items of Plant) and step-by-step procedures for inspection, checking and adjustments for proper operation of the Plant.

The maintenance data shall include complete instructions for routine checks, servicing, maintenance and repair of all parts and for dismantling, handling and re-assembly of all equipment, sub-assemblies and all separate components. The maintenance data shall also include where possible parts catalogues The lists shall provide all necessary information for identifying the parts and for re-ordering the parts including name of part, part number and catalogue references where applicable, name of manufacturer, size, capacity and other characteristics .

General arrangements, single line diagrams and detailed drawings shall be provided

for ready reference in the operation and maintenance instructions.

The manuals shall be printed on ISO paper size A4 (210x297 mm) with offset or equivalent printing strongly bound in a durable stiff cover bearing the title in approved legend. Drawings shall be folded or reduced to 297 mm height. All volumes shall bear on the spine an approved shortened version of the title.

The Contractor shall submit three draft copies for approval of the Engineer prior to producing finished volumes.

The Contractor shall provide ten (10) copies of the approved Operation and Maintenance Manuals prior to Taking Over by the Employer. Supplementary Operation and Maintenance Manual shall be provided by the Contractor, if required, to incorporate changes resulting from experience during the operation and maintenance period. The work shall not be considered to be completed for the purpose of taking over until such manual and drawings have been supplied to the Employer.”

Sub-Clause 6.9 Manufacturing Drawings

The words “Unless otherwise specified in Part-II” are deleted and the following is added at the end of Sub-Clause:

“However, the Contractor is required to disclose to the Engineer or the Employer any confidential information necessary to justify the reliability, the efficiency and the operation and maintenance of the Plant supplied by him.”

Sub-Clause 6.10 “As-Built” Drawings

The following new Sub-Clause is added:

The Contractor shall furnish to the Engineer six (6) copies and one (1) reproducible of approved quality of all “As-Built” drawings within the period mentioned in the Preamble to Conditions of Contract.

Sub-Clause 8.1 General Obligations

The text of Sub-Clause 8.1 is deleted and substituted by the following:

- “(a) The Contractor shall commence the work on the date specified in the Preamble to Conditions of Contract and shall proceed with the same with due expedition and without delay.
- (b) The Contractor shall, in accordance with the Contract, with due care and diligence, complete the Works and test and commission the Plant and carry out the Works within the Time for Completion. The Contractor shall also provide all necessary Contractor's Equipment, superintendence, labour and except as stated hereinbelow, all necessary facilities therefor.

The Employer will permit use of the Erection, Testing Equipment and Maintenance Tools as stated in the Preamble to Conditions of Contract.

The above facilities shall be provided at no cost to the Contractor but he shall procure at his cost all required consumable materials and any other items necessary for the proper execution of the Works. These shall be properly used and maintained by the Contractor and returned to the Employer upon handing over of the Works in good

condition, fair wear and tear excepted. In case of any damage, loss or theft, the items shall be replaced by the Contractor at his own cost.”

Sub-Clause 10.1 Performance Security

Sub-Clause 10.1 is deleted and substituted by the following:

“The Contractor shall provide a Performance Security in the prescribed Form annexed to these Documents. The said Security shall be furnished by the Contractor within 28 days after the receipt of Letter of Acceptance. The Performance Security shall be of an amount equal to 10 percent of the Contract Price in the currency (ies) of the Contract at the option of the bidder, in the form of Bank Guarantee from any Scheduled Bank in Pakistan or from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan or an insurance company having atleast AA rating from PACRA/JCR.”

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

Sub-Clause 10.3 Claims under Performance Security

Sub-Clause 10.3 is deleted in its entirety.

The following Sub Clause is added:

Sub-Clause 10.4 Performance Security Binding on Variations and Changes

“The Performance Security shall be binding irrespective of variations and changes in the quantities of the Works or extensions in completion time of the Works, which are granted or agreed upon under the provisions of the Contract.”

Sub-Clause 12.1 Programme to be Furnished

Sub-Clause 12.1(a) is deleted and substituted by the following:

“(a) the order in which the Contractor proposes to carry out the Works (including preliminaries, required material ordering, delivery to Site, erection and rectifications work, testing, commissioning and taking-over by the Employer). The programme shall also include the following:

- (i) Employment of local and expatriate labour of various categories,
- (ii) Local material procurement,
- (iii) Material imports, if any.”

In Sub-Clause 12.1(c)(iv) the words “any import licenses” are deleted.

Sub-Clause 12.4 Monthly Progress Report

The following Sub-Clause 12.4 is added:

“During the period of the Contract, the Contractor shall submit six sets of report to the

Engineer not later than the 8th day of each month, including:

- (i) a construction schedule indicating the progress achieved during the preceding month;
- (ii) description of all work carried out since the last report;
- (iii) description of the work planned for the next forty two days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
- (iv) summary of daily job record for the preceding month; and
- (v) colour photographs to illustrate progress.

Sub-Clause 12.5 Daily Job Record

The following Sub Clause 12.5 is added:

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

The daily record shall include particulars of weather conditions, number of men working, in different categories, deliveries of materials, quantity, location and assignment of equipment.”

Sub-Clause 13.1 Contractor's Representative

At the end of the Sub-Clause the following is added:

“The Contractor's Representative shall be a competent and skilled person approved by the Engineer (which approval may at any time be withdrawn) and who shall be present on the Site during all working hours. He shall be fluent in the English language. He shall not be transferred from the Site without the consent of the Engineer. The Contractor's Representative shall be a Registered/Professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976).”

Sub-Clause 13.3 Language Ability of Superintending Staff of Contractor

The following Sub-Clause 13.3 is added:

“A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language.”

Sub-Clause 13.4 Employment of Local Personnel

The following Sub-Clause 13.4 is added:

“The Contractor shall, to the extent practicable and reasonable, employ staff and labour from sources within Pakistan.”

Sub-Clause 14.1 Contractor's Equipment

Replace the word “or” at the end of Sub-paragraph (a) by the word “and” and insert the following at the end of Sub-paragraph(b):
“which shall not be unreasonably withheld.”

Sub-Clause 14.2 Safety Precautions

At the end of the Sub-Clause the following is added:

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

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

Sub-Clause 14.3 Electricity Water and Gas

The text of Sub-Clause 14.3 is deleted and substituted by the following:

“The Contractor shall be responsible for making his own arrangements for the adequate supply of electricity, water and gas required for the effective performance of his obligations under the Contract. Subject to the aforesaid, the Contractor shall be entitled to use for the purposes of the Works such supplies and services as may be available on the Site. The Contractor shall, before the commencement of the work at Site, seek the approval of the Engineer as to his detailed requirements of electricity, water and gas for the entire Contract period. The Contractor shall pay the Employer at the rates/cost incurred by the Employer. The Contractor shall at his own cost provide any apparatus necessary for such use.”

Sub-Clause 14.4 Employer’s Equipment

The text of Sub-Clause 14.4 is deleted and substituted by the following:

“The Employer shall, if the Contractor so requests for the execution of the works, operate any available equipment of which details are given in the Preamble to Conditions of Contract. The Contractor shall pay the Employer a mutually agreed price for such use.

The Employer shall during such operation retain control of and be responsible for the safe working of the equipment.

Sub-Clause 14.8 Information for Import Permits & Licences

The text of Sub-Clause 14.8 is deleted and substituted by the following:

“The Contractor shall submit to the Employer in good time such details of all Plant

and Contractor's Equipment as is to be imported into Pakistan and identify as to what assistance of the Employer is required for obtaining by the Contractor of all necessary import permits or licences.”

Sub-Clause 15.2 Compliance with Laws

The Sub-Clause 15.2 is deleted and substituted by the following:

“The Contractor shall comply with the Laws of country of manufacture and the Laws of Pakistan where the Plant is to be erected.”

Sub-Clause 16.4 Photographs of Works and Advertisement Prohibited

Sub-Clause 16.4 is added:

“Except with the prior written authorisation of the Employer the Contractor shall not exhibit or permit to be exhibited any photographs or advertisement on the Works. Any authorized exhibition shall be immediately removed if the Employer so requires.”

Sub-Clause 16.5 Training of Employer's Staff

Sub-Clause 16.5 is added:

“The Contractor shall provide such facilities for the training of such numbers of Pakistani engineers, engineering students, apprentices and trade apprentices on such sections of the Works at the Site or on the Contractor’s premises or Contractor selected plant manufacturer's premises and factories, or wherever else work is in hand, as specified or directed by the Engineer. The Employer shall direct what sums by way of wages and allowances are to be paid by the Contractor to such persons and shall reimburse the Contractor for such sums as are so directed to be paid and are paid. The Contractor shall also provide medical expenses or medical insurance and travelling expenses for trainees if required by the Employer which shall be reimbursed by the Employer.

The language of training at the above stated premises shall be English and Urdu.”

Sub-Clause 17.4 Consents and Way Leaves

The Sub-Clause 17.4 is deleted and substituted by the following:

The Employer shall issue permissions, letters, certificates and provide such other assistance to the Contractor for his obtaining permits-to-work, way leaves and approvals from any other department/authority and right of way from private owners, if required. The Contractor will bear the cost of logistics, fees, etc. for such activities. The Employer, will reimburse the Contractor only the payments made by him in respect of any land compensation for obtaining such way leaves, required for the Works.

Sub-Clause 17.5 – Import Permits and Licences

The word “Employer” is deleted and substituted by the word “Contractor” and the

following is added at the end of Sub-Clause 17.5:
“the Employer will provide assistance for this purpose.”

Sub-Clause 18.1 – Engagement of Labour

At the end of the Clause the following is added:
“in accordance with the regulations, orders and requirements of the Govt. of Pakistan.”

Sub-Clauses 18.5 to 18.12 are added:

“Sub-Clause 18.5 Employment of Persons in the Service of Others

The Contractor shall not recruit or attempt to recruit staff and labour from amongst the persons in the service of the Employer or the Engineer and vice-versa, unless mutually agreed between the Employer/Engineer and the Contractor

Sub-Clause 18.6 Alcoholic Liquor or Drugs

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

Sub-Clause 18.7 Arms and Ammunition

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

Sub-Clause 18.8 Festivals and Religious Customs

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

Sub-Clause 18.9 Disorderly Conduct

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

Sub-Clause 18.10 Records of Safety and Health

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

Sub-Clause 18.11 Reporting of Accidents

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

Sub-Clause 18.12 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the foregoing provisions.”

Sub-Clause 19.1 Manner of Execution

The following is added at the end of Sub-Clause:

“The Contractor shall submit for approval of the Engineer, his detailed method statement(s) for the execution of such items of work as may be desired by the Engineer. Approval of such method statement(s) shall neither relieve the Contractor of his responsibilities under the Contract nor form any basis for claiming additional costs.”

Sub-Clause 19.3 Uncovering Work

The following is added at the end of second paragraph of Sub-Clause 19.3:

“In any other case, all costs shall be borne by the Contractor.”

Sub-Clause 19.4 Use of Pakistani Materials

The following Sub-Clause 19.4 is added:

“The Contractor shall so far as may be consistent with the Contract make the maximum use of materials, supplies and equipment indigenous to or produced in Pakistan and services available in Pakistan or operated in Pakistan provided such materials, supplies, equipment and services shall be of required standard.”

Sub-Clause 24.1 Cost of Suspension

At the end of the second paragraph after the word “Contractor” the following is added:

“or for the proper execution or for the safety of the Works or Plant unless such necessity results from any act or default of the Engineer or the Employer or in consequence of any of the Employer's Risks under Sub-Clause 37.2.”

Sub-Clause 24.4 Resumption of Work

First paragraph of Sub-Clause 24.4 is deleted and substituted by the following:

“If the Contractor chooses not to treat prolonged suspension as an omission or termination under Sub-Clause 24.3, the Employer shall, upon the request of the Contractor, take over the responsibility for protection, storage, security and insurance of the suspended Works and of the Plant which has been delivered to the Site and which is affected by suspension and the risk of loss or damage thereto shall thereupon pass to the Employer.”

Sub-Clause 25.1 Time for Completion

The text of Sub-Clause 25.1 is deleted and substituted by the following:

“The Works at the place of the project mentioned in the Preamble to Conditions of Contract shall be completed tested and commissioned within the period mentioned in the Preamble to Conditions of Contract.”

Sub-Clause 26.1 Extension of Time for Completion

Sub-Clause 26.1(h) is deleted.

Sub-Clause 26.3 Earlier Completion

- (i) At the end of Sub-Clause 26.3(a) the following text is added and Clause is re-designated as 26.3.

“The extra sum to be paid to the Contractor for Completion of Works prior to the date of Completion established under Sub-Clause 25.1 shall be computed on the basis of the sums mentioned in the Preamble to Conditions of Contract.”

- (ii) Sub-Clause 26.3 (b) is deleted.

“Sub-Clause 26.4 Rate of Progress

Sub-Clause 26.4 is added:

“If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognised days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Sub-Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any moneys due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.”

Sub-Clause 27.1 Delay in Completion

Sub-Clause 27.1 is deleted and substituted by the following:

“If the Contractor fails to deliver the Works, or any part thereof, within the time stated in Sub-Clause 25.1, or fails to complete the whole of the Work, or, if applicable, any Section within the relevant time prescribed by Sub-Clause 25.1, then the Contractor shall pay to the Employer the relevant sum stated hereinbelow as liquidated damages for such default (which sum shall be the only moneys due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant time for Delivery or Time for Completion and the actual date of delivery at site or the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, as the case may be, subject to the applicable limit stated hereinbelow.

The Employer may deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations & liabilities under the Contract.”

The liquidated damages for each day of delay and the maximum amount of liquidated damages shall be the amounts mentioned in the Preamble to Conditions of Contract.

Sub-Clause 28.7 Consequences of Failure to Pass Tests on Completion

The words “by arbitration” appearing at the end of the Sub-Clause 28.7(c) are deleted and substituted by the words “by the Engineer”.

Sub-Clause 30.4 Extension of Defects Liability Period

At the end of 4th paragraph of Sub-Clause the following is added:
“or a mutually agreed period.”

Sub-Clause 30.5 Failure to Remedy Defects

In first line after the words “reasonable time” the following is added:
“fixed by the Engineer”.

Sub-Clause 30.13 Unfulfilled Obligations

New Sub-Clause 30.13 is added as herein below:

“After the Defects Liability Certificate has been issued, the Contractor and the Employer shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force.”

Sub-Clause 31.1 Engineer's Right to Vary

The following is added at the end of second paragraph:

“No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 31. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of Contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.”

Sub-Clause 31.5 Record of Costs

The word “Engineer” in 4th line of Sub-Clause is deleted and substituted by
“Engineer/Employer”.

Sub-Clause 31.6 Daywork under Variation Order

New Sub-Clause 31.6 is added as given below:

“A Variation Order may provide that work done pursuant thereto shall be executed as Daywork. In such case the Contractor shall be paid for such work under the conditions and the rates and prices set out in the Day Work Schedule.”

Sub-Clause 31.7 Value Engineering

New Sub-Clause 31.7 is added as given below:

The Contractor may, at any time, submit to the Engineer a written proposal which in the Contractor’s opinion will reduce the cost of constructing, maintaining or operating the works, or improve the efficiency or value to the Employer of the completed Works or otherwise be of benefit to the Employer. Any such proposal shall be prepared at the cost of the Contractor. However Employer is not bound to accept such proposal.

Sub-Clause 33.1 Terms of Payment

(Employer may vary this Sub-Clause)

The following Sub-Clauses are added:

Sub-Clause 33.1.1 Retention of Payment

If at any time any payment would fall due for Works or part of Works and, if there shall be any defect in part of such Works in respect of which such payment is proposed, the Employer may retain the whole or any part of such payment. Any sum retained by the Employer pursuant to the provisions of this Clause shall be paid to the Contractor after the said defect is removed.

Sub-Clause 33.1.2 Payment Where Taking-Over Certificate Issued for Section or part of Works

If any section or part of the Works shall be taken-over separately under Clause 29 (Taking-Over) hereof, the payments herein provided for on or after Taking-Over shall be made in respect of the section or part taken-over and reference to the price shall mean such part of the price as shall, in the absence of agreement, be apportioned thereto by the Engineer.

Sub-Clause 33.2 Method of Application

(Employer may vary this Sub-Clause)

Sub-Clause 33.5 Payment

Sub-Clause 33.5 is deleted and substituted by the following:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 27, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate referred to in Sub-Clause 33.10 within 60 days after such Final Payment Certificate has been jointly verified by Employer and Contractor; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project, subject to release of funds and satisfaction of the Engineer & Employer.

Deduction shall be made from the net amounts payable to the Contractor of any sum(s) in accordance with the prevalent Federal and/or Provincial laws, provided that no such deduction shall be made from those payments in respect of which the Contractor has obtained exemption under the Law.”

Sub-Clause 33.6 Delayed Payment

The text of Sub-Clause 33.6 is deleted and substituted by the following:

“In the event of the failure of the Employer to make payment within the times stated in Sub-Clause 33.5, the Employer shall pay to the Contractor compensation at the rate of KIBOR+2% for local currency and LIBOR+1% for foreign currency per annum, upon all local currency sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to Contractor's entitlement under Sub-Clause 46.1. All this shall be subject to release of funds and satisfaction of the Engineer & Employer”

Sub-Clause 33.8 Payment by Measurement

The work shall be measured for the units mentioned in the Schedule of Prices according to the Contract as determined by the Engineer from approved drawings, Specifications and Contract Documents.

Sub-Clause 33.12 Withholding of Payment

New Sub-Clause 33.12 is added as given below:

If the Works or any part thereof are not being carried out to the Engineer's satisfaction and in order to protect the Employer from loss on account of:

- (a) defective work not rectified
- (b) guarantees not met
- (c) claims filed against the Contractor
- (d) failure of the Contractor to make payments due for Plant procured or labour employed by him.
- (e) damage to any other contractor employed by the Employer.
- (f) Contractor's non-compliance with the Contract
- (g) any Government dues recoverable from the Contractor if notified by the Government

The Engineer may notify withholding of such payments or part thereof as may, in his opinion, be related to the aforesaid reasons/grounds. When the reasons/grounds for withholding the payment are removed by the Contractor, the Engineer shall upon being satisfied to that effect issue Certificate of Payment in respect of withheld amounts.

Sub-Clause 35.1 Payment in Foreign Currencies

(Employer may vary this Sub-Clause)

Sub-Clause 35.2 Currency Restrictions

The text of Sub-Clause 35.2 is deleted and substituted by the following:

“Any required foreign currency transactions shall be met by the Employer/Contractor at his cost from his own resources” All payments shall be in Pak Rs.

Sub-Clause 35.3 Rates of Exchange

The words “as stated in the Preamble” appearing in 3rd line of Sub-Clause are deleted and substituted by the words “as published or authorized by State Bank of Pakistan”.

Sub-Clause 36.4 Payment against Provisional Sums

Sub-Clause 36.4 is deleted and substituted by the following:

“Provisional Sum if any will be expended on the direction of the Engineer through Variation Orders which would be valued in accordance with the provisions of Clause 31 Conditions of Contract.”

Sub-Clause 37.2 Employer's Risks

The text of Sub-Clause 37.2 is deleted and substituted by the following:

“The Employer's Risks are:

- (a) (Insofar as they relate to Pakistan) war and hostilities (whether war be declared or not), invasion, act of foreign enemies
- (b) (Insofar as they relate to Pakistan) rebellion, revolution, insurrection, military or usurped power or civil war
- (c) ionizing radiation or contamination by radioactivity from any nuclear fuel, radio-active toxic explosives or other hazardous properties of any explosive nuclear assembly or nuclear components thereof
- (d) pressure waves caused by aircraft travelling at sonic or supersonic speed
- (e) (Insofar as they relate to Pakistan) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors
- (f) use or occupation of the Work or any part thereof by the Employer
- (g) fault, error, defect or omission in the design of any part of the Works by the Engineer, Employer or those for whom the Employer is responsible for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of such design
- (h) the use or occupation of the Site by the Works or any part thereof, or for the purposes of the Contract: or interference, whether temporary or permanent with any right of way, light, air or water or with any easement, way leaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract
- (i) the right of the Employer to construct the Works or any part thereof on, over, under, in or through any land

- (j) damage (other than that resulting from the Contractor's method of construction) which is the inevitable result of the construction of the Works in accordance with the Contract
- (k) the act, neglect or omission or breach of contract or of statutory duty of the Engineer, the Employer or other contractors engaged by the Employer or of their respective employees or agents.”

Sub-Clause 39.2 Loss or Damage Before Risk Transfer Date

The words “by arbitration under Clause 50” are deleted and substituted by the words “by the Engineer”.

Sub-Clause 39.4 Duty to Minimize Delay

New Sub-Clause 39.4 is added as given below:

Each Party shall at all times use all reasonable endeavours to minimize any delay in the Performance of the Contract as a result of Risks.

The Contractor shall give notice to the Employer and vice versa the Employer shall give notice to the Contractor in case of foreseeable delay by the Risks.

Sub-Clause 40.2 Employer's Liability

The text of Sub-Clause 40.2 from the words “or of death or personal injury” to the end of the Sub-Clause, is deleted and substituted by the following:

“..... (other than the Works) or of death or personal injury to the extent caused by any of the Employer's Risks listed in paragraphs (f), (g), (h), (i), (j), and (k) of Sub-Clause 37.2 but not otherwise.”

Sub-Clause 42.2 Maximum Liability

the words “the sum stated in the Preamble to Conditions of Contract or if no such sum is stated” appearing in 2nd line of Sub-Clause are deleted.

Sub-Clause 42.6 Foreseen Damage

Sub-Clause 42.6 is deleted in its entirety.

Sub-Clause 43.1 The Works (Insurance)

(Employer may vary this Sub-Clause)

Sub-Clause 43.2 Contractor's Equipment

Sub-Clause 43.2 is deleted and substituted by the following:

“The Contractor shall insure the Contractor's Equipment for its full replacement value while on the Site against all loss or damage caused by any of the Contractor's Risks.”

Sub-Clause 43.3 Third Party Liability (Insurance)

(Employer may vary this Sub-Clause)

Sub-Clause 43.7 Remedies on the Contractor's Failure to Insure

In 3rd line after the word, "purpose", the expressions- "and reasonable costs including the man-hours costs of Employer's Personnel" are added.

Sub-Clause 43.9 Currency of Insurance

New Sub-Clause 43.9 is added as given below:

"All policies of Insurance of the Plant shall provide for payment of indemnity to be made in such amounts as will allow making good of loss of or damage to the whole or any part of the Works."

Sub-Clause 43.10 Contractor to Notify

New Sub-Clause 43.10 is added as given below:

"It shall be the responsibility of the Contractor to notify the insurance company of any changes in nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times in accordance with the provisions of the Contract."

Sub-Clause 43.11 Procurement of Insurance Policies

New Sub-Clause 43.11 is added as given below:

"The Contractor shall procure and submit the insurance cover under this Clause within a period of 28 days from the date of receipt of Letter of Acceptance from the Employer."

Sub-Clause 44.6 Damage Caused by Force Majeure

At the end of the Sub-Clause 44.6 the following is added:

"However the Contractor shall put up his claim to the Employer / Engineer with full details and justification."

Sub-Clause 44.8 Payment on Termination for Force Majeure

Text in sub-para (c) is deleted and para (d) and (e) are re-numbered as (c) and (d).

Sub-Clause 44.10 Force Majeure Affecting Engineer's Duties

Sub-Clause 44.10 is deleted in its entirety.

Sub-Clause 45.2 Contractor's Default

The following paragraph is added at the end of Sub-Clause 45.2.

"The Employer or such other contractor may use for such completion any Contractor's Equipment which is upon the Site as he or they may think proper, and the Employer

shall pay the Contractor a reasonable compensation for such use”.

Sub-Clause 45.6 is added as follows:

Sub-Clause 45.6 Integrity Pact

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

- (a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder’s fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
- (b) terminate the Contract; and
- (c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 45.2 to 45.5 and the payment under Sub-Clause 45.4 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.

Sub-Clause 46.1 Employer's Default

The comma and the word “or” at the end of paragraph (d) of Sub-Clause 46.1 are deleted and substituted by period (.) Paragraph (e) of Sub-Clause 46.1 is deleted.

Sub-Clause 46.3 Payment on Termination for Employer's Default

The words “including loss of profit” in the second paragraph of Sub-Clause 46.3 are deleted.

Sub-Clause 47.1 Labour, Materials and Transport

(Employer to modify this Sub-Clause as provided under Clause 70.1 of PCC of PEC Civil Documents and following PEC Procedure and Formula for Price Adjustment) (Not Applicable)

Sub-Clause 48.1 Customs and Import Duties

(Employer may vary this Sub-Clause)

The Sub-Clause 48.3 is added:

Sub-Clause 48.3 Port Charges and Port Congestion

The Contractor shall be deemed to have obtained all the information regarding facilities and charges, in respect of port clearance, loading and unloading, storage, transportation, congestion and confirmed the requirements thereof at his own responsibility and all such costs and charges are deemed to be included in the rates and prices of the Schedule of Prices.

Sub-Clause 49.1 Notice to Contractor

The following is added at the end of Sub-Clause 49.1:

“For the purposes of Sub-Clause 49.1 the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.”

Sub-Clause 50 Disputes & Arbitration

Clause 50 is deleted and in its place the following Sub-Clauses 50.1 to 50.5 are inserted:

“50.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, 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 fifty sixth (56) day after the day on which he received such reference, the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

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

In any case where the Conditions of Contract provide that the decision of the Engineer is to be final and conclusive, such decision shall not be referable to arbitration under this Clause nor shall the same be questioned in any other form of proceedings whatsoever.

If either the Employer or the Contractor be dissatisfied with a decision of the Engineer or if the Engineer fails to give notice of his decision on or before the fifty sixth (56) day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the twenty eighth (28) day after the day on which the said period of fifty six (56) days expired, as the case may be, give notice to the other party to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 50.5, no arbitration in respect thereof may be commenced unless such notice is given.

If the Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notification of intention to commence arbitration as to such dispute has been given by either the Employer or the

Contractor on or before the twenty eighth (28) day after the day on which the parties received notice as to such decision from the Engineer the said decision shall become final and binding upon the Employer and the Contractor.

Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 50.2, arbitration of such dispute shall not be commenced unless an attempt has first been made by the parties to settle such dispute amicably through mutual negotiation within ninety (90) days from the date of notification of Engineer's decision.

Any dispute in respect of which:

- (a) the decision, if any, of the Engineer has not become final and binding pursuant to Sub-Clause 50.1 and
- (b) amicable settlement has not been started/reached within the period stated in Sub-Clause 50.3

shall be finally settled, unless otherwise specified in the Contract, under the Pakistan Arbitration Act, 1940 (Act No. X of 1940) and Rules made thereunder as amended, by one or more arbitrators appointed under such Rules.

The said arbitrator(s) shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Engineer for the purpose of obtaining said decision pursuant to Sub-Clause 50.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

The venue of arbitration proceedings shall be the place in Pakistan as mentioned in the Preamble to Conditions of Contract.

Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 50.1 or 50.2 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 50.4. The provisions of Sub-Clauses 50.1 to 50.2 shall not apply to any such reference.”



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STANDARD FORMS

STANDARD FORMS

	Page No.
Standard Forms include the following:	
• Form of Bid Security (Bank Guarantee)	174
• Form of Contract Agreement	176
• Form of Performance Security (Bank Guarantee)	178
• Form of Bank Guarantee/Bond for Advance Payment	180

(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 _____

Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address: _____

Name of Principal (Bidder) with address: _____

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

Bid Reference No. _____ Date of Bid _____

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

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

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

- (1) that the Bid Security shall remain valid for a period 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 24.2 of Instructions to Bidders, or
 - (c) failure of the successful bidder to
 - (i) furnish the required Performance Security, in accordance with Clause 34 of Instructions to Bidders, or
 - (ii) sign the proposed Contract Agreement, in accordance with Clause 35 of Instructions to Bidders,

then the entire sum be paid immediately to the said Employer as liquidated damages


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and not as penalty for the successful bidder's failure to perform.

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

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

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

IN WITNESS WHEREOF, the above bounden 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:	Signature _____
1. _____	Name _____
_____	Title _____
Corporate Secretary (Seal)	
2. _____	_____
_____	_____
(Name, Title & Address)	Corporate Guarantor (Seal)


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FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the day of _____ (month) 20____ between _____ (hereafter called the "Employer") of the one part and _____ (hereafter called the "Contractor") of the other part.

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

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:
 - (a) The Contract Agreement
 - (b) The Letter of Acceptance
 - (c) The completed Form of Bid
 - (d) The Preamble to Conditions of Contract
 - (e) The Particular Conditions of Contract
 - (f) The General Conditions of Contract
 - (g) The priced Schedule of Prices
 - (h) The completed Schedules to Bid
 - (i) The Specifications
 - (j) The Drawings
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this 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 Employer

(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:

(Name, Title and Address)

Witness:

(Name, Title and Address)

**FORM OF PERFORMANCE SECURITY
(Bank Guarantee)**

Guarantee No. _____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) 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 Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

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

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 30, Defects after Taking Over, of Conditions of Contract are fulfilled.

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

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


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

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

Witness: 1. _____ _____ Corporate Secretary (Seal) 2. _____ _____ Name, Title & Address	_____ Guarantor (Bank) Signature _____ Name _____ Title _____ _____ Corporate Guarantor (Seal)
---	--

FORM OF BANK GUARANTEE/BOND FOR ADVANCE PAYMENT

Guarantee No. _____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

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

_____ (Particulars of Contract), with

_____ (hereinafter called the Contractor).

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

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

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

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

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

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

This guarantee shall expire not later than _____ by which date we must have received any claims by registered letter, telegram, telex or telefax.

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


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Witness:

1. _____

Corporate Secretary (Seal)

2. _____

Name, Title & Address

Guarantor (Bank)

Signature _____

Name _____

Title _____

Corporate Guarantor (Seal)

Schedule – I to Bid

**INSTRUCTIONS TO BIDDERS FOR SUBMISSION OF
TECHNICAL BID FOR TECHNICAL EVALUATION
UNDER SINGLE STAGE TWO ENVELOP BIDDING,**

EVALUATION CRITERIA

DRAWINGS

AND

SPECIFICATIONS

EVIDENCE OF BIDDER'S CAPABILITY

SYSTEM DESIGN FOR AUTO TRACKING BASED SOLAR POWER PUMPING SETS

S No.	Name of Work	Discharge (I- GPH)	Head (Feet)	Setting (feet)	Water Horse Power (KW)	Pump efficiency	Motor Efficiency	Motor Input Power (watt)	Shaft Power (Watt)	Total PV Power (Watt)	PV Generator Peak Power (watts)			PV De- Rating Factor for Solar Panels as per Specification attached	
											No of Strings in Parallel	No of Module/String in Series	Module Size		Total PV Generation
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

Application Form A – 1

General Information

All individual firms and each partner of a joint venture applying for qualification are requested to complete the information in this form. Nationality information is also to be provided for foreign owners or applicants who are forming part of the Joint Ventures as required under the PEC Bye-Laws as a Partnership/Joint Venture.

Where the Applicant proposes to use named subcontractors for critical components of the works or for work contents in excess of 10 percent of the value of the whole works, the following information should also be supplied for the specialist subcontractor(s).

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

NATIONALITY OF OWNERS		
	NAME	NATIONALITY
1.		
2.		
3.		
4.		
5.		

Application Form A – 2

General Experience Record

Name of Applicant or partner of a joint venture

All individual firms and all partners of a joint venture are requested to complete the information in this form. The information supplied should be the annual turnover of the Applicant (or each member of a joint venture), in terms of the amounts billed to clients for each year for work in progress or completed over the past five years.

Use a separate sheet for each partner of a joint venture.

Annual Turnover		
Year	Turnover (in actual currency)	Equivalent Rupees in Millions
1.		
2.		
3.		
4.		
5.		

Application Form A - 3

Joint Venture Summary

Names of all Partners of a Joint Venture	
1.	Lead Partner
2.	Partner
3.	Partner

Total value of annual turnover, in terms of work billed to clients,

Annual Turnover Data (Equivalent in Pak Rupees, Millions)						
Partner	Form A-2 Page No.	Year 1	Year 2	Year 3	Year 4	Year 5
1. Lead Partner						
2. Partner						
3. Partner						
Total:						

Application Form A – 4

Particular Experience Record

Name of Applicant or partner of a joint venture

On a separate page, using the format of Application Form A -5, each applicant or partner of a Joint Venture is required to list all contracts of a value equivalent to Pak

***Rupees 4.5 million** and above of a similar nature and complexity (Supply & Installation of Solar Based Pumping Machinery in any Public Work/NGOs) to the contract for which the Applicant wishes to qualify, undertaken during the last five years. The information is to be summarized, using Application Form A-5, for each contract completed or under execution by the Applicant or by each partner of a Joint Venture.*

Where the Applicant proposes to use named subcontractor(s) for critical components of the works or for work contents in excess of 10 percent of the value of the whole works, the information in the afore -mentioned forms should also be supplied for each specialist subcontractor.

Application Form A – 5
Details of Contracts of Similar Nature & Complexity

Name of Applicant or partner of a joint venture

Use a separate sheet for each contract.

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

¹Insert any specific criteria required for particular operations, such as annual volume of earthmoving, underground excavation, or placing concrete etc.

Application Form A – 6

Summary Sheet: Current Contract Commitments/Works in Progress

Name of Applicant or partner of a joint venture

Applicants and each partner to an application should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which substantial Completion Certificate has yet to be issued.

Name of Contract	Value of Outstanding work (Equivalent Pak Rs. Millions)	Estimated Completion Date
1.		
2.		
3.		
4.		
5.		
6.		

Application Form A – 7

Personnel Capabilities

Name of Applicant

For specific positions essential to contract implementation, Applicants should provide the names of at least two candidates qualified to meet the specified requirements stated for each position. The data on their experience should be supplied on separate sheets using one Form for each candidate (Application Form A-8).

1.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
2.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
3.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
4.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate

Application Form A – 8

Candidate Summary

Name of Applicant

Position		Candidate [Tick appropriate one] <input type="checkbox"/> Prime <input type="checkbox"/> Alternate
Candidate information	1. Name of Candidate	2. Date of Birth
	3. Professional Qualification	4. PEC Registration No.
Present employment	5. Name of employer	
	Address of employer	
	Telephone	Contact (manager/personnel officer)
	Fax	
	Job title of candidate	Years with present employer

Summarize professional experience over the last 10 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.

Month/ Dates/Years		Company/Project/Position/Relevant technical and management experience
From	To	

Application Form A - 9 Equipment Capabilities

Name of Applicant

The Applicant shall provide adequate information to demonstrate clearly that he has the capability to meet the requirements for each and all items of equipment listed in the Evaluation Criteria 1.2 (v). A separate Form shall be prepared for each item of equipment listed or for alternative equipment proposed by the Applicant.

Item of Equipment		
Equipment information	1. Name of manufacturer	2. Model and power rating
	3. Capacity	4. Year of manufacture
Current status	5. Current location	
	6. Details of current commitments	
Source	7. Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased	

Omit the following information if it is owned by the Applicant or partner.

Owner	8. Name of owner	
	9. Address of owner	
	Telephone	Contact name and title
	Fax	
Agreement	Details of rental/lease specific to the Project	

Application Form A - 10 Financial Capability

Name of Applicant or Partner of a Joint Venture

Applicants, including each partner of a joint venture, should provide financial information to demonstrate that they meet the minimum requirements. All the above figures will be added together to arrive at JV's total capacity. Each applicant or partner of a joint venture must fill-in this form. If necessary, use separate sheets to provide complete banker information. A copy of the audited balance sheets should be attached.

Banker	Name of banker	
	Address of banker	
	Telephone	Contact name and title
	Fax	Telex

Summarize actual assets and liabilities in Pak Rupees (Equivalent at the current rate of exchange at the end of each year) for the previous five years, based upon known commitments, projected assets and liabilities in pak Rupees equivalent for the next two years.

Financial information in Pak Rs. or equivalent	Actual: previous five year					Projected next two years	
	1	2	3	4	5	6	7
1. Total assets							
2. Current assets							
3. Total liabilities							
4. Current liabilities							
5. Profits before taxes							
6. Profits after taxes							

Specific proposed sources of financing to meet the cash flow of the Project, net of current commitments

Source of financing	Amount (Pak Rs. or equivalent)
1.	
2.	
3.	
4.	

Attach audited financial statements for the last five years (for individual applicant or each partner of joint venture). Firms owned by individuals, and partnerships, may submit their balance sheets certified by a registered accountant, and supported by copies of tax returns, if audits are not required by the laws of their countries of origin in case of foreign firms.

Check List

Yes	No	Check list
<input type="checkbox"/>	<input type="checkbox"/>	Valid PEC Certificate(s) in required category
<input type="checkbox"/>	<input type="checkbox"/>	Copy of valid dealer ship certificate
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-1), General Information
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-2), General Experience Record
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-3), Joint Venture Summary
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-4), Particular Experience (Record List of Solar based pumping machinery projects of similar nature and complexity completed in last five years and complexity in-hand.)
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-5), Detail of Contracts of Similar Nature and Complexity (Supply & Installation of Solar based pumping machinery)
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-6) Current Contract Commitments/Works in Progress
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-7), Personnel Capabilities
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-8) Candidate Summary (List of B.Sc. Engineers having relevant experience with their CVs and PEC Reg. No.& List of Associates Engineers (DAE) with their CVs having relevant experience)
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-9), Equipment capabilities
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-10), Financial Capability
<input type="checkbox"/>	<input type="checkbox"/>	Application form (A-11), Litigation History
<input type="checkbox"/>	<input type="checkbox"/>	Undertaking that all equipment listed in this document for qualification will be made available for the subject Project
<input type="checkbox"/>	<input type="checkbox"/>	Audited balance sheets for at least last three years and Bank statements
<input type="checkbox"/>	<input type="checkbox"/>	Undertaking that the Applicant has not been declared bankrupt
<input type="checkbox"/>	<input type="checkbox"/>	Original affidavit that the firm has not been black listed
<input type="checkbox"/>	<input type="checkbox"/>	Applicants legal status
<input type="checkbox"/>	<input type="checkbox"/>	Principal place of Business
<input type="checkbox"/>	<input type="checkbox"/>	Place of incorporation or registration
<input type="checkbox"/>	<input type="checkbox"/>	Certificate of registration with Income Tax & Sales Tax Department
<input type="checkbox"/>	<input type="checkbox"/>	Enlistment record with Government organizations and other agencies
<input type="checkbox"/>	<input type="checkbox"/>	Location of workshop facility, if any
<input type="checkbox"/>	<input type="checkbox"/>	Equipment's sole agencies represented by the Contractor
<input type="checkbox"/>	<input type="checkbox"/>	Written description of internal quality control program for specified works

EVALUATION CRITERIA

Eligibility for Qualification

Keeping in view the complexity of the Project, eligibility of Applicants for qualification evaluation is as mentioned below:

Mandatory Requirements

Sr. No.	Description	Yes/No
1.	Registration with Pakistan Engineering Council (PEC) in relevant category with field of specialization EE-11 (Specified for Solar Energy)	If "YES" the applicant will be Eligible for further Evaluation for qualification (copy of valid PEC certificate shall be attached).
2.	Blacklisting from any Government/Semi-Government Agency/Department.	If "YES" the applicant will not be Eligible for further Evaluation for qualification. (Original Affidavit on Judicial Stamp Paper that the firm has not been black listed from any Government/ Semi Government Agency/ Department till date shall be provided).
3.	System Design	System Design duly filled must be submitted in technical bid otherwise applicant will not be Eligible for further Evaluation.
4.	<ul style="list-style-type: none"> i. Firm must have ISO 9001 certificate quality management system ii. Firm must have pumping machinery according to ISO 9906 Roto dynamic acceptance test. iii. Warranty period for solar panel etc will be 20 years and pumping machinery 2 – years for electrical/mechanical parts. iv. Firm must have 250 Million Accumulative turnover for last 3 Years. Must be attached Sales Tax Returns/Income Tax Returns & Financial Audited Balance Sheets. v. Goods declaration (bill of entry) must be provided for each product (i.e Solar Panel, Pumps, Motors, Inverter & Tracker Sleeve Drive). vi. Performance curves at STC for both solar panel and pumping machinery 	Attach Valid documents

	should be provided for each work separately along with bidding documents	
vii.	The PV modules offered should not be more than One (01) year old with respect to the date of manufacturing.	
viii.	Brand name(s) of PV modules, the supplier intends to supply must be included in the technical proposal.	
ix.	Solar Auto Tracker slow speed DC Motors driven.	
x.	Defect liability period of Electrical / Mechanical works will be 2 years.	

Evaluation Criteria

Keeping in view the complexity of the Project works, criteria for qualification has been evolved by considering the prevailing market trends and unique local conditions as mentioned below:

Sr. No.	Category	Weightage/Marks
i.	General Capabilities	10
ii.	Financial Soundness	20
iii.	Experience Record	30
iv.	Personnel Capabilities	20
v.	Equipment Capabilities	20
Total:		100

Qualification will be carried out on the point scoring basis. Any applicant securing overall minimum score of 60 % as total will be considered as qualified.

An applicant may score below 60% in any one category provided it is not less than 50%.

Qualification Evaluation Criteria

i) General Capabilities

a)	Copy of Valid dealer ship(pumps & solar panels) certificate from Sub-Contractor/JV Partner	2	<ul style="list-style-type: none"> No marks will be given if license is not attached and 2 points will be added in case of valid certificate.
c)	Litigation History in which Decision has been given against the firm(s)	6	<ul style="list-style-type: none"> In case the firm is involved in any litigation, -5 will be given and 6 points will be added in case original affidavit of no litigation is attached.
d)	Description of Internal Quality Control assurance program for Construction/ Erection/Maintenance	2	<ul style="list-style-type: none"> 2 Marks will be given if Description is provided.
Total Marks Allocated			10

ii) Financial Soundness

Sr. No.	Description	Marks Assigned	Criteria for Marks Obtained
a)	Bank Certificate including Bank Credit Line (Evidence in Original from Guarantor Bank)	5	<p><u>Bank Certificate (2-Marks)</u></p> <ul style="list-style-type: none"> 2 Marks are given if Original Bank Certificate is provided and no marks for photocopy. <p><u>Bank Credit Line (3-Marks)</u></p> <ul style="list-style-type: none"> 2 Marks are given if the available bank credit line limit is equal to 50 Million. For limit less than 50 Million, use following weight-age: $2 \times (A/50)$ For the limit more than 50 million but less than 100 million use following weight-

			<p>age:</p> <p>$2 + (A/100)$</p> <p>A = Available Bank Credit Line Limit</p> <ul style="list-style-type: none"> • Full Marks are given in case of limit is 100 million or more.
b)	Audited Balance Sheets for at least last three years	5	<ul style="list-style-type: none"> • No points will be given if Audited Balance Sheets are not attached. Two (2) points will be given for one year audited balance sheets, four (4) points for two years and full points for three years.
c)	Working Capital in last 3 years	5	<ul style="list-style-type: none"> • 3 Marks are given if the available average working capital for last three years is equal to 30 Million. • For the capital less than 30 million use following weight-age: <p>$3 \times (A/30)$</p> • For the capital more than 30 million but less than 100 million use following weight-age. <p>$3 + (A/100)$</p> <p>A = Average working capital in last three years.</p> • Full Marks are given in case of limit is 100 million or more.
d)	Registration with income tax & sale tax department	5	<ul style="list-style-type: none"> • No marks will be given if NTN & GST Registration certificate is not attached and 5 points will be added in case of valid certificates.

Total Marks Allocated	20
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iii) Experience Record

Sr. No.	Description	Marks Assigned	Explanation for Marks Obtained
a)	Projects of similar nature and complexity (Supply & Installation of Solar Based Pumping Machinery) completed in last five years in any Public Works Department/NGOs.	16	<ul style="list-style-type: none"> • 4 Marks are given if the applicant has completed upto 2 projects of similar nature in last five years. • For less than 5 projects completed use the following weight age. 8 x (A/3) A = No of projects of similar nature completed in last five years • Full Marks are given in case of 5 projects or more.
b)	Projects of similar nature and complexity (Supply & Installation of Solar Based Pumping Machinery) in-hand in any Public Works Department/NGOs.	9	<ul style="list-style-type: none"> • 2 Marks are given if the applicant has upto 2 projects of similar nature in-hand. • 6 Marks are given if the applicant has 3 projects of similar nature in-hand. • For more than 3 but less than 5 projects in-hand use the following weight-age. 6 x (A/3) A = No of projects of similar nature in-hand during last five years. • Full Marks are given in case of 5 projects or more.
d)	Enlistment record with Government Organizations &	5	<ul style="list-style-type: none"> • 1 Mark for each enlistment up to a maximum of five

	other agencies		enlistments. <ul style="list-style-type: none"> • Full marks if enlisted under Khyber Pakhtunkhwa's new enlistment mechanism.
Total Marks Allocated			30

iv) **Personnel Capabilities**

Sr. No.	Description	Marks Assigned	Explanation for Marks Obtained
i)	B.Sc. Engineers registered with Pakistan Engineering Council (PEC)	14	<p><u>Experience (6-Marks)</u></p> <ul style="list-style-type: none"> 6 Marks will be given if the individual relevant experience of at least 1 numbers of B.Sc. Engineer Electrical/Electronics/Mechanical is equal to 15 years or above. <p><u>Strength of Engineers (8 Marks)</u></p> <ul style="list-style-type: none"> 2 Marks will be given if the total no. of Engineers registered with PEC is upto 2. 4 Marks will be given if the total no. of Engineers registered with PEC is upto 4. 8 Marks will be given if the total no. of engineers registered with PEC is 5 or above.
ii)	Associates Engineers (DAE)	6	<p><u>Experience (4-Marks)</u></p> <ul style="list-style-type: none"> 4 Marks will be given if the individual relevant experience of at least 1 number of Associates Engineers Electrical/Mechanical (DAE) is equal to 8 years or above. <p><u>Strength of Associate Engineers (2 Marks)</u></p> <ul style="list-style-type: none"> 1 Mark will be given if the total no. of Associate Engineers (DAE) are upto 2. 2 Marks will be given if the total no. of Associate Engineers (DAE) are 3 or

			above.
Total Marks Allocated			20

v) Equipment Capabilities

Sr. No.	Description	Marks Assigned	Explanation for Marks Obtained
a)	1. Test Bed for verification / testing of Solar pumps along with all accessories as per ISO-9906 in company premises. (Firm must have Third Party Certification regarding Test Bed arrangements).	13	13 Marks for complete setup are given. (Attached Third Party Certificate)
b)	Workshop facilities. Attach layout sketch of workshop.	5	No marks will be given if Contractor has no workshop facilities.
c)	Equipment sole agencies represented by the Contractor	2	1 mark for each agency Upto maximum 2 points
Total Marks Allocated			20

**Appendix C to
Instructions to Bidders**

Domestic Goods (Value added in Pakistan)

NOT USED

SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF SOLAR BASED PUMPING UNITS

1. SOLAR PANELS:

Solar cell type:

The photovoltaic cell should use technology of Mono Crystalline Silicon Cell with high efficiency and the w module efficiency should be minimum 16.5% or above. More power per square meter than other panel. Low temperature coefficient. The PV modulus have an ability to works well with high voltage input inverter/charger controllers (1000 Vdc). Fully automated production cycle, reducing sources of variation in production, Manufacturer should have their own in house solar cell and solar panel manufacturer facility. Multi award winning company should preferred.

Protections:

Panel should have series fuse rating of 15 Amp with a bypass diodes for reverse current protection. Junction box should be there with water resistant capability. Ingress protection of panel should be at least IP-65. Cable connectors should be ingress protected by at least IP-67 with application classification of class A. Panel should have capability to sustain its functionality with wind load of at least **3.8 KPa** & Robust frame up to **5400 Pa** snow load. Ammonia and salt mist corrosion resistance.

Material & finishing:

The encapsulation material must be Ethylene Vinyl Acetate (EVA) and its lamination with temperature safety glass. Special glass etching and anti-reflective coating.

Traceability:

A strip containing Serial number should be laminated inside the module so as to be clearly visible from front side.

Life Time and Warranty:

The PV cells should be designed for more than 25 years of its life with power decrease of not more than 20% after completion of 20 years. Solar panel should have at least 20 years of guarantee with all its subsystem. The PV module offered should not be more than one (01) year old with respect to the date of manufacturing. Unique Serial No of PV Modules and date (DD/MM/YYYY) of manufacturing should be laminated inside of the module to make it clearly visible from the front side. Brand name of PV modules, the supplier intends to supply must be included in the technical proposal.

Wiring:

Panel wire should be specifically designed for solar usage with Plug and play connectors. Wiring should have compatibility of field serviceable contact removal.

PID Free Certification:

Potential Induced Degradation (PID) refers to potential induced performance degradation in crystalline photovoltaic modules. It occurs when the module's voltage potential and leakage current cause ion mobility within the module. The degradation accelerates with exposure to humidity, temperature and voltage potential. Consequently, PID can have a profound adverse effect on the financing and operation of PV plants. PID tests simulate the practical conditions in the PV system, and verify the module performance and power output under high voltage and temperatures.

Standard Conformity:

The PV module should fully conform to following specifications.

- IEC-61215:2016 or IEC-61215:2005.
- IEC-61730-1:2004 or latest IEC-61730-2-2004 or latest.
- IEC-61701(latest).
- IEC-62716.
- IEC-60068-2-68.
- PPP58042

Submittals:

Following details should be provided with the supply of each panel:

- PID Free Certificate from TUV.
- EL and Flush test report from manufacturer for each panel (at the time of supply).
- TUV certification of IEC-61215, IEC-61730, IEC-60068-2-68 & PPP58042 Conformity.
- I-V curve for solar photovoltaic module panel.
- TUV certification Wind load of at least **3.8 KPa** & Robust frame up to **5400 Pa**
- PV module efficiency at STC.

Note: All information regarding solar panel with above mentioned featured data should be accessible and verifiable online on manufacturer website or verifiable in writing from the manufacturer through fast track courier.

2.INVERTER/CONTROLLER:

The solar pump controller should have built-in MPPT controller, Voltage Frequency (V/F) regulation, over load protection, soft start/ soft stop features and variable frequency Drive (VFD) with integrated Gate Bipolar transistors. The make and origin of the inverter/controller should be of Japanese and European origin or approved equivalent and clearly mentioned in the technical proposal. The inverter offered should comply to or equivalent standards:

- CE/ROHS/international standards (ISO 14001, OHSAS 18001 applicable).
- Low Voltage Directive 2014/35/EU with supplements.
- EMC Directive 2004/108/EU with supplements.
- The efficiency of inverter should be 92% and above.
- Inverter should have at least three (3) years extendable to 10 years performance warranty.

Inverter circuit must include protection against:

- Over or low voltages and currents beyond critical level of the inverters circuits.
- Protection against accidental short circuits & reverse polarity connections.
- Over load protection.
- Low RPM protection (i-e: efficiency < 30 Hz) Motor should be stop.
- Dry run protection.

Submittals:

Following details should be provided with the tender submission.

- LVD certificate
- Origin country Certificate for module quality
- CE marking
- Test report for weather-Proof Test (IP40)

The complete datasheet showing all the electrical parameters like input & output voltage ranges should be provided in the technical bid.

3. MOUNTING STRUCTURE:

The panel mounting structure should be made of hot dipped galvanized steel pipes, or epoxy coated mild steel pipes (minimum wall thickness 2.5 mm) and should have the provision for vertical (east to west) automatic Sun-Tracking by slewing drive. A sketch of the mounting frame showing dimensions of the frame parts should be provided in the technical proposal.

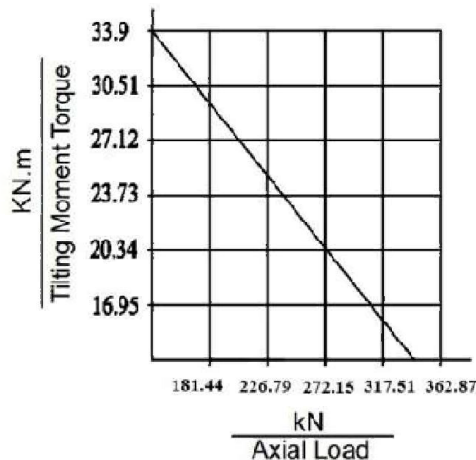
4. AUTO SUN TRACKING SYSTEM:

The tracker offered should be fabricated from GI pipes or channels having minimum wall thickness of 2.6 mm. It should have large mounting capacity 4000 Wp to 5500 Wp in order to achieve better land area utilization. The tracker offered should have robust structure capable of withstanding 150 km/hr wind speed. The tracker structure should rest on standard 9-Inch gear drive/ slewing drive having following minimum specifications. Three years comprehensive free replacement, repair and maintenance warranty (Free of cost) should be provided for all components of auto tracker (including Batteries).

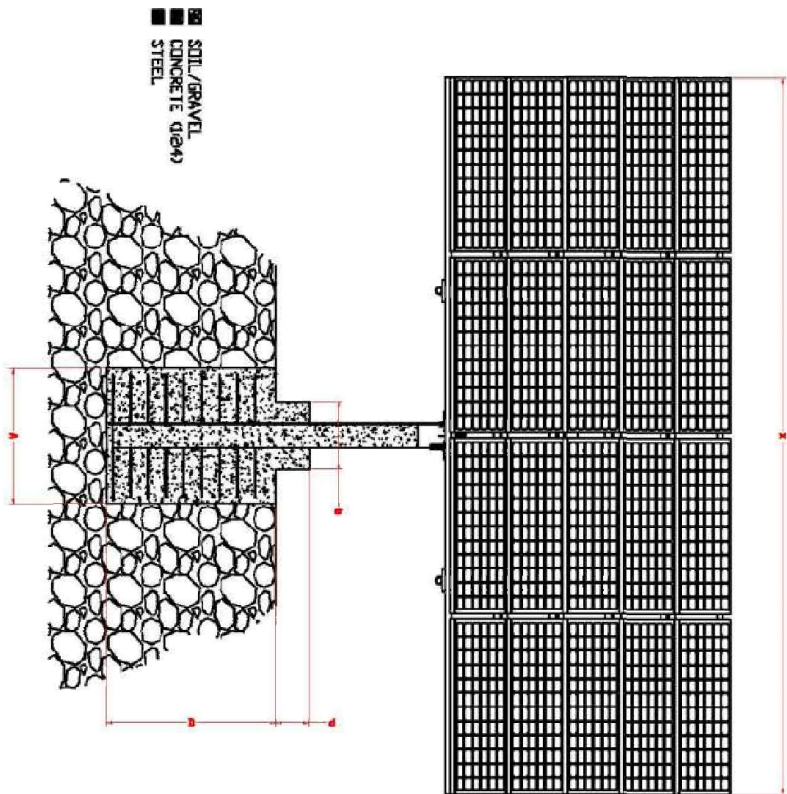
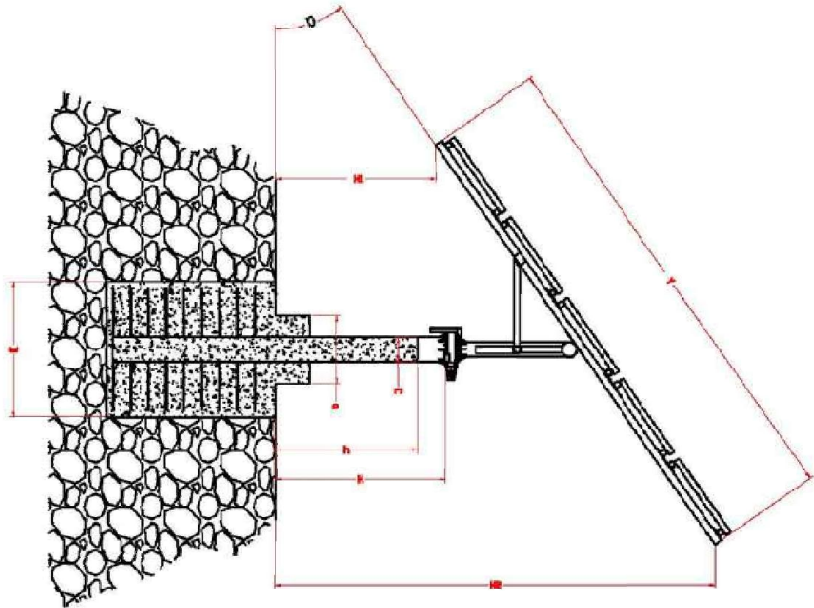
Detail catalog showing material specifications, load characteristics, make & origin of the slewing Drive and rated speed, voltage and power of the DC motor used must be provided in the Technical Proposal.

<i>Slewing Drive Performance Data</i>		
Rated Output Speed	0.049 rpm	
Rated Output Torque	805.2 kN.m	595.8 lbf.ft
Tilting Moment Torque (Max.)	33.9 kN.m	25×10 ³ lbf.ft
Holding Torque	38.7 kN.m	29×10 ³ lbf.ft
Axial Load (Max.)	338 kN	76×10 ³ lbf
Radial Load (Max.)	135 kN	30×10 ³ lbf
Ratio of Worm Gear	61:1	
Tracking Precision	≤ 0.17°	

The tilting moment/ axial load characteristics should meet or exceed the following



The slewing drive offered should be maintenance free. The drive control should be



General Dimensions and Concrete Plan of Single Pole PV Mounting Structure with Single Axis Tracking System

Sr. No.	Type/Size	X (ft)	Y (ft)	H1 (ft)	H2 (ft)	d	A (ft)	B (ft)	D (ft)	a (ft)	b (ft)	d (ft)	C (ft)	H (ft)	h (ft)
1	5/72x20	20.7	12.25	13	<12	30-36	4	4	5.5	2	2	1	8	4.5	4
2	5/72x21	18.5	13.55	13	<12	30-36	4	4	5.5	2	2	1	8	4.5	4
3	6/60x18	19.52	16.10	13	<12	30-36	4	4	5.5	2	2	1	8	4.5	4
4	6/60x20	21.5	16.27	13	<12	30-36	4	4	5.5	2	2	1	8	4.5	4

5. SYSTEM DESIGN/SIZING:

De-rating factors should be applied while designing the system in order to have compensations for variations in irradiance. The motor output (BHP) should be at least **20%** more than the pump required input power (Shaft Power). Also the panel peak power at STC (Wp) should be **40%** more than the maximum required input power of the motor (motor consumption).

6. PRE-SUPPLY TESTING & INSPECTION:

The firm applying for the tender must have test bed facility to carry out pump performance acceptance test witnessed by third party inspector/Client as per ISO-9906 standard. Each of the offered pump set models must undergo this witness test prior to supply and installation.

7. DC CABLE / WIRING:

99% copper wires of size at least 6 mm for single and 6 mm or above for multi strings and rated current 30A to be used. Working temperature range should be in between -40C to +85C. The cable must have double insulation suitable for 1000 VDC transmission, and all the relevant test reports i.e.

- Conductor resistance test.
- Insulation resistance test.
- Pressure test.
- Spark test.

Are to be provided in the technical proposal. The wiring must be protected by PVC conduits for underground installations. DC circuit breakers (not fuse) of at least 800V and suitable ampere rating must be installed between PV modules and PV pump controller in order to avoid short-circuiting. No direct jointing in DC power line is allowed, junction boxes of at least IP-44 rating are to be used for easy debugging where necessary. The cable should have safety level class II and standard flame class. Shell protection degree should be IP67 with connector rating IP67 (plug and play). The insertion and withdrawal force up to 50N can be bearable by the cable.

The Supplier should provide the manufacturer quality tests certificates at the time of supply.

**SPECIFICATIONS FOR PUMPING MACHINERY AS PER
ISO-9906 STANDARD**

1. PUMP:

Pumps are to be supplied having standard ISO-9906 specifications. The pump must be submersible, made of stainless steel. The characteristic curves showing the efficiency and performance of the pumps are to be provided in the technical proposals. The quoted pump is to be tested for its performance and certified as per ISO-9906 standard. The pump must 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:

CASING/DIFFUSER: The Casing/Diffuser should be in fabricated stainless steel AISI 304.

IMPELLERS: stainless steel AISI 304

DRIVING SHAFT: Stainless steel 304/420

SLEEVES: Stainless steel AISI 329/ 304

GASKETS: Rubber Gaskets

BEARINGS: AISI 329 stainless steel

COUPLING & SCREEN + CABLE GUARD:
Stainless steel AISI 316/319/304/420

NON-RETURN VALVE: As per British standard specifications (BSS), Minimum 16 bar pressure sustaining design

PRESSURE GAUGE: As per British standard specifications (BSS), having PSI or Bar scale

CLAMPS: Steel – Pressed

PUMP EFFICIENCY: Minimum efficiency of the pump should be 70% at duty point

2. MOTOR:

The origin, make and material of the motor should be clearly mentioned in the technical proposal. The winding material should be 99.99% copper. The motor should have wet type, water cool rewind-able/repairable stator. The motor should have non-disposable/non-hermetically sealed winding. The insulation class of the winding material should be mentioned. For each model quoted, all the technical parameters such as rated voltage, power factor, efficiency, full load ampere, speed and other similar parameters should be provided in the technical proposal. The testing report with all basic parameters should also be provided at the time of supply.

The motor shall be manufactured in compliance with National Electrical Manufacturer Association (NEMA) standards. The motor shall be three-phase submersible and shall be capable of operating at rated voltage of 380 Volts at 50 Hz. The motor should be capable of operating with variable speed through V/F control. Winding of the motor shall of rewind able type with class – IC40 insulation and IP68 protection. The

synchronous speed should be 2850-2950 RPM. Motor shall be capable of operating in well water with temperature starting from 40C. Motor should be designed for continuous operation. Motor must be filled with water without any chemical additives hazardous to health, for cooling. The motor must be properly protected against the entry of well water sand etc. by double mechanical seal i.e. one rotating and other stationary and the seal 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 shall be capable of minimum of 20 starts in an hour. Motor efficiency should not be less than 70%.

Material/technical specifications of rewind-able wet stators, three phase squirrel cage water filled submersible motor.

WINDING: Made of pure electrolyte copper a non-hygroscopic poly vinylchloride for normal temperature and must full fill resistant tests range.

STATOR: Energy efficient low-losses electrical magnetic sheet should be fixed in stainless steel casing. M800 or M600 magnetic sheet are preferable to use.

ROTOR: Energy efficient low-losses electrical magnetic sheet fixed with highgrade copper bars. M800 or M600 magnetic sheets are preferable to use.

SPLINE SHAFT: AISI 420 stainless steel, flange dimension according to NEAM standard, over size design to ensure stiffness in severe condition.

SHAFT BEARING: Water lubricated guide/general bearings fixed in upper and lower brackets should be made of metal impregnated carbon.

LOWER THRUST BEARING: Thrust sliding block bearings, self-aligning Mitchell type, should be able to withstand 15500N/20000N axial load.

MECHANICAL SEAL (STATIONARY & ROTARY): Silicon carbide or tungsten carbide mechanical seal.

COOLING FILLING FLUID: Water mixed with non-toxic anti-freeze provides cooling and lubrication also protect and prevent inside parts from corrosion.

DEGREE OF PROTECTION: IP68

INSULATION OF CLASS: With winding wire poly vinyl chloride up to 70 degree C with winding wire polyethylene up to 95 degree C.

VOLTAGE TOLERANCE: -6% to -10%

MOUNTING POSITION: Vertical horizontal

Class: IC40

MAXIMUM IMMERSION: 150 Meters

STARTING PER HOUR: 20

3. SUBMERSIBLE FLAT ELECTRIC CABLE:

The submersible cable should be made of 99% copper coated with double PVC, should be adequately flexible and environment friendly. The cable must have undergone quality tests as per BSS standards. Following lab tests are mandatory.

- Conductor resistance test.
- Insulation resistance test.
- Pressure test.
- Spark test.

Note: The Supplier should provide the manufacturer quality tests certificates at the time of supply.

4. COLUMN PIPE:

The column pipe shall be flanged ERW steel pipes confirming to ASTM designation A-53 with a minimum thickness of 3.5 mm and shall be painted with corrosion resistance paint of suitable thickness. Flanges thickness of 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. The flanges should be welded perfectly perpendicular to the axis of the pipe.

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 tested for hydrostatic pressure as per manufacturing standard.
- Pipes should be gone through straightening process to remove bendiness.

5. TOP SET:

Top set shall comprise of Bore covers plate, (covering bore hole completely and securely), installation/suspension clamps, sluice valve, reflex valve, connector and cable jointing material (Cable connection from motor to switching device shall be joint free) pressure gauge and cable ties.

and

**REVISED
SPECIFICATIONS
FOR
SUPPLY AND INSTALLATIONS OF**

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



**2019
Version-01**

**APPROVED BY STANDARIZATION COMMITTEE OF
KHYBER PAKHTUNKHWA**

[Signature]
Executive Engineer
Warsak Canals Division
Peshawar

[Signature]
Superintending Engineer
PHE Circle Tribal
Districts Peshawar.

[Signature]
PDA

DIRECTOR
Agril: Engineering
Tarnab, Peshawar

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

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Assistant Director (M&E)

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PO Lt Depu

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

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16/01/2019
Chairman Electric & UED

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GEN PBC-II

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GEN (PHE)

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ECP

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SE (HR)
CE (M.A)

A - SPECIFICATIONS FOR SOLAR SYSTEMS-COMMON PART

1. SOLAR PANELS:

- a. The PV module(s) shall contain mono crystalline silicon Grade-A Solar cells. (N-Type Mono PV Cell Modules and Bifacial Double Glass Modules due to its better performance will be given preference).
- b. The PV module should Work well with high-voltage input Inverters/ charge controllers (1000 Vdc).
- c. The PV Panel must have clear anodized aluminium frame with Anti-reflective, hydrophobic, low-iron Tempered cover glass.
- d. The Solar Modules shall meet the following valid IEC Standards or latest:
 - IEC 61215-1, IEC 61215-1-1, IEC 61215-2 :2016 (Design Qualification)
 - IEC61730-1:2016 (Safety - Requirements for construction)
 - IEC61730-2:2016 (Safety - Requirements for testing)
 - IEC TS-62804-1. (i.e: TUV PPP-58042 or Equivalent) Anti-PID Certification.
 - IEC 61701 Salt Mist Corrosion Resistance Test (Latest)
 - IEC 62716 Ammonia Corrosion Resistance Test (Latest)
 - IEC 60068-2-68 Sand and Dust Erosion Resistance Test.
- e. Unique Serial number, Name / Logo of manufacturer and separate date of manufacturing (DD/MM/YYYY) should be laminated inside the module so as to be clearly visible from the front side.
- f. A properly laminated sticker containing the following details should be available at the back side of the module.
 - Name of the manufacturer / distinctive logo.
 - Model Name and Type of Cell Technology.
 - Peak Watt Rating (Wp) and Power Tolerance Range
 - Voltage (V_{mp}) and Current (I_{mp}) at STC
 - Open Circuit Voltage (V_{oc}) and Short Circuit Current (I_{sc})
 - Maximum System Voltage (V_{dc}) (i.e: This should not be less than 1000 V_{dc})
 - Dimensions of PV Module
 - Test Standard(s) to which the module has been tested and certified.
- g. Following essential technical parameters of solar panel/modules should be provided with each panel supplied as well as in the technical proposal.
 - I-V curve for the solar photovoltaic module/panel.
 - Date and year of obtaining IEC PV module standardization qualification certificate.
 - Electrical Data (i.e: P_{max} , V_{oc}/V_{mp} , I_{sc}/I_{mp} at nominal Cell Operating Temperature (NOCT).

- PV Module efficiency at STC.
- Working temperature range of PV Module.

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

- i. Limited performance guarantee: panel power, in standard conditions, will not be less than 90% of nominal power by the end of 10 years of operation and at least 80% at the end of 25 years of operation with 25-year limited power warranty.
- j. The PV Module should have at least 10-years warranty for any defects and efficiency as mentioned above. It should be provided On Stamp Paper Signed and Sealed by Contractor at the time of Handing/Taking Over.
- k. The PV Module should have at-least 17.50 % Module efficiency with Positive Power Tolerance.

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

AD (M&E)

16/1/2019

Chairman
Elects Eng Dept

16/01/2019

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

2. CABLE & WIRING:

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

Deputy Secretary (Tech:)
Public Health/Engg: Department
Muzher Pakhtunkhwa

DIRECTOR
Agril: Engineering
PK Tarnab, Peshawar

ADCMSE

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- q. The Inverter Junction Box should be properly earthed as well as per vetted design of the Engineer in charge.
- r. All wiring should be in proper conduit of capping casing. Wire should not be hanging loose.
- s. All wires should be terminated properly by using lugs / thimble connectors / sleeves.
- t. Distribution board must be installed with proper screws.
- u. Electrical Hazards Safety Labels should be pasted on DC Combiner /VFD Enclosure / Charge Controller /Battery Enclosures.
- v. Following lab tests are mandatory.
Conductor resistance test, Insulation resistance test, Pressure test, Spark test.
- w. DC Cable from PV Module to Junction Box / Inverter for each string should be minimum size 6 mm².
- x. DC Cable sizing (For Pumping Schemes) from Junction Box to Inverter as per details below;

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

3. PANEL MOUNTING & STRUCTURE:

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

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

4. EARTHING/ GROUNDING:

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

5. BATTERIES:

- The battery should be Deep Cycle, GEL, OPzV/OPzS, Lithium LiFePO4, Lead Carbon Type or equivalent. (Note: Battery type shall be specified in the bidding documents.)
- The battery must ensure safe and reliable operation in the whole range of ambient temperatures from -5° C to + 50° C.
- The maximum permissible self-discharge rate should not be more than 5 percent of rated capacity per month at 25° C.
- The battery shall have a certificate of compliances, issued by a recognized laboratory.
- The Batteries should have three years Comprehensive replacement warranty.
- The battery shall meet the requirements and recommendations given in IEC 61427, IEC 60896 21/22 (For VRLA) or equivalent. Lab Test Reports for battery cycle life should be provided.
- The Battery must support parallel connection to increase capacity in case of future expansion. Each Battery should have following minimum information printed on battery:
 - Model Number, Serial Number and Type of battery.
 - Rated Voltage and Capacity (AH) at discharge rate of 10 Hours.
 - Origin of made.
 - Manufacturer Name with distinct logo.
- 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.
- 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.
- Battery disconnect switch / breaker of suitable size should be installed between batteries and inverter / charge controller.
- The Battery must have Low self-discharge rate, No memory effect and No gassing.

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5.1 GEL BATTERIES:

- 5.1.1 Cycle life of the GEL battery (12V) before 80% capacity of Initial Capacity must be minimum **1000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours
- 5.1.2 Cycle life of the GEL battery (2V Cell) before 80% capacity of Initial Capacity must be minimum **1300** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.2 LEAD CARBON:

- 5.2.1 Cycle life of the Lead Carbon battery (12V) before 80% capacity of Initial Capacity must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.
- 5.2.2 Cycle life of the Lead Carbon battery (2V) before 80% capacity of Initial Capacity must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.

5.3 OPzV / OPzS BATTERIES:

- 5.3.1 Cycle life of the OPzV / OPzS battery (12V) before 80% capacity of Initial Capacity must be minimum **2000** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours
- 5.3.2 Cycle life of the OPzV / OPzS battery (2V Cell) before 80% capacity of Initial Capacity must be minimum **2500** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours

5.4 LITHIUM BATTERIES (LiFePO4):

- 5.4.1 Cycle life of the Lithium LiFePO4 battery before 80% capacity of Initial Capacity must be minimum **5750** cycles @ 50% depth of discharge (DOD) at discharge rate of 10 Hours.
- 5.4.2 The battery must have Integrated Battery Management System (BMS) to ensure battery safety and reliability.
- 5.4.3 The BMS of the battery must have the following specifications:
 - Temperature protection
 - Over charge protection
 - Low voltage disconnect
 - High Voltage Disconnect
 - Short circuit alarm function
 - Self-balancing function
- 5.4.4 The LiFePO4 Battery must have LED status and alarm indication.
- 5.4.5 The charge and discharge rate of the battery must be designed at 0.2C minimum but capable of handling 0.5C charge and discharge currents.

Note:

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

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

- a. The batteries should be housed in a vented compartment/stand that prevents users from coming in contact with battery terminals. This compartment/stand should be strong enough to accommodate the weight of the battery.
- b. A mechanism to prevent opening and entry of the battery should be provided.
- c. This compartment should be manufactured of mild steel of at least **18 SWG**.
- d. The compartment should be powder coated paint.
- e. The entire enclosure/stand must be constructed to last at least twenty years without maintenance and should be protected against corrosion. The enclosure should have a clean

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

7. LED FLOOD LIGHTS:

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

8. AC ENERGY EFFICIENT LED LIGHT BULBS:

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

Note:

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

9. AC ENERGY EFFICIENT CEILING FANS:

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

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

Note:

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

10. DC ENERGY EFFICIENT LED LIGHT BULBS:

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

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

11. DC CEILING FANS:

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

12. DC PEDISTAL FANS:

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

13. INVERTER BASED SPLIT AC

Inverter based AC with both heating and cooling option.

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

14. PVC CHANNEL DUCTS & PIPES

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

15. FLEXIBLE PVC PIPE

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

16. CIVIL WORK:

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

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

17. REFLECTIVE / INSULATING PAINT

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

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

18. WARRANTY/AFTER SALE SERVICE:

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

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B - SPECIFICATIONS FOR SOLAR PUMPING SYSTEMS

19. PUMP (SUBERSIBLE):

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

Specification for main components of the Pumps:

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

20. MOTOR:

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

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

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

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

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23. TOPSET:

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

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

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

24. SOLAR PUMP INVERTER / CONTROLLER:

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

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

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

26. SYSTEM DESIGN FOR PUMPING SYSTEM:

- a. Suitable factor of safety should be applied while designing the system in order to have compensations for variations in irradiations.
- b. For Fix Structure and Auto Tracker, the PV panel **peak power at STC (W_p) 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 (W_p) should be 50% more** than the Motor basic input power (**PV Loss Compensation Factor = 1.5**) as per direction of Engineer Incharge
- d. If Single Axis Auto Tracker Structure is installed on the above factor, then daily operational timings of pumping can be increased by 10-20%, as compared to fixed structure installation.
- e. Total PV Power (W_p) (Imperial Gallons) =
$$\frac{Q \text{ (IGPH)} * \text{TDH (ft)} * 746 * \text{PV Loss Factor}}{60 * 3300 * \eta_{\text{pump}} * \eta_{\text{motor}}}$$
- f. Total PV Power (W_p) (US-Gallons) =
$$\frac{Q \text{ (US-GPH)} * \text{TDH (ft)} * 746 * \text{PV Loss Factor}}{60 * 3960 * \eta_{\text{pump}} * \eta_{\text{motor}}}$$
- g. Total PV Power (W_p) (Metric Units) =
$$\frac{Q \text{ (m}^3\text{/hr)} * \text{TDH (m)} * 9.81 * 1000 * \text{PV Loss Factor}}{3600 * \eta_{\text{pump}} * \eta_{\text{motor}}}$$
- 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 Vac 3-Phase Motor = $380 * 1.414 * 1.06 = 570 \text{ Vdc}$ String, minimum
 - ii. For 220 Vac 3-Phase Motor = $220 * 1.414 = 310 \text{ Vdc}$ String.
 - iii. Small Inverters (i.e: 3-Phase, 220 Vac) with voltage boost function are exempted from the above string voltage requirements. String can made as per boost Inverter Controller recommended String DC Voltage and should not be less than 230Vdc in any case.
- i. Details of each PV Panel string should be submitted in Technical proposal (i.e: Nos of total strings and Nos of PV panels in each string along with wattage and V_{mp} of each PV panel).
- j. Unjustified Oversizing in PV Panels Wattage is not allowed.
- k. To avoid any oversizing, all commercially available PV Panels should be considered.

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

27. PRESSURE PUMPS (UPTO 5.5 HP):

- a. Submersible pump confirming to ISO-9906 Standard.
- b. Pump + AC Motor (3-Phase-220V/380V) or DC Motor and Pump with Display Unit.
- c. Solar pump inverter/controller should be MPPT based and Minimum Ingress Protection of IP65.
- d. In case, where the column pipe diameter is less than or equal to 1.5-inch (For discharge equal or less than 6000 LPH and/or for Motor 4 HP and below), HDPE pipe of at least PN12 / SDR 13.6 / PE100 (For TDH of equal or less than 300 ft) without joint may be used instead of MS pipe for better economics and to avoid hydraulic losses. However stainless steel rope of minimum diameter of 6 mm (28 mm²) for suspension of pump-set must be supplied with HDPE pipe. (Note: For TDH of more than 300 ft, HDPE Pipe type / thickness may be increased/changed accordingly)
- e. Top set shall comprise of Suitable Galvanized stand (Design should be verified from Engineer In-Charge before start of work)
- f. For Pressure Pumps \leq 5.5 HP schemes, Solar Module efficiency requirement is minimum 16%. (Only for Cut Cells PV Modules or Cell Size of 5 Inches PV Modules).
- g. Connection to overhead water storage tank. Top bend, S.S Fasteners & Erection clamps.
- h. Civil work to protect borehole i/e foundation.
- i. The pump should operate safely with Sand particles up to (50) gram/m³.

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

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

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C- SPECIFICATIONS FOR SOLAR HOMES & BUILDING SYSTEMS.

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

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

34. OFF-GRID / HYBRID INVERTER:

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

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D - SPECIFICATIONS FOR SOLAR STREET LIGHTS

35. SOLAR STREET / ROAD LIGHT SYSTEM DESIGN:

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

36. LED SOLAR ROAD/STREET LIGHT FIXTURE:

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

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

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D.I. Khan

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

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

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

38. Battery and Controller Box:

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

39. Electric Cable:

The specifications of Electric cables are as under:

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

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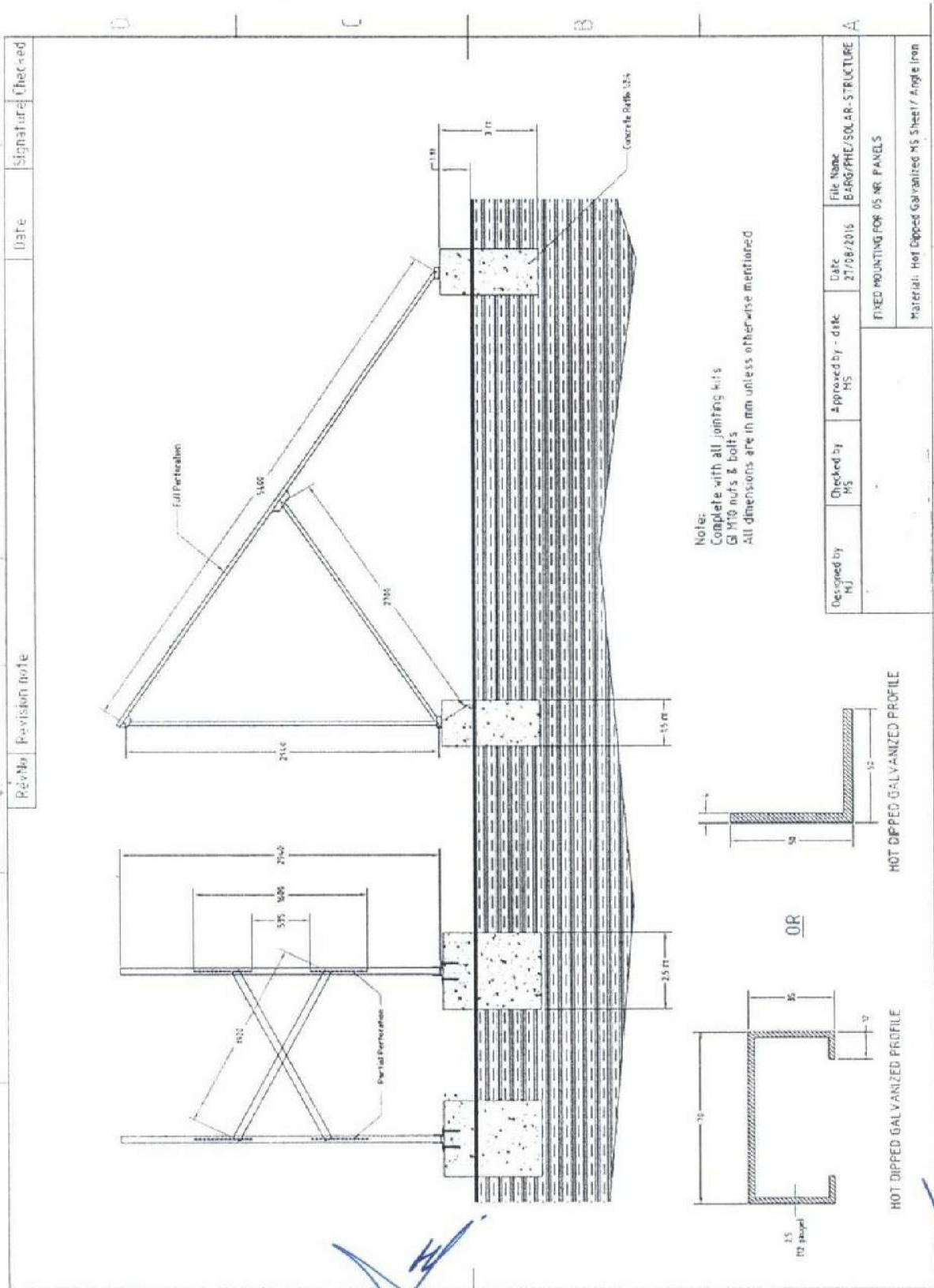
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ANNEXURE-1 (STRUCTURE DRAWING)



Note:
Complete with all jointing kits
G M10 nuts & bolts
All dimensions are in mm unless otherwise mentioned

Designed by HJ	Checked by MS	Approved by - date MS	Date 27/08/2019	File Name BARG/PHE/SOLAR-STRUCTURE
FIXED MOUNTING FOR OS MR PANELS				Material - Hot Dipped Galvanized MS Sheet / Angle Iron

Rev No	Revision note	Date	Signature	Checked
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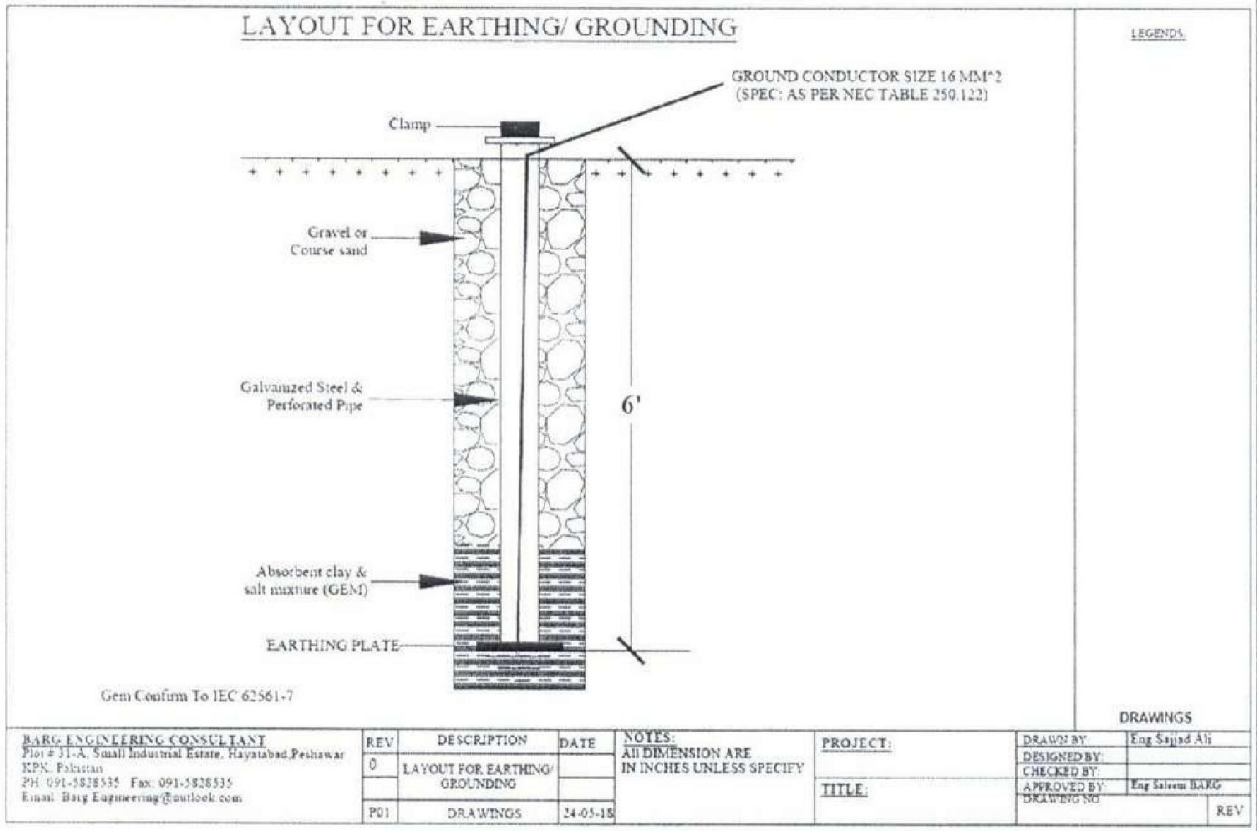
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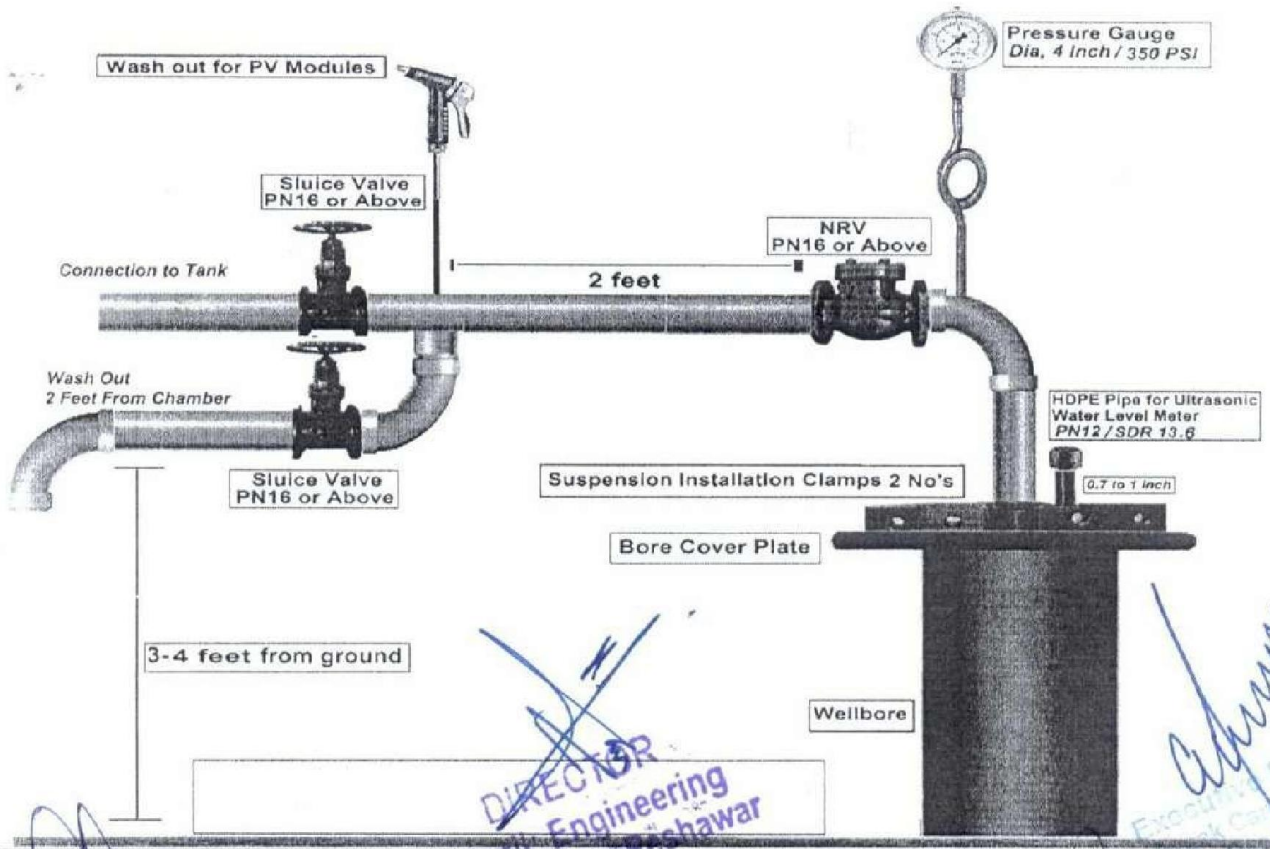
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ANNEXURE-2 (EARTHING / GROUNDING DRAWING)



ANNEXURE-3 TOPSET LAYOUT:



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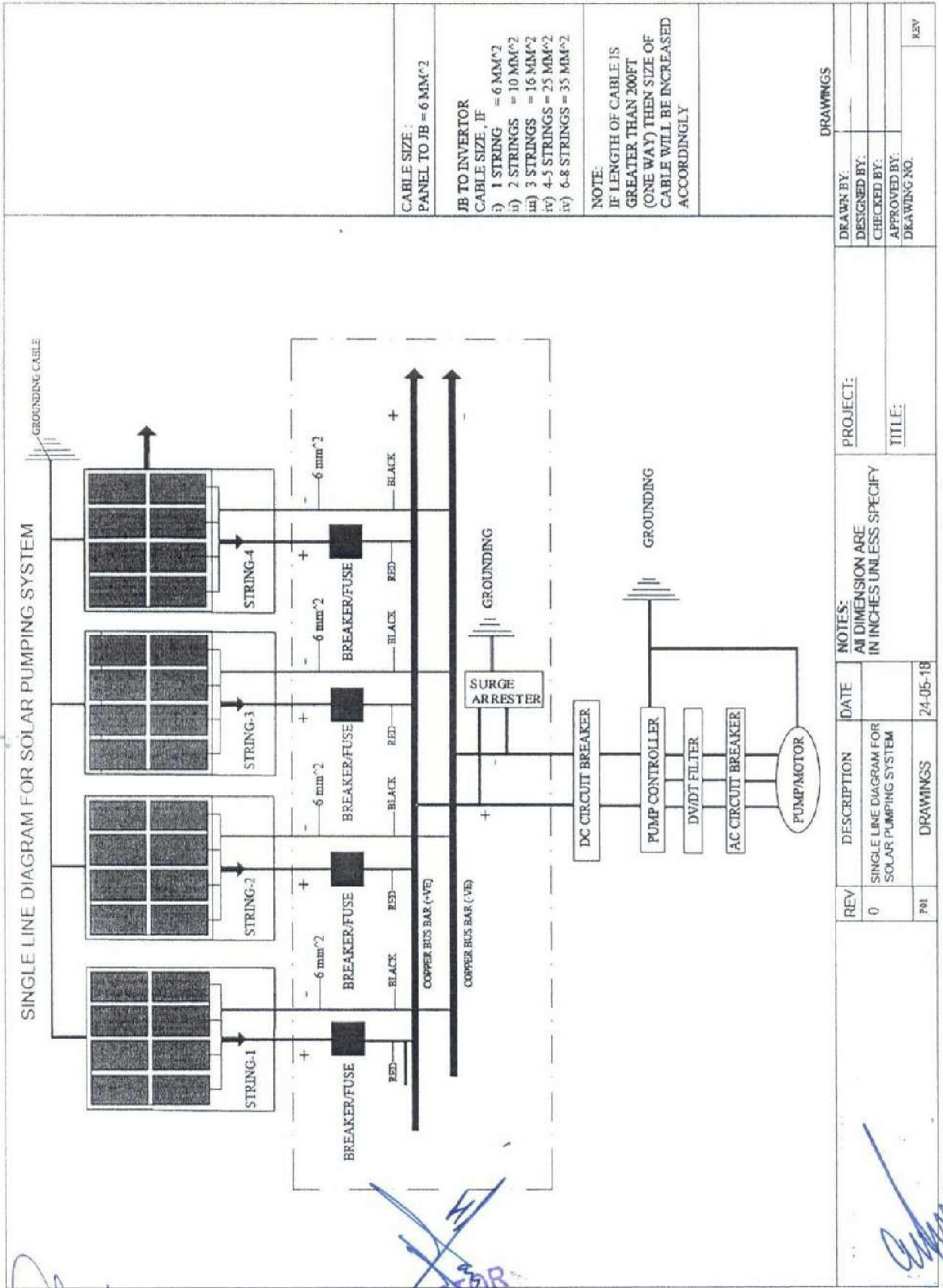
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ANNEXURE-4 (SYSTEM SINGLE LINE DIAGRAM-PUMPING)



CABLE SIZE :
PANEL TO JB = 6 MM²

JB TO INVERTOR

- CABLE SIZE , IF
- i) 1 STRING = 6 MM²
 - ii) 2 STRINGS = 10 MM²
 - iii) 3 STRINGS = 16 MM²
 - iv) 4-5 STRINGS = 25 MM²
 - v) 6-8 STRINGS = 35 MM²

NOTE:
IF LENGTH OF CABLE IS
GREATER THAN 200FT
(ONE WAY) THEN SIZE OF
CABLE WILL BE INCREASED
ACCORDINGLY

DRAWINGS

REV	DESCRIPTION	DATE	NOTES:	PROJECT:	DRAWN BY:
0	SINGLE LINE DIAGRAM FOR SOLAR PUMPING SYSTEM		ALL DIMENSION ARE IN INCHES UNLESS SPECIFY		DESIGNED BY:
P01	DRAWINGS	24-05-18		TITLE:	CHECKED BY:
					APPROVED BY:
					DRAWING NO.
					REV

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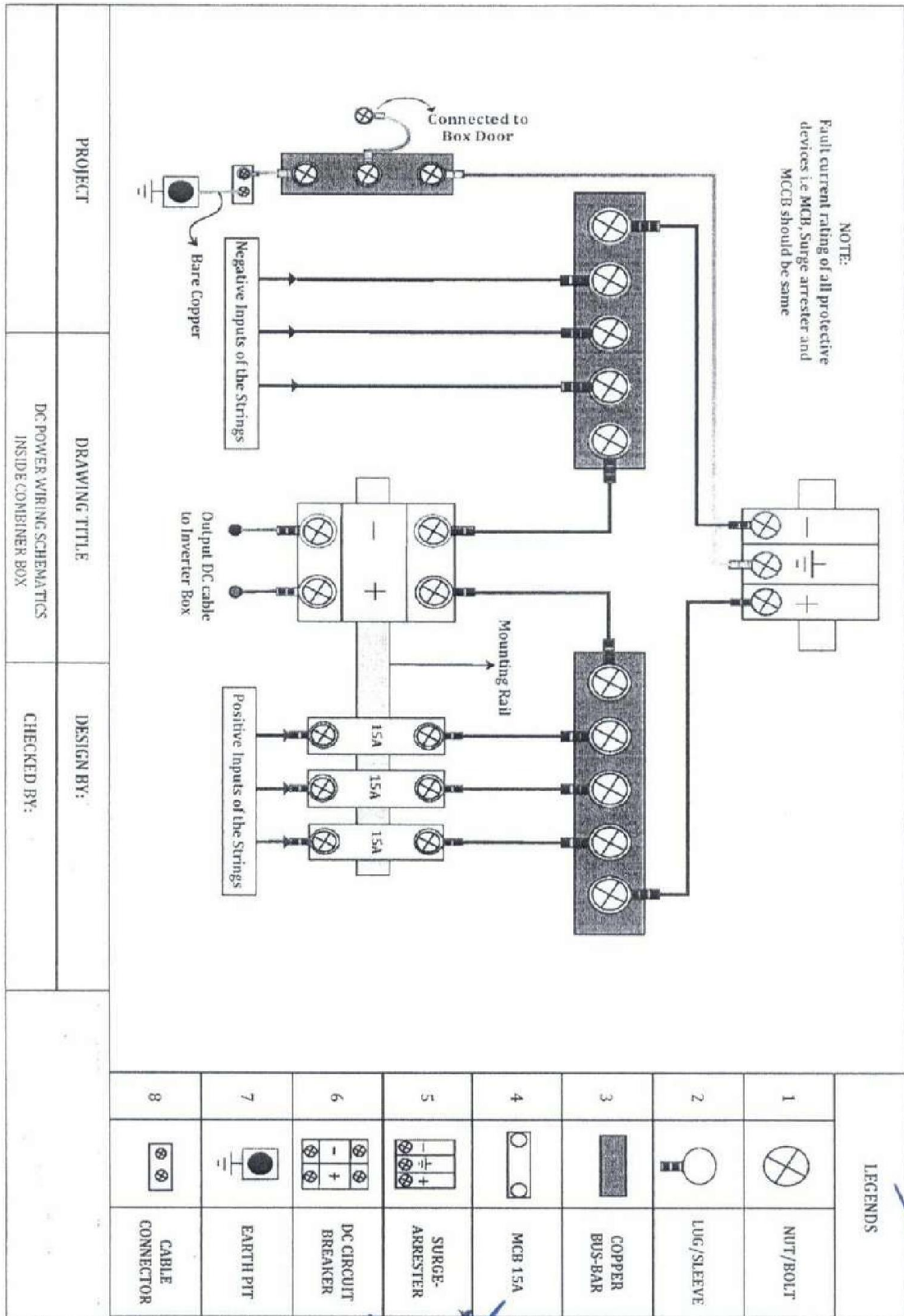
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**ANNEXURE-5
(JUNCTION/COMBINER BOX SCHEMATICS DIAGRAM)**



PROJECT: _____
 DRAWING TITLE: DC POWER WIRING SCHEMATICS INSIDE COMBINER BOX
 DESIGN BY: _____
 CHECKED BY: _____

NOTE:
 Fault current rating of all protective devices i.e. MCB, Surge arrester and MCB should be same

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