GOVERNMENT OF THE KYBER PAKHTUNKHWA PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION (PEDO)

BIDDING DOCUMENT

SINGLE-STAGE: ONE-ENVELOPE

BIDDING PROCEDURE

HIRING OF CONTRACTORS

FOR

KHYBER PAKHTUNKHWA SOLARIZATION OF HOUSES

CATEGORY – I

MARCH-2025

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I-INVITATION FOR BIDS

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P E D O
PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
GOVERNMENT OF KHYBER PAKHTUNKHWA

INVITATION FOR BIDS

Pakhtunkhwa Energy Development Organization (PEDO) invites pre-qualified firms to submit their proposals for the project "Khyber Pakhtunkhwa Solarization of Houses – DC Systems for Houses for Category – I" on Single Stage One Envelope Procedure. The proposal shall be submitted on or before 15-04-2025. The proposals will be opened on same day at 1430 hrs in the presence of the Procurement Committee and representatives of the concerned firms. The proposal must be submitted in consideration to the points mentioned below:

1. Bidding is open to the firms pre-qualified only for the subject project only notified via Notification No. **PD(Solar)/Solarization of Houses Initiative/2024-25/3651-4 dated 07-03-2025** issued by the **office of Project Director (Solar),** Plot No. 38/B-2 Phase-V, Hayatabad Peshawar. The selection of Contractors will be based on **Single Stage One Envelope procedure** in accordance to Rule 14, 2(a) of the KPPRA Procurement Rules 2014.

2. The project comprises twenty (20) packages in total. Properly sealed separate Bids must be submitted for each package accompanied by original Call Deposit Receipt (CDR) or Bank Guarantee in favor of CEO PEDO issued by any scheduled bank of Pakistan @ 2% of the estimated cost of the package.

3. The bidder must quote bid rate in terms of percentage above/below/at par on the estimated cost.

4. The bidder must quote their bids inclusive of all taxes. All Government taxes will be deducted according to FBR and Provincial Government prevailing rules.

5. In light of notification vide S.R.O (13)/Vol:1-24 /2021-22 dated May 10, 2022, if the bidder is quoting its bid more than 10% below the Engineer's estimate, shall submit along with their bids an additional Security of 8% of the Engineer Estimates. The additional bid security submitted must be in shape of Call Deposit Receipt (CDR) issued by any scheduled bank of Pakistan. Any bid found more than 10% below the estimated cost and without the additional bid security will be rejected as non-responsive irrespective of its offered bid rate.

6. The proposal must reach on the mentioned date and time to Committee room, PEDO Head office, Plot# 38, Sect B-2, Phase-5, Hayatabad Peshawar.

7. Bidders may obtain further information from, inspect at and acquire the Bidding Documents from the Office of Project Director (Solar) addressed below on submission of a written application to the above office and upon payment of a non-refundable fee of Rs. 5000/- in form of Demand Draft, Pay Order or Call Deposit in favor of CEO PEDO issued by a Pakistani scheduled Bank.

8. Pre-Bid meeting regarding the submission of proposals for the subject project will be held in office of the undersigned on 10-04-2025. Only Authorized representatives of the pre-qualified firms will be allowed to attend the pre-bid meeting.

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9. Final results will be notified after detailed evaluation and approval of the competent authority. Bidders may submit proposals for all packages; however, only two packages will be awarded to each successful bidder, based on the priority order specified by the bidder in their submission. Each bidder must submit a list of priority for all the packages they are interested in, for which they have submitted proposals. Failure to comply with the condition will render their bids non-responsive.

10. Bidders participating in the bidding process for Two Packages and seeking to be awarded two Contracts must meet the Financial Capability (Average annual turnover and financial resources) on an aggregate basis for two Contracts. Additionally, the successful bidder for all two Contracts must demonstrate the availability of essential resources, including key personnel and required equipment.

11. Bidders must upload their proposal in PDF format at https://etender.pedo.pk/, in addition to the hard copy submission. If the website is inaccessible, the bidders must submit a PDF copy of their proposals in a USB, at the time of bid submission.

12. The Employer may reject any or all bids at any time prior to the acceptance of a bid. The Employer shall upon request communicate to any bidders who submitted a bid, the grounds for rejection of all bids, as per KPPRA rule 47(1).

Project Director (Solar)
House # 21 B-II Abdara Road
University Town Peshawar
Phone No: 091-3022347, E-mail: pdsolar.pedo@gmail.com.

II. INSTRUCTIONS TO BIDDERS

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INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid and Source of Funds

1.1 Scope of Bid

(refer to Bidding Data Sheet) (hereinafter called "the Employer") wishes to receive bids for the following scope of work:

(refer to Bidding Data Sheet)

(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.

1.2 Source of Funds

The Employer has applied for / received a loan/credit from ***(refer to Bidding Data Sheet)***

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

in the various currencies towards the cost of the ***(refer to Bidding Data Sheet)*** and it is

(Name of Project)

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

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

a) duly licensed by the Pakistan Engineering Council (PEC) in the appropriate category relevant to the value of the Works. ***(refer to Bidding Data Sheet)***

b) from eligible countries of _____ listed in Appendix 'A'
(Name of Funding Agency)
to Instructions to Bidders.

c) duly enlisted/prequalified with the Employer (if applicable).***(refer to Bidding Data Sheet)***

IB.3 Eligible Goods and Services

3.1 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.

3.2 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.

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3.3 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

5.1 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
   (vi) Schedule F: Method of Performing Works
   (vii) Schedule G: Proposed Organisation
   (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

5.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the bidders own risk. Pursuant to Clause IB.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:

a) ***(refer to Bidding Data Sheet)***

(Insert address of the Employer with telex/fax no.)

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b) _____

_____
(Insert address of the Engineer with telex/fax no.)

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

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

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

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

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

(a) Covering Letter

(b) Form of Bid duly filled, signed and sealed, in accordance with 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). ***(refer to Bidding Data Sheet)***

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(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. ***(refer to Bidding Data Sheet)***

(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

10.1 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.

10.2 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: ***(refer to Bidding Data Sheet)***

(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

11.1 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.

11.2 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.

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11.3 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.

11.4 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.

11.5 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

12.1 Prices shall be quoted in the following currencies:

(a) For Goods and Services which the bidder will supply from within Pakistan, the prices shall be quoted in the Pak. Rupees.

(b) For Goods and Services which the bidder will supply from outside Pakistan, the prices shall be quoted either in U.S. Dollars or in any other freely convertible currency. ***(refer to Bidding data sheet)***

12.2 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. ***(refer to Bidding data sheet)***

12.3 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

13.1 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.

13.2 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.

13.3 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; ***(refer to Bidding Data Sheet)***

(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

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Supplier's maintenance, repair and spare parts stocking obligations prescribed by the Conditions of Contract and/or Technical Provisions.

13.4 (a) Bidder/Manufacturer must possess and provide evidence of the following experience.

(refer to Bidding Data Sheet)

(Insert the required Experience)

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 _____ years and such Goods
(Insert the number of years)
shall have proven successful in the field for at least _____
(Insert the number of years)
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. 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. ***(refer to Bidding Data Sheet)***

13.5 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 authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners.

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(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.

13.6 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. ***(refer to Bidding Data Sheet)***

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

14.1 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.

14.2 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.

14.3 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. ***(refer to Bidding Data Sheet)***

(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.

14.4 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

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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

15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount of Pak. Rupees ***(refer to Bidding Data Sheet)*** or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan or an insurance company having alteast AA rating from PACRA/JCR in favor of the Employer valid for a period twenty-eight (28) days beyond the bid validity date. ***(refer to Bidding Data Sheet)***

15.3 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.

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

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

15.6 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security, pursuant to Clause IB.34 and signed the Contract Agreement, pursuant to Clause IB.35.

15.7 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:

(i) furnish the required Performance Security in accordance with Clause IB.34, or

(ii) sign the Contract Agreement, in accordance with Clause IB.35.

IB.16 Validity of Bids ***(refer to Bidding Data Sheet)***

16.1 Bids shall remain valid for ***(refer to Bidding Data Sheet)*** days after the
(Insert number of days ranging from 56 to 182 days)
date of bid opening as prescribed in Clause IB.19.

16.2 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

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

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

17.3 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.

17.4 Each bidder shall prepare one (1) Original and ***(refer to Bidding Data Sheet)*** Copies, of _____
(Insert Number)
the documents comprising the bid as described in Clause IB.9 and clearly mark them "ORIGINAL" and 'COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

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

17.6 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.

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

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

D. SUBMISSION OF BIDS

IB.18 Sealing and Marking of Bids

18.1 Each bidder shall submit his bid as under:

(a) ORIGINAL and each COPY of the Bid shall be separately sealed and put in separate envelopes and marked as such. ***(refer to Bidding Data Sheet)***

(b) The envelopes containing the ORIGINAL and COPIES will be put in one sealed envelope and addressed / identified as given in Sub- Clause 18.2 hereof.

18.2 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.

18.3 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.

18.4 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.

18.5 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.

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

19.3 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

21.1 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.

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

21.3 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.

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E. BID OPENING AND EVALUATION

IB.22 Bid Opening

22.1 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.

22.2 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.

22.3 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.

22.4 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

24.1 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,

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(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.

24.2 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.

24.3 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.

24.4 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.

24.5 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/authorised by State Bank of Pakistan and applicable to similar transactions, on the date of the opening of Bids.

IB.26 Detailed Evaluation of Bids

26.1 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 here under.

26.2 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 Day work.
(iii) making an appropriate adjustment for any other acceptable variation or deviation.

26.3 Evaluation Methods

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

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(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 noncompliance will be added to the Corrected Total Bid Price for comparison purposes only. The adjustments will be applied taking the highest price quoted by other Bidders being evaluated in detail in their original Bids for corresponding item. In case of non-availability of price from other Bidders, the price will be estimated by the Engineer.

(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 ***(refer to Bidding Data Sheet)***
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 to 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 ***(refer to Bidding Data Sheet)***

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.

26.4 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 ***(refer to Bidding Data Sheet)***

27.1 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.

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

27.3 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.

27.4 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.

27.5 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%.

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27.6 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

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

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

29.2 The determination will take into account the bidder's financial, technical and production capabilities. 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.

29.3 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 up to 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.

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

32.1 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.

32.2 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. ***(refer to Bidding Data Sheet)***

IB.33 Notification of Award

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

33.2 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.

33.3 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

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

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

IB.35 Signing of Contract Agreement

35.1 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.

35.2 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

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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

40.1 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, ***(refer to Bidding Data Sheet)*** Pakistan.
(Insert name of place)

(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 *(refer to Bidding Data Sheet)*

41.1 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.

41.2 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. However, Employer will assist the Bidder wherever practicable and possible.

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.

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BIDDING DATA SHEET

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BIDDING DATA SHEET

A. GENERAL

IB.1	**Scope of Bid and Source of Funds**
IB 1.1 Scope of Bid	**Pakhtunkhwa Energy Development Organization (PEDO)** (hereinafter called "the Employer") wishes to receive bids for the following scope of work: **Khyber Pakhtunkhwa Solarization of Houses – DC Systems For Houses For Category – I** The work is further divided into twenty (20) packages as tabularized below.

Sr. No.	District	Package #	Proposed Allocation of Solar Systems	Cost in PKR.(Million) Package Wise	PEC Category
1	Peshawar-1	1	1,694	345.72	C-3
2	Peshawar-2	2	1,694	345.72	C-3
3	Nowshera	3	1,239	252.86	C-3
4	Charsadda	4	1,307	266.74	C-3
5	Mardan	5	1,954	398.79	C-3
6	Swabi	6	1,349	275.31	C-3
7	Swat	7	1,913	390.42	C-3
8	Buner	8	724	277.35	C-3
9	Shangla		635		
10	Malakand	9	588	359.81	C-3
11	Dir (Lower)		1,175		
12	Dir (Upper)	10	771	232.25	C-3
13	Chitral (Upper)		139		
14	Chitral (Lower)		228		
15	Abbottabad	11	1,010	376.74	C-3
16	Haripur		836		
17	Mansehra	12	1,280	261.23	C-3
18	Battagram	13	395	261.23	C-3

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19	Kohistan (Upper)		301		
20	Kohistan (Lower)		242		
21	Kolai Palas		199		
22	Torghar		143		
23	Bannu	14	967	467.15	C-3
24	Karak		581		
25	Lakki Marwat		741		
26	Kohat	15	879	256.33	C-3
27	Hangu		377		
28	Tank	16	335	334.50	C-3
29	DI Khan		1,304		
29	Bajaur	17	1,682	490.83	C-3
30	Mohmand		723		
31	Khyber	18	1,497	305.52	C-3
32	Kurram	19	1,026	312.66	C-3
33	Orakzai		506		
34	North Waziristan	20	905	421.64	C-3
35	South Waziristan		1,161		

IB 1.2 Source of Funds	The Project is financed by Government of the Khyber Pakhtunkhwa (GoKP) through Loan from the Bank of Khyber (BOK).
IB. 2	**Eligible Bidders**
2.1 (a)	i. The bidders must be duly licensed by Pakistan Engineering Council (PEC) in "C-3" Category having the required codes for solar EE-04 and EE-11. ii. The bidders must be registered with the Federal Board of Revenue (FBR) and Khyber Pakhtunkhwa Revenue Authority (KPRA) with Active Status. iii. The bidder's must be registered with the Securities & Exchange Commission of Pakistan (SECP). iv. The bidder must be registered with Electric Inspectorate Government of Khyber Pakhtunkhwa within Category of A or E. v. The Bidder shall submit an original affidavit on Stamp Paper, declaring that it is not debarred or blacklisted by any Government, Semi-Government Agency, or Non-Governmental Organization (NGO), in accordance with the rules and regulations of the Khyber Pakhtunkhwa Public Procurement Regulatory Authority (KPPRA).
2.1 (c)	Text of the IB 2.1 (c) is deleted and substituted with the following: Only the firms Pre-Qualified in the pre-qualification phase for the subject project are eligible to participate in the bidding process. The eligible pre-qualified firms are hereby

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	listed below. 1. M/s Solar Tech Pvt Ltd 2. M/s Renewable Power Pvt Ltd 3. M/s TSK Engineering International Pvt Ltd 4. M/s Cititek Pvt Ltd 5. M/s M. Younas Builders Pvt Ltd 6. M/s Akhunzada Associates Pvt Ltd 7. M/s Ali Haider & Brothers Engg Co. Pvt Ltd 8. M/s NRTC Pvt Ltd 9. M/s Al-Watan Pvt Ltd 10. M/s Pak Reliable Engineering Co. Pvt JV M/S Peshawar Construction & Pipes Company Pvt Ltd 11. M/s S&I Enterprises Pvt Ltd 12. M/s Catkin Engineering Sales Services Pvt Ltd 13. M/s MAK Pumps Pvt Ltd

B. BIDDING DOCUMENTS

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 email at the address: **PROJECT DIRECTOR (SOLAR),** House # 21 B-II Abdara Road, University Town, Peshawar Phone No: 091-3022347, E-mail: pdsolar.pedo@gmail.com. nouman.solar@pedo.pk Employer will examine the request for clarification of the Bidding Documents which it receives not later than Five (05) days prior to the deadline for the submission of bids and if needed will issue the clarification/amendment of the Bidding Documents at least Two (02) days before the date of submission of Bids (without identifying the source of enquiry) to all prospective bidders who have purchased the Bidding Documents.

C. PREPARATION OF BID

IB.9	**Documents Comprising the Bid**
9.1 (g)	The Joint Venture Agreement shall be produced on non-judicial stamp paper as per PEC format including schedules 1, 2, 3 & 4
9.1 (j)	Not Applicable
IB.10	**Form of Bid and Schedules**
10.2	Not Applicable.

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IB.12	**Currencies of Bid**
12.1	The Prices shall be quoted in Pak Rupees
12.2	The Payment will be in Pak Rupees
IB.13	**Documents Establishing Bidder's Eligibility and Qualifications**
13.3 (a)	The bidder must provide Authorization certificate against the product provided in Technical Compliance sheet Schedule A to bid
13.4 (a)	Not Applicable
13.4 (b)	Bidders may submit proposals for all packages; however, only two packages will be awarded to each successful bidder, based on the priority order specified by the bidder in their submission. Each bidder must submit a list of priority for all the packages they are interested in, for which they have submitted proposals. Failure to comply with the condition will render their bids non-responsive. Bidders participating in the bidding process for Two (02) Packages (Detail mentioned in IB 1.1) and seeking to be awarded two Contracts must meet the Financial Capability (Average annual turnover and financial resources) on an aggregate basis for two Contracts. Additionally, the successful bidder for all two Contracts must demonstrate the availability of essential resources, including key personnel and required equipment.
13.6	The bidder shall propose plant, equipment or goods from three (03) Manufacturers as per Schedule A to Bid Specific Works Data/Technical Provisions of the bidding documents.
14.3 (b)	The bidder shall fill in Schedule A to Bid, Specific Works Data/Technical Provisions for documents establishing Good's Eligibility and Conformity to bidding documents. The bid will be considered non-responsive, If any quoted product/item is found non compliant with the specifications.
IB.15	**Bid Security**
15.1	All bids must be accompanied by a bid Security @2% of Engineer Estimate
15.2	The Bid Security shall be, in the name of CEO PEDO, in the form of Deposit at Call or a Bank Guarantee, issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a corresponding Scheduled Bank in Pakistan, valid for a period twenty-eight (28) days beyond the bid validity date.
IB.16	**Validity of Bid**
16.1	Bids shall remain valid for **120 days** after the date of bid opening as prescribed in Clause IB.19.1(a).
IB.17	**Format and Signing of Bid**
17.4	Each bidder shall prepare only (1) Original copy of the documents comprising the bid as described in Clause IB.9 and clearly mark it "ORIGINAL" as appropriate

D. SUBMISSION OF BIDS

IB 18	**Sealing and Marking of Bids**
IB 18.1 (a)	For number of copies please refer to IB 17.4 of the BDS. Bidders must upload their proposal in PDF format at https://etender.pedo.pk/, in addition to

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	the hard copy submission. If the website is inaccessible, the bidders must submit a PDF copy of their proposals in a USB, at the time of bid submission.

E. BID OPENING AND EVALUATION

26.3	**Evaluation Methods**
26.3 (v)	**Pursuant to Sub-Clause 26.2,** Bids indicating completion beyond later than the dates set out in Preamble to Conditions of Contract, shall not be considered and rejected as non-responsive
IB.27	**Domestic Preference** Not Applicable

G. AWARD OF CONTRACT

IB-32	**Employer's Right to Accept any Bids and to Reject any or all Bids**
32.2	The text of 32.2 is deleted and substituted pas under: The Employer may in addition to clarification meetings(s), also conduct price negotiation meeting(s) as per KPPRA Rules

G. ADDITIONAL INSTRUCTIONS

IB.40	**Bidder to Inform Himself**
40.1(a)	The place of inquiries on Pakistani Income Tax /Sales Tax shall be Khyber Pakhtunkhwa Province, Pakistan.
IB.41	**Alternate Proposals by Bidder**
41.1 & 41.2	Not Applicable

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NAME OF ELIGIBLE COUNTRIES

All the bidders are allowed to participate in the subject of procurement without regard to nationality, except bidder of some nationality, prohibited in accordance with policy of Federal Government

The following countries are ineligible to participate in the procurement process.

1. India
2. Israel

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Appendix B to Instructions to Bidders

EVIDENCE OF BIDDER'S CAPABILITY
(NOT APPLICABLE)

[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.	
7.	Detailed description of the quality control testing and research facilities. If the equipment is manufactured under license,the name of the licenser and details of the licensing arrangements, such as the duration of the license, the facilities provided to the bidder by the licenser 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.	

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(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).

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).

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Appendix C to Instructions to Bidders

Domestic Goods (Value added in Pakistan)

(NOT APPLICABLE)

[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_____

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III. FORM OF BID AND SCHEDULES TO BID

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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 favor 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_____

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SCHEDULES TO BID INCLUDE THE FOLLOWING:

- Schedule A to Bid: Specific Works Data/Technical Provisions
- 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

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SCHEDULE – A TO BID

SPECIFIC WORKS DATA/TECHNICAL PROVISION

Instructions Regarding Filling the Technical Compliance Sheet:

Compliance sheet for the system design is given below. Each bid by the bidder must contain completely filled, signed and stamped compliance sheet.

Note:

1. Any cell must not be left blank in the technical compliance sheet.
2. The bidders are expected to mention in the technical compliance sheet the exact brand with the subject quoted model for any product / item clearly and boldly. The cell must be marked as **"N/A" (Not Applicable)** if the bidder is not willing to provide an alternate option.
3. The bidder must provide / quote at least one (1) option for each item of the technical compliance sheet. ***Marking any cell as "Equivalent" will be considered as "Not Applicable".***
4. The Bidder must provide the data sheet of all the quoted products.
5. Incomplete technical compliance sheet or any discrepancy / non-compliance of the technical compliance sheet found with BOQ and/or technical specifications approved for Solar Works by Standardization Committee of Khyber Pakhtunkhwa will lead to rejection of the bid as non-responsive, irrespective of the bidder's financial bid rate.

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KHYBER PAKHTUNKHWA SOLARIZATION OF HOUSES INITIATIVE										
TECHNICAL COMPLIANCE SHEET										
Products Required				Products Quoted						
				Option 1		Option 2		Option 3		
S #	Description	Unit	Capacity	Brand	Model	Brand	Model	Brand	Model
1	Solar Panel (PV module) Mono-crystalline, A Grade, 17.50% Module efficiency minimum and 25 years' power output warranty, The Solar Module shall meet the valid IEC standards and as per attached Specifications.	Watt							
2	MPPT Charge controller and all sorts of safety. Protections as per instructions of Client / Engineer in- charge. (Lithium Ion Battery Compatible)	V/A							
3	Battery Bank: Lithium Ion Battery	KWHr							
4	DC Ceiling Fans	Watts							
5	DC Pedestal Fan	Watts							
6	DC LED Bulb	Watts							

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A. Pre-Supply Inspection:

The Contractor shall ensure Pre-supply inspection of the items delivered to sites. Pre-supply inspection is an important quality control procedure to verify that products or equipment meets specified requirements and quality standards mentioned in BOQ & Specific works data/Employer Requirements before they are accepted and received by the buyer or the end-user. The Contractor must inform the Engineer of the Pre-Supply inspection of all items that will be further delivered to sites.

B. Final Testing:

Standard Operating Procedure for conducting final testing of an installed solar system by a consultant ensures that the system operates as expected and meets the client's requirements. Here is a general SOP for conducting such final testing:

1. To verify the proper installation and functioning of a solar system, ensuring it meets the specified requirements and standards as mentioned in the Specifications/ Employer's Requirement. Also, the Contractor shall approve the inverter settings from the Consultant's office before conducting final testing.

2. The Contractor will ensure the availability of tools required at the site for conducting final testing. Calibrate and verify the accuracy of testing instruments. Some common tools that will be necessary for conducting final testing are as follows:

a. Clamp meter
b. Taco/RPM meter
c. Irradiance Meter
d. PV analyzer
e. Compass
f. Ultrasonic Thickness gauge
g. Ultrasonic Microns/Galvanization meter
h. Earth resistance meter
i. Lux meter
j. Power analyzer (if required)
k. Measuring tape
l. Level meter
m. Any other tool necessary for conducting the final test

Inspection and Documentation Review:

a. The project consultant will inspect the installation to ensure it complies with applicable standards and specifications.

b. Verify that all wiring, connections, and safety measures are correctly implemented.

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.

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

(NOT APPLICABLE)

Note:

1. The bidder shall make no change of Sub-Contractor without prior approval of the Employer.
2. The bidder guarantees the truthfulness and accuracy of the statement as to the experience of Subcontractors. The Employer's judgment shall be final as to evaluating 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.

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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.

Note: The Bidder's proposed work programme must be within a time limit of 21 Months comprising the activities mentioned below.

1. Award of Contract to Commencement of Physical Work including equipment procurement – 3 Months
2. Completion of Installation with Handing/Taking – 18 Months

If the proposed work programme is beyond the time limits provided, the bid will be considered as non-responsive under all circumstances.

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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

(NOT APPLICABLE)

[Note: Attach additional sheets, if necessary]

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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]

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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 Work, including the number of shifts per day and hours per shift he expects to work.
- A list of all major items of construction and erection plant, tools and vehicles proposed to be used in carrying out the Works at the Site, including the number of each kind, make type, capacity of all equipment, and 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 equipment installation and transportation procedure of equipment and materials to the site.
- Details regarding mobilization in Pakistan, the type of facilities, including personnel accommodation, office accommodation, provision for maintenance and storage, communications, security and other services to be used.
- Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

Note:

The Method of Performing Works must comply with Schedule C to bid. The bid will be considered non-responsive if any mismatch or deviations are found.

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SCHEDULE – G TO BID

PROPOSED ORGANISATION

The bidder shall list in this Schedule the key personnel he will employ from Head office and from Site office to direct and execute the Works, together with their names, qualifications, experience, positions held and their nationalities.

Designation	Name of	Summary of Qualifications Experience, Present Position and Nationality

Head Office:

Site Office:
Contractor's Representative:
Site Superintendent:
Supervising Engineer:
Plant Erectors:
Construction Supervisors:
Other Key Staff:

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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 time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Buyer: .....
Signature: .....
[Seal]

Name of Seller/Supplier: .....
Signature: .....
[Seal

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IV - SCHEDULE OF PRICES

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SCHEDULE OF PRICES

Description

1. Preamble to Schedule of Prices

2. Schedule of Prices for Each Package

   2. (a) Summary of Bid Prices for Each Package

   2. (b) Bill of Quantities (BOQs) of associated Solar Systems for Each Package

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1. PREAMBLE TO SCHEDULE OF PRICES

1. General

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

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

2. Description

2.1 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.

2.2 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 anyincrease 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

3.1 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:

	Abbreviation
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

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

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

4.2 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.

4.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates and prices and the total Bid Price submitted by a bidder.

4.4 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 bidder shall fill in rates as percentage above/below/at par on the estimated cost of the package as described in the Schedule of Prices only.

4.5 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 seaportof 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.

4.6 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

The price offered by bidder shall be inclusive of all taxes, custom duties, inland transportation to designated sites, installation and training of field and Directorate staff for O&M.

5.1 Break-up of Bid Prices **(NOT APPLICABLE)**

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

a) FOB Port of Shipment

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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 thecost 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 onboard 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).

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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 bequoted 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

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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 occuring 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.

5.2 Total Bid Price

The total of bid prices under foreign currency and local currency columns in the Schedule of Prices shall be entered in the Summary of Bid Prices. The unitrates and prices and lumpsum amount entered in the Schedule of Prices will bethe 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

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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 (NOT APPLICABLE)

6.1 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.

6.2 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 (NOT APPLICABLE)

7.1 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

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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.

7.2 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 (NOT APPLICABLE)

8.1 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.

8.2 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 theSchedule of Prices.

9. Provisional Sums (NOT APPLICABLE)

9.1 Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Employer/ 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.

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DAYWORK SCHEDULE

1. General

1.1 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 (NOT APPLICABLE)

2.1 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 ofall allowances and overheads.

2.2 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 inthe 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.

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2.3 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 (NOT APPLICABLE)

3.1 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 andadministrative costs related to the use of such equipment.

3.2 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.

3.3 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 (NOT APPLICABLE)

4.1 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.

4.2 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.

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

The Schedule of Bid Prices of a package includes the summary of bid prices for the concerned package accompanied by the Bill of Quantities (BOQs) of the Solar System.

Details of the Schedule of Prices i.e. Summary of Bid Prices with Bill of Quantities (BOQs) for Package 01, 02, 03, 04, 05 & 06 are provided in succession.

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2.(a) Summary of Bid Prices

PACKAGE – 01

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Peshawar-1	1	1,694	345.72

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 02

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Peshawar-2	2	1,694	345.72

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 03

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Nowshera	3	1,239	252.86

I hereby quote my rate at % ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 04

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Charsadda	4	1,307	266.74

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 05

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Mardan	5	1,954	398.79

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 06

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Swabi	6	1,349	275.31

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 07

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Swat	7	1,913	390.42

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 08

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Buner	8	724	277.35
Shangla		635	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 09

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Malakand	9	588	359.81
Dir (Lower)		1,175	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 10

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Dir (Upper)	10	771	232.25
Chitral (Upper)		139	
Chitral (Lower)		228	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 11

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Abbottabad	11	1,010	376.74
Haripur		836	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 12

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Mansehra	12	1,280	261.23

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 13

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Battagram	13	395	261.23
Kohistan (Upper)		301	
Kohistan (Lower)		242	
Kolai Palas		199	
Torghar		143	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 14

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Bannu	14	967	467.15
Karak		581	
Lakki Marwat		741	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 15

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Kohat	15	879	256.33
Hangu		377	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 16

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Tank	16	335	334.50
DI Khan		1,304	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 17

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Bajaur	17	1,682	490.83
Mohmand		723	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 18

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Khyber	18	1,497	305.52

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 19

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
Kurram	19	1,026	312.66
Orakzai		506	

I hereby quote my rate at_____% ☐ **Below** ☐ **At Par** ☐ **Above**

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

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PACKAGE – 20

District	Package #	Proposed Allocation of Solar Systems	Cost in Rs. Million
North Waziristan	20	905	421.64
South Waziriztan		1,161	

I hereby quote my rate at_____% ☐ Below ☐ At Par ☐ Above

Official Stamp: _____

Signature: _____

Name: _____

Designation: _____

Note:

1. Total Price, Pak Rupees including all Govt. applicable taxes.
2. √ one (1) of the option among Below, At Par and Above.

2(b) Bill of Quantities (BOQs) of associated Solar Systems for Each Package

SOLARIZATION OF HOUSES IN KHYBER PAKHTUNKHWA							
DC SYSTEMS FOR HOUSES, CATEGORY-I							
BILL OF QUANTITIES (BOQ)							
Sr #	**MRS-2024 (1st Bi-Annual)**	**Item Code**	**Description**	**Unit**	**Qty**	**Unit Composite Rate (Rs)**	**Total Cost of each Item in PAK Rupees**
1	**Rate Analysis of Solar Panel Mono Crystalline**						
a	MRS-2024 (1st Bi-Annual)	26-01-d-01	Supply and Erection of Solar PV Module (Solar Panel) Mono-crystalline A-Grade (per Watt) (As per Approved Specifications)	Watt	585	49.72	29,086.20
2	**Rate Analysis MPPT Solar Light Charge Controller**						
a	MRS-2024 (1st Bi-Annual)	26-01-e-06	Supply and Erection of MPPT Solar Light Charge Controller (45 Amps, 12/24 V) with all sort of electronic protections	No	1	43,857.65	43,857.65
3	**Rate Analysis of Misc Items**						
a	NSI		DC Fuse of 20A between PV Modules & Charge controller	No	1	560.56	560.56
b	NSI		DC Breaker 32A-2P between Load & Charge controller.	No	1	5,605.60	5,605.60
c	NSI		PVC Pipe (Indoor), HDPE Pipe (Outdoor), flexible pipe etc for Installation of DC Cables, On/Off, Plug,Distribution Board, Cabinet, Bulb Holder, Fan Hookes, USB Charging Port.	Job	1	8,408.40	8,408.40
d	MRS-2024 (1st Bi-Annual)	26-01-g-02	Supply and Erection 1x4 sq.mm double insulated flexible copper cable (from PV to Charge Controller and Charge Controller to Switch Board)	Rft	60	122.52	7,351.20
e	MRS-2024 (1st Bi-Annual)	26-01-g-01	Supply and Erection 1x2.5 sq.mm flexible copper cable (From Switch Board to Fans & Lights)	Rft	90	82.30	7,407.00
f	MRS-2024 (1st Bi-Annual)	26-01-h-01	Supply and Erection MC4 connector (TUV Approved)	Pair	2	354.61	709.22
4	**Rate Analysis of DC Ceiling Fan (30-36 Watts) 1No ; DC Padestial Fan (40-60 watt) 1 No**						
a	MRS-2024 (1st Bi-Annual)	26-01-l-02	Supply and Erection of DC CEILING FANS 48 inch 30-36 W	No	1	6,887.92	6,887.92
b	NSI		DC Padestial Fan (40-60 watt)	No	1	8,548.54	8,548.54
5	**Rate Analysis of DC LED Light Bulbs (10Watts)**						
a	NSI		Market rate of DC LED Light Blue (10 Watts as per International standards.	No	3	560.56	1,681.68
6	**Rate Analysis of 12V/24V LiFePO4**						
a	MRS-2024 (1st Bi-Annual)	26-01-f-06	Supply of Lithium LiFeP04 battery with 6000 cycles @ 80% DOD & 3 Years Warranty with 12 Volt	KWhrs	1.2	61,787.50	74,145.00
7	**Rate Analysis of PV Mounting Structure**						
a	NSI		Supply and Erection of GI steel Structure (minimum thickness of 12 SWG C-Channel) / Aluminum Alloy 6063, (Anodized 7-10 Microns with Min 2.3 mm Profile) / Pole Mounted structure with Foundations (as per Engineer recommendations)	Watt	585	16.82	9,837.83
						Total	**204,086.80**
						Unit Cost	**204,086.80**
						Amount Exempted of GST (Solar Panel Material Cost)	**28,431.00**
						Amount Applicable of GST (Material Cost)	**139,653.15**
						GST Amount @ of 18% Material Cost	**30,655.57**
						Amount Applicable of KPRA	**5,240.14**
						Service Tax @ 2% of Services Charges	**106.94**
						Total Amount Inclusive of All Taxes Unit Cost	**204,086.80**
						Total Cost of 32500 No. of Systems (Rs)	**6,632,820,935.00**
						Total Cost of 32500 No. of Systems in million (Rs)	**6632.82**

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V - PREAMBLE TO CONDITIONS OF CONTRACT

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PREAMBLE TO CONDITIONS OF CONTRACT	
Commencement Date	Sub-Clause 1.1.1.(i) The date for commencement of the physical Works is the date of the Engineer written order to commence, which shall be issued within 14 days of signing of the Contract Agreement.
Defect Liability Period	Sub-Clause 1.1.11 The Defect Liability Period is One (01) Year after the date certified in Taking Over Certificate subject to extension provided under sub clause 30.4.
The Employer	Sub-Clause 1.1.12. The Employer is Pakhtunkhwa Energy Development Organization (PEDO), Government of Khyber Pakhtunkhwa, representated by Chief Executive Officer (CEO) PEDO and and the Employer's Representative is the Project Director, Solar whose address is: **Project Director (Solar, PEDO)** House # 21 B-II Abdara Road University Town Peshawar Phone No: 091-3022347 Facsimile: 091-3022347 E-mail: pdsolar.pedo@gmail.com
The Engineer	Sub-Clause 1.1.15. The Engineer is Project Directed Solar or a person appointed by the Employer and notified to the Contractor. Address of the Engineer is given below: Project Director (Solar, PEDO) House # 21 B-II Abdara Road University Town Peshawar Phone No: 091-3022347 Facsimile: 091-3022347 E-mail: pdsolar.pedo@gmail.com
Time for Completion	Sub-Clause 1.1.35. Time for completion for whole of the works is 21 months, reckoned from the commencement date for the project, excluding defect liability period..

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Warranty Period	Sub-Clause 1.1.40. The warranty period will start from the date of completion of Defect Liability Period and will expire as per the below mentioned period.The Warranty Period of goods and equipment is as follows: **Solar Panels:** 10 Years of defect free warranty and 25 Years of Limited Power Warranty **Inverter/Charge Controller:** 1 Year **Batteries:** 2 Years **Wires/ Cables with Allied Accessories:** 1 Year During the DLP, the Contractor will be responsible to provide free services for replacement of the defected/faulty product. After completion of the DLP period, the Contractor will provide warranty services as per the manufacturer protocol.
Engineer's Duties & Authorities	Sub-Clause 2.1 The duties and authorities of the Project Manager/Engineer are specified in Particular Condition of Contract.
Confirmation in Writing	Sub-Clause 2.6 The Contractor shall notify the Project Manager/Engineer within 10 days. The Project Manager/Engineer shall confirm the decision/instruction within 10 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 and O&M manual shall be provided to the Engineer prior to the Taking Over Certificate.
Programme to be Furnished	Sub-Clause 12.1. The Programme must be submitted in accordance to Schedule C to Bid.
Electricity Water, Gas and Other Services	Sub-Clause14.3. Supplies on the Site are: The Contractor shall be responsible for making his own arrangements for adequate supply of electricity, water, gas and other services required for the effective performance of his obligations under the contract.
Employer's Equipment	Sub-Clause 14.4. There will be no Employer's equipment available for use by the Contractor.
Time for Completion	Sub-Clause 25.1 Time for completion for whole of the works is as stated in sub clause 1.1.35

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Earlier Completion	Sub-Clause 26.3 The Contractor will be awarded an appreciation certificate by the Employer if the work is completed earlier than Schedule C to Bid.
Delay in Completion	Sub-Clause 27.1. Failure of the Contractor to meet the time for completion of theworks, or any part thereof within the time stated in Sub Clause 25.1, shall entitle the Employer for deduction from the Contract Price the liquidated damages @ 0.05% of Contract Price as stated in the Letter of Acceptance (LOA) for each and every day including holidays for delay but to a maximum limit of 10 percent (10%) of Contract Price as stated in the Letter of Acceptance excluding provisional sums.
Prolonged Delay	Sub-Clause 27.2. Maximum amount recoverable from the Contractor by the Employer shall be 10% of the Contract Price as stated in the Letter of Acceptance.
Terms of Payment	Sub-Clause 33.1. In addition to the provisions under Clause 33, the terms of payment shall be as stated in Particular Conditions of Contract.
Payment in Foreign Currencies	Sub-Clause 35.1. Payment will be made only in Local Currency.
Insurance of Works	Sub-Clause 43.1. The amount of insurance shall be full replacement value of the works. For deductible if any the Contractor shall submit an undertaking that he shall indemnify and keep indemnified the Employer for the amount of deductible provided in the insurance policy.
Third Party Liability	Sub-Clause 43.3. The amount of insurance against third party liability taken out by the Contractor shall not be less than Rs. Two Million Per occurrence with number of occurrences unlimited
Notices to Employer and Engineer	The address of the Employer for notices is the same as given in Sub-Clause 1.1.12 herein above. The address of the Project Manager/Engineer for notices is the same as given in Sub-Clause 1.1.15 herein above.
Applicable Law	Sub-Clause 51.1. The Contract in all respect be read and constute and shall operate as a Pakistani contract in conformity with the laws of Islamic Republic of Pakistan.

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Procedural Law for Arbitration	Sub-Clause 51.2. The procedural law for arbitration shall be the Rules of Pakistan Arbitration Act, 1940 as amended from time to time.
Language and Place of Arbitration	Sub-Clause 51.3. The language of arbitration is English language. The place of arbitration is Peshawar, Pakistan.

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VI - GENERAL CONDITIONS OF CONTRACT

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PART-I: GENERAL CONDITIONS

Definitions and Interpretations

1.1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them:

1.1.1 "Commencement Date" means whichever is the latest of:

i) the date specified in the Preamble as the date for commencement of the Works or the date when the Contractor receives:

ii) such payment in advance of the commencement of the Works as may be specified in the terms of payment, or

iii) notice of the issue of any import licence necessary for commencing performance of the Contract, or

iv) notice that any legal requirements necessary for the Contract to enter into force have been fulfilled, or

v) notice that any necessary financial or administrative requirements specified in Part II as conditions precedent to commencement have been fulfilled.

1.1.2 "Conditions" means the Preamble to and these Conditions of Contract, Parts I and II.

1.1.3 "Contract" means the agreement between the Employer and the Contractor for the execution of the Works incorporating the Conditions, Specification, Employer's Drawings and Contractor's Drawings, priced and completed Schedules, Tender, Letter of Acceptance and such further documents as maybe expressly incorporated by the Letter of Acceptance.

1.1.4 "Contract Agreement" means the documents recording the terms of the Contract between the Employer and the Contractor.

1.1.5 "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution of the Works.

1.1.6 "Contractor" means the person whose tender has been accepted by the Employer and the legal successors in title to the Contractor but not (except with the consent of the Employer) any assignee of the Contractor.

1.1.7 "Contractor's Drawings' means all drawings, samples, patterns, models and operation and maintenance manuals to be submitted by the Contractor in accordance with Clause 6.

1.1.8 "Contractor's Equipment" means all appliances or things of whatsoever nature required for the purposes of the Works but does not include Plant.

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1.1.9 "Contractor's Risks" means the risks defined in Sub-Clause 37.3.

1.1.10 "Defects Liability Certificate" means the certificate to be issued by the Engineer to the Contractor in accordance with Sub-Clause 30.11.

1.1.11 "Defects Liability Period" means one year or the period stated in Part II following taking over, during which the Contractor is responsible for making good defects and damage in accordance with Clause 30.

1.1.12 Employer" means the person named as such in the Preamble and the legal successors in title to the Employer but not (except with the consent of the Contractor) any assignee of the Employer.

1.1.13 "Employer's Drawings" means all the drawings and information provided by the Employer or the Engineer to the Contractor under the Contract.

1.1.14 "Employer's Risks" means those risks defined in Sub-Clause 37.2.

1.1.15 "Engineer means the person appointed by the Employer to act as Engineer for the purposes of the Contract and designated as such in the Preamble

1.1.16 "Engineer's Representative" means any representative of the Engineerappointed from time to time by the Engineer under Sub-Clause 2.2.

1.1.17 "Final Certificate of Payment", means the certificate to be issued by theEngineer to the Employer in accordance with Sub-Clause 33.10.

1.1.18 "Force Majeure" has the meaning assigned to it under Sub-Clause 44.1.

1.1.19 "Foreign Currency" means a currency of a country other than that in which Plant is to be installed.

1.1.20 "Gross Misconduct" means any act or omission of the Contractor in violation of the most elementary rules of diligence which a conscientous contractor in the same position and under the same circumstances would have followed.

1.1.21 "Letter of Acceptance" means the formal acceptance by the Employer of the Tender incorporating any adjustments or variations to the Tender agreed between the Employer and the Contractor.

1.1.22 "Performance Security" means the security to be provided by the Contractor in accordance with Sub-clause 10.1. for the due performance of the Contract.

1.1.23 "Plant" means machinery, apparatus, materials and all things to be provided under the Contract for incorporation in the Works.

1.1.24 "Programme" means the Programme to be submitted by the Contractor in accordance with Sub-Clause 12.1 and any approved revision thereto.

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1.1.25 "Provisional Sum" means a sum, described as such for the execution of work or for the supply of goods or services, to be used in accordance with Sub- Clause 36.1.

1.1.26 "Risks Transfer Date" means the date when the risk of loss of or damage to the Works passes from the Contractor to the Employer in accordance with Sub-Clause 39.1.

1.1.27 "Schedule of Prices" means the completed and priced Schedule of Prices, or any part or individual schedule thereof, submitted by the Contractor with his Tender and forming a part of the Contract documents.

1.1.28 "Section" means a part of the Works specifically identified as such as in the Contract.

1.1.29 "Site" means the place or places, provided or made available by the Employer where work is to be done by the Contractor or to which Plant is to be delivered, together with so much of the area surrounding the same as the Contractor shall with the consent of the Employer use in connection with the Works otherwise than merely for the purposes of access.

1.1.30 "Specification" means the specification of the Works included in the Contract and any modification thereof made in accordance with Clause 31.

1.1.31 "Subcontractor" means any person (other than the Contractor) named in the Contract for any part of the Works, or any person to whom any part of the Contract has been subcontracted with the consent of the Engineer, and the Subcontractor's legal successors in title but not any assignee of the Subcontractor.

1.1.32 "Taking-Over Certificate" means the certificate to be given by the Engineer to the Contractor in accordance with Clause 29.

1.1.33 "Tender" means the Contractor's priced offer to the Employer for the Execution of the Works.

1.1.34 "Tests on Completion" means the tests specified in the Contract or otherwise agreed by the Engineer and the Contractor to be performed before the Works are taken over by the Employer.

1.1.35 "Time for Completion" means the time stated in the Preamble for completing the Works or any Section thereof and passing the Tests on Completion calculated from the Commencement Date unless extended in accordance with Clause 26.

1.1.36 "Variation Order" means any written order, identified as such, issued to the Contractor by the Engineer under Sub-Clause 31.1.

1.1.37 "Works" means all Plant to be provided and work to be done by the Contractor under the Contract.

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1.2 **Headings and Titles**

The headings and titles in these Conditions shall not be deemed part thereof or be taken into consideration in the interpretation or construction of the Contract.

1.3 **Interpretation**

Words importing persons or parties shall include firms and corporations and any organisation having legal capacity.

Words importing the singular only also include the plural and vice versa where the context requires.

1.4 **Written Communications**

Wherever in the contract provision is made for a communication to be "written" or "in writing" this means any hand-written, type-written or printed communication, including telex, cable and facsimile transmission.

1.5 **Notices, Consents and Approvals**

Wherever in the Contract provision is made for the giving of notice, consent or approval by any person, such consent or approval shall not be unreasonably withheld. Unless otherwise specified, such notice, consent or approval shall be in writing and the word "notify" shall be construed accordingly.

1.6 **Costs, Overhead Charges and Profit**

Whenever by these Conditions the Contractor is entitled to be paid cost, such cost shall be properly incurred and shall include any overhead charges properly allocable thereto but not profit unless so stated. Any profit entitlement shall be added to cost at the percentage stated in the Preamble.

1.7 **Periods**

In these Conditions "days" means calendar day and "year" means 365 days.

Engineer and Engineer's Representative

2.1 **Engineer's Duties**

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

If the Engineer is required, under the terms of his appointment by the Employer, to obtain the specific approval of the Employer before carrying out any of these duties, full particulars of such requirements shall be set out in PartII.

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

2.2 Engineer's Representative

The Engineer's Representative shall be appointed by and be responsible to the Engineer and shall only carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3.

2.3 Engineer's Power to Delegate

The Engineer may from time to time delegate to the Engineer's Representative any of the duties vested in the Engineer and may at any time revoke such delegation.

Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Contractor and the Employer.

Any decision, instruction or approval given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. However:

(a) any failure of the Engineer's Representative to disapprove any Plant or workmanship shall not prejudice the right of the Engineer to disapprove such Plant or workmanship and to give instructions for the rectification thereof;

(b) if the Contractor questions any decision or instruction of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary such decision or instruction.

2.4 Engineer to Act Impartially

Wherever under the Contract the Engineer is required to exercise his discretion by:

(a) giving his decision, opinion or consent. Or

(b) expressing his satisfaction or approval, or

(c) determining value, or

(d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor, he shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances.

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2.5 Engineer's Decisions and Instructions

The Contractor shall proceed with the decisions and instructions given by the Engineer in accordance with these Conditions.

2.6 Confirmation in Writing

The Contractor may require the Engineer to confirm in writing any decision or instruction of the Engineer which is not in writing. The Contractor shall notify the Engineer of such requirement without undue delay. Such a decision or instruction shall not be effective until written confirmation thereof has been received by the Contractor.

2.7 Disputing Engineer's Decisions and Instructions

If the Contractor disputes or questions any decision or instruction under Clause 2.5 or a written confirmation under Clause 2.6, he shall give notice to the Engineer within 28 days after receipt thereof, giving his reasons.

The Engineer shall within a further period of 28 days by notice to the Contractor and the Employer with reasons, confirm, reverse or vary suchdecision or instruction.

If either party disagrees with the action taken by the Engineer, or if the Engineer fails to reply to the Contractor's notice within the stipulated 28 days, and the matter cannot be settled amicably that party shall be at liberty, subject to Sub-Clause 50.1, to refer the matter to arbitration in accordance with the Contract.

2.8 Replacement of Engineer

The Employer shall not appoint any person to act in replacement of theEngineer without the consent of the Contractor.

Assignment and Subcontracting

3.1 Assignment

The Contractor shall not assign the Contract or any part of his obligations under the Contract. A charge in favour of the Contractor's bankers of any monies due under the Contract shall not be considered an assignment.

4.1 Subcontracting

The Contractor shall not subcontract the whole of the Works.

Except where otherwise provided by the Contract the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer.

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The Contractor shall however, not require such consent for purchases of materials or to place contracts for minor details or for any part of the Works of which the manufacturer or supplier is named in the Contract.

The Contractor shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents or employees as fully as if they were the acts,defaults or neglects of the Contractor, his agents or employees.

Contract Documents

5.1 Ruling Language

Where versions of the Contract are prepared in different languages, the version which is to prevail shall be specified in the Preamble. The language of such version is referred to as the ruling language.

5.2 Day to Day Communications

The language for day to day communications is stated in the Preamble.

5.3 Priority of Contract Documents

Unless otherwise provided in the Contract the priority of the Contract documents shall as follows:

1. The Letter of Acceptance
2. The Preamble
3. The Conditions of Contract, Part II
4. The Conditions of Contract, Part I
5. Any other documents forming part of the Contract.

5.4 Documents Mutually Explanatory

Subject to Sub-Clause 5.3. the Contract documents shall be taken as mutually explanatory. any ambiguities or discrepancies shall be resolved by the Engineer, who shall then instruct the Contractor thereon.

If the Contractor considers that compliance with such instructions will resultin any cost which the Contractor could not reasonably have anticipated, he shall forthwith inform the Engineer with full supporting details. The Engineer shall then, if he approves, certify such costs as may be reasonable, together with profit where appropriate, which shall be added to the Contract Price.

If on the other hand compliance with such instructions results in lower costs for the Contractor them he had reason to anticipate, the Engineer shall certify a deduction from the Contract Price allowing for profit where appropriate.

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6.1 Contractor's Drawings

The Contractor shall submit to the Engineer for approval:

(a) within the time given in the Contract or in the Programme such drawings, samples, models or information as may be called for therein, and in thenumbers therein required, and

(b) during the progress of the Works, such drawings of the general arrangement and details of the Works as specified in the Contract or as the Engineer may require.

The Engineer shall signify his approval or disapproval thereof. If he fails to do so within the time given in the Contract or the Programme or if no time limit is specified, within 28 days of receipt, they shall be deemed to be approved.

Approved drawings, samples and models shall be signed or otherwise identified by the Engineer.

The Contractor shall supply additional copies of approved drawings in the form and numbers stated in the Contract.

6.2 Consequences of Disapproval of Contractor's Drawings

Any Contractor's Drawings which the Engineer disapprove shall be forthwith modified to meet the requirements of the Engineer and shall be re-submitted.

6.3 Approved Contractor's Drawings

Approved Contractor's Drawings shall not be departed from except asprovided in Clause 31.

6.4 Inspection of Contractor's Drawings

The Engineer shall have the right at all reasonable times to inspect, at Contractor's premises, all Contractor's Drawings of any part of the Works.

6.5 Erection Information

The Contractor shall provide, within the times stated in the Contract or in the Programme, drawings showing how the Plant is to be affixed and any other information required for:

(a) preparing suitable foundations or other means of support, and

(b) providing suitable access on the Site for the Plant and any necessary equipment to the place where the Plant is to be erected, and

(c) making necessary connections to the Plant

6.6 Operation and Maintenance Manuals

Before the Works are taken over in accordance with Clause 29 the Contractor shall supply operation and maintenance manuals together with drawings of the

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Works as built. These shall be in such detail as will enable the Employer to operate, maintain, adjust and repair all parts of the Works.

Unless otherwise stated in Part II the manuals and drawings shall be in the ruling language, and in such form and numbers as stated in the Contract.

Unless otherwise agreed, the Works shall not be considered to be completed for the purposes of taking over until such manuals and drawings have been supplied to the Employer.

6.7 Employer's Use of Contractor's Drawings

Contractor's Drawings may be used by the Employer for no other purpose than completing, operating, maintaining, adjusting and repairing the Works.

6.8 Contractor's Use of Employer's Drawings

The Employer's Drawings, Specification and other information submitted by the Employer or the Engineer to the Contractor shall remain the property ofthe Employer. They shall not, without the consent of the Employer, be used, copied or communicated to a third party by the Contractor unless necessary forthe purposes of the Contract.

6.9 Manufacturing Drawings

Unless otherwise specified in Part II the Contractor shall not be required to disclose to the Employer or the Engineer the Contractor's confidential manufacturing drawings, designs, know-how or manufacturing practices, processes or operations.

7.1 Errors in Contractor's Drawings

The Contractor shall be responsible for any errors or omissions in the Contractor's Drawings unless they are due to incorrect Employer's Drawings or other written information supplied by the Employer or the Engineer. Approval by the Engineer of the Contractor's Drawings shall not relieve the Contractor from any responsibility under this Sub-Clause.

The Contractor shall bear any costs he may incur as a result of delay in providing Contractor's Drawings and other information or as a result of errors or omissions therein, for which the Contractor is responsible.

The Contractor shall at his own cost carry out any alterations or remedial work necessitated by such errors or omissions for which he is responsible and modify the Contractor's Drawings and such other information accordingly.

The performance of his obligations under this Clause shall be in full satisfaction of the Contractor's liability under this Clause but shall not relieve him of his liability under Sub-Clause 27.1.

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7.2 **Errors by Employer or Engineer**

The Employer shall be responsible for the Employer's Drawings and for other written information supplied by the Employer or the Engineer and for the details of special work specified by either of them. If such Employer's Drawings, information or details are incorrect and necessitate alterations of thework, the Employer shall pay the Contractor the cost of the alterations together with profit as certified by the Engineer.

Obligations of the Contractor

8.1 **General Obligations**

The Contractor shall, in accordance with the Contract, with due care and diligence, design, manufacture, deliver to Site, erect, 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 in Part II, all necessary facilities therefor.

8.2 **Setting Out**

The Contractor shall set out the Works in relation to original points, lines and levels of reference given by the Engineer in writing and provide all necessary instruments, appliances and labour for such purposes.

If, at any time during the execution of the Works, any error appears in the positions, levels, dimensions or alignment of the Works, the Contractor shall rectify the error.

The Contractor shall bear the cost of rectifying the error, unless the error results from incorrect information supplied in writing by the Employer, the Engineer or from default by another contractor, in which case the cost togetherwith profit shall be borne by the Employer.

The checking of any setting-out by the Engineer shall not relieve the Contractor of his responsibility for the accuracy thereof.

9.1 **Contract Agreement**

The Contractor shall, if called upon so to do, execute a Contract Agreement recording all the terms of the Contract, to be prepared by and completed at the cost of the Employer in the form annexed hereto.

10.1 **Performance Security**

If Part II requires the Contractor to obtain a Performance Security, he shall obtain the same in the sum required, within 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be provided by a person and in a form approved by the Employer. The cost of complying with the requirements of this Clause shall be borne by the Contractor.

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10.2 Period of Validity

The Performance Security shall be valid until the Contractor has executed, completed and remedied defects in the Works in accordance with the Contract. No claim shall be made against the Performance Security after the issue of the Defects Liability Certificate and the Performance Security shall be returned to the Contractor within 14 days of the issue of the Defects Liability Certificate.

10.3 Claims under Performance Security

Whether or not the Performance Security is stated by its terms to be payable on the demand of the Employer the Employer shall not make a claim under the Performance Security unless one of the following conditions is satisfied:

(a) the Contractor is in breach of the Contract and fails to remedy the breach within 42 days after receiving written notice from the E
mployer requiring him so to do. The notice shall state the intention to claim under the Performance Security, the amount claimed and the breach relied upon, or

(b) the Employer and the Contractor have agreed in writing that the amount demanded is payable to the Employer, and the amount has not been paid within 42 days thereafter, or

(c) the Employer has obtained an award in arbitration under Clause 50 and the amount awarded has not been paid within 42 days after the award, or

(d) the Contractor has gone into liquidation or is bankrupt.

In every case the Employer shall, when making the claim, send a copy to the Contractor.

11.1 Site Data

The Tender shall be deemed to have been based on such data on climatic, hydrological and general conditions on the Site and for the operation of the Works as the Employer or the Engineer has made available to the Contractor for the purposes of the Tender. The Contractor shall be responsible for his own interpretation of such data.

11.2 Sufficiency of Contract Price

The Contractor shall be deemed to have satisfied himself on and taken account of in his Tender:

(a) all the conditions and circumstances affecting the Contract Price,

(b) the possibility of carrying out the Works as described in the Contract,

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(c) the general circumstances at the Site (if access has been made available to him) and
(d) the general labour position at the Site.

The Contractor shall not be responsible for the accuracy of information given in writing by the Employer or the Engineer but shall be responsible for his interpretation of information received from whatever source.

11.3 Physical Obstructions and Conditions

If during the execution of the Works on Site the Contractor encounters physical obstructions or conditions of the kind stipulated in Sub-Clause 26.1.c) the Contractor shall be entitled to recover the additional cost incurred in consequence.

The Engineer shall certify and there shall be added to the Contract Price the additional cost of:

(a)complying with any instruction which the Engineer, after due consultation with the Employer and the Contractor, issues to the Contractor in connection therewith, and

(b)any necessary measures which the Contractor may take in the absence of specific instructions from the Engineer.

12.1 Programme to be Furnished

The Contractor shall submit to the Engineer for his approval the Programme which shall contain the following:

(a) the order in which the Contractor proposes to carry out the Works (including design, manufacture, delivery to Site, erection, testing and commissioning),

(b) the times when submission and approval of the Contractor's Drawing are required,

(c) the times by which the Contractor requires the Employer:

(i) to furnish any Employer's Drawings,
(ii) to provide access to the Site,
(iii) to have completed the necessary civil engineering work (including foundations for the Plant) and
(iv) to have obtained any import licences, consents, wayleaves and approvals necessary for the purpose of the Works.

The Contractor shall submit the Programme in the form stated in the Preamble within 28 days after the Commencement Date.

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The approval by the Engineer of the Programme shall not relieve the Contractor or the Employer from any obligation under the Contract.

12.2 Alteration to Programme

No material alteration to the Programme shall be made without the approval of the Engineer.

12.3 Revision of Programme

If the progress of the Works does not conform to the Programme, the Engineer may instruct the Contractor to revise the Programme.

If such modifications are required for reasons for which the Contractor is not responsible, the cost of preparing the revised Programme shall be certified by the Engineer and added to the Contract Price.

13.1 Contractor's Representative

The Contractor shall employ one or more competent representatives to superintend the carrying out of the Works on Site. They shall be fluent in the language for day to day communications. Their names shall be communicated in writing to the Engineer before work on Site begins.

Any instruction or notice which the Engineer gives to the Contractor's representative shall be deemed to have been given to the Contractor.

13.2 Objection to Contractor's Employees

The Contractor shall, upon the Engineer's written instruction, remove from the Works any person employed by him in the execution of the Works, who misconducts himself or is incompetent or negligent.

14.1 Contractor's Equipment

Except to the extent specified in Part II, the Contractor shall provide all Contractor's Equipment necessary to complete the Works.

All Contractor's Equipment shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any such equipment, except:

(a) when it is no longer required for the completion of the Works, or

(b)when the Engineer has given his consent.

14.2 Safety Precautions

The Contractor shall observe all applicable regulations regarding safety on the Site.

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Unless otherwise agreed, the Contractor shall, from the commencement of work on Site until taking over provide:
(a)fencing, lighting, guarding and watching of the Works, and

(b)temporary roadways, footways, guards and fences which may be necessary for the accommodation and protection of owners and occupiers of adjacent property, the public and others.

14.3 Electricity Water and Gas

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details are given in the Preamble. The Contractor shall pay the Employer a fair price for such use. The Contractor shall at his own cost provide any apparatus necessary for such use.

14.4 Employer's Equipment

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. The Contractor shall pay the Employer a fair price for such use.
The Employer shall during such operation retain control of and be responsible for the safe working of the equipment.

14.5 Clearance of Site

The Contractor shall from time to time during the progress of the Works clear away and remove all surplus materials and rubbish. On completion of the Works the Contractor shall remove all Contractor's Equipment and leave the whole of the Site and the Works clean and in a workmanlike condition, to the satisfaction of the Engineer.

14.6 Opportunities for Other Contractors

The Contractor shall, in accordance with the Engineer's instructions, afford to other contractors engaged by the Employer to work on the Site and persons lawfully upon the Site all reasonable opportunities for carrying out their work provided that the same shall not obstruct or disturb the progress of the Works. The Contractor shall also afford such opportunities to the employees of the Employer.

If the Contractor, on the written request of the Engineer, makes available any Contractor's Equipment or provides any other service, the Employer shall pay the Contractor accordingly. The amount to be paid shall be certified by the Engineer and added to the Contract Price.

14.7 Authority for Access
No persons other than the employees of the Contractor and his Subcontractors shall be allowed on the Site except with the consent of the Engineer.

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Facilities to inspect the Works shall at all times be afforded by the Contractor to the Engineer and his representative, the Employer's representatives, authorities and officials.

14.8 Information for Import Permits and Licences

The Contractor shall submit to the Employer in good time such details of all Plant and Contractor's Equipment as will enable the Employer to obtain all necessary import permits or licences.

15.1 Compliance with Statutes, Regulations

The Contractor shall, in all matters arising in the performance of the Contract, comply in all respects with, give all notices and pay all fees required by the provisions of any national or state statute, ordinance or other law or any regulation or bye-law of any duly constituted authority.

15.2 Compliance with Laws

The Contractor shall comply with the laws of the country of manufacture concerning the manufacture of the Plant, and the laws of the country where the Plant is to be erected so far as such laws concern the manufacture, erection and operation of the Works.

16.1 Patent Rights

The Contractor shall indemnify the Employer against all claims of infringement of any patent, registered design, copyright, trade mark or trade name or other intellectual property right provided that all of following conditions are satisfied:

(a) The claim or proceedings arise out of the design, construction, manufacture or use of Works or any Plant supplied by the Contractor.

(b) The right was protected at the date of the Contract in the Contractor's country or the country in which the Plant is to be manufactured or erected.

(c) The infringement or allegation of infringement was not caused by any use of the Works otherwise than for purpose indicated by or reasonably to be inferred from date Specification.

(d) The infringement or allegation of infringement was not caused by the use of any Plant in association or combination with any plant not supplied by the Contractor, unless such association or combination was disclosed to the Contractor prior to the due of the Tender.

(e) The infringement of or allegation of infringement was not caused by the Contractor following the design or instructions of the Employer or the Engineer.

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16.2 Claims in respect of Patent Right

The Contractor shall be promptly notified of any claim under this Clause made against the Employer. The Contractor may at his own cost conduct negotiations for the settlement of such claim, and any litigation that may arise therefrom..

The Employer shall not make any admission which might be prejudicial to the Contractor unless the Contractor has failed to take over the conduct of the negotiations or litigation within a reasonable time after having been so requested.

The Contractor may not, however, conduct such negotiations or litigation before he has given the Employer such reasonable security as the Employer may require. The security shall be for an amount which is an assessment of the compensation, damages, expenses and costs for which the Employer may become liable and which are the subject of the indemnity under Sub-Clause 16.1

The Employer shall, at the request of the Contractor, provide all available assistance for the purpose of contesting any such claim or action, and shall be repaid all reasonable costs incurred in so doing.

16.3 Employer's Warranty for Patent Rights

If any matter for which the Contractor is not liable to indemnify the Employer under Sub-Clause 16.1 causes the infringement or allegation of infringement by the Contractor of any patent, registered design, trade mark, copyright or other intellectual property right, the Employer shall indemnify the Contractor against all claims damages, expenses and costs which the Contractor may incur in relation thereto. The provisions of Sub-Clause 16.2 shall apply mutatis mutandis.

Obligations of the Employer

17.1 Access to and Possession of the Site

The Employer shall in reasonable time grant the Contractor access to and possession of the Site, which may, however, not be exclusive to the Contractor.

The Employer shall to the extent stated in the Specification provide means of access for the delivery of all Plant and Contractor's Equipment to the Site.

17.2 Assistance with Local Regulations

The Employer shall assist the Contractor in ascertaining the nature and extent of any laws, regulations, orders or bye-laws, and customs in the country where the Plant is to be erected, which may affect the Contractor in the performance of his obligations under the Contract. The Employer shall if so requested

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procure for the Contractor copies thereof and information relating thereto at the Contractor's cost.

17.3 Civil Works on Site

Any building, structure, foundation or means of access on the Site to beprovided by the Employer shall be in a condition suitable for the reception, movement, installation and maintenance of the Works within the time or timesindicated in the Programme.

17.4 Consents and Wayleaves

The Employer shall in due time obtain or grant all consents including permits-to-work, wayleaves and approvals required for the Works.

17.5 Import Permits and Licences

The Employer shall obtain all import permits or licences required for any part of the Plant or Works in reasonable time having regard to the time for delivery of the Plant and completion of the Works.

Labour

18.1 Engagement of Labour

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all labour and for their payment, housing feeding and transport.

18.2 Returns of Labour

The Contractor shall submit detailed returns showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor and Subcontractors on the Site. The returns shall be submitted in such form and at such intervals as the Engineer may prescribe.

18.3 Working Hours

On the Site the Contractor shall observe the normal working hours stated in the Preamble. The Employer shall allow the Contractor to carry out work on the Site continuously during such working hours.

The Engineer may after consulting the Employer and the Contractor, direct that work shall be done at other times. The extra cost, together with profit, shall be added to the Contract Price unless it has become necessary for the completion of the Works within the Time for Completion, and this is due tothe default of the Contractor.

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18.4 Restriction on Working Hours

No work shall be carried out on the Site outside normal working hours or on the locally recognised days of rest, unless:

(a) the Contract so provides, or

(b) the work is unavoidable or necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer, or

(c) the Engineer gives his consent.

Workmanship and Materials

19.1 Manner of Execution

All Plant to be supplied shall be manufactured and all work to be done shall be executed in the manner set out in the Contract.

Where the manner of manufacture and execution is not set out in the Contract, the work shall be executed in a proper and workmanlike manner in accordance with recognised good practice.

19.2 Covering up Work

The Contractor shall give the Engineer full opportunity to examine, measure and test any work on Site which is about to be covered up or put out of view.

The Contractor shall give due notice to the Engineer whenever such work is ready for examination, measurement or testing.

The Engineer shall then, unless he notifies the Contractor that he considers it unnecessary, without unreasonable delay carry out the examination, measurement or testing.

19.3 Uncovering Work

If so instructed by the Engineer, the Contractor shall expose any parts of the Works. The Contractor shall reinstate and make good such parts to the Engineer's satisfaction.

If any parts of the Works have been covered up or put out of view by the Contractor after complying with Sub-Clause 19.2 and are found to be in accordance with the Contract the cost incurred by the Contractor in complying with the Engineer's instructions including profit shall be certified by the Engineer and added to the Contract Price.

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20.1 Independent Inspection

The Engineer may, if so provided in the Contract or with the Contractor's consent, delegate inspection and testing of Plant to an independent inspector. Any such delegation shall be effected in the manner required by Sub-Clause 2.3, and for this purpose such independent inspector shall be considered as an Engineer's Representative. Notice of such appointment (being not less than 14 days) shall be given by the Engineer to the Contractor.

20.2 Inspection and Testing During Manufacture

The Engineer shall be entitled during manufacture to inspect, examine and test the materials and workmanship and check the progress of manufacture of all Plant to be supplied under the Contract. This shall take place on the Contractor's premises during working hours. If Plant is being manufactured on other premises, the Contractor shall obtain permission for the Engineer to carry out such inspection, examination and testing on those premises.

No such inspection, examination or testing shall release the Contractor from any obligation under the Contract.

20.3 Dates for Inspection and Testing

The Contractor shall agree with the Engineer the time and place for the testing of any Plant as provided in the Contract. The Engineer shall give the Contractor 24 hours notice of his intention to attend the tests.

If the Engineer does not attend on the date agreed, the Contractor may, unless the Engineer instructs the Contractor not to do so, proceed with the tests, which shall be deemed to have been made in the Engineer's presence.

The Contractor shall forthwith forward to the Engineer duly certified copies of the test results. If the Engineer has not attended the test, he shall accept the validity of the test readings.

20.4 Facilities for Testing

Where the Contract provides for tests on the premises of the Contractor or of any Sub-contractor, the Contractor shall provide such assistance, labour materials, electricity, fuel, stores, apparatus and instruments as may be necessary to carry out the test efficiently.

20.5 Certificate of Testing

When Plant has passed the tests referred to in this Clause, the Engineer shall furnish to the Contractor a certificate or endorse the Contractor's test certificate to that effect.

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21.1 Rejection

If, as a result of the inspection, examination or testing referred to in Clause 20, the Engineer decides that any Plant is defective or otherwise not in accordance with the Contract, he may reject such Plant and shall notify the Contractor thereof immediately. The notice shall state the Engineer's objections with reasons. The Engineer shall not reject any Plant for minor defects which do not affect the commercial operation of such Plant.

The Contractor shall then with all speed make good the defect or ensure that any rejected Plant complies with the Contract.

If the Engineer requires such Plant to be retested, the tests shall be repeated under the same terms and conditions. All costs incurred by the Employer by the repetition of the tests shall be deducted form the Contract Price.

22.1 Permission to Deliver

The Contractor shall apply in writing to the Engineer for permission to deliver any Plant or Contractor's equipment to the Site. No Plant or Contractor's Equipment may be delivered to the Site without the Engineer's written permission.

The Contractor shall be responsible for the reception on Site of the Plant and Contractor's Equipment.

Suspension of Works, Delivery or Erection

23.1 Order to Suspend

The Engineer may at any time instruct the Contractor to:

(a)suspend progress of the Works, or

(b) suspend delivery of Plant or Contractor's Equipment which is ready for delivery to the Site at the time for delivery specified in the Programme, or if no time is specified, at the time appropriate for it to be delivered, or

(c) suspend the erection of Plant which has been delivered to the Site,

When the Contractor is prevented from delivering or erecting Plant in accordance with the Programme the Engineer shall be deemed to have instructed a suspension except when such prevention is caused by the Contractor's default.

The Contractor shall during suspension protect and secure the Works or Plant affected at the Contractor's works or elsewhere or at the Site, as the case may be, against any deterioration, loss or damage.

24.1 Cost of Suspension

The additional cost incurred by the Contractor in protection, securing and insuring the Works or Plant and in following the Engineer's instructions under Sub-Clause 23.1 and in resumption of the work, shall be added to the Contract Price.

The Contractor shall not be entitled to be paid any additional costs if such suspension is necessary by reason of a default on the part of the Contractor.
The Contractor shall not be entitled to additional costs unless he notifies the Engineer of his intention to make such claim, within 28 days after receipt of the order to suspend progress or delivery or of the date of deemed suspension under Sub-Clause 23.1.

24.2 Payment in Event of Suspension

The Contractor shall be entitled to payment for Plant which has not been delivered to Site if the work on Plant or delivery of Plant has been suspended for more than 28 days. After 28 days of suspension, the Contractor shall be entitled to payment of the value of such Plant as at the date of suspension.

A certificate of payment shall be issued on condition that:

(a) the Contractor has marked the Plant as the Employer's property in accordance with the Engineer's instructions, and

(b) the suspension is not due to the Contractor's default.

24.3 Prolonged Suspension

If suspension under Clause 23.1. has continued for more than 84 days, and the suspension is not due to the Contractor's default, the Contractor may by notice to the Engineer require permission to proceed within 28 days.

If permission is not granted within that time, the Contractor may treat the suspension as an omission under Clause 31 of the Section it affects, or if the suspension affects the whole of the Works, terminate the Contract and the provisions of Clause 46 shall apply.

24.4 Resumption of Work

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 the risk of loss or damage thereto shall thereupon pass to the Employer.

After receipt of permission or an order to proceed, the Contractor, shall after due notice to the Engineer, examine the Works and the Plant affected by the

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suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant that may have occurred during the suspension. Cost properly incurred by the Contractor which would not have been incurred but for the suspension shall be added to the Contract Price together with profit.

The Contractor shall not be entitled to payment for costs incurred in making good any deterioration, defect or loss caused by faulty workmanship or materials or by the Contractor's failure to take the measures specified in Sub- Clause 23.1.

If the Employer has taken over risk and responsibility for the suspended Works under this Sub-Clause, risk and responsibility shall revert to the Contractor 14 days after receipt of the permission or order to proceed.

Completion

25.1 Time for Completion

The Works shall be completed and shall have passed the Tests on Completion within the Time for Completion

26.1 Extension of Time for Completion

The Contractor may claim an extension of the Time for Completion if he is or will be delayed in completing the Works by any of the following causes:

(a) extra or additional work ordered in writing under Clause 31,

(b)exceptional adverse weather conditions,

(c) physical obstructions or conditions which could not reasonably have been foreseen by the Contractor,

(d) Employer's or Engineer's instructions, otherwise than by reason of the Contractor's default,

(e) the failure of the Employer to fulfil any of his obligations under the Contract,

(f) delay by any other contractor engaged by the Employer,

(g) any suspension of the Works under Clause 23, except when due to the Contractor's default,

(h) any industrial dispute,

(i)the Employer's Risks,

(j)Force Majeure.

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The Contractor shall give to the Engineer notice of his intention to make a claim for an extension of time within 14 days of the circumstances for such a claim becoming known to the Contractor. The notice shall be followed as soonas possible by the claim with full supporting details.

The Engineer shall, after due consultation with the Employer and the Contractor, grant the Contractor from time to time, either prospectively or retrospectively, such extension of Time for Completions as may be justified. The Engineer shall notify the Employer and the Contractor accordingly.

The Contractor shall be entitled to such extension whether the delay occurs before or after the Time for Completion.

26.2 Delays by Subcontractors

The Contractor shall be entitled to claim an extension of time if delay on the part of a Subcontractor is due to a cause mentioned in Clause 26.1, and such delay prevents the Contractor from meeting the Time for Completion.

26.3 Earlier Completion

The Employer may require completion of the Works or part thereof earlier than the Time for Completion, on the following conditions:

(a) The Employer and the Contractor shall first agree the extra sum to be paid for each day by which the Contractor completes the Works or part thereof earlier than the Time for Completion.

(b) The Contractor shall not become liable under Sub-Clause 27.1 for any failure to complete the Works or the part thereof by the earlier time.

27.1 Delay in Completion

If the Contractor fails to complete the Works within the Time for Completion, the Employer shall be entitled to a reduction in the Contract Price unless it can be reasonably concluded from circumstance that the Employer will suffer no loss.

The Employer shall within a reasonable time give the Contractor notice of his intention to claim a reduction.

The reduction shall be the percentage per day stated in the Preamble of that part of the Contract Price which is attributable to such part of the Works as cannot in consequence of the failure be put to the intended use. The reduction shall be computed for each day between the Time for Completion and the actual dateof completion.

The reduction shall in no case exceed the maximum percentage of the Contract Price of such part stated in the Preamble.

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Except as provided in Sub-Clause 27.2, such reduction shall be to the exclusion of any other remedy of the Employer in respect of the Contractor's failure to complete within the Time for Completion.

27.2 Prolonged Delay

If the Employer has become entitled to the maximum reduction under Clause 27.1 for any part of the Works, he may by notice require the Contractor to complete. Such notice shall fix a final time for completion which shall be reasonable.

If the Contractor fails to complete within such time, and this is not due to a cause for which the Employer or some other contractor employed by him is responsible, the Employer may by further notice to the Contractor either:

(a) require the Contractor to complete, or

(b) may himself complete at the Contractor's cost provided that he does so in a reasonable manner, or

(c) terminate the Contract.

If the Employer terminates the Contract, he shall be entitled to recover from the Contractor any loss he has suffered up to the maximum amount stated in the Preamble. If no maximum amount is stated, the Employer shall not be entitled to recover more than that part of the Contract Price which is attributable to that part of the Works which cannot by reason of the Contractor's failure be put to the intended use.

The Employer shall give credit for the value of any part of the Works which he retains.

Tests on Completion

28.1 Notice of Tests

The Employer shall give to the Engineer 21 day's notice of the date after which he will be ready to make the Tests on Completion (the Tests). Unless otherwise agreed, the Tests shall take place within 14 days after the said date on such day or days as the Engineer shall notify the Contractor.

28.2 Time for Tests

If the Engineer fails to appoint a time after having been asked to do so, or does not attend at the time and place appointed, the Contractor shall be entitled to proceed with the Test in his absence. The Tests shall then be deemed to have been made in the presence of the Engineer and the results of the Tests shall be accepted as accurate.

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28.3 Delayed Tests

If the Tests are being unduly delayed by the Contractor the Engineer may by notice require the Contractor to make the Tests within 21 days after the receipt of such notice. The Contractor shall make the Tests on such days within that period as the Contractor may fix and of which he shall give notice to the Engineer.

If the Contractor fails to make the Tests within 21 days the Engineer may himself proceed with the Tests. All Tests so made by the Engineer shall be at the risk and cost of the Contractor and the cost thereof shall be deducted from the Contract Price. The tests shall then be deemed to have been made in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

28.4 Facilities for Tests on Completion

Except where otherwise specified, the Employer shall provide free of charge such labour, materials, electricity, fuel, water, stores, apparatus and feedstock as may be reasonably required by the Contractor to carry out the Tests.

28.5 Retesting

If the Works or any Section fails to pass the Tests, the Engineer or theContractor may require such Tests to be repeated on the same terms and conditions. All costs to which the Employer may be put by the repetition of the Tests under this Sub-Clause or under Sub-Clause 30.7 shall be deducted from the Contract Price.

28.6 Disagreement as to Result of Tests

If the Engineer and the Contractor disagree on the interpretation of the Test results, each shall give a statement of his views to the other within 14 days after such disagreement arises. The statement shall be accompanied by all relevant evidence.

28.7 Consequences of Failure to Pass Tests on Completion

If the Works or any Section fails to pass the Tests on the repetition thereof under Sub-Clause 28.5, the Engineer, after due consultation with the Employerand the Contractor, shall be entitled to:

(a) order one further repetition of the Tests under the conditions of Sub-Clause 28.5, or

(b) reject the Works or Section in which event the Employer shall have the same remedies against the Contractor as are provided under Sub-Clause 30.5 (c), or

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(c) issue a Taking-Over Certificate, if the Employer so wishes, notwithstanding that the Works are not complete. The Contract Price shall then be reduced by such amount as may be agreed by the Employer and the Contractor or, failing agreement, as may be determined by arbitration.

28.8 Use by the Employer

In considering the results of Tests carried out under Sub-Clauses 29.3, 29.4 and 30.7 the Engineer shall make allowances for the effect of any use of the Works by the Employer on the Certificate to the performance or other characteristics of the Works.

28.9 Test Certificate

As soon as the Works or any Section thereof has passed the Tests, the Engineer shall issue a Certificate to the Contractor and the Employer to that effect.

Taking Over

29.1 Taking Over

The Works shall be taken over by the Employer when they have been completed in accordance with the Contract, except in minor respects that do not affect the use of the Works for their intended purpose, have passed the Tests on Completion and a Taking-Over Certificate has been issued or deemed to have been issued in accordance with Sub-Clause 29.2.

29.2 Taking-Over Certificate

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will in the Contractor's opinion be complete and ready for taking over under Sub-Clause 29.1.

The Engineer shall within 28 days after the receipt of the Contractor's application either:

(a) issue the Taking-Over Certificate to the Contractor with a copy to the Employer stating the date on which the Works were complete and ready for taking over, or

(b) reject the application giving his reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 days he shall be deemed to have issued the Taking-Over Certificate on the last day of that period.

If the Works are divided by the Contract into Sections the Contractor shall be entitled to apply for separate Taking-Over Certificate for each such Section

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29.3 Use before Taking Over

The Employer shall not use any part of the Works unless a Taking-Over Certificate has been issued in respect thereof.

If nevertheless the Employer uses any part of the Works, that part which is used shall be deemed to have been taken over at the date of such use. The Engineer shall on request of the Contractor issue a Taking-Over Certificate accordingly. If the Employer uses any part of the Works before taking over theContractor shall be given the earliest opportunity of taking such steps as may be necessary to carry out the Tests on Completion.

The provisions of Sub-Clause 27.1 shall not apply to any part of the Works while being so used by the Employer. Clause 30 shall apply as if the part had been taken over on the date it was taken into use.

29.4 Interference With Tests on Completion

If the Contractor is prevented from carrying out the Tests on Completion by a cause for which the Employer or the Engineer or other contractors employed by the Employer are responsible, the Employer shall be deemed to have taken over the Works on the date when the Tests on Completion would have been completed but for such prevention. The Engineer shall issue a Taking-Over Certificate accordingly.

The Works shall not be deemed to have been taken over if they are not substantially in accordance with the Contract.

If the Works are taken over under this Clause the Contractor shall nevertheless carry out the Tests on Completion during the Defects Liability Period. The Engineer shall require the Tests on Completion to be carried out by 14 days notice and in accordance with the relevant provisions of Clause 28.

Any additional costs to which the Contractor may be put in making the Tests on Completion during the Defects Liability Period, shall be added to theContract Price.

Defects after Taking Over

30.1 Defects Liability Period

Where any part of the Works is taken over separately from the Works the Defects Liability Period for that part shall commence on the date it was taken over.

30.2 Making Good Defects

The Contractor shall, subject to Sub-Clause 30.9, be responsible of making good any defect in or damage to any part of the Works which may appear or occur during the Defects Liability Period and which arises from, either:

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(a) any defective materials, workmanship or design, or

(b) any act or omission of the Contractor during the Defects Liability Period. The Contractor shall make good the Defects or damage as soon as practicable and at his own cost.

30.3 Notice of Defects

If any such defect appears or damage occurs, the Employer or the Engineer shall forthwith notify the Contractor thereof.

30.4 Extension of Defects Liability Period

The provision of this Clause shall apply to all replacements or renewals carried out by the Contractor as if the replacements and renewals had been taken over on the date they were completed.

The Defects Liability Period for the Works shall be extended by a period equal to the period during which the Works cannot be used by reason of a defect or damage. If only part of the Works cannot be used by reason of a defect, the Defect Liability Period shall be extended only for that part.

In neither case shall the Defects Liability Period be extended by more than one year.

When erection or delivery of Plant has been suspended under Sub-Clause 23.1, the Contractor's obligations under this Clause shall not apply to any defects occurring more than three years after it would have been delivered but for the suspension or such period as may be stated in Part II.

30.5 Failure to Remedy Defects

If the Contractor fails to remedy a defect or damage within a reasonable time, the Employer may fix a final time for remedying the defect or damage.

If the Contractor fails to do so, the Employer may:

(a) carry out the work himself or by others at the Contractor's risk and cost, provided that he does so in a reasonable manner. The costs properly incurred by the Employer in remedying the defect or damage shall be deducted from the Contract Price, but the Contractor shall have no responsibility for such work, or

(b) require the Contractor to grant the Employer a reasonable reduction in the Contract Price to be agreed or fixed by arbitration under Clause 50, or

(c) if the defect or damage is such that the Employer has been deprived of substantially the whole of the benefit of the Works or a part thereof, he may terminate the Contract in respect of such parts of the Works as cannot be put to the intended use. The Employer shall to the exclusion of any remedy under

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Clause 45 be entitled to recover all sums paid in respect of such parts of the Works together with the cost of dismantling the same, clearing the Site and returning Plant to the Contractor or otherwise disposing of it in accordance with the Contractor's instructions.

30.6 Removal of Defective Work

If the defect of damage is such that repairs cannot be expeditiously carried out on the Site, the Contractor may with the consent of the Engineer or theEmployer remove from the Site for the purposes of repair any part of the Works which is defective or damaged.

30.7 Further Tests on Completion

If the replacements or renewals are such that they may affect the performance of the Works the Employer may request that Tests on Completion be repeated to the extent necessary. The request shall be made by notice within 28 days after the replacement or renewal. The Tests shall be carried out in accordance with Clause 28.

30.8 Right of Access

Until the Final Certificate of Payment has been issued, the Contractor shall have the right of access to all parts of the Works and to records of the workingand performance of the Works.

Such right of access shall be during the Employer's normal working hours at the Contractor's risk and cost. Access shall also be granted to any duly authorised representative of the Contractor whose name has been communicated in writing to the Engineer.

Subject to the Engineer's approval, the Contractor may also at his own risk and cost make any tests which he considers desirable.

30.9 Defects in Employer's and Engineer's Designs

The Contractor shall not be liable for any defects resulting from designs furnished or specified by the Employer or the Engineer.

30.10 Contractor to Search

The Contractor shall, if required by the Engineer in writing, search for the cause of any defect, under the direction of the Engineer. Unless the defect is one for which the Contractor is liable under this Clause, the cost of the work carried out by the Contractor in searching for the cause of the defect shall be added to the Contract Price.

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30.11 Defects Liability Certificate

When the Defects Liability Period for the Works or any part thereof has expired and the Contractor has fulfilled all his obligations under the Contract for defects in the Works or that part, the Engineer shall issue within 28 days tothe Employer and the Contractor a Defects Liability Certificate to that effect.

30.12 Exclusive Remedies

Except in the case of Gross Misconduct, the Employer's remedies under this Clause shall be in place of and to the exclusion of any other remedy in relation to defects whatsoever.

Variations

31.1 Engineer's Right to Vary

The Engineer may by Variation Order to the Contractor at any time before the Works are taken over, instruct the Contractor to alter, amend, omit, add to or otherwise vary any part of the Works.

The Contractor shall not vary or alter any of the Works, except in accordance with a Variation Order from the Engineer. The Contractor may, however, at any time propose variations of the Works to the Engineer.

31.2 Variation Order Procedure

Prior to any Variation Order under Sub-Clause 31.1 the Engineer shall notify the Contractor of the nature and form of such variation.

As soon as possible after having received such notice, the Contractor shall submit to the Engineer:

(a) a description of work, if any, to be performed and a programme for its execution, and

(b) the Contractor's proposals for any necessary modifications to the Programme according to Sub-Clause 26.1 ro to any of the Contractor"s obligations under the Contract, and

(c) the Contractor's proposals for adjustment to the Contract Price.

Following the receipt of the Contractor's submission the Engineer shall, after due consultation with the Employer and the Contractor, decide as soon as possible whether or not the variation shall be carried out.

If the Engineer decides that the variation shall be carried out, he shall issue a Variation Order clearly identified as such in accordance with the Contractor's submission or as modified by agreement. If the Engineer and the Contractor

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are unable to agree the adjustment of the Contract Price, the provisions of Sub-Clause 31.3 shall apply.

31.3 Disagreement on Adjustment of the Contract Price

If the Contractor and the Engineer are unable to agree on the adjustment of the Contract Price, the adjustment shall be determined in accordance with the rates specified in the Schedule of Prices.

If the rates contained in the Schedule of Price are not directly applicable to the specific work in question, suitable rates shall be established by the Engineer reflecting the level of pricing in the Schedule of Prices

Where rates are not contained in the said Schedule, the amount shall be such as is in all the circumstances reasonable. Due account shall be taken of any over- or under-recovery of overheads by the Contractor in consequence of the variation.

The Contractor shall also be entitled to be paid.

(a) the cost of any partial execution of the Works rendered useless by any such variation, and

(b) the cost of making necessary alterations to Plant already manufactured or in the course of manufacture or of any work done that has to be altered in consequence of such a variation, and

(c) any additional costs incurred by the Contractor by the disruption of the progress of the Works as detailed in the Programme, and

(d) the net effect of the Contractor's finance costs, including interest, caused by the variation.

The Engineer shall on this basis determine the rates or prices to enable on-account payment to be included in certificates of payment.

31.4 Contractor to Proceed

On receipt of a Variation Order, the Contractor shall forthwith proceed to carry out the variation and be bound to these Conditions in so doing as if such variation was stated in the Contract.

The work shall not be delayed pending the granting of an extension of the Time for Completion or an adjustment to the Contract Price under Sub-Clause 31.3.

31.5 Records of Costs

In any case where the Contractor is instructed to proceed with variation prior to the determination of the adjustment to the Contract Price in respect thereof

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the Contractor shall keep records of the cost of undertaking the variation and of time expended thereon. Such records shall be open to inspection by the Engineer at all reasonable times.

Ownership of Plant

32.1 Ownership of Plant

Plant to be supplied pursuant to the Contract shall become the property of the Employer at whichever is the earlier of the following times:

(a) when Plant is delivered to Site, or

(b) when by virtue of Sub-Clause 24.2 the Contractor becomes entitled to payment of the value of the Plant

Certificates and Payment

33.1 Terms of Payment

The terms of payment shall be as stated in the Preamble.

33.2 Method of Application

Unless otherwise specified in Part II applications by the Contractor for payment shall be made to the Engineer as follows:

(a) in respect of the progress of the Works accompanied by such evidence of the value of the work done as the Engineer may require, and

(b) in respect of Plant shipped and en route to the Site identifying the Plant concerned and accompanied by such evidence of shipment and of payment of freight and insurance and by such other documents as the Engineer mayrequire, and

(c) for additional payment in accordance with Clause 34.

Any other application for payment shall state the amounts claimed and the detailed particulars in respect of which the application is made.

33.3 Issue of Certificate of Payment

Within 14 days after receiving an application for payment which the Contractor was entitled to make the Engineer shall issue a Certificate ofPayment to the Employer showing the amount due, with a copy to the Contractor.

A certificate of payment, other than the Final Certificate of Payment, shall not be withheld on account of:

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(a) defects of a minor character which are not such as to affect the use of the Works, or

(b) any part of the payment applied for being disputed. In such case a certificate of payment for the undisputed amount shall be issued.

33.4 Corrections to Certificates of Payment

The Engineer may in any certificate of payment make any correction or modification that should properly be made in respect of any previous certificate.

33.5 Payment

Unless otherwise specified in Part II, the Employer shall pay the amount certified within 28 days from the date of issue of each certificate of payment to the Contractor at his principal place of business.

33.6 Delayed Payment

If payment of any sum payable under Sub-Clause 33.5 is delayed, the Contractor shall be entitled to receive interest on the amount unpaid during theperiod of delay. Unless otherwise stated in Part II the interest shall be at the annual rate three percentage points above the discount rate of the central bank in the Contractor's country. The Contractor shall be entitled to such payment without formal notice and without prejudice to any other right or remedy.

33.7 Remedies on Failure to Certify or Make Payment

The Contractor shall be entitled to stop the Works by giving 14 days notice to the Engineer and the Employer, if either:

(a) the Engineer fails to issue a certificate of payment upon proper application by the Contractor, or

(b) the Employer fails to make any payment as provided in this Clause.

The cost to the Contractor together with profit occasioned by the stoppage and the subsequent resumption of work, shall be added to the Contract Price.

The Contractor shall also be entitled to terminate the Contract by giving 28 days notice to the Engineer and the Employer in any case where the Engineer has failed to issue a certificate of payment upon proper application by the Contractor.

33.8 Payment by Measurement

For any part of the Works which is to be paid according to quantity supplied or work done, the provisions for measurement shall be stated in Part II.

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33.9 Application for Final Certificate of Payment

The Contractor shall make application to the Engineer for the Final Certificate of Payment within 28 days after the issue of the Defect Liability Certificate, or if more than one, the last Defect Liability Certificate.

The application for the Final Certificate of Payment shall be accompanied by a final account prepared by the Contractor. The final account shall give full details of the value of all Plant supplied and work done under the Contract together with:

(a) such additions to or deductions from the Contract Price as have been agreed, and

(b) all claims for additional payment to which the Contractor may consider himself entitled.

33.10 Issue of Final Certificate of Payment

The Engineer shall issue to the Employer with a copy to the Contractor, the Final Certificate of Payment within 28 days after receiving an application in accordance with Sub-Clause 33.9.

If the Contractor has not applied for a Final Certificate of Payment within the time specified in Sub-Clause 33.9 the Engineer shall request the Contractor to do so within a further period of 28 days. If the Contractor fails to make such an application, the Engineer shall issue the Final Certificate of Payment for such amount as he deems correct.

33.11 Final Certificate of Payment Conclusive

A Final Certificate of Payment shall be conclusive evidence of the value of the Works, that the Works are in accordance with the Contract and that the Contractor has performed all his obligations under the Contract.

Payment of the amount certified in the Final Certificate of Payment shall be conclusive evidence that the Employer has performed all his obligations under the Contract.

A Final Certificate of Payment or payment shall not be conclusive:

(a) to the extent that fraud or dishonesty relates to or affects any matter dealt with in the certificate, or

(b) if any arbitration or court proceedings under the Contract have been commenced by either party before the expiry of 84 days after the issue of the Final Certificate of Payment.

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Claims

34.1 Procedure

In any case where under these Conditions there are circumstances which the Contractor considers entitle him to claim additional payment, the Contractor shall:

(a) if he intends to make any claim for additional payment give to the Engineer notice of his intention to make such claim within 28 days after the said circumstances became known to the Contractor stating the reasons for his claim, and

(b) as soon as reasonably practical after the date of such notice submit to the Engineer full and detailed particulars of his claim but not later than 182 days after such notice unless otherwise agreed by the Engineer. In any event such particulars shall be submitted no later than the application for the Final Certificate of Payment. The Contractor shall thereafter promptly submit such further particulars as the Engineer may reasonably require to assess the validity of the claim

34.2 Assessment

When the Engineer has received full and detailed particulars of the Contractor's claim in accordance with Sub-Clause 34.1 and such further particulars as he may reasonably have required he shall after due consultation with the Employer and the Contractor determine whether the Contractor is entitled to additional payment and notify the parties accordingly.

The Engineer may reject any claim for additional payment which does not comply with the requirements of Sub-Clause 34.1.

Foreign Currency and Rates of Exchange

35.1 Payment in Foreign Currencies

Arrangements for payment in foreign currencies shall be as stated in the Preamble.

35.2 Currency Restrictions

The Employer shall reimburse the Contractor for any loss arising from:

(a)currency restrictions, and

(b)restrictions on the transfer of currency in which the Contractor is to be paid which are imposed by the government or authorized agency of the government of the country from which any payments under the Contract are to be made.

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This Sub-Clause only applies to restrictions imposed after the date 28 days prior to the latest date for submission of tenders for the Works.

35.3 Rates of Exchange

Where the Contract provides for payment in Foreign Currency the rates of exchange between the currencies shall be fixed for the purpose of the Contract and shall be as stated in the Preamble.

If such rates of exchange are not stated in the Preamble the rates to be used shall be those quoted by the central bank of the country whose currency is tobe sold 28 days or the nearest day thereto prior to the latest date for submission of tenders for the Works.

Provisional Sums

36.1 Use of Provisional Sums

A Provisional Sum shall only be used, in whole or in part in accordance with the Engineer's instructions.

The total sum paid to the Contractor shall include only such amounts in respect of work, supplies or services to which such Provisional Sums relate as the Engineer shall have instructed.

36.2 Ordering Work against Provisional Sums

In respect of every Provisional Sum the Engineer may after due consultation with the Employer and the Contractor order:

(a) work to be executed, including goods, materials or services to be supplied by the Contractor. The value of such work executed, determined in accordancewith Clause 31, shall be paid to the Contractor in accordance with Clause 33, and

(b) goods and materials to be purchased by the Contractor, for which payment will be made in accordance with Sub-Clause 36.4.

36.3 Invoices and Receipts

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums.

36.4 Payment against Provisional Sums

For all work executed or goods, materials or services supplied or purchased by the Contractor under Sub-Clause 36.2(b), there shall be included in the sums paid to the Contractor:

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(a) the actual price paid or due to be paid by the Contractor, and

(b) in respect of all other charges and profit, a percentage of the actual price paid or due to be paid. Such percentage shall be as stated in the Preamble.

Risk and Responsibility

37.1 Allocation of Risk and Responsibility

The Risks of loss of or damage to physical property and of death and personal injury which arise in consequence of the performance of the Contract shall be allocated between the Employer and the Contractor as follows:

(a) the Employer: the Employer"s Risks as specified in Sub-Clause 37.2

(b) the Contractor: the Contractor's Risks as specified in Sub-Clause 37.3.

37.2 Employer's Risks

The Employer's Risks are:

(a) war and hostilities (whether war be declared or not), invasion, act of foreign enemies;

(b) rebellion, revolution, insurrection, military or usurped power or civil war insofar as it relates to the country in which the Works are located or countries through which plant must be transported;

(c) ionising radiation or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of 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) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors;

(f) use or occupation of the Works 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;

(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, wayleaves or right of a similar nature which is the inevitable result of the construction of the Works in accordance with the Contract;

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(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;

and all risks which an experienced contractor could not have foreseen or, if foreseeable, against which measures to prevent loss, damage or injury from occurring could not reasonably have been taken by such contractor.

37.3 Contractor's Risks

The Contractor's Risks are all risks other than those identified as the Employer's Risks.

Care of the Works and Passing of Risk

38.1 Contractor's Responsibility for the Care of the Works

The Contractor shall be responsible for the care of the Works or any Section thereof from the Commencement until the Risk Transfer Date applicable thereto under Sub-Clause 38.2.

The Contractor shall also be responsible for the care of any part of the Works upon which any outstanding work is being performed by the Contractor during the Defects Liability Period until completion of such outstanding work.

38.2 Risk Transfer Date

The Risk Transfer Date in relation to the Works or a Section thereof is the earliest of either:

(a) the date of issue of the Taking-Over Certificate, or

(b) the date when the Engineer is deemed to have issued the Taking Certificate or the Works are deemed to have been taken over in accordance with Clause 29, or

(c) the date of expiry of the notice of termination when the Contract is terminated by the Employer or the Contractor in accordance with these Conditions.

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39.1 **Passing of Risk of Loss of or Damage to the Works**

The risk of loss of or damage to the Works or any Section thereof shall pass from the Contractor to the Employer on the Risk Transfer Date applicable thereto.

39.2 **Loss or Damage Before Risk Transfer Date**

Loss of or damage to the Works or any Section thereof occurring before the Risk Transfer Date shall:

(a) to the extent caused by any of the Contractor's Risks, be made good forthwith by the Contractor at his own cost, and

(b) to the extent caused by any of the Employer's Risks, be made good by the Contractor at the Employer's expense if so required by the Engineer within 28 days after the occurrence of the loss or damage. The price for making good such loss and damage shall be in all circumstances reasonable and shall be agreed by the Employer and the Contractor, or in the absence of agreement, shall be fixed by arbitration under Clause 50.

39.3 **Loss or Damage After Risk Transfer Date**

After the Risk Transfer Date, the Contractor's liability in respect of loss of or damage to any part of the Works shall, except in the case of Gross Misconduct, be limited:

(a) to the fulfillment of the Contractor's obligations under Clause 30 in respect of defects therein, and

(b) to making good forthwith loss or damage caused by the Contractor during the Defects Liability Period.

Damage to Property and Injury to Persons

40.1 **Contractor's Liability**

Except as provided under Sub-Clause 41.1, the Contractor shall be liable for and shall indemnify the Employer against all losses, expenses and claims in respect of any loss of or damage to physical property (other than the Works), death or personal injury occurring before the issue of the last Defects Liability Certificate to the extent caused by:

(a) defective design, material or workmanship of the Contractor, or

(b) negligence or breach of statutory duty of the Contractor, his Subcontractors or their respective employees and agents.

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40.2 Employer's Liability

The Employer shall be liable for and shall indemnify the Contractor against all losses, expenses or claims in respect of loss of or damage to any physical property or of death or personal injury whenever occurring, to the extent caused by any of the Employer's Risks.

41.1 Accidents

The Contractor shall be liable for and shall indemnify the Employer against all losses, expenses or claims arising in connection with the death of or injury to any person employed by the Contractor or his Subcontractors for the purposes of the Works, unless caused by any acts or defaults of the Engineer, the Employer, or other contractors engaged by the Employer or by their respective employees or agents. In the latter cases the Employer shall be liable for and shall indemnify the Contractor against all losses, expenses and claims arisingin connection therewith.

Limitations of Liability

42.1 Liability for Indirect or Consequential Damage

Neither party shall be liable to the other for any loss of profit, loss of use, loss of production, loss of contracts or for any other indirect or consequential damage that may be suffered by the other, except:

(a) as expressly provided in Clause 27, and

(b) those provisions of these Conditions whereby the Contractor is expressly entitled to receive profit.

42.2 Maximum Liability

The liability of the Contractor to the Employer under these Conditions shall in no case exceed the sum stated in the Preamble or, if no such sum is stated, the Contract Price.

42.3 Liability after Expiration of Defects Liability Period

The Contractor shall have no liability to the Employer for any loss of or damage to the Employer's physical property which occurs after the expiration of the Defects Liability Period unless caused by Gross Misconduct of the Contractor.

42.4 Exclusive Remedies

The Employer and the Contractor intend that their respective rights,obligations and liabilities as provided for in these Conditions shall alonegovern their rights under the Contract and in relation to the Works.

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Accordingly, the remedies provided under the contract in respect of or in consequence of:

(a) any breach of contract, or

(b) any negligent act or omission, or

(c)death or personal injury, or

(d)loss or damage to any property

are, save in the case of Gross Misconduct, to be to the exclusion of any other remedy that either may have against the other under the law governing the Contract or otherwise.

42.5 Mitigation of Loss of Damage

In all cases the party claiming a breach of Contract or a right to be indemnified in accordance with the Contract shall be obliged to take all reasonable measures to mitigate loss or damage which has occurred or may occur.

42.6 Foreseen Damage

Where either the Employer or the Contractor is liable in damages to the other these shall not exceed the damage which the party in default could reasonably have foreseen at the date of the Contract.

Insurance

43.1 The Works

The Contractor shall insure the Works in the joint names of the Contractor and the Employer to their full replacement value with deductible limits not exceeding those stated in the Preamble.

(a) from the Commencement Date until the Risk Transfer Date against any loss or damage caused by any of the Contractor's Risks and any other risks specified in the Preamble, and

(b) during the Defects Liability period against any loss or damage which is caused either:

(i) by the Contractor in completing any outstanding work or complying with his obligations under Clause 30, or

(ii) by any of the Contractor's Risks which occurred prior to the Risks Transfer Date.

43.2 Contractor's Equipment

The Contractor shall insure Contractor's Equipment for its full replacement value whilst in transit to the Site, from commencement of loading until

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completion of unloading at the Site and while on the Site against all loss or damage caused by any of the Contractor's Risks.

43.3 Third Party Liability

The Contractor shall insure against liability to third parties for any death or personal injury and loss of or damage to any physical property arising out of the performance of the Contract and occurring before the issue of the last Defects Liability Certificate.

Such insurance shall be effected before the Contractor begins any work on the Site The insurance shall be for not less than the amount specified in the Preamble.

43.4 Employees

The Contractor shall insure and maintain insurance against his liability under Sub-Clause 41.1.

43.5 General Requirements of Insurance Policies

The Contractor shall:

(a) whenever required by the Employer produce the policies or certificates of any insurance which he is required to effect under the Contract together with receipts for the premiums,

(b) effect all insurances for which he is responsible with an insurer and in terms approved by the Employer, and

(c) make no material alterations to the terms of any insurance without the Employer's approval. If an insurer makes any material alteration to the terms the Contractor shall forthwith notify the Employer, and

(d) in all respect comply with any conditions stipulated in the insurance policies which he is required to place under the Contract.

43.6 Permitted Exclusions from Insurance Policies

The insurance cover effected by the Contractor may exclude any of the following:

(a) the cost of making good any part of the Works which is defective or otherwise does not comply with the Contract provided that it does not exclude the cost of making good any loss or damage to any other part of the Works attributable to such defect or non-compliance,

(b) indirect or consequential loss of damage including any reductions in the Contract Price for delay,

(c) wear and tear, shortages and theft,

(d) risks relating to vehicles for which third party or other insurance is required by law.

43.7 Remedies on the Contractor's Failure to Insure

If the Contractor fails to produce evidence of insurance cover as stated in Sub-Clause 43.5 (a) then the Employer may effect and keep in force such insurance. Premiums paid by the Employer for this purpose shall be deducted from the Contract Price.

43.8 Amounts not Recovered

Any amounts not recovered from the insurers shall be borne by the Employer or Contractor in accordance with their responsibilities under Clause 37.

Force Majeure

44.1 Definition of Force Majeure

Force Majeure means any circumstances beyond the control of the parties, including but not limited to:

(a) war and other hostilities, (whether war be declared or not), invasion, act of foreign enemies, mobilisation, requisition or embargo;

(b) ionising radiation or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosives, or other hazardous properties of any explosive nuclear assembly or nuclear components thereof;

(c) rebellion, revolution, insurrection, military or usurped power and civil war;

(d) riot, commotion or disorder, except where solely restricted to employees of the Contractor.

44.2 Effect of Force Majeure

Neither party shall be considered to be in default or in breach of his obligations under the Contract to the extent that performance of such obligations is prevented by any circumstances of Force Majeure which arise after the date of the Letter of Acceptance or the date when the Contract becomes effective, whichever is the earlier.

44.3 Notice of Occurrence

If either party considers that any circumstances of Force Majeure have occurred which may affect performance of his obligations he shall promptly notify the other party and the Engineer thereof.

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44.4 Performance to Continue

Upon the occurrence of any circumstances of Force Majeure the Contractor shall endeavour to continue to perform his obligations under the Contract so far as reasonably practicable. The Contractor shall notify the Engineer of the steps he proposes to take including any reasonable alternative means for performance which is not prevented by Force Majeure. The Contractor shall not take any such steps unless directed so to do by the Engineer.

44.5 Additional Costs caused by Force Majeure

If the Contractor incurs additional costs in complying with the Engineer's directions under Sub-Clause 44.4, the amount thereof shall be certified by the Engineer and added to the Contract Price.

44.6 Damage Caused by Force Majeure

If in consequence of Force Majeure the Works shall suffer loss or damage the Contractor shall be entitled to have the value of the work done, without regard to the loss or damage that has occurred, included in a Certificate of Payment.

44.7 Termination in Consequence of Force Majeure

If circumstances of Force Majeure have occurred and shall continue for a period of 182 days then, notwithstanding that the Contractor may by reason thereof have been granted an extension of Time for Completion of the Works, either party shall be entitled to serve upon the other 28 days' notice to terminate the Contract. If at the expiry of the period of 28 days Force Majeure shall still continue the Contract shall terminate.

44.8 Payment on Termination for Force Majeure

If the Contract is terminated under Sub-Clause 44.7 the Contractor shall be paid the value of the work done.

The contractor shall also be entitled to receive:

(a) the amounts payable in respect of any preliminary items so far as the work or service comprised therein has been carried out and a proper proportion of any such item in which the work or service comprised has only been partially carried out,

(b) the cost of materials or goods ordered for the Works or for use in connection with the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery. Such materials or goods shall become the property of and be at the risk of the Employer when paid for by the Employer and the Contractor shall place the same at the Employer's disposal,

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(c) the amount of any other expenditure which in the circumstances was reasonably incurred by the Contractor in the expectation of completing the whole of the Works,

(d) the reasonable cost of removal of Contractor's Equipment from the Site and the return thereof to the Contractor's works in his country or to any other destination at no greater cost, and

(e) the reasonable cost of repatriation of the Contractor's staff and workmen employed wholly in connection with the Works at the date of such termination.

44.9 Release from Performance

If circumstances of Force Majeure occur and in consequence thereof under the law governing the Contract the parties are released from further performance of the Contract, the sum payable by the Employer to the Contractor shall be the same as that which would have been payable under Sub-Clause 44.8 if the Contract had been terminated under Sub-Clause 44.7.

44.10 Force Majeure Affecting Engineer's Duties

The provisions of Clause 44 shall also apply in circumstances where the Engineer is prevented from performing any of his duties under the Contract by reason of Force Majeure.

Default

45.1 Notice of Default

If the Contractor is not executing the Works in accordance with the Contract or is neglecting to perform his obligations thereunder so as seriously to affect the carrying out of the Works, the Engineer may give notice to the Contractor requiring him to make good such failure or neglect.

45.2 Contractor's Default

If the Contractor:

(a) has failed to comply within a reasonable time with a notice under Sub-Clause 45.1, or

(b) assigns the Contract or subcontracts the whole of the Works without the Employer's written consent, or

(c) becomes bankrupt or insolvent, has a receiving order made against him or compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors or goes into liquidation, the Employer may, after having given 7 days notice to the Contractor, terminate the Contract and expel the Contractor from the Site.

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Any such expulsion and termination shall be without prejudice to any other rights or powers of the Employer, the Engineer or the Contractor under the Contract.

The Employer may upon such termination complete the Works himself or by any other contractor.

45.3 Valuation at Date of Termination

The Engineer shall, as soon as possible after such termination, certify the value of the Works and all sums then due to the Contractor as at the date of termination in accordance with Clause 33.

45.4 Payment after Termination

The Employer shall not be liable to make any further payments to the Contractor until the Works have been completed. When the Works are so complete, the Employers shall be entitled to recover from the Contractor the extra costs, if any, of completing the Works after allowing for any sum due to the Contractor under Sub-Clause 45.3. If there is no such extra cost the Employer shall pay any balance due to the Contractor.

45.5 Effect on Liability for Delay

The Contractor's liability under Clause 27 shall immediately cease when the Employer expels him from the Site without prejudice to any liability thereunder that may have already occurred.

46.1 Employer's Default

The Contractor may, by giving 14 days notice to the Employer and the Engineer, terminate the Contract if the Employer:

(a) fails to pay the Contractor the amount due under any certificate of the Engineer within 28 days after the amount became payable, or

(b) interferes with or obstructs the issue of any certificate of the Engineer, or

(c) becomes bankrupt or insolvent, has a receiving order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors or goes into liquidation, or goes into liquidation, or

(d) consistently fails to meet his contractual obligations, or

(e) appoints, a person to act with or in replacement of the Engineer without the Contractor's consent.

Any such termination shall be without prejudice to any other rights of the Contractor under the Contract.

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46.2 Removal of Contractor's Equipment

On such termination, the Contractor shall be entitled to remove immediately all Contractor's Equipment which is on the Site.

46.3 Payment on Termination for Employer's Default

In the event of such termination the Employer shall pay the Contractor an amount calculated in accordance with Sub-Clause 44.8.

The Employer shall pay in addition the amount of any loss or damage, including loss of profit which the Contractor may have suffered in consequence of termination. The additional amount shall, however, not exceed the limit specified in the Preamble.

Change in Cost and Legislation

47.1 Labour, Materials and Transport

Where the Contract Price is to be adjusted for changes in the cost of labour, materials, transport or other costs of execution of the Works, the method for calculating such adjustment shall be specified in the Preamble.

When calculating the adjustment no account shall be taken of any increased cost which results from the Contractor's default or negligence.

47.2 Statutory and Other Regulations

The Contract Price shall be adjusted to take account of any increase or decrease in cost resulting from changes in legislation of the country where the Site is located or in its generally accepted interpretation.

Legislation means any law, order, regulation or bye-law having the force of law, which affects the Contractor in the performance of his obligations under the Contract, made after the date 28 days prior to the latest date for submissionof tenders for the Works.

The Engineer shall certify the amount of the resulting increase or decrease in cost, which shall be added to or deducted from the Contract Price.

Customs

48.1 Customs and Import Duties

Unless otherwise stated in Part II the Employer shall pay all customs, import duties and taxes in consequence of the importation of Plant. If the Contractor is required to pay such customs, import duties and taxes, the Employer shall reimburse the amount thereof.

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48.2 Clearance through Customs

The Employer shall assist the Contractor in obtaining clearance through the customs of all Plant and Contractor's Equipment and in procuring any necessary government consent to the re-export of Contractor's Equipmentwhen it is removed from the Site.

Notices

49.1 Notices to Contractor

All certificates, notices or written orders to be given to the Contractor by the Employer or the Engineer under these Conditions shall be sent by airmail post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or such other address as the Contractor shall nominate for that purpose, or may be handed over to the Contractor's representative.

49.2 Notice to Employer and Engineer

Any notice to be given to the Employer or to the Engineer under these Conditions shall be sent by airmail post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in the Preamble, or handed over to the Engineer's or the Employer's representative authorised to receive it.

49.3 Minutes of Meetings

Instructions or notices to the Contractor and notices from the Contractor to the Engineer or the Employer recorded in a minute or protocol signed by the authorized representatives of the giver and recipient of such notice or instruction shall be valid notice or instruction for the purposes of the Contract.

Disputes and Arbitration

50.1 Disputes concerning Engineer's Decisions

If either party is dissatisfied with a decision or instruction of the Engineer as confirmed, reversed or varied in accordance with Clause 2 he may refer the matter to arbitration pursuant to Sub-Clause 50.2.

Unless the dissatisfied party has notified the other party and the Engineer within 56 days of such decision or instruction of his intention to refer the matter to arbitration, he shall be deemed to have accepted the decision as final.

Reference to arbitration shall not relieve the Contractor of his obligation to proceed with the Works in accordance with the Engineer's decision or instruction, nor relieve the Employer of any of his obligations under the Contract.

The Contractor shall in any such arbitration be at liberty to rely on reasons additional to the reasons stated in the notice given under Sub-Clause 2.7.

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50.2 Arbitration

If at any time any question, dispute or difference shall arise between the Employer and the Contractor in connection with or arising out of the Contract or the carrying out of the Works either party shall be entitled to refer the matter to be finally settled by arbitration in accordance with the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with those Rules, or byarbitration in accordance with such other rules as are specified in Part II.

The Arbitrators(s) shall have full power to open up, review and revise:

(a) any decision or instruction of the Engineer referred to arbitration pursuantto Sub-Clause 50.1, and

(b) any certificate of the Engineer related to the dispute.

50.3 Works to Continue

Performance of the Contract shall continue during arbitration proceedingsunless the Employer shall order suspension. If any such suspension is ordered the reasonable costs incurred by the Contractor and occasioned thereby shall be added to the Contract Price.

No payments due or payable by the Employer shall be withheld on account of pending reference to arbitration.

50.4 Time Limit for Arbitration

Formal notice of arbitration must be given to the other party, and where required to the appropriate arbitration body, no later than 84 days after the issue of the Final Certificate of Payment

Law and Procedure

51.1 Applicable Law

The law which is to apply to the Contract and under which theContract is to be construed is stated in the Preamble.

51.2 Procedural Law

The law governing the procedure and administration of any arbitration instituted pursuant to Clause 50 is stated in the Preamble.

51.3 Language

The language and place of the arbitration are stated in the Preamble.

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VII - PARTICULAR CONDITIONS OF CONTRACT

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PART-II: PARTICULAR CONDITIONS OF CONTRACT

1.1 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.

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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 Signing of Handing / Taking Over certificate of each Solar System.

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

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(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. How ever 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:

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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

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

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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 volumesshall 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 purposeof 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, labor and except as stated herein below, 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 to the Employer in the prescribed Form annexed to these documents. The said security shall be furnished by the Contractor with in 28 days after the receipt of the letter of acceptance. The Performance security shall be of an amount equal to 10% of the Contact Price in the currency of the contract in the form of Bank Guarantee from any Schedule Bank in Pakistan.

The Performance Guarantee shall be valid for twenty eight (28) days beyond defect liability period.

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:

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"(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 labor 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 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) color 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, Urdu and Pashto languages. 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)."

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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 labor 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 authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determineto 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 atthe rates/cost incurred by the Employer. The Contractor shall at his own cost provide any apparatus necessary for such use."

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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 authorization 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 wayof 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."

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The Contractor shall also provide such facilities for the training of end-users regarding full operation & usage of the installed solar system and will provide a detailbooklet for the assistance of end-users which will also include contact numbers for any complaint during defect liability period.

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 labor 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 labor.

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.

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Sub-Clause 18.8 Festivals and Religious Customs

The Contractor shall in all dealings with his staff and labor have due regard to all recognized 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 labor and for the preservation of peace and protection of persons and property in the neighborhood 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 theEngineer. Approval of such method statement(s) shall neither relieve the Contractorof 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:

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"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 (Not Applicable)

(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.

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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 recognized 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 herein below 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 herein below.

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".

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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 Day work under Variation Order (Not Applicable)

New Sub-Clause 31.6 is added as given below:

"A Variation Order may provide that work done pursuant thereto shall be executed as Day work. 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

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Prepared at the cost of the Contractor. However Employer is not bound to accept such proposal.

Sub-Clause 33.1 Terms of Payment

In respect of each Solar DC system the following payment shall be made

Twenty percent (20%) of the total amount of each DC System upon delivery of complete DC system as per BOQ at site, as evidenced by the Engineer, within time specified in PCC Sub-Clause 33.5.

Eighty percent (80%) of the total amount of each DC System upon installation of complete DC system as per BOQ at the site, as evidenced by the Engineer, within the time specified in PCC Sub-Clause 33.5 and upon issuance of the Taking Over Certificate (TOC) by the Engineer under Sub-Clause 29.2.

The minimum amount for each Interim Payment Certificate shall be five percent (5%) of the Contract Price.

Sub-Clause 33.2 Method of Application

The following paragraphs are added:

"The Contractor shall submit to the Employer/Project Manager/Engineer six (6) copies of the Application for Certificate of Payment (invoices) each signed by the Contractor and in such form as the Employer/Project Manager/Engineer may from time to time prescribe.

The Employer/Project Manager/Engineer shall examine such invoices within the times stated in Sub-Clauses 33.3 and 33.5. After such time each invoice will be deemed to have been accepted. If the invoice amount is not accepted by the Employer/Project Manager/Engineer, the disputed amount which is retained, shall be communicated, giving the reasons in writing, to the Contractor within the same time. If the objections of the Employer/Project Manager/Engineer are not acceptable to the Contractor he will justify his claims with necessary documentation and include left over amounts / items in the next invoice. However, the portions of such invoices accepted by the Employer/Project Manager/Engineer shall be paid as per Sub-Clause 33.5."

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.

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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 33.5.1 IPCs/Bill Submission

New Sub-Clause 33.5.1 is added as given below
"The IPCs/Bills submitted by the contractor shall include the following:

a) Valid Tax Exemption certificate acceptable to Employer (In case of any claim from exemption of tax).
b) Detail of Previous processed Interim Payments Certificates.
c) Any other relevant document required by Client and Engineer In-Charge

The date of submission of IPCs/Bills shall be considered from date of submission of comprehensive IPCs/Bills (Complete in all respect and without short comings)" by the Engineer in Charge to Client.

Sub-Clause 33.6 Delayed Payments

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."

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 is 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 labor 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 withheldamounts.

Sub-Clause 35.1 Payment in Foreign Currencies (Not Applicable)

Sub-Clause 35.2 Currency Restrictions (Not Applicable)

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

"Any required foreign currency transactions shall be met by the Contractor at his cost from his own resources."

Sub-Clause 35.3 Rates of Exchange (Not Applicable)

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 (Not Applicable)

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

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(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 endeavors 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

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Sub-Clause 42.6 is deleted in its entirety.

Sub-Clause 43.1 The Works (Insurance)

The Contractor Shall insure the Works in the joint names of the Contractor and the Employer to their full replacement value with deductible limits not exceeding those stated in the Preamble.

(a) from the Commencement Date until the Risk Transfer Date against any loss or damage caused by any of the Contractor's Risk and other risks specified in the Preamble, and

(b) during the Defect Liability period against any loss or damage which is caused either:

(i) by the Contractor in completing any outstanding work or complying with his obligations under Clause 30, or

(ii) by any of the Contractor's Risks which occurred prior to the Risks Transfer Date.

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)

The amount of insurance per occurrence shall be as stated in Preamble to Conditions of Contract.

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 Clausewithin 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

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(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 (Not applicable)

(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)

Sub-Clause 48.1 Customs and Import Duties (Not applicable)

(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 receiptof 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

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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.

50.2 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.

50.3 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 notbe commenced unless an attempt has first been made by the parties to settle such dispute amicably through mutual negotiation within ninety (90) daysfrom the date of notification of Engineer's decision.

50.4 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 periodstated 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 suchRules.

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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.

50.5 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.

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VIII - STANDARD FORMS

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STANDARD FORMS

Standard Forms include the following:

- Form of Contract Agreement
- Mobilization Advance Guarantee
  (Bank Guarantee)
- Form of Performance Security
  (Bank Guarantee)
- Form of Bank Guarantee/Bond for Advance Payment

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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 ContractPrice or such other sum as may become payable under the provisions of the Contractat 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)

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MOBILIZATION ADVANCE GUARANTEE
(Bank Guarantee)

Guarantee No._____Date _____

WHEREAS_____(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 the mobilization advance for the performance of his obligations under the said Contract.

AND WHEREAS, _____
(Scheduled Bank in Pakistan or Insurance Company acceptable to the Employer)
(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 fulfilment 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, 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 remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____whichever is earlier.
(Date)
The Guarantor's liability under this Guarantee shall not in any case exceed the sum of Rupees _____(Rs_____).

This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from Interim Payment Certificates of the Contractor provided that the Guarantor agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

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GUARANTOR

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

WITNESS

1. _____

_____

Corporate Secretary (Seal)

2. _____ _____

(Name Title & Address) Corporate Guarantor(Seal)

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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 obligationto 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.

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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.

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

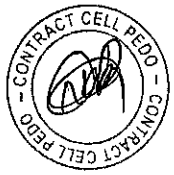
_____
Guarantor (Bank)

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

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

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

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

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

_____
Guarantor (Bank)

Witness: 1._____ Signature _____

_____ Name _____

Corporate Secretary (Seal) Title _____

2. _____

_____ _____
Name, Title & Address Corporate Guarantor (Seal)

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IX - SPECIFICATIONS

TECHNICAL PROVISIONS

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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 aluminum frame with Anti-reflective, hydrophobic, low iron Tempered cover glass.

d. The Solar Modules shall meet the following valid IEC Standards or latest:

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

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

f. A properly laminated sticker containing the following details should be available at the back side of the module.

- Name of the manufacturer / distinctive logo.
- Model Name and Type of Cell Technology.
- Peak Watt Ratting (Wp) and Power Tolerance Range
- Voltage (V_{mp}) and Current (I_{mp}) at STC
- Open Circuit Voltage (Voc) and Short Circuit Current (Isc)
- Maximum System Voltage (V_{dc}) (i.e: This should not be less than 1000 Vdc).
- 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.

- `orking temperature range of PV Module.

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

i. Limited performance guarantees: 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 17.5 % Module efficiency with Positive Power Tolerance.

l. The PV modules offered should not be more than 12 months old from the date of issue of work order.

m. PV Module should have a Snow Load bearing of 5400 Pa and Wind Load Bearing of 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. Electroluminescence (EL) test will be performed randomly for each individual project at the cost of contractor/supplier.

2. BATTERIES:

a. The battery should be Deep Cycle, GEL, OPzV/OPzS, Lithium LiFePO4, Lead Carbon Type or equivalent. (Note: Battery type shall be specified in the bidding documents).

b. The battery must ensure safe and reliable operation in the whole range of ambient temperatures from -5° C to + 50° C.

c. The maximum permissible self-discharge rate should not be more than 5 percent of rated capacity per month at 25° C.

d. The battery shall have a certificate of compliances, issued by a recognized laboratory.

e. The Batteries should have three years' Comprehensive replacement warranty.

f. The battery shall meet the requirements and recommendations given in IEC 61427, IEC 60896 21/22 (For VRLA) or equivalent. Lab Test Reports for battery cycle life should be provided.

g. The Battery must support parallel connection to increase capacity in case of future expansion.

h. 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 / distinct logo.

i. 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.

j. 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.
k. Battery disconnect switch / breaker of suitable size should be installed between batteries and inverter / charge controller.
l. The Battery must have Low self-discharge rate, No memory effect and No gassing.

2.1. LITHIUM BATTERIES (LiFePO4):

2.1.1. 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.

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

2.1.3. The BMS of the battery must have the following specifications:

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

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

2.1.5. 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, Catalog and certificates must be attached with the Technical Bid.

3. SOLAR CHARGE CONTROLLER (FOR SOLAR BUILDING SYSTEM):

a. The charge controller must be suitable for the required battery voltage, auto voltage recognition feature and capable of charging Lithium Ferrous Phosphate (LiFePO4) Batteries.
b. *The charge controller must be IP-30 for indoor & IP-67 or above for outdoor installation*
c. The charge controller must have MPPT Technology.
d. The Maximum power point tracking *MPPT efficiency ≥ 99%, and converter efficiency up to 98%.*
e. *It must have temperature compensation for charging batteries in higher temperatures.*
f. 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
g. It must have proper heat sink to dissipate excessive heat.
h. The charge controller must have protection for reverse flow of current through the PV modules.
i. The Solar Charge controller must have the following certification:

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- ISO 9001
- CE Certified

Note: Product Brochure, Catalog and certificates must be attached with the Technical Bid & Battery type specified in the bidding Solicitation documents should be quoted.)

4. **DC ENERGY EFFICIENT LED LIGHT BULBS:**
   a. The LED lamps must have luminous efficacy of at least 80 Lumens/Watt (at 25° C ambient temperature).
   b. The LED lamp must be protected against reversed polarity of the operation voltage.
   c. Base shall be an E-27 thread type.
   d. The emitted light shall be cool or warm white.
   e. The wide angle shall be between 120 to 125°).
   f. Operating Voltage 12Vdc / 24Vdc
   g. Lamps should be marked with the manufacturer model number, rated voltage, wattage and or batch number.

5. **DC CEILING FANS:**

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

6. **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

7. **ALL IN ONE SOLAR SOLUTION:**
   All in One Solar Solution must have following;
   a. MPPT Charge Controller, Lithium Battery and required protection (Breakers & Fuses).
   b. Charge Controller must be of 99% efficient.
   c. LCD display for parameters reading.

d. Active BMS Communication between Battery and Charge Controller.
e. Good heating dissipation with heat sink, cooling fans with fan controller.
f. Breakers/Fuses for PV input and Load output.
g. USB Mobile Charging Ports.
h. DC Load Output Ports.
i. Short Circuit Protection.
j. Over Current Protection.
k. Reverse Polarity Protection.
l. Over Charge & Discharge Protection.
m. Should have the IEC-62109-1/ IEC- 62257-9-5/ for DC standalone (all in one) solar system

8. WARRANTY:

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

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GOVERNMENT OF KHYBER PAKHTUNKHWA
COMMUNICATION & WORKS DEPARTMENT

SPECIFICATIONS
FOR
SUPPLY AND INSTALLATIONS OF SOLAR PANELS AND ALLIED EQUIPMENTS

2019

APPROVED BY STANDARIZATION COMMITTEE OF

KHYBER PAKHTUNKHWA

STANDARDIZATION COMMITTEE GOVERNMENT OF KP

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NOTIFICATION:

NO.SO(B)/II-10/Solar Panels/PBC/2018-19/C&WD-Dated-30/01/2019: The recommendations of the Sub-Committee as arrived in its meeting held on 08/01/2019, the Standardization Committee notified vide Planning & Development Department letter No. Chief/INF/P&&D/601/03/2017/378-483 dated 21/02/2017 regarding standardization of Engineering products / Materials / Equipment's has approved the **"Revised Technical Specifications For Solar Panels And Allied Equipment (Rev 2019)"** in its meeting held on 11/01/2019 as per following details and notified with the direction that these specifications will be applicable for the works which would be tendered on or after 01/04/2019. These specifications will also be available on C&W Department official website i-e www.cwd.gkp.pk

A - SPECIFICATIONS FOR SOLAR SYSTEMS-COMMON PART

1. SOLAR PANELS:

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

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

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

d. The Solar Modules shall meet the following valid IEC Standards or latest:

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

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

f. A properly laminated sticker containing the following details should be available at the back side of the module:

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

g. Following essential technical parameters of solar panel/modules should be provided with each panel supplied as well as in the technical proposal.

- I-V curve for the solar photovoltaic module/panel.

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- Date and year of obtaining IEC PV module standardization qualification certificate.
- Electrical Data (i.e: Pmax, Voc/Vmp, Isc/Imp at nominal Cell Operating Temperature (NOCT).
- PV Module efficiency at STC.
- Working temperature range of PV Module.

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

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

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

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

l. The PV modules offered should not be more than 12 months old from the date of issue of work order.

m. PV Module should have a Snow Load bearing of 5400 Pa and Wind Load Bearing of at least 2400 pa however if department deem appropriate may go for 3800 pa wind load depending upon their requirement.

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

o. The department/consultant on the expense of contractor/supplier shall verify Flash test reports with serial numbers from manufacturer for each panel (at the time of supply).

p. All information regarding solar panel with above mentioned featured data should be accessible and verifiable online on the manufacturer website.

q. IEC accredited lab test for solar panels is mandatory.

r. EL (Electro-luminous) test will be performed randomly for each individual project at the cost of contractor/supplier.

2. CABLE & WIRING:

a. The AC / DC cables should be made of 99.9% copper strands and Flexible.

b. From PV Panel to Junction Box, XLPE or XLPO insulated & XLPE/PVC Sheathed, UV stabilized single core, Double Insulated, Stranded /flexible cables (Conforming preferably to EN 50618 or IEC FDIS 62930) be used.

c. From JB to Inverter, the DC cable must have Single Core, double insulated and suitable for minimum 1000 V_{DC} transmission.

d. From Inverter to batteries, the DC cable can be single insulated, Single Core and suitable for minimum 300 V_{DC} transmission.

e. DC circuit breakers (not fuse) of ≥ Voc of String Voltage and suitable ampere rating (1.25 to 1.50 Times of Rated Current of all strings connected) must be installed between PV modules and controller / inverter.

f. AC Circuit Breaker (s) of suitable rating (1.25 to 1.50 Times of connected Load) must be installed between Controller / inverter to Load and Grid to Controller / Inverter.

g. AC / DC breakers should be marked with the manufacturer model number, rated voltage, ampere rating and batch/serial number.

h. DC / AC breakers rating should be approved from Engineer In-charge before installation at site.

i. To prevent solar panels from damage an appropriate size of DC Breaker / Fuse should be installed for each PV string and Surge Protection should be installed for combined Array (before Main DC Breaker / Inverter).

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j. DC Breaker, AC Breaker & Change overs should be placed in an enclosure. All Enclosures / Junction boxes should be made from Hot Dipped Galvanized Sheets of minimum 16 SWG.
k. Cables shall be clearly labelled with essential electrical parameters including manufacturer name, Voltage Range, standards etc.
l. All DC Wiring shall be aesthetically neat and clean, over all wiring/connection losses shall not exceed 1% of the total rated output power.
m. All connections/ socket outlet among array, controller, inverters, batteries, and pumping set etc must be made in junction boxes of adequate protection level.
n. All wires/cables should be in standard flexible UV-Resistant conduits / HDPE of PN12, SDR 13.6, PE100 for outdoor installation & (2-3 feet deep) for underground wiring / Cabling and PVC ducts for indoor installation.
o. The DC Combiner Junction Box should be properly earthed including earthing of door as well.
p. The DC Combiner should contain proper bus bars of adequate size each for Positive, Negative and Earthing.
q. The Inverter Junction Box should be properly earthed as well as per vetted design of the Engineer in charge.
r. All wiring should be in proper conduit of capping casing. Wire should not be hanging loose.
s. All wires should be terminated properly by using lugs / thimble connectors / sleeves.
t. Distribution board must be installed with proper screws.
u. Electrical Hazards Safety Labels should be pasted on DC Combiner /VFD Enclosure / Charge Controller /Battery Enclosures.
v. Following lab tests are mandatory.
   Conductor resistance test, Insulation resistance test, Pressure test, Spark test.
w. DC Cable from PV Module to Junction Box / Inverter for each string should be minimum size 6 mm^2.
x. DC Cable sizing (For Pumping Schemes) from Junction Box to Inverter as per details below;

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

3. PANEL MOUNTING & STRUCTURE:

a. The panel mounting and structure should be made of hot dipped (80 microns Average) galvanized steel of minimum thickness of **12 SWG / 2.64 mm Channel / Pipe or 8 SWG / 4.06 mm Angle** (Profile of channel and Sketch Attached for Reference).
b. A sketch of the mounting frame (As per Actual Site Requirements) showing dimensions of the frame parts should be provided at the time of supply.
c. PV to ground clearance must not be less than 1.5 feet. The height of the upper edge of the structure should not exceed 10 feet above the ground and 6 Feet for Roof Top Installations.
d. To avoid Shading, Distance between two rows of PV panels and from walls should be maintained at a minimum of 1.6 times the height of structure/walls.
e. The pit size for concrete works should be minimum 1.5x1.5x2 feet for each individual leg or 1.5x2.5x2 for double leg and the concrete should be extended at least 1 foot above the ground. The concrete ratio should be 1:2:4.
f. The Surface azimuth angle of PV Module 180° and the Tilt angle (slope) of PV Module should be 33°.

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g. The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour.
h. Due to land Non-availability or any other problem, Structure design can be modified as per site requirement. Pole Mounted or manual Tracker Structure can be provided with the approval of Engineer In-charge.
i. Array fasteners (nut/bolts/washers) between PV Module and Structure shall be stainless steel. Washers should be installed on both sides of Module frame.
j. The minimum space between two PV Modules should be 2.54 cm (1 inch), to avoid air push over PV Modules.
k. Mechanism / arrangement for cleaning of PV Panels should be provided. i.e: Space and ladder between panels or at the back side of structure, so that the operator can safely climb and clean the panels.
l. All other array fasteners Structure shall be stainless steel or galvanized steel that provides the required mechanical strength.
m. The PV modules will be mounted on metallic structures at the inner holes for cantilevered installation, which will evenly distribute the load of the panel around the support structure on both sides and in the middle.

4. EARTHING/ GROUNDING:

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

5. BATTERIES:

a. The battery should be Deep Cycle, GEL, OPzV/OPzS, Lithium LiFePO4, Lead Carbon Type or equivalent. (Note: Battery type shall be specified in the bidding documents.)
b. The battery must ensure safe and reliable operation in the whole range of ambient temperatures from -5° C to + 50° C.
c. The maximum permissible self-discharge rate should not be more than 5 percent of rated capacity per month at 25° C.
d. The battery shall have a certificate of compliances, issued by a recognized laboratory.
e. The Batteries should have three years Comprehensive replacement warranty.
f. The battery shall meet the requirements and recommendations given in IEC 61427, IEC 60896 21/22 (For VRLA) or equivalent. Lab Test Reports for battery cycle life should be provided.

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g. The Battery must support parallel connection to increase capacity in case of future expansion. Each Battery should have following minimum information printed on battery:
   - Model Number, Serial Number and Type of battery.
   - Rated Voltage and Capacity (AH) at discharge rate of 10 Hours.
   - Origin of made.
   - Manufacturer Name with distinct logo.

h. The following information must be provided in the data sheet while submitting technical bid.
   - Certification/Test Standard(s) of the battery.
   - Information regarding cycles & self-discharge rate.

i. In case of rechargeable battery bank (having more than one battery), the interconnection shall be made using lead plated copper bus bars or properly insulated flexible copper conductors.

j. Battery disconnect switch / breaker of suitable size should be installed between batteries and inverter / charge controller.

k. The Battery must have Low self-discharge rate, No memory effect and No gassing.

5.1 GEL BATTERIES:

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

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

5.2 LEAD CARBON:

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

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

5.3 OPzV / OPzS BATTERIES:

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

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

5.4 LITHIUM BATTERIES (LiFePO4):

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

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

5.4.3 The BMS of the battery must have the following specifications:
   - Temperature protection
   - Over charge protection
   - Low voltage disconnect
   - High Voltage Disconnect
   - Short circuit alarm function
   - Self-balancing function

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

STANDARD BIDDING DOCUMENT GOVERNMENT OF KP

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

Note:

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

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

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

7. LED FLOOD LIGHTS:

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

8. AC ENERGY EFFICIENT LED LIGHT BULBS:

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

Note:

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

9. AC ENERGY EFFICIENT CEILING FANS:

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

a. 10% + in Power Consumption is Allowed as per PSQCA Standard
b. Rated Voltage: 230 V~ (±10V)

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c. Rated Frequency: 50 Hz
d. Insulation Class: 155 (F) or better
e. Motor Core: Electrical Steel Sheet
f. Winding Wire: 99.99% Super Enamelled Copper CA Wire or 99.99% Pure Copper Wire.

Note:

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

10. DC ENERGY EFFICIENT LED LIGHT BULBS:

a. The LED lamps must have luminous efficacy of at least 80 lm/W (at 25 °C ambient temperature).
b. The LED lamp must be protected against reversed polarity of the operation voltage.
c. Base shall be an E-27 thread type.
d. The emitted light shall be cool or warm white.
e. The wide angle shall be between 120° to 125°.
f. Operating Voltage 12Vdc / 24Vdc
g. Lamps should be marked with the manufacturer model number, rated voltage, wattage and date of manufacture or batch number.

11. DC CEILING FANS:

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

12. DC PEDISTAL FANS:

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

13. INVERTER BASED SPLIT AC

Inverter based AC with both heating and cooling option.

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

14. PVC CHANNEL DUCTS & PIPES

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

15. FLEXIBLE PVC PIPE

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

16. CIVIL WORK:

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

a. Minor Cutting and clearing of trees/plantation to avoid shadows.

b. Civil work for earthing system as per the statutory requirements.

17. REFLECTIVE / INSULATING PAINT

The Roof Paint should be ultra-white, high reflective,100% acrylic elastomeric roof sealer designed for fixing leaks in roofs the paint should contain heat reflective pigments and additives that provide an excellent, highly protective barrier which reflects the sun's heat and destructive UV rays leaves a brilliant ultra-white finish, reducing surface heat absorption up 20°F.
The Reflective paint should comply with ASTM D6083, Fiber Reinforced for more protection, strength and durability which allows for contraction and expansion, Resists surface fungal growth.

18. WARRANTY/AFTER SALE SERVICE:

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

B - SPECIFICATIONS FOR SOLAR PUMPING SYSTEMS

19. PUMP (SUBERSIBLE):

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

Specification for main components of the Pumps:

S.NO	Components	Specifications
1	Casing/Diffuser	The Casing/Diffuser should be in fabricated stainless steel AISI 304 / 316.
2	Impellers	Stainless steel AISI 304 / 316.
3	Driving Shaft	Stainless steel 304/420 / 316
4	Sleeves	Stainless steel AISI 329/ 304 / 316
5	Gaskets	Rubber Gaskets
6	Bearings	AISI 329 stainless steel

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7	Coupling & Screen + Cable Guard	Stainless steel AISI 316/319/304/420
8	Non-Return Valve / Sluice Valve	As per British standard specifications (BSS), Minimum PN16 (16 Bar) or Above (As Per Site Requirements) PN Value / Bar Capacity of Valves must be more than Installed Pump Max/Shut-off Head Minus Static Water Level of Bore. (Leakages in Valves are NOT Acceptable).
9	Pressure Gauge	As per British standard specifications (BSS), having PSI or Bar scale (4 Inch Size), Liquid Filled, minimum 350 PSI Range, Looped Siphon tube Pipe, Stainless Steel/polypropylene Casing.
10	Clamps	Steel – Pressed
11	Pump Efficiency	**Minimum efficiency of the pump (For discharge of 3000 GPH and more) should be 70% ensured at duty point. (Duty Point of the Pump be preferably selected at the peak efficiency point or (Within ±10% of discharge) of Pump Peak efficiency Point)**

20. MOTOR:

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

The motor shall be manufactured in compliance with National Electrical Manufacturer Association (NEMA) standards. The motor shall be three-phase submersible and shall be capable of operating at rated voltage of 380 Volts at 50 Hz. The motor should be capable of operating with variable speed through V/F control. Winding of the motor shall of rewind able type with class – IC40 insulation and IP68 protection. The synchronous speed should be 2850-2950 RPM. Motor shall be capable of operating in well water with temperature normally start from 40°C. Motor should be designed for continuous operation. Motor must be filled with water without any chemical additives hazards to health for cooling. The motor must be properly protected against the entry of well water sand etc by double mechanical seal one is rotating and other stationary and must be made of Siiicon 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.

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

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

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

Following lab tests are mandatory.

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

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22. COLUMN PIPE:

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

The column pipe shall be supplied in interchangeable section having an approximate length of 10 feet column pipe shall be flanged perpendicular to the axis of pipe.
Column pipe size should be selected so that the Head Losses in the column pipe should not be more than 5%.
For Reference a table-1 is given below.

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

FEATURES:

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

23. TOPSET:

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

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

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

24. SOLAR PUMP INVERTER / CONTROLLER:

a. The solar pump inverter/controller should have built-in advance version of Auto MPPT controller, over load protection, Soft start/Soft Stop Features and Variable Frequency Drive (VFD) with integrated Gate Bipolar Transistors (IGBTs) of European, USA or Japanese origin or atleast equivalent.
b. The make and origin of the inverter/controller should be clearly mentioned in the catalog and submitted in the technical proposal.
c. The inverter offered should comply to or Equivalent standards:

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i. CE/RoHS
ii. Low Voltage Directive 2014/35/EU
iii. EMC Directive 2014/30/EU
iv. IEC 62109-1 (Safety of Power Converters for use in PV Systems)

d. The complete datasheet showing all the electrical parameters like input & output voltage ranges should be provided in the technical bid.
e. All the electrical parameters like input & output voltage ranges, and efficiency should be provided at the time of pre-supply testing and inspection.
f. Efficiency of inverter should be 96% and above at Rated Capacity.
g. Efficiency of MPPT should be 98% and above.
h. The inverter < 25kW ingress protection of inverter must be minimum IP 65 Rating or above and for inverter ≥ 25kW ingress protection of inverter / enclosure will be minimum IP 54 Rating or above.
i. Inverter / Controller having the capability to run both on AC and DC Power would be given preference.
j. Inverter should have at least three (3) years product and performance warranty.
k. The Pump Controller/Inverter should have an ON/OFF Switch/Button to Start and Stop the Pump.
l. Inverter should have active RS232/485 etc communication port available, the Data available through this port can be used for Remote Monitoring.
m. Inverter circuit must include protection against:
   i. Over or Low voltages and currents beyond critical level of the inverters circuits.
   ii. Protection against accidental short circuits & reverse polarity connections.
   iii. Protection against lightning induced transients.
   iv. Over load protection.
   v. Low RPM Protection (i.e: Frequency < 30 Hz or as per pump characteristic curve) Motor Should Stop.
   vi. Dry run protection. (PF / Current Based).

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

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

26. SYSTEM DESIGN FOR PUMPING SYSTEM:

a. Suitable factor of safety should be applied while designing the system in order to have compensations for variations in irradiations.
b. For Fix Structure and Auto Tracker, the PV panel **peak power at STC (Wp) should be 75% more** than the Motor basic input power **(PV Loss Compensation Factor = 1.75)**.

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c. For Auto /Manual Tracker, the PV panel **peak power at STC (Wp) should be 50% more** than the Motor basic input power **(PV Loss Compensation Factor = 1.5)** as per direction of Engineer Incharge

d. If Single Axis Auto Tracker Structure is installed on the above factor, then daily operational timings of pumping can be increased by 10-20%, as compared to fixed structure installation.

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

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

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

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

i. Details of each PV Panel string should be submitted in Technical proposal (i.e: Nos of total strings and Nos of PV panels in each string along with wattage and V_{mp} of each PV panel).

j. Unjustified Oversizing in PV Panels Wattage is not allowed.

k. To avoid any oversizing, all commercially available PV Panels should be considered.

l. Solar Pump Inverter should have a kW capacity equal or greater than the Motor Rated Input Power.

m. Solar Pump Inverter / Controller Size (kW) ≥ (Motor Rated Power in kW / Motor Efficiency).

n. Solar Pump Inverter / Controller should have a current rating of 1.15 Times (minimum) of Motor FLA Rated Current.

o. Motor should not be loaded more than 90%. (i.e: Design / Calculated BHP should not be more than 90% of Motor Rated Horse Power)

p. Along with this specification, contractors should also follow manufacturer's recommendations for all major components of Solar Pumping System.

q. Requirement of Efficiency for Motor i.e. 75% will not apply on Motors smaller than or equal to 5.5HP and the requirement of efficiency for pump i.e. 70% will not apply on pumps having discharge equal to or lower than 3000 GPH.

27. PRESSURE PUMPS (UPTO 5.5 HP):

a. Submersible pump confirming to ISO-9906 Standard.

b. Pump + AC Motor (3-Phase-220V/380V) or DC Motor and Pump with Display Unit.

c. Solar pump inverter/controller should be MPPT based and Minimum Ingress Protection of IP65.

d. In case, where the column pipe diameter is less than or equal to 1.5-inch (For discharge equal or less than 6000 LPH and/or for Motor 4 HP and below), HDPE pipe of at least PN12 / SDR 13.6 / PE100 (For TDH of equal or less than 300 ft) without joint may be used instead of MS pipe for better economics and to avoid hydraulic losses. However stainless steel rope of minimum diameter of 6 mm (28 mm^2) for suspension of pump-set must be supplied with HDPE

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pipe. (Note: For TDH of more than 300 ft, HDPE Pipe type / thickness may be increased/changed accordingly)

e. Top set shall comprise of Suitable Galvanized stand (Design should be verified from Engineer In-Charge before start of work)
f. For Pressure Pumps ≤ 5.5 HP schemes, Solar Module efficiency requirement is minimum 16%. (Only for Cut Cells PV Modules or Cell Size of 5 Inches PV Modules).
g. Connection to overhead water storage tank. Top bend, S.S Fasteners & Erection clamps.
h. Civil work to protect borehole i/e foundation.
i. The pump should operate safely with Sand particles up to (50) gram/m^3.

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

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

29. SOLAR AUTO TRACKER:

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

30. PV MOUNTING FRAME WITH MANUAL TRAKERING :

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

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Steel frame shall be properly designed and shall withstand wind speed/load of at least 130 km/hr and tough weather condition.

31. PRE-SUPPLY TESTING & INSPECTION:

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

32. OPERATION AND MAINTENANCE MANUAL:

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

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

Note:

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

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D - SPECIFICATIONS FOR SOLAR STREET LIGHTS

35. SOLAR STREET / ROAD LIGHT SYSTEM DESIGN:

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

36. LED SOLAR ROAD/STREET LIGHT FIXTURE:

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

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

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

a. The charge controller must be suitable for the required battery voltage, auto voltage recognition feature and capable of charging 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, catalogue & certificates must be attached with the Technical Bid

38. Battery and Controller Box:

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

39. Electric Cable:

The specifications of Electric cables are as under:

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

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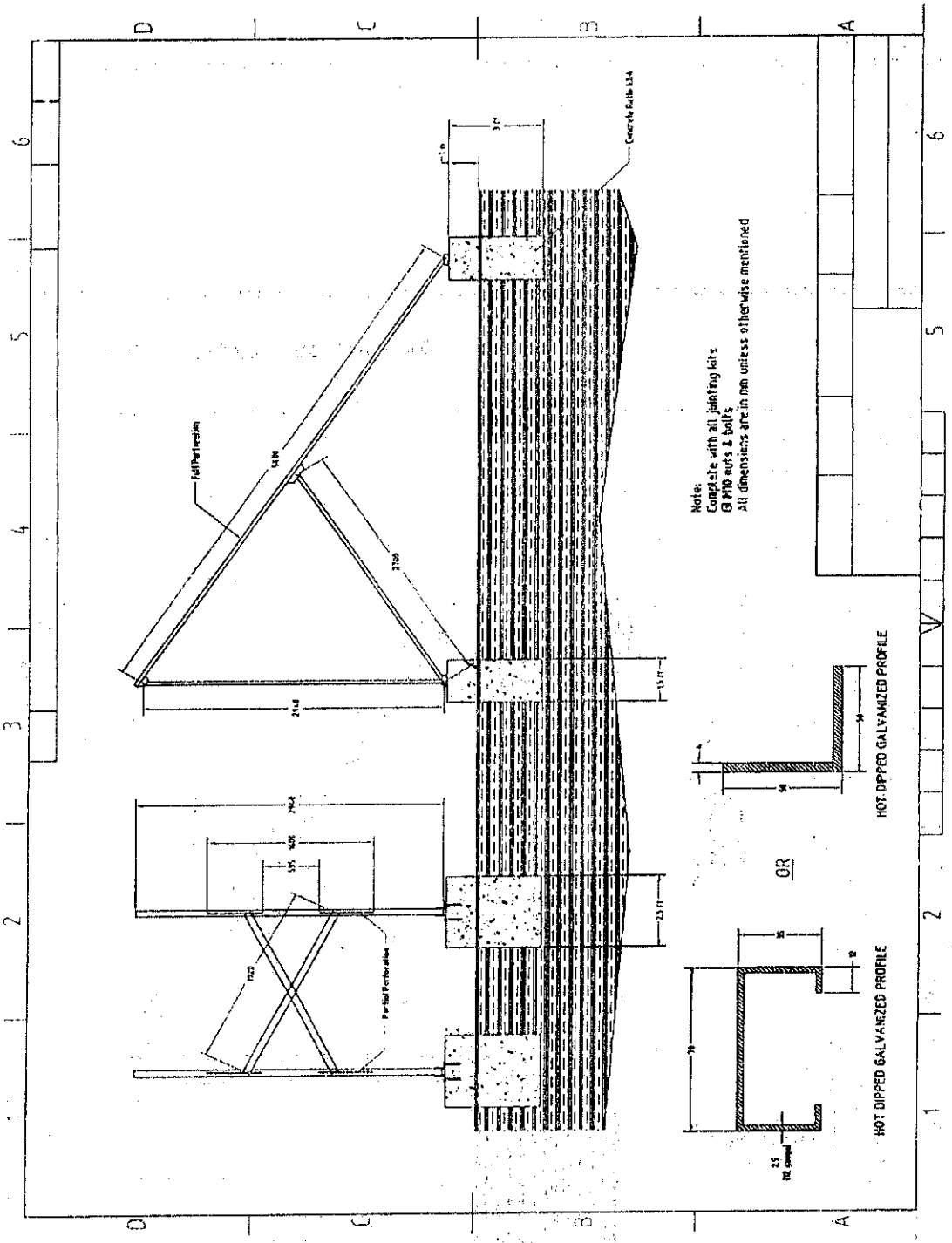
ANNEXURE-1 (STRUCTURE DRAWING)



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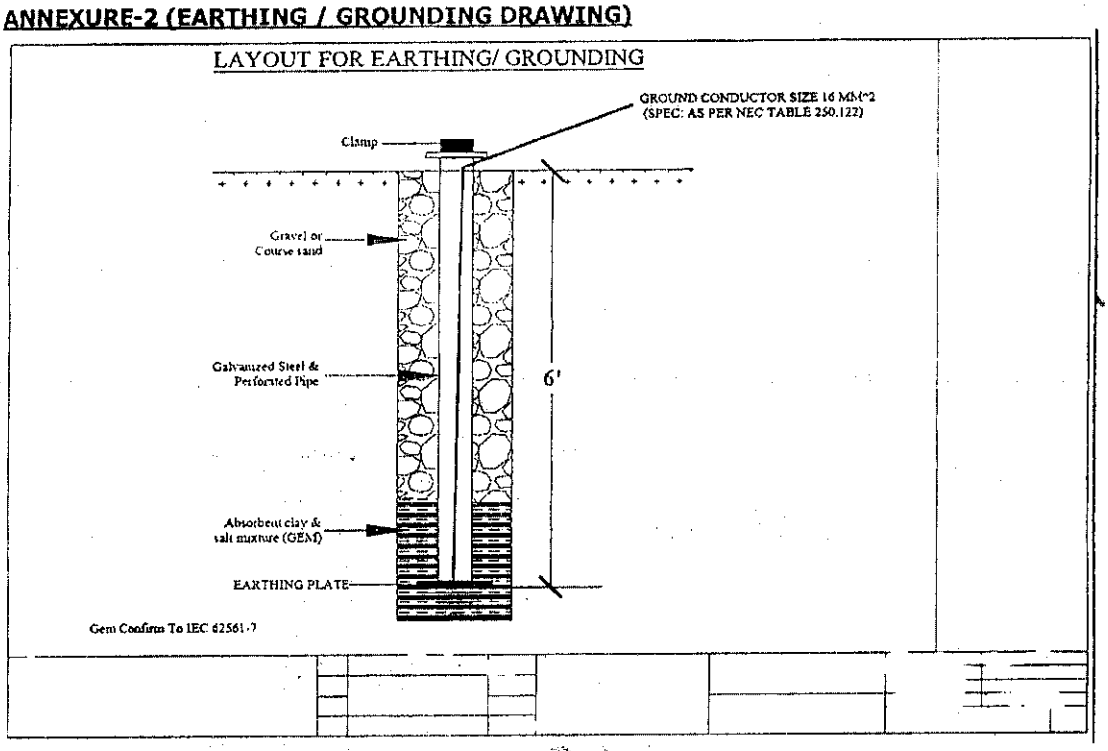
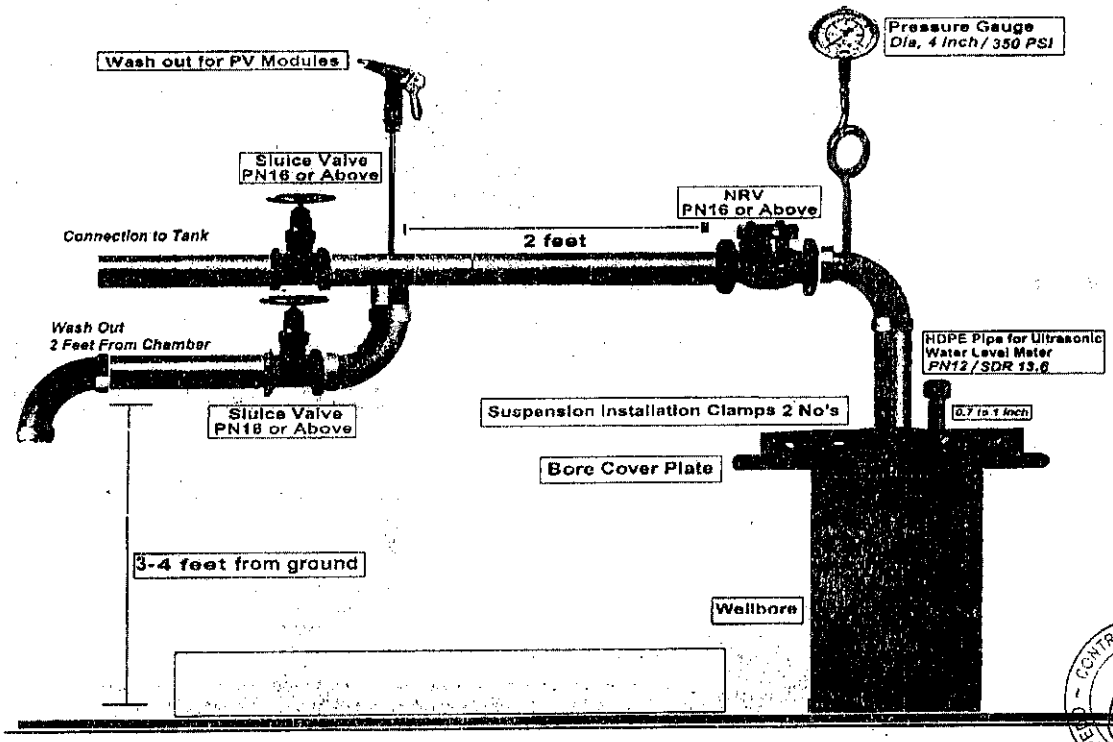
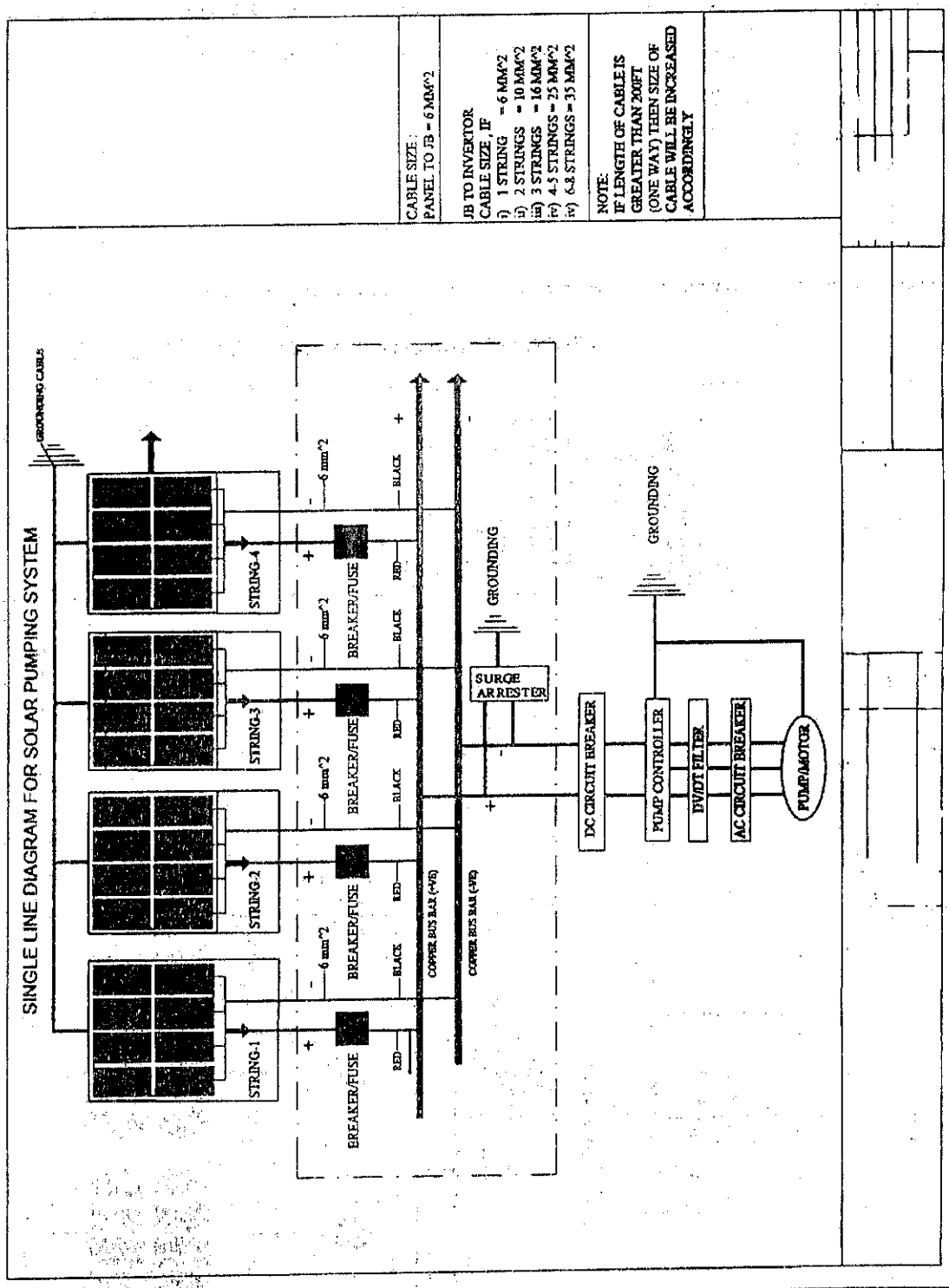
ANNEXURE-2 (EARTHING / GROUNDING DRAWING)



ANNEXURE-3 TOPSET LAYOUT:



ANNEXURE-4 (SYSTEM SINGLE LINE DIAGRAM-PUMPING)



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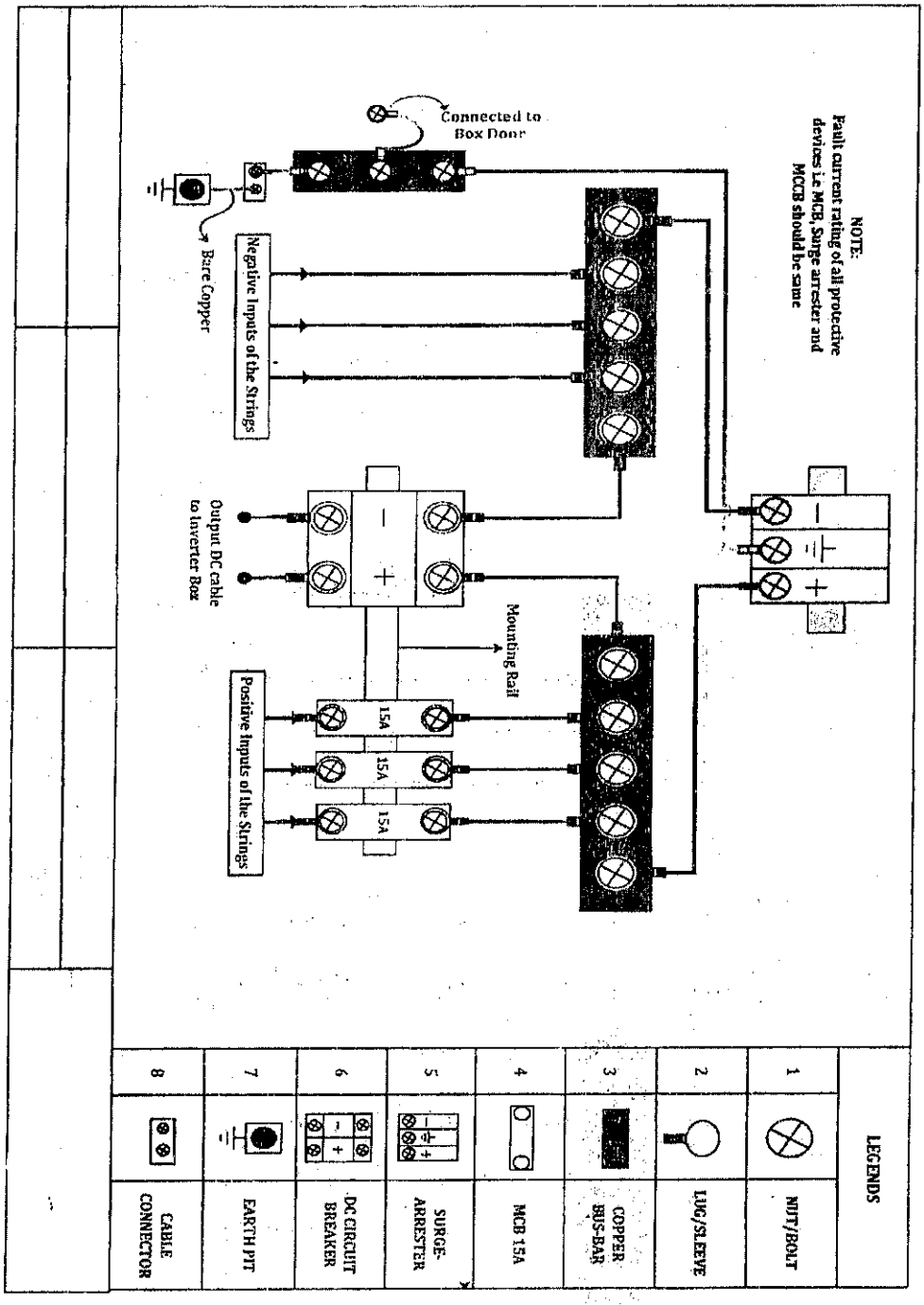
ANNEXURE-5
(JUNCTION/COMBINER BOX SCHEMATICS DIAGRAM)



NO.SO(B)/II-10/Solar Panels/PBC/2018-19/C&WD-Dated-30/01/2019

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42. The Chief Engineer (Merged Area) C&W Department, Peshawar.

Sd/
Secretary C&W

(Engr: Muhammad Imran)
Section Officer (Buildings)

STANDARDIZATION COMMITTEE GOVERNMENT OF KP

ALL IN ONE SOLAR SOLUTION:

All in One Solar Solution must have following;

a. MPPT Charge Controller, Lithium Battery and required protection (Breakers & Fuses).

b. Charge Controller must be of 99% efficient.

c. LCD display for parameters reading.

d. Active BMS Communication between Battery and Charge Controller.

e. Good heating dissipation with heat sink, cooling fans with fan controller.

f. Breakers/Fuses for PV input and Load output.

g. USB Mobile Charging Ports.

h. DC Load Output Ports.

i. Short Circuit Protection.

j. Over Current Protection.

k. Reverse Polarity Protection.

l. Over Charge & Discharge Protection.

m. Should have the IEC-62109-1/ IEC- 62257-9-5/ for DC standalone (all in one) solar system

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