

SCHEDULE - A TO BID: SCHEDULE OF PRICES**A. Price Schedule of Solar PV Systems:****SUMMARY OF BID PRICES**

Item No.	Description	TOTAL INSTALLED CAPACITY kWp	AMOUNT (PKR)	TOTAL UNIT GENERATION YEARLY (Minimum) KWh
(A)	Design, Procurement, Supply, Installation, Testing and Commissioning of On Grid Solar Power System (Store Office, PEB Shed & Car Port).	145.58	20,408,575.00	222,300 KWh
	TOTAL ESTIMATED COST OF THE PROJECT WITH OUT TAX	145.58	20,017,000.00	222,300 KWh
	TOTAL ESTIMATED COST OF THE PROJECT PER WATT WITH OUT TAX	145.58	137.5/watt	222,300 KWh
	TOTAL ESTIMATED TAX AMOUNT OF THE PROJECT	145.58	391,575.00	222,300 KWh
	TOTAL ESTIMATED COST OF THE PROJECT WITH TAX	145.58	20,408,575.00	222,300 KWh
	TOTAL ESTIMATED COST OF THE PROJECT PER WATT WITH TAX	145.58	140/watt	222,300 KWh

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PROJECT TITLE: Design, Supply, Installation, Testing & Commissioning of 145.58 kWp Store Office, PEB Shed Roof & Car Port Mounted Grid Tied Utility Interactive Photo Voltaic Solar Power System at IBA Main Campus

ABSTRACT OF COST

Sr No.	Product	Capacity	Unit	Quantity	Price (PKR)
	<u>Photovoltaic Solar System works</u>	<u>145.58</u>	<u>KW</u>	<u>01</u>	<u>20,408,575.00</u>
	General: The system is designed to cover the Essential loads in IBA Main Campus				
1	The system will be grid interactive connected which will allow many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the grid when PV generates more than the loads.				
2	Contractor shall submit shop drawings for all civil, electrical and a complete photovoltaic solar system works, including a single line diagram showing all the components of the PV system, DC & AC distribution boards, PV Arrays layout, connections and cables, wire cross section for all the system to be approved by the Engineer before executing the work.				
3	Contractor shall submit the catalogues of each component showing the requested specifications stated at the bill of quantity.				
4	The contractor shall submit the Manufacture testing certificate, country of origin, certified characteristics, test performance curves, spare parts regular (as recommended by manufacturer, maintenance manuals and manufacturer's warranty for each components of the system.				
5	As-built drawings shall be submitted after handing over the work.				
6	All DBs will be lockable type.				
7	Upon completion of the installation, the contractor shall organize an onsite training program involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates.				
8	The price includes all builder's works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.				
9	All the following items include Supply, Installation, Testing, Commissioning and Operate of the complete PV Solar System				
10	Contractor must provide Bank Maintenance Guarantee for Period of One year for all components of the Solar System.				

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BOQ of Store Office Building, PEB Shed & Car Port Estimated Capacity 145.58kWp

Sr No	Product	Unit	Qty	Unit Price (PKR)	Amount (PKR)
1	MODULE MOUNTING STRUCTURE STORE OFFICE BUILDING				
i)	Designing, Supplying, Fabrication & Installation of PV Mounting structure (Aluminium/Hot Dip Galvanized), Roof Mount Fixed Tilt angle. The Module Mounted Structure (MMS) shall Comprising of Corrosion resistant anodized aluminium Section or Hot dipped galvanized Steel Profile. The mounting structures and the civil pads must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads etc) min wind speed pressure 150Km/hour in harsh environment. The design submission must be as per ASTM-A36, ASTM-123 and ASCE 7-10, for anodized aluminium AL6005/6063. The mounting structure components are bonded together to guaranty potential equalization. The tilt angle shall be not more than 20 deg for self-cleaning purposes and not less than 5 deg for optimal exposure to direct solar irradiation. The work is to be carried out strictly as per approved drawing, design and specification and the rate quoted is inclusive of the following:	Watt	73080.0	14.11	1,031,280
a	Designing of the structure as per design specification approved				
b	Layout at Site				
c	Footing & Foundation work as per drawing and specification				
d	Placing of Anchor Bolts & Base Plate as per design & length & Details				
e	Tilt angle is to be maintained as per recommended.				
f	The Contractor shall remove all the debris and clear the site as per direction				
g	The Contractor shall submit the detail technical shop drawing before execution of work.				
h	After completion of the work the contractor shall submit the as built drawing.				

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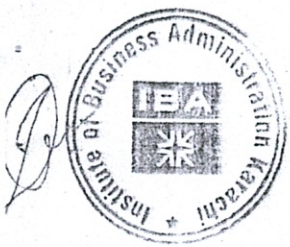


MODULE MOUNTING STRUCTURE CAR PORT		Unit	Qty	Unit Price(PKR)	Amount (PKR)
ii)	Designing, Supplying, Fabrication & Installation of PV Mounting structure (Aluminium), Roof Mount Fixed Tilt angle. The Module Mounted Structure (MMS) shall Comprising of Corrosion resistant anodized aluminium Section Profile. The mounting structures and the civil pads must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads etc) min wind speed pressure 150Km/hour in harsh environment. The design submission must be as per ASTM-A36, ASTM-123 and ASCE 7-10, for anodized aluminium AL6005/6063. The mounting structure components are bonded together to guaranty potential equalization. The tilt angle shall be not more than 20 deg for self-cleaning purposes and not less than 5 deg for optimal exposure to direct solar irradiation. The work is to be carried out strictly as per approved drawing, design and specification and the rate quoted is inclusive of the following:	Watt	50460.0	25.87	1,305,390
a	Designing of the structure as per design specification approved				
b	Layout at Site				
c	Footing & Foundation work as per drawing and specification				
d	Placing of Anchor Bolts & Base Plate as per design & length & Details				
e	Tilt angle is to be maintained as per recommended.				
f	The Contractor shall remove all the debris and clear the site as per direction				
g	The Contractor shall submit the detail technical shop drawing before execution of work.				
h	After completion of the work the contractor shall submit the as built drawing.				

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	<u>MODULE MOUNTING STRUCTURE PEB SHED</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
iii)	Designing, Supplying, Fabrication & Installation of PV Module Mounting structure (MMS) for PEB Shed. The Module Mounted Structure (MMS) shall comprising of Corrosion resistant anodized Aluminium section Profile. The mounting structures must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads etc) min wind speed pressure 150Km/hour in harsh environment. The design submission must be as per ASTM-A36, ASTM-123 and ASCE 7-10, for anodized aluminium AL6005/6063. The mounting structure components are bonded together to guaranty potential equalization. The tilt angle shall flush type along with PEB shed for optimal exposure to direct solar irradiation. The work is to be carried out strictly as per approved drawing, design and specification and the rate quoted is inclusive of the following:	Watt	22040.0	18.81	414,669
a	Designing of the structure as per design specification approved				
b	Layout at Site				
c	Placing of Anchor Bolts & aluminium profile as per design length & Details				
d	Tilt angle is to be maintained as per recommended.				
e	The Contractor shall remove all the debris and clear the site as per direction				
f	The Contractor shall submit the detail technical shop drawing before execution of work.				
gg	After completion of the work the contractor shall submit the as built drawing.				

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2	PV Modules-145.58KWp:	Unit	Qty	Unit Price (PKR)	Amount (PKR)
	<p>Supply, Installation, Testing & Commissioning (SITC) Mono Crystalline N-type 144 Cells Photovoltaic Solar Modules Tier 1 Type anti-reflective high transparency low iron tempered glass, with Earthing provision. The modules STC parameters must be as under</p> <p>(a) Min Power Pmax 580 or above Wp rated power (b) Open circuit voltage (Voc) +/- 5% 48.47V-53.57V (c) MPP Voltage Vmpp 41.2V - 41.8V (d) MPP Current Impp 12.75A - 13.04A (e) Short Circuit Current Isc +/-5% 13.65A- 13.92A (f) Module Efficiency 22.0-22.5% (g) Operating Temp. Degree Centigrade -40 ~ +85 (h) Maximum System Voltage 1500V UL 1000V IEC (i) Maximum Series Fuse Rating 25 A (j) Junction Box Protection Degree, IP 68 (k) Connection box, 4.0mm2 conductor cross section, (m) Cable with, MC4 male and female connectors, (o) Anodized Aluminium Frame and Support Bars (p) PVC duct, Clamps & Accessories, support and labels to be stalled under PV Array.</p> <p>The Contractor shall provide manufacturer warranty for solar panel for a period not less than 25 years. Contractor must submit all the required certificates for each PV solar panel from manufacturer as per specification. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Watt	145580.0	49.45 49.45 	7,199,507

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3	<u>GRID-TIED INVERTER (PCU)</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
	<p>Supply, Installation, Testing & Commissioning (SITC) DC/AC grid tie 3-phase inverter with data communication unit with Ethernet connection. The inverter with must be suited to any PV module configuration, and depending on the system design and installation proposed and for the future extended also. (Leading Market brand, having annual production greater than 1GW). The DC max power input rating should be at least 1.2 times of AC power at standard test condition (STC). The inverter unit shall be suitable for indoor and outdoor installations with IP65.</p> <p>i) The inverter must include the safety concepts such as (triple protection with Opti protect, electronic strings fuses, self-learning string failure detection, DC surge arrester type (2) to ensure max availability. The inverter includes online monitoring feature. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p> <p>Make: Sungrow/Huawei/SMA Power Rating: 110KW & above</p> <p>Brief specification is as under:</p>	Each	1	2,566,990	2,566,990
	<p>a</p>	<p>Max Input DC Voltage: 1100V</p>			
	<p>b</p>	<p>MPPT Operating Voltage Range : 200V~1000V,</p>			
	<p>c</p>	<p>Min 10 Independent MPPT Trackers,</p>			
	<p>d</p>	<p>Minimum Efficiency 98.0%,</p>			
	<p>e</p>	<p>Warranty : 10 Years</p>			
	<p>f</p>	<p>Inverter should be compatible with the existing installed inverters for online monitoring on a single platform.</p>			
	<p>g</p>	<p>Certification Required : EN 62109-1/-2, IEC 62109-1/-2, EN 50530, IEC 62116, IEC 60068, IEC 61683, IEC 61000-6-3, EN 50549</p>			

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4	<u>DC BOX</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
a	<p>DC Combiner Box for Store Office, PEB Shed & Car Port</p> <p>Supply, Installation, Testing & Commissioning (SITC) of DC box/Array Junction Box with all accessories for indoor usage with proper cable glands as per cable size. DC Combiner Box shall be provided One SPD (Surge Protection device) and One DC Fuse Protection 2Pole per string.</p> <p>DC Fuse Protection 2 Pole 20A/25A,1000VDC, Qty=14 DC SPD's Type II , Qty=14</p> <p>Fuse Make: Schnieder/ABB/Zjbeny or Equivalent DC SPD's Make: Schnieder/Dehn/Zjbeny or Equivalent</p>	Each	1	647,968	647,968
5	<u>AC COMBINER BOX (LV PANEL)</u>				
a	<p>LV Panel for Store Office, PEB Shed & Car Port</p> <p>Supply, Installation, Testing & Commissioning (SITC) of AC Combiner Box (LV Panel) with wall mounted, locally fabricated in 16 gauge, Colour Code:RAL7035, MS Powder Coated, Copper Glands, Lugs, Phase indication lights, Digital Ammeter & Voltmeter, bus bar Tin Coated for 3 Phases, Neutral & Earth with Polycarbonate cover. Glands at Bottom In & Out, CT's, Energy meter with all related accessories for outdoor usage (IP Rating 42) with dust proofenclosure.</p> <p>AC Breaker 250A adj,4P,MCCB,400V/415V, Qty:01 AC SPD 4Pole, 40kA with HRC Fuses Energy Meter: Janitza or Equivalent CT's: Ficco/Saci or Equivalent MCCB Make: Schnieder/ABB/Terasaki or Equivalent</p>	Each	1	651,381	651,381

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6	<u>CABLES</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
a	DC CABLES				
	Supply, Installation & Testing of DC Cable, 1 Core 6mm ² Cu/XLPO/XLPO cable complete in all respect with accessories to connect the PV solar cells together and to the inverter directly to have a complete operational circuit, clamps, trays and cable end terminations which shall be DC plug and socket connectors. The allowable voltage drop for DC cables between PV Arrays and inverter less than 1%. Minimum voltage capacity 1500VDC, Highest permissible voltage conductor/conductor should be 1.8kV DC, Standard Double insulated: Cross link polyolefin, Tinned copper conductor: Certified from DIN VDE 0295 CL.5, Fine-wire, IEC 60228 CL.5, Cable should be Certified from TUV Approved. Standard: EN50618 Make: Pakistan Cable/Fast Cable/ Jiukai or Equivalent as Engineer Approved.	Meter	2850	482.12	1374,039
b	AC Cables				
	Supply, Connecting and termination of the power cables with all required works in different sizes of ducts/pipes, Cable lugs, clamps and all needed fittings to connect cables terminals from source to destination. According to drawings, specifications, instructions, and demand of the supervising engineer as follow: Brand: Pakistan Cable/Fast Cable or Equivalent as Engineer Approved.				
i)	4C x 95mm ² , 0.6/1kV Cu/XLPE/PVC Pure Copper	Meter	20	21,701.23	434,025
c	Earthing Cables				
	Supply, Installation & Testing of Earthing Cable, Including PVC Pipe with related accessories. Brand: Pakistan Cable/Fast Cable or Equivalent as Engineer Approved.				
i)	1 core 2.5/4 sqmm, CU/PVC/FLEX (Green)	Meter	360	188.14	67,732
ii)	1 core, 16 sqmm, Bare Conductor	Meter	50	2,586.98	129,349
iii)	1 core, 50 sqmm, CU/PVC/FLEX (Green)	Meter	20	11,664.93	233,299
iv)	1 core, 10 sqmm, CU/PVC/FLEX (Green)	Meter	45	1,424	64,081



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7	<u>EARTHING SYSTEM</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
i)	Supply, Installation, testing and commissioning of Earth Electrodes (Rod Type) for Earthing System with 25mm Dia 3 meters (10feet) long driven copper rod, complete with clamps lugs, washer/bolts, connected with 2x70mmsq bare copper 50mm dia G.I pipe/UPVC pipe class 'D/E' up to Earth chamber, job includes cad-welding of copper conductor to earth electrode rod at one end and provision/fixing of cable lugs at other end, including all accessories and RCC inspection chamber, heavy duty G.I. Cover having earth symbol, etc as per the specifications and Drawings and to the entire satisfaction and approval of the Engineer. Earthing result should be less than 5 Ohm for AC combiner, less than 1 Ohm for DC combiner and less than 5 Ohm for structure/lighting protection system.	Each	5	37,475.93	187,380
8	<u>LIGHTNING PROTECTION SYSTEM</u>				
	Air-Terminal				
i)	Supply, Installation, Testing & Commissioning of Early Streamer Emission (ESE) type lightning arrestor. Supporting Mast The mounting pole used to support the lightning air terminal shall be minimum length of 05 Mtr. non-corrosive and made up of medium class GI / SS pipe of 1.5" diameter having base plate at bottom for securely fixing the mast on roof top. The mounting pole and supports shall be securely fixed with the brackets to withstand the maximum wind velocity of that area. All the work should be carried out as per the specified specifications and instruction of the Engineer-in-Charge. Protection Radius : Minimum 80 Mtr. Protection Level: II	Each	1	40,692 40,692	40,692
	Lightning Strike Counter:				
ii)	Supply, Installation, Testing & Commissioning of non-electronic & non-resettable (Not require any external power supply) type lightning strike counter to count the lightning stroke having display with IP-67 enclosure including all accessories and connection. (6/7 digit)	Each	1	16,962	16,962

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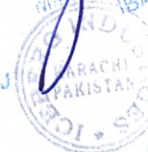


9	<u>REMOTE MONITORING SYSTEM</u>	Unit	Qty	Unit Price (PKR)	Amount (PKR)
	DATA MANAGER/DATA LOGGER with REMOTE MONITORING SYSTEM				
i)	<p>Design, Supply, installation, testing and commission of data Manager with Remote Monitoring System consists of the following parameter:</p> <ul style="list-style-type: none"> a) Total energy generation of PV Plant b) Instantaneous Power been generated by solar PV plant c) Performance ratio of PV plant d) Current load of client e) Load profile v/s energy generation. f) Daily Solar Plant report in PDF from <p>Data should be store on server for not more than 10 min time interval. Data must be access through internet via user friendly GUI.</p>	Each	1	2,616	2,616
10	<u>CABLE TRAY</u>				
i)	<p>Supply and installation of following sizes 16SWG heavy duty G.I Perforated Cable Tray 100mm x 75mm with 16 SWG G.I. Covers as per details given in the drawings and specifications. Complete with all installation material such as angle iron support of size, MS round bar, elbows, Tee, Nuts, Bolts, Washer, Hilti drop-in anchour, etc. Complete in all respect, as per the specification and drawings.</p>	Meter	30	3,527.7	105,831
ii)	<p>Supply and installation of following sizes 16SWG heavy duty G.I Perforated Cable Tray 150mm x 75mm with 16 SWG G.I. Covers as per details given in the drawings and specifications. Complete with all installation material such as angle iron support of size, MS round bar, elbows, Tee, Nuts, Bolts, Washer, Hilti drop-in anchour, etc. Complete in all respect, as per the specification and drawings.</p>	Meter	15	4,521.3	67,820

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11	CIVIL & MISCELLANEOUS WORK	Unit	Qty	Unit Price (PKR)	Amount (PKR)
i)	Supply and installation of 3 inch UPVC Class E conduit sockets, Bends, Elbows, T-Joints, Clamps, complete in all respects.	Meter	60	15,051.5	903,091
ii)	Providing & Supply of adjustable & moveable trolley type ladder with working plate form for cleaning of Solar PV Modules, Maximum height of 5'-0"	Each	1	1,763,850	1,763,850
iii)	Construct of concrete manholes/cable chambers (900mm x 900mm x 900mm deep) with heavy duty RCC covers with anti-rust paint, including all required sleeves for pulling underground power cables laid in pipes.	Each	1	259,903	259,903
v)	Removing of heat insulation tiles from roof to designated dumping point as directed by client Engineer	Job	1	293,975	293,975
vi)	Re-fixing pavers as in position including providing sand etc required & Removal/Cutting of trees etc.	Job	1	293,975	293,975
Total Cost in PKR without Tax				20,017,000.00	
Tax Amount				391,575.00	
Total Cost in PKR with Tax				20,408,575.00	

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