



## **Project Strengthening Institutional and Economic Resilience in Yemen (SIERY)**

**مشروع / تعزيز المرونة المؤسسية والاقتصادية في اليمن (SIERY)**

**BOQs for Supplying and installing a solar energy system for 5 School, Education Office Building With Solar System Maintenance for 3 schools in Khawr Maqsar District - Aden Gov.-Aden**

**جداول الكميات والمواصفات لتوريد وتركيب واختبار منظومة طاقة شمسية لعدد ٥ مدارس بالإضافة الي مكتب التربية مع صيانة منظومة شمسية ل ٣ مدارس في مديرية خور مكسر - محافظة عدن**

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### SUMMARY

N	Facility	Unit	Qty.	Unit Price (USD)	Total Price (USD)
1	Comprehensive international School for Boys	NO	1		
2	Abdul Bari Qasim School	NO	1		
3	Al-Amal Kindergarten	NO	1		
4	Abdullah Khalifa School	NO	1		
5	Abdel Wahed Abbad School	NO	1		
6	Education Office Building	NO	1		
7	Al-Arish School	NO	1		
8	Al-Gala'a School	NO	1		
9	Al-Sa'adah School	NO	1		
TOTAL					

### ملاحظة:

يجب علي المقاول تقديم خطة تفصيلية لتنفيذ الاعمال مع مراعاة الفترة الزمنية باقل فترة ممكنة لتنفيذ الاعمال من خلال تكثيف فرع العمل وبما لا يخل بالجودة.

علي المقاول تقديم جميع الكتلوجات وصور ومواصفات المواد والمعدات التي سيقوم بتوريدها ورافاقها ضمن وثائق العطاء.

المقاول مسؤولاً عن تقديم دورة تدريبية تركز علي تشغيل النظام الشمسي وصيانتة وإدارته، ويجب ان يقترح المقاول نطاق التدريب والجدول الزمني ويوافق عليه الاستشاري.

يجب علي المقاول قبل وضع اسعارة زيارة الموقع والتحقق من واقع الحال، ودراسة فصل الاحمال الثقيلة قبل التنفيذ وفحص الكابلات الكهربائية. ولوحات التوزيع، ووضع الحلول لكل ماسبق وعلى حسابة

يجب ان يتم تصنيع جميع المعدات الموردة من قبل مصنعين عالميين مشهورين وذات جودة عالية درجة أولى ومعايير معتمدة وشهادة اختبار من طرف ثالث مستقل ويجب أن يكون جميع المواد والمعدات مدعومة بكافة التفاصيل والبيانات الفنية وعلي احضار عينات قبل التوريد لاعتمادها من قبل المهندس الاستشاري ولن تقبل أي مواد لم يتم اعتمادها مسبقاً.

يجب علي المقاول إجراء تقارير اختبار طرف ثالث للبطاريات والعاكسات، الألواح الشمسية، قواطع الدائرة، والكابلات، إلخ، الخ حسب المعايير المعمول بها.

المقاول مسؤول عن صيانة النظام لمدة عام بما في ذلك زيارات الصيانة الوقائية.

علي المقاول عمل دليل تشغيل وصيانة ولوحة ارشادية بأجراءات التشغيل في الاوقات الطبيعية وفي حالة حدوث اي حوادث.



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### Specifications & BOQ of the Project : Solar System Installation for international School

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
ملاحظة: يجب ارفاق جميع الكتلوجات ومواصفات وصور العينات							
<b>ELECTRICAL WORKS</b>							
1	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 580W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	24				



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<b>ELECTRICAL WORKS</b>							
2	<b>Solar Hybrid inverter</b>						
2.0	Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications: <ul style="list-style-type: none"> <li>- Inverter type : <b>Three phase and Max 10 pcs parallel (It can be connected as parallel Inverter)</b></li> <li>- <b>Rated power : 12 KW.- Max. PV Input Power :15600 W</b></li> <li>- Output voltage : 230/220 VAC per phase</li> <li>- Frequency : 50 Hz.</li> <li>- Battery voltage : <b>48 VDC .</b></li> <li>- Compatible for use with lithium batteries.</li> <li>- Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A.</li> <li>- Maximum charging capacity not less than 200 A.</li> <li>- <b>Voltage range 150-425 VDC, and Voc not less than 500VDC,</b></li> <li>- Hybrid inverter with charger that supports external power supply from the best types in the market.</li> <li>- The contractor must provide a catalog before supply in accordance with the specifications, .</li> <li>- The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.</li> </ul>					Notes	
2.1	<b>Hybrid inverter: 12Kw</b>	Pcs	1				



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<b>ELECTRICAL WORKS</b>							
4	<b>Solar Battery with Racks</b>						
4.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <p><b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b></p> <p><b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b></p> <p>- Built-in intelligent <b>BMS and RS, CAN,,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</p> <p>- Reliable performance at high operating temperatures of up to 50° C;</p> <p>- One brand of battery shall be used for the entire installation;</p> <p>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</p> <p>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</p> <p><b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b></p> <p>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</p> <p>-This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</p> <p>- Product warranty shall be 5 years;</p>					Note	
4.1	<b>Battery Capacity :100AH</b>	Pcs	4				



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<b>ELECTRICAL WORKS</b>							
5	<b>DC Combiner Box (DCCB)</b>						
5.1	Supply, install, test, and commissioning of DC Combiner Box <b>4 input, 4 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation,IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string:1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
6	<b>DC Cabling</b>						
6.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
6.1	(1C*6 sqr.mm) (Red& Black)	M	140				
6.2	(1C*25 sqr.mm) (Red& Black)	M	30				



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<b>ELECTRICAL WORKS</b>							
7	<b>AC Cabling</b>						
7.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XLPE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;						Note
7.1	<b>4C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	15				
8	<b>Inverter and Battery DC Breakers Box</b>						
8.1	Supply, install, test and commission <b>DC breakers box including 2X200 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessories as per drawings	Pcs	1				



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<b>ELECTRICAL WORKS</b>							
9	<b>AC Coupling Panel</b>						
9.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram <b>(Three phase one inverter)</b> - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				





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<b>ELECTRICAL WORKS</b>							
<b>10</b>	<b>Earthing System</b>						
10.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	3				
<b>11</b>	<b>Lighting Protection System</b>						
11.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories - <b>lighting arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				



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<b>ELECTRICAL WORKS</b>							
<b>12</b>	<b>Main Distibution Board and MDBs</b>						
12.1	Supply, install, wire, test, and commissioning of essential loads AC distribution board ( <b>EMDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - Warranty: at least 1 year.	Pcs	1				
<b>13</b>	<b>Automatic Transfer Switch</b>						
13.1	Supply, install, test, and commissioning of Low Voltage <b>ATS 4P, 100A, 2 ways</b> as per technical specifications including metal enclosure	Pcs	1				
<b>14</b>	<b>Ventilation System</b>						
14.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				



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<b>ELECTRICAL WORKS</b>							
15	<b>Alarm System</b>						
15.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
15.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
15.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				
16.0	<b>Others</b>						
16.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - <b>Including all accessories, removing old items and installing the new ones,</b>	Pcs	80				



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<b>ELECTRICAL WORKS</b>							
16.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications <ul style="list-style-type: none"> <li>- Lamp luminous efficacy: not less than 90 lm/W;</li> <li>- Cap type &amp; base: bayonet bulbs- B22d-BC/ E27;</li> <li>- Color temperatures (CCT): 5000 K to 6500 K;</li> <li>- Input Voltage and frequency: 220V, 50 Hz;</li> <li>- Operation temperature rang: up to 50°C;</li> <li>- Certification: All related certificates shall be provided such CE, RoHS;</li> <li>- Warranty: at least two years.</li> <li>- <b>Including all accessories, removing old items and installing the new ones,</b></li> </ul>	Pcs	20				
16.3	Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) <ul style="list-style-type: none"> <li>- LED outdoor light shall withstand all the weather and working conditions and corrosive environment;</li> <li>- <b>LED light 40-50 W;</b></li> <li>- Lamp luminous efficacy: not less than 90 lm/w;</li> <li>- Voltage rating: 220-240 VAC, 50 Hz ±2%;</li> <li>- The color temperature range: 5000K – 6500K;</li> <li>- Deigned with IP 65 protection;</li> <li>- Operating Temperature range: up to 40°C;</li> <li>- Certification: All related certificates shall be provided such CE, RoHS;</li> <li>- Wall Mounted type;</li> <li>- Warranty: at least two years.</li> </ul>	Pcs	4				



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### Specifications & BOQ of the Project : Solar System Installation for international School

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
ملاحظة: يجب ارفاق جميع الكتلوجات ومواصفات وصور العينات							
<b>ELECTRICAL WORKS</b>							
16.4	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; - <b>speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. - <b>Including all accessories, removing old items and installing the new one</b>	Pcs	40				
16.5	Supply, install, test and commissioning of <b>1 RT Spilt Air Condition inverter type</b> include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; - <b>Including all accessories switches, new wires and trunky</b>	Pcs	1				



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<b>ELECTRICAL WORKS</b>							
<b>17</b>	<b>Project sign boards</b>						
17.1	Supply, installation, and maintenance of project signboard (1.6m x 1.4m and 1.2m from ground) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>18</b>	<b>System Training</b>						
18.1	Carrying our training as per required.	LS	~				
<b>SUB TOTAL ELECTRICAL</b>							
<b>CIVIL WORKS</b>							
<b>19</b>	<b>Rooftop Mounting Structure:</b>						
<b>19.0</b>	<b>General Requirements:</b>						<b>Note</b>
19.0	The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval. - All works shall be done according to the Engineer's instructions, Drawings, and attached specification. - The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement. - Benchmark and leveling network shall be approved prior to starting next works. - The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings . - <b>This work prepared to cover 8 solar panels (2278mm x 1135mm) approximately.</b> - Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels						Note



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						[USD]	[USD]
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<b>ELECTRICAL WORKS</b>							
19.1	<p><b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b></p> <ul style="list-style-type: none"> <li>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (min galvanized 60~120mic) with minimum yield strength of 240Mpa .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (min Fc' = 30Mpa for 28 days as ASTM Standers) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</li> <li>- As ASTM all bolts is A325 or A490 high strength bolts.</li> <li>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) column channel C75X35X2.8 ~ 3mm with base plate P200x200x6mm As Per Drawings And Included: <ul style="list-style-type: none"> <li>• 4Ø14mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• L=6cm welded with 2.8 ~ 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> </li> </ul> <p>The columns details As following:  Chanel C75X35X3mm L =600±150 mm  Chanel C75X35X3mm L =1420± 150 mm  - Beam And Bracing Structure Mounting  As per technical specification and drawings details.  Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) beam channel C75X35X2.8 ~ 3mm and C80X40X2.8 ~ 3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.  - Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) bracing channel C75X35X2.8 ~ 3mm L=1520±150 mm with Ø14mm connection bolts with 25 mm length at all ends.  - The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.</p>						
<b>SUB TOTAL CIVIL</b>							
<b>TOTAL PRICE</b>							



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>ELECTRICAL WORKS</b>							
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 650W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	32				





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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
2	<b>Solar Hybrid inverter</b>						
2.0	<p>Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications:</p> <ul style="list-style-type: none"> <li>- Inverter type : <b>Three phase and Max 10 pcs parallel (It can be connected as parallel Inverter)</b></li> <li>- <b>Rated power : 12 KW.- Max. PV Input Power :15600 W</b></li> <li>- Output voltage : 230/220 VAC per phase</li> <li>- Frequency : 50 Hz.</li> <li>- Battery voltage : <b>48 VDC .</b></li> <li>- Compatible for use with lithium batteries.</li> <li>- Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A.</li> <li>- Maximum charging capacity not less than 200 A.</li> <li>- <b>Voltage range 150-425 VDC, and Voc not less than 500VDC,</b></li> <li>- Hybrid inverter with charger that supports external power supply from the best types in the market.</li> <li>- The contractor must provide a catalog before supply in accordance with the specifications, .</li> <li>- The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.</li> </ul>					Notes	
2.1	<b>Hybrid inverter: 12Kw</b>	Pcs	2				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
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3	<b>Solar Battery with Racks</b>						
3.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <p><b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b></p> <p><b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b></p> <p>- Built-in intelligent <b>BMS and RS, CAN,,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</p> <p>- Reliable performance at high operating temperatures of up to 50° C;</p> <p>- One brand of battery shall be used for the entire installation;</p> <p>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</p> <p>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</p> <p><b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder,</b> the battery rack busbars shall be covered.</p> <p>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</p> <p>-This item includes any addittional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</p> <p>- Product warranty shall be 5 years;</p>				Note		
3.1	<b>Battery Capacity :100AH</b>	Pcs	6				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>4</b>	<b>DC Combiner Box (DCCB)</b>						
4.1	Supply, install, test, and commissioning of DC Combiner Box <b>4 input, 4 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation, IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string: 1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
<b>5</b>	<b>DC Cabling</b>						
5.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
5.1	(1C*6 sqr.mm) (Red& Black)	M	340				
5.2	(1C*25 sqr.mm) (Red& Black)	M	60				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
6	<b>AC Cabling</b>						
6.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulationg material 1kV XPPE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;				Note		
6.1	<b>4C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	140				
6.2	<b>4C*25sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	20				
7	<b>Inverter and Battery DC Breakers Box</b>						
7.1	Supply, install, test and comission <b>DC breakers box including 4X200 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessires as per drawings	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>8</b>	<b>AC Coupling Panel</b>						
8.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram <b>(Three phase 2 inverter)</b> - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				
<b>9</b>	<b>Earthing System</b>						
9.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>10</b>	<b>Lighting Protection System</b>						
10.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories - <b>lighting arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; - <b>Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				
<b>11</b>	<b>Main Distibution Board and MDBs</b>						
11.1	Supply, install, wire, test, and commissioning of sub distribution board ( <b>EMDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				

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جداول الكميات والمواصفات لتوريد وتركيب واختبار منظومة طاقة شمسية لعدد ٥ مدارس بالإضافة الي مكتب التربية مع صيانة منظومة شمسية ل ٣ مدارس في مديرية خور مكسر - محافظة عدن

#### Specifications & BOQ of the Project : Solar System Installation for A. Barey Qassem School

ملاحظة: يجب ارفاق جميع الكتلوجات ومواصفات وصور العينات

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
11.2	Supply, install, wire, test, and commissioning of sub distribution board (A/C SDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	4				
<b>12</b>	<b>Automatic Transfer Switch</b>						
12.1	Supply, install, test, and commissioning of Low Voltage <b>ATS 4P, 100A, 2 ways</b> as per technical specifications including metal enclosure	Pcs	1				
<b>13</b>	<b>Ventilation System</b>						
13.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				



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						[USD]	[USD]
<b>14</b>	<b>Alarm System</b>						
14.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
14.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
14.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				
<b>15.0</b>	<b>Others</b>						
15.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - <b>Including all accessories, removing old items and installing the new ones,</b>	Pcs	100				





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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
15.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications - Lamp luminous efficacy: not less than 90 lm/W; - Cap type & base: bayonet bulbs- B22d-BC/ E27; - Color temperatures (CCT): 5000 K to 6500 K; - Input Voltage and frequency: 220V, 50 Hz; - Operation temperature rang: up to 50°C; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty: at least two years. <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	20				
15.3	Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) - LED outdoor light shall withstand all the weather and working conditions and corrosive environment; <b>- LED light 40-50 W;</b> - Lamp luminous efficacy: not less than 90 lm/w; - Voltage rating: 220-240 VAC, 50 Hz ±2%; - The color temperature range: 5000K – 6500K; - Deigned with IP 65 protection; - Operating Temperature range: up to 40°C; - Certification: All related certificates shall be provided such CE, RoHS; - Wall Mounted type; - Warranty: at least two years.	Pcs	4				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
15.4	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one, installing power sockets, switches, speed controllers, replacing old wires with new wires.</b>	Pcs	40				
15.5	Supply, install, test and commissioning of <b>1 RT Spilt Air Condition inverter type</b> include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; <b>- Including all accessories switches, new wires and trunky</b>	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
15.6	Supply and wiring <b>25A wall mount Switch for Split Type Air Conditioner</b> , with all necessary components and earthing <b>insulated copper (3x4 sq.mm) wire run inside the trunking</b> including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	18				
<b>16</b>	<b>Project sign boards</b>						
16.1	Supply, installation, and maintenance of project signboard <b>(1.6m x 1.4m and 1.2m from ground)</b> as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>17</b>	<b>System Training</b>						
17.1	Carrying our training as per required.	LS	~				
<b>SUB TOTAL ELECTRICAL</b>							
<b>CIVIL WORKS</b>							
<b>18</b>	<b>Rooftop Mounting Structure:</b>						
<b>18.0</b>	<b>General Requirements:</b>					<b>Note</b>	
18.0	The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval. - All works shall be done according to the Engineer's instructions, Drawings, and attached specification. - The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement. - Benchmark and leveling network shall be approved prior to starting next works. - The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings . - <b>This work prepared to cover 8 solar panels (2384mm x 1303mm) approximately.</b> - Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels						Note

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
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18.1	<p><b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b></p> <ul style="list-style-type: none"> <li>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (<b>min galvanized 60~120mic</b>) <b>with minimum yield strength of 240Mpa</b> .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (<b>min Fc'= 30Mpa for 28 days as ASTM Standers</b>) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</li> <li>- As ASTM all bolts is A325 or A490 high strength bolts.</li> <li>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) column channel C75X35X2.8 ~ 3mm with base plate P200x200x6mm As Per Drawings And Included: <ul style="list-style-type: none"> <li>• 4Ø14mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• L=6cm welded with 2.8 ~ 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> </li> </ul> <p>The columns details As following:  Chanel C75X35X3mm L =600±150 mm  Chanel C75X35X3mm L =1420± 150 mm  - Beam And Bracing Structure Mounting  As per technical specification and drawings details.  Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) beam channel C75X35X2.8 ~ 3mm and C80X40X2.8 ~ 3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.  - Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) bracing channel C75X35X2.8 ~ 3mm L=1520±150 mm with Ø14mm connection bolts with 25 mm length at all ends.  - The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.</p>	Sqr.m	100				
		Note					



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price	
						[USD]	[USD]	
19	<b>cable trench</b>							
19.1	"Excavation (in all types of soil, tiles ,concrete,stone, Asphalt and Asphalt pavement,etc)) and backfill of cable trench with cross section size of 0.8 meter depth and 0.6 meter width including shoring and shuttering works (If Required). The items includes disposal of surplus excavated materials outside to any unobjectionable place to be identified by contractor at his own cost, import approved backfill materials (If Required), leveling, watering and compacting. The item includes reconstruction the top layer or pavement with approved materials to its original condition . -Supply/import and lay approved sand bedding/covering materials (to be sieve sand) under (One layer, 15 cm thick) and over (Two layers, each 10cm thick) the power cable -Supply and install protection tiles as a safety warning over the power cable -Supply and install safety warning tape over the power cable protection tiles."	L.M.	22					
19.2	Supply installation & construction of Inspection manholes (size 1.0m x 1.0m x 1.0m) with plain concrete base (15cm thick) and concrete solid block walls (block size 20x20x40cm) and ductile cast iron frame and hinged cover (size 60x60cm) including excavation, disposal of surplus earth, fittings, testing, cement rendering and back filling and any others as per engineer instructions.	No.	3					
<b>SUB TOTAL CIVIL</b>								
<b>TOTAL PRICE</b>								



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>ELECTRICAL WORKS</b>							
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 650W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	16				
<b>2</b>	<b>Solar Hybrid inverter</b>						
2.0	Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications: - Inverter type : <b>Three phase and Max 10 pcs parallel (It can be connected as parallel inverter)</b> - <b>Rated power : 10 KW.- Max. PV Input Power :13000 W</b> - Output voltage : 230/220 VAC per phase - Frequency : 50 Hz. - Battery voltage : <b>48 VDC .</b> - Compatible for use with lithium batteries. - Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A. - Maximum charging capacity not less than 200 A. - <b>Voltage range 150-425 VDC, and Voc not less than 500VDC,</b> - Hybrid inverter with charger that supports external power supply from the best types in the market. - The contractor must provide a catalog before supply in accordance with the specifications, . - The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal,						Notes
2.1	<b>Hybrid inverter: 10Kw</b>	Pcs	1				

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						[USD]	[USD]
4	<b>Solar Battery with Racks</b>						
4.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <p><b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b></p> <p><b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b></p> <p>- Built-in intelligent <b>BMS and RS, CAN,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</p> <p>- Reliable performance at high operating temperatures of up to 50° C;</p> <p>- One brand of battery shall be used for the entire installation;</p> <p>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</p> <p>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</p> <p><b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b></p> <p>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</p> <p>-This item includes any addittional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</p> <p>- Product warranty shall be 5 years;</p>				Note		
4.1	<b>Battery Capacity :100AH</b>	Pcs	3				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
5	<b>DC Combiner Box (DCCB)</b>						
5.1	Supply, install, test, and commissioning of DC Combiner Box <b>2 input, 2 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation, IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string: 1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
6	<b>DC Cabling</b>						
6.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
6.1	(1C*6 sqr.mm) (Red& Black)	M	150				
6.2	(1C*25 sqr.mm) (Red& Black)	M	30				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>7</b>	<b>AC Cabling</b>						
7.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XPLE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;				Note		
7.1	<b>4C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	60				
<b>8</b>	<b>Inverter and Battery DC Breakers Box</b>						
8.1	Supply, install, test and commission <b>DC breakers box including 2X200 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessories as per drawings	Pcs	1				
<b>9</b>	<b>AC Coupling Panel</b>						
9.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram <b>(Three phase for one inverter)</b> - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>10</b>	<b>Earthing System</b>						
10.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				
<b>11</b>	<b>Lighting Protection System</b>						
11.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories <b>- lighting arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	1				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>12</b>	<b>Main Distibution Board and MDBs</b>						
12.1	Supply, install, wire, test, and commissioning of sub distribution board ( <b>EMDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				
12.2	Supply, install, wire, test, and commissioning of sub distribution board ( <b>A/C SDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				
<b>13</b>	<b>Automatic Transfer Switch</b>						
13.1	Supply, install, test, and commissioning of Low Voltage <b>ATS 4P, 100A, 2 ways</b> as per technical specifications including metal enclosure	Pcs	1				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>14</b>	<b>Ventilation System</b>						
14.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				
<b>15</b>	<b>Alarm System</b>						
15.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
15.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
15.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				
<b>16.0</b>	<b>Others</b>						
16.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - <b>Including all accessories, removing old items and installing the new ones</b>	Pcs	60				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
16.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications - Lamp luminous efficacy: not less than 90 lm/W; - Cap type & base: bayonet bulbs- B22d-BC/ E27; - Color temperatures (CCT): 5000 K to 6500 K; - Input Voltage and frequency: 220V, 50 Hz; - Operation temperature rang: up to 50°C; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty: at least two years. <b>- Including all accessories, removing old items and installing the new ones</b>	Pcs	20				
16.3	Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) - LED outdoor light shall withstand all the weather and working conditions and corrosive environment; <b>- LED light 40-50 W;</b> - Lamp luminous efficacy: not less than 90 lm/w; - Voltage rating: 220-240 VAC, 50 Hz ±2%; - The color temperature range: 5000K – 6500K; - Deigned with IP 65 protection; - Operating Temperature range: up to 40°C; - Certification: All related certificates shall be provided such CE, RoHS; - Wall Mounted type; - Warranty: at least two years.	Pcs	3				
16.4	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one.</b>	Pcs	25				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
16.5	Supply, install, test and commissioning of <b>1 RT Split Air Condition inverter type</b> include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; <b>- Including all accessories switches, new wires and trunky</b>	Pcs	1				
16.6	Supply and wiring <b>25A wall mount Switch for Split Type Air Conditioner</b> , with all necessary components and earthing <b>insulated copper (3x4 sq.mm) wire run inside the trunking</b> including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	7				
<b>17</b>	<b>Project sign boards</b>						
17.1	Supply, installation, and maintenance of project signboard ( <b>1.6m x 1.4m and 1.2m from ground</b> ) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price	
						[USD]	[USD]	
<b>18</b>	<b>System Training</b>							
18.1	Carrying our training as per required.	LS	~					
<b>SUB TOTAL ELECTRICAL</b>								--
<b>CIVIL WORKS</b>								
<b>19</b>	<b>Rooftop Mounting Structure:</b>							
<b>19.0</b>	<b>General Requirements:</b>						<b>Note</b>	
19.0	<p>The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval.</p> <ul style="list-style-type: none"> <li>- All works shall be done according to the Engineer's instructions, Drawings, and attached specification.</li> <li>- The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement.</li> <li>- Benchmark and leveling network shall be approved prior to starting next works.</li> <li>- The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings .</li> <li>- <b>This work prepared to cover 8 solar panels (2384mm x 1303mm) approximately.</b></li> <li>- Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels</li> </ul>						Note	

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
	<b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b>	Note					
19.1	<p>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (<b>min galvanized 60~120mic</b>) with <b>minimum yield strength of 240Mpa</b> .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (<b>min Fc'= 30Mpa for 28 days as ASTM Stenders</b>) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</p> <p>- As ASTM all bolts is A325 or A490 high strength bolts.</p> <p>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</p> <p>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) column channel C75X35X2.8 ~ 3mm with base plate P200x200x6mm As Per Drawings And Included:</p> <ul style="list-style-type: none"> <li>• 4Ø14mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• L=6cm welded with 2.8 ~ 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> <p>The columns details As following: Chanel C75X35X3mm L =600±150 mm Chanel C75X35X3mm L =1420± 150 mm</p> <p>- Beam And Bracing Structure Mounting As per technical specification and drawings details.</p> <p>Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) beam channel C75X35X2.8 ~ 3mm and C80X40X2.8 ~ 3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.</p> <p>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) bracing channel C75X35X2.8 ~ 3mm L=1520±150 mm with Ø14mm connection bolts with 25 mm length at all ends.</p> <p>- The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.</p>	Sqr.m	51				
<b>SUB TOTAL CIVIL</b>							
<b>TOTAL PRICE</b>							





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						[USD]	[USD]
<b>ELECTRICAL WORKS</b>							
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 650W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	32				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
2	<b>Solar Hybrid inverter</b>						
2.0	Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications: - Inverter type : Three phase. and Max 10 pcs parallel (It can be connected as Three phase parallel Inverter) - Rated power : 12 KW.- Max. PV Input Power :15600 W - Output voltage : 230/220 VAC per phase - Frequency : 50 Hz. - Battery voltage : 48 VDC . - Compatible for use with lithium batteries. - Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A. - Maximum charging capacity not less than 200 A. - Voltage range 150-425 VDC, and Voc not less than 500VDC, - Hybrid inverter with charger that supports external power supply from the best types in the market. - The contractor must provide a catalog before supply in accordance with the specifications, . - The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.					Notes	
2.1	<b>Hybrid inverter: 12Kw</b>	Pcs	2				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
3	<b>Solar Battery with Racks</b>						
3.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <p><b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b></p> <p><b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b></p> <p>- Built-in intelligent <b>BMS and RS, CAN,</b>, and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</p> <p>- Reliable performance at high operating temperatures of up to 50° C;</p> <p>- One brand of battery shall be used for the entire installation;</p> <p>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</p> <p>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</p> <p><b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b></p> <p>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</p> <p>-This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</p> <p>- Product warranty shall be 5 years;</p>				Note		
3.1	<b>Battery Capacity :100AH</b>	Pcs	6				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>4</b>	<b>DC Combiner Box (DCCB)</b>						
4.1	Supply, install, test, and commissioning of DC Combiner Box <b>4 input, 4 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation, IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string: 1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
<b>5</b>	<b>DC Cabling</b>						
5.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
5.1	(1C*6 sqr.mm) (Red& Black)	M	350				
5.2	(1C*25 sqr.mm) (Red& Black)	M	40				
<b>6</b>	<b>AC Cabling</b>						



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6.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XPLE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;					Note	
6.1	<b>4C*25sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	32				
6.2	<b>4C*16sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	80				
6.3	<b>4C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	60				
<b>7</b>	<b>Inverter and Battery DC Breakers Box</b>						
7.1	Supply, install, test and commission <b>DC breakers box including 4X200 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessories as per drawings	Pcs	1				



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8	<b>AC Coupling Panel</b>						
8.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram <b>(Three phase for 2 inverters)</b> - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				
9	<b>Earthing System</b>						
9.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>10</b>	<b>Lightning Protection System</b>						
10.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories - <b>lighting arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; - <b>Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				
<b>11</b>	<b>Main Distribution Board and MDBs</b>						
11.1	Supply, install, wire, test, and commissioning of sub distribution board ( <b>AC EMDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
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11.2	Supply, install, wire, test, and commissioning of sub distribution board (A/C MDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				
11.3	Supply, install, wire, test, and commissioning of sub distribution board (A/C SDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	4				
<b>12</b>	<b>Automatic Transfer Switch</b>						
12.1	Supply, install, test, and commissioning of Low Voltage ATS 4P, 100A, 2 ways as per technical specifications including metal enclosure	Pcs	1				





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<b>13</b>	<b>Ventilation System</b>						
13.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				
<b>14</b>	<b>Fire Alarm System</b>						
14.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
14.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
14.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				



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15.0	<b>Others</b>						
15.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	100				
15.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications - Lamp luminous efficacy: not less than 90 lm/W; - Cap type & base: bayonet bulbs- B22d-BC/ E27; - Color temperatures (CCT): 5000 K to 6500 K; - Input Voltage and frequency: 220V, 50 Hz; - Operation temperature rang: up to 50°C; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty: at least two years. <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	40				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
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15.3	<p>Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.)</p> <ul style="list-style-type: none"> <li>- LED outdoor light shall withstand all the weather and working conditions and corrosive environment;</li> <li>- <b>LED light 40-50 W;</b></li> <li>- Lamp luminous efficacy: not less than 90 lm/w;</li> <li>- Voltage rating: 220-240 VAC, 50 Hz ±2%;</li> <li>- The color temperature range: 5000K – 6500K;</li> <li>- Deigned with IP 65 protection;</li> <li>- Operating Temperature range: up to 40°C;</li> <li>- Certification: All related certificates shall be provided such CE, RoHS;</li> <li>- Wall Mounted type;</li> <li>- Warranty: at least two years.</li> </ul>	Pcs	4				
15.4	<p>Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification</p> <ul style="list-style-type: none"> <li>- No. of blades:3</li> <li>- Air delivery : not less than 200CMM ;</li> <li>-<b>speed controller &amp; Remote control</b></li> <li>- metal components must be rust proof</li> <li>- Input Voltage and frequency: 220-240V, 50 Hz;</li> <li>- Certification: All related certificates shall be provided such CE, RoHS;</li> <li>- Warranty at least two years.</li> <li>- <b>Including all accessories, removing old items and installing the new one,</b></li> </ul>	Pcs	40				



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15.5	Supply, install, test and commissioning of <b>1 RT Split Air Condition inverter type</b> include alternate operation and temperature control unit with all wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; - <b>Including all accessories switches, new wires and trunking</b>	Pcs	1				
15.6	Supply and wiring <b>25A wall mount Switch for Split Type Air Conditioner</b> , with all necessary components and earthing <b>insulated copper (3x4 sq.mm) wire run inside the trunking</b> including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	20				
16	<b>Project sign boards</b>						
16.1	Supply, installation, and maintenance of project signboard ( <b>1.6m x 1.4m and 1.2m from ground</b> ) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
17	<b>System Training</b>						
17.1	Carrying our training as per required.	LS	~				
<b>SUB TOTAL ELECTRICAL</b>							
<b>CIVIL WORKS</b>							



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18	<b>Rooftop Mounting Structure:</b>						
18.0	<b>General Requirements:</b>						
18.0	The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval. - All works shall be done according to the Engineer's instructions, Drawings, and attached specification. - The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement. - Benchmark and leveling network shall be approved prior to starting next works. - The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings . - <b>This work prepared to cover 8 solar panels (2384mm x 1303mm) approximately.</b> - Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels						Note



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						[USD]	[USD]
18.1	<p><b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b></p> <ul style="list-style-type: none"> <li>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (min galvanized 60~120mic) with minimum yield strength of 240Mpa .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (min Fc'= 30Mpa for 28 days as ASTM Standers) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</li> <li>- As ASTM all bolts is A325 or A490 high strength bolts.</li> <li>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) column channel C75X35X2.8 ~ 3mm with base plate P200x200x6mm As Per Drawings And Included: <ul style="list-style-type: none"> <li>• 4Ø14mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• L=6cm welded with 2.8 ~ 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> </li> <li>The columns details As following: <ul style="list-style-type: none"> <li>Chanel C75X35X3mm L =600±150 mm</li> <li>Chanel C75X35X3mm L =1420± 150 mm</li> <li>- Beam And Bracing Structure Mounting</li> </ul> </li> <li>As per technical specification and drawings details.</li> <li>Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) beam channel C75X35X2.8 ~ 3mm and C80X40X2.8 ~ 3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) bracing channel C75X35X2.8 ~ 3mm L=1520±150 mm with Ø14mm connection bolts with 25 mm length at all ends.</li> </ul>	Sqr.m	100				
19	cable trench						



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						[USD]	[USD]
19.1	"Excavation (in all types of soil, tiles ,concrete,stone, Asphalt and Asphalt pavement,etc)) and backfill of cable trench with cross section size of 0.6 meter depth and 0.4 meter width including shoring and shuttering works (If Required). The items includes disposal of surplus excavated materials outside to any unobjectionable place to be identified by contractor at his own cost, import approved backfill materials (If Required), leveling, watering and compacting. The item includes reconstruction the top layer or pavement with approved materials to its original condition . -Supply/import and lay approved sand bedding/covering materials (to be sieve sand) under (One layer, 15 cm thick) and over (Two layers, each 10cm thick) the power cable -Supply and install protection tiles as a safety warning over the power cable -Supply and install safety warning tape over the power cable protection tiles."	L.M.	60				
19.2	Supply installation & construction of Inspection manholes (size 6.0m x 6.0m x 0.6m) with plain concrete base (15cm thick) and concrete solid block walls (block size 20x20x40cm) and ductile cast iron frame and hinged cover (size 60x60cm) including excavation, disposal of surplus earth, fittings, testing, cement rendering and back filling and any others as per engineer instructions.	No.	10				
SUB TOTAL CIVIL							
TOTAL PRICE							



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>ELECTRICAL WORKS</b>							
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 580W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	24				





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						[USD]	[USD]
2	<b>Solar Hybrid inverter</b>						
2.0	Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications: - Inverter type : <b>Three phase and Max 10 pcs parallel (It can be connected as parallel Inverter)</b> - <b>Rated power : 12 KW.- Max. PV Input Power :15600 W</b> - Output voltage : 230/220 VAC per phase - Frequency : 50 Hz. - Battery voltage : <b>48 VDC</b> . - Compatible for use with lithium batteries. - Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A. - Maximum charging capacity not less than 200 A. - <b>Voltage range 150-425 VDC, and Voc not less than 500VDC,</b> - Hybrid inverter with charger that supports external power supply from the best types in the market. - The contractor must provide a catalog before supply in accordance with the specifications, . - The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.					Notes	
2.1	<b>Hybrid inverter: 12Kw</b>	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
3	<b>Solar Battery with Racks</b>						
3.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <ul style="list-style-type: none"> <li>- Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</li> <li>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</li> <li>- Built-in intelligent BMS and RS, CAN,, and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</li> <li>- Reliable performance at high operating temperatures of up to 50° C;</li> <li>- One brand of battery shall be used for the entire installation;</li> <li>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</li> <li>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</li> <li>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</li> <li>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</li> <li>- This item includes any addittional communication kits or devices for the successfull and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</li> <li>- Product warranty shall be 5 years;</li> </ul>				Note		
3.1	<b>Battery Capacity :100AH</b>	Pcs	4				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>4</b>	<b>DC Combiner Box (DCCB)</b>						
4.1	Supply, install, test, and commissioning of DC Combiner Box <b>4 input, 4 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation,IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string:1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
<b>5</b>	<b>DC Cabling</b>						
5.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
5.1	(1C*6 sqr.mm) (Red& Black)	M	140				
5.2	(1C*25 sqr.mm) (Red& Black)	M	30				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>6</b>	<b>AC Cabling</b>						
6.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XPLE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;				Note		
6.1	<b>4C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	80				
<b>7</b>	<b>Inverter and Battery DC Breakers Box</b>						
7.1	Supply, install, test and commission <b>DC breakers box including 2X200 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessories as per drawings	Pcs	1				
<b>8</b>	<b>AC Coupling Panel</b>						
8.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram <b>(Three phase one inverter)</b> - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>9</b>	<b>Earthing System</b>						
9.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				
<b>10</b>	<b>Lighting Protection System</b>						
10.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories - <b>lighting arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				



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						[USD]	[USD]
<b>11</b>	<b>Main Distibution Board and MDBs</b>						
11.1	Supply, install, wire, test, and commissioning of sub distribution board ( <b>EMDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				
11.2	Supply, install, wire, test, and commissioning of sub distribution board ( <b>A/C SDB</b> ) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	2				
<b>12</b>	<b>Automatic Transfer Switch</b>						
12.1	Supply, install, test, and commissioning of Low Voltage <b>ATS 4P, 100A, 2 ways</b> as per technical specifications including metal enclosure	Pcs	1				



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						[USD]	[USD]
<b>13</b>	<b>Ventilation System</b>						
13.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				
<b>14</b>	<b>Alarm System</b>						
14.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
14.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
14.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				



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						[USD]	[USD]
15.0	<b>Others</b>						
15.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	80				
15.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications - Lamp luminous efficacy: not less than 90 lm/W; - Cap type & base: bayonet bulbs- B22d-BC/ E27; - Color temperatures (CCT): 5000 K to 6500 K; - Input Voltage and frequency: 220V, 50 Hz; - Operation temperature rang: up to 50°C; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty: at least two years. <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	20				
15.3	Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) - LED outdoor light shall withstand all the weather and working conditions and corrosive environment; <b>- LED light 40-50 W;</b> - Lamp luminous efficacy: not less than 90 lm/w; - Voltage rating: 220-240 VAC, 50 Hz ±2%; - The color temperature range: 5000K – 6500K; - Deigned with IP 65 protection; - Operating Temperature range: up to 40°C; - Certification: All related certificates shall be provided such CE, RoHS; - Wall Mounted type; - Warranty: at least two years.	Pcs	3				





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جداول الكميات ومواصفات لتوريد وتركيب واختبار منظومة طاقة شمسية لعدد ٥ مدارس بالإضافة الى مكتب التربية مع صيانة منظومة شمسية ل ٣ مدارس في مديرية خور مكسر - محافظة عدن

### Specifications & BOQ of the Project : Solar System Installation for Abdel Wahed Abbad School

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
15.4	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one, installing power sockets, switches, speed controllers, replacing old wires with new wires.</b>	Pcs	25				
15.5	Supply, install, test and commissioning of <b>1 RT Spilt Air Condition inverter type</b> include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; <b>- Including all accessories switches, new wires and trunky</b>	Pcs	1				
15.6	Supply and wiring <b>25A wall mount Switch for Split Type Air Conditioner</b> , with all necessary components and earthing <b>insulated copper (3x4 sq.mm) wire run inside the trunking</b> including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	12				
<b>16</b>	<b>Project sign boards</b>						
16.1	Supply, installation, and maintenance of project signboard <b>(1.6m x 1.4m and 1.2m from ground)</b> as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>17</b>	<b>System Training</b>						
17.1	Carrying our training as per required.	LS	~				
<b>SUB TOTAL ELECTRICAL</b>							



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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
<b>CIVIL WORKS</b>							
<b>18</b>	<b>Rooftop Mounting Structure:</b>						
<b>18.0</b>	<b>General Requirements:</b>	<b>Note</b>					
18.0	<p>The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval.</p> <ul style="list-style-type: none"> <li>- All works shall be done according to the Engineer's instructions, Drawings, and attached specification.</li> <li>- The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement.</li> <li>- Benchmark and leveling network shall be approved prior to starting next works.</li> <li>- The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings .</li> <li>- <b>This work prepared to cover 8 solar panels (2278mm x 1135mm) approximately.</b></li> <li>- Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels</li> </ul>	Note					



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18.1	<p><b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b></p> <ul style="list-style-type: none"> <li>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (min galvanized 60~120mic) with minimum yield strength of 240Mpa .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (min Fc'= 30Mpa for 28 days as ASTM Standers) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</li> <li>- As ASTM all bolts is A325 or A490 high strength bolts.</li> <li>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) column channel C75X35X2.8 ~ 3mm with base plate P200x200x6mm As Per Drawings And Included: <ul style="list-style-type: none"> <li>• 4Ø14mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• L=6cm welded with 2.8 ~ 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> </li> <li>The columns details As following: <ul style="list-style-type: none"> <li>Chanel C75X35X3mm L =600±150 mm</li> <li>Chanel C75X35X3mm L =1420± 150 mm</li> <li>- Beam And Bracing Structure Mounting</li> </ul> </li> <li>As per technical specification and drawings details.</li> <li>Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) beam channel C75X35X2.8 ~ 3mm and C80X40X2.8 ~ 3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 60~120mic) bracing channel C75X35X2.8 ~ 3mm L=1520±150 mm with Ø14mm connection bolts with 25 mm length at all ends.</li> <li>- The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.</li> </ul>	Sqr.m	65				
<b>SUB TOTAL CIVIL</b>							
<b>TOTAL PRICE</b>							



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						[USD]	[USD]
<b>ELECTRICAL WORKS</b>							
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commissioning of <b>solar panels not less than 650W</b> should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	8				



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						[USD]	[USD]
2	<b>Solar Hybrid inverter</b>						
2.0	<p>Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications:</p> <ul style="list-style-type: none"> <li>- Inverter type : <b>Single phase. and Max 16 pcs parallel (It can be connected as Three phase parallel Inverter)</b></li> <li>- <b>Rated power : 6 KW.- Max. PV Input Power :7000 W</b></li> <li>- Output voltage : 230/220 VAC per phase</li> <li>- Frequency : 50 Hz.</li> <li>- Battery voltage : <b>48 VDC .</b></li> <li>- Compatible for use with lithium batteries.</li> <li>- Integrated with MPPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A.</li> <li>- Maximum charging capacity not less than 200 A.</li> <li>- <b>Voltage range 150-425 VDC, and Voc not less than 500VDC,</b></li> <li>- Hybrid inverter with charger that supports external power supply from the best types in the market.</li> <li>- The contractor must provide a catalog before supply in accordance with the specifications, .</li> <li>- The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.</li> </ul>				Notes		
2.1	<b>Hybrid inverter: 6Kw</b>	Pcs	1				



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4	<b>Solar Battery with Racks</b>						
4.0	<p>Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings .</p> <p><b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b></p> <p><b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b></p> <p>- Built-in intelligent <b>BMS and RS, CAN,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely &amp; real time, and protect the battery pack at any time to prolong its service life</p> <p>- Reliable performance at high operating temperatures of up to 50° C;</p> <p>- One brand of battery shall be used for the entire installation;</p> <p>- The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks</p> <p>- Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3.</p> <p><b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b></p> <p>- Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware;</p> <p>-This item includes any addittional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations</p> <p>- Product warranty shall be 5 years;</p>				Note		
4.1	<b>Battery Capacity :100AH</b>	Pcs	2				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>5</b>	<b>DC Combiner Box (DCCB)</b>						
5.1	Supply, install, test, and commissioning of DC Combiner Box <b>2 input, 2 output DC Combiner Box;</b> - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation, IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with <b>the maximum current X 1.25, 1000 VDC breaker;</b> - DC fuse rating for each string: 1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1				
<b>6</b>	<b>DC Cabling</b>						
6.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
6.1	(1C*6 sqr.mm) (Red& Black)	M	40				
6.2	(1C*25 sqr.mm) (Red& Black)	M	20				



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<b>7</b>	<b>AC Cabling</b>						
7.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XPLE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - <b>XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502;</b> - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;				Note		
7.2	<b>3C*10sqm.m</b> include remove tiles and including outdoor suspended cable tray.	M	10				
<b>8</b>	<b>Inverter and Battery DC Breakers Box</b>						
8.1	Supply, install, test and commission <b>DC breakers box including 1X125 DC breaker with Bus-bar Positive &amp; Negative</b> and all the required accessories as per drawings	Pcs	1				
<b>9</b>	<b>AC Coupling Panel</b>						
9.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, <b>Built in SPD, RCCB, MCCB</b> as shown on schematic wiring diagram ( <b>Single phase</b> ) - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1				



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<b>10</b>	<b>Earthing System</b>						
10.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2				
<b>11</b>	<b>Lightning Protection System</b>						
11.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories <b>- lightning arrester shall be copper.</b> - All metal casing/shielding of the system and its components should be thoroughly grounded; <b>-Earthing pit with Bentonite clay</b> - Earth resistance should be tested in presence of the representative by calibrated earth tester, <b>the earth resistance should not be more than 5 Ohm.</b> - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	1				



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<b>12</b>	<b>Main Distibution Board and MDBs</b>						
12.1	Supply, install, wire, test, and commissioning of sub distribution board (A/C SDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	1				
<b>13</b>	<b>Automatic Transfer Switch</b>						
13.1	Supply, install, test, and commissioning of Low Voltage ATS 4P, 63A, 2 ways as per technical specifications including metal enclosure	Pcs	1				

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<b>14</b>	<b>Ventilation System</b>						
14.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements ( exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, -Fans CFM is to be not less than 800	L.S	1				
<b>15</b>	<b>Alarm System</b>						
15.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2				
15.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1				
15.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1				

## Project Strengthening Institutional and Economic Resilience in Yemen (SIERY)

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### BOQs for Supplying and installing a solar energy system for 5 School, Education Office Building With Solar System Maintenance for 3 schools in Khawr Maqsar District - Aden Gov.-Aden

جداول الكميات والمواصفات لتوريد وتركيب واختبار منظومة طاقة شمسية لعدد ٥ مدارس بالإضافة الي مكتب التربية مع صيانة منظومة شمسية ل ٣ مدارس في مديرية خور مكسر - محافظة عدن

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
16.0	<b>Others</b>						
16.1	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	20				
16.2	Supply, install, test and commissioning of <b>LED light bulb (1X 9 w)</b> as per technical specifications - Lamp luminous efficacy: not less than 90 lm/W; - Cap type & base: bayonet bulbs- B22d-BC/ E27; - Color temperatures (CCT): 5000 K to 6500 K; - Input Voltage and frequency: 220V, 50 Hz; - Operation temperature rang: up to 50°C; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty: at least two years. <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	10				
16.3	Supply, install, test and commissioning of wall Mounted <b>LED 40W to 50 W Outdoor lighting</b> fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) - LED outdoor light shall withstand all the weather and working conditions and corrosive environment; <b>- LED light 40-50 W;</b> - Lamp luminous efficacy: not less than 90 lm/w; - Voltage rating: 220-240 VAC, 50 Hz ±2%; - The color temperature range: 5000K – 6500K; - Deigned with IP 65 protection; - Operating Temperature range: up to 40°C; - Certification: All related certificates shall be provided such CE, RoHS; - Wall Mounted type; - Warranty: at least two years.	Pcs	2				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price
						[USD]	[USD]
16.4	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one, installing power sockets, switches, speed controllers, replacing old wires with new wires.</b>	Pcs	10				
16.5	Supply, install, test and commissioning of <b>1 RT Spilt Air Condition inverter type</b> include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting; <b>- Including all accessories switches, new wires and trunky</b>	Pcs	1				
16.6	Supply and wiring <b>25A wall mount Switch for Split Type Air Conditioner</b> , with all necessary components and earthing <b>insulated copper (3x4 sq.mm) wire run inside the trunking</b> including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	7				

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>17</b>	<b>Project sign boards</b>						
17.1	Supply, installation, and maintenance of project signboard (1.6m x 1.4m and 1.2m from ground) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>18</b>	<b>System Training</b>						
18.1	Carrying our training as per required.	LS	~				
<b>SUB TOTAL ELECTRICAL</b>							
<b>CIVIL WORKS</b>							
<b>19</b>	<b>Rooftop Mounting Structure:</b>						
<b>19.0</b>	<b>General Requirements:</b>						<b>Note</b>
19.0	The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval. - All works shall be done according to the Engineer's instructions, Drawings, and attached specification. - The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement. - Benchmark and leveling network shall be approved prior to starting next works. - The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings . - <b>This work prepared to cover 8 solar panels (2384mm x 1303mm) approximately.</b> - Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels						Note

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Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price	Total Price	
						[USD]	[USD]	
19.1	<p><b>Supply and install steel structure mountain as per drawings, specification and as per the following details:</b></p> <ul style="list-style-type: none"> <li>- Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (min galvanized 80~120mic) with minimum yield strength of 240Mpa .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts &amp; washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (min Fc'= 30Mpa for 28 days as ASTM Standers) etc., complete all as per design, details, drawings, specifications etc. with all lead &amp; lift for all materials &amp; labour and as directed, at all heights &amp; locations.</li> <li>- As ASTM all bolts is A325 or A490 high strength bolts.</li> <li>- Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings.</li> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) column channel C75X35X3mm with base plate P200x200x6mm</li> </ul> <p>As Per Drawings And Included:</p> <ul style="list-style-type: none"> <li>• 4Ø12mm L120mm anchor bolt.</li> <li>• 3Ø12mm connection bolts with 25 mm length.</li> <li>• C90X45X6mm L=6cm welded with 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings.</li> </ul> <p>The columns details As following: Chanel C75X35X3mm L =600±150 mm Chanel C75X35X3mm L =1420± 150 mm</p> <ul style="list-style-type: none"> <li>- Beam And Bracing Structure Mounting</li> </ul> <p>As per technical specification and drawings details.</p> <p>Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) beam channel C75X35X3mm and C80X40X3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends.</p> <ul style="list-style-type: none"> <li>- Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) bracing channel C75X35X3mm L=1520±150 mm with Ø12mm connection bolts with 25 mm length at all ends.</li> <li>- The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.</li> </ul>	Sqr.m	25					
<b>SUB TOTAL CIVIL</b>								
<b>TOTAL PRICE</b>								



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**ELECTRICAL WORKS**

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>1</b>	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commission <b>TRINA solar panels 365W or equivalent Solar panels with the same Voltage and Current</b> should be comprised of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 19 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	8				



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### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
2	<b>Solar Battery with Racks</b>						
2.0	Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts <b>with built in battery rack</b> as per technical specifications and drawings . -Batteries shall be Lithium-ion type LiFePO4 with integrated BMS. - Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C° - Built-in intelligent BMS and RS, CAN,, and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely & real time, and protect the battery pack at any time to prolong its service life - Reliable performance at high operating temperatures of up to 50° C; - One brand of battery shall be used for the entire installation; - The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks - Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3. - <b>Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b> - Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware; -This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations - Product warranty shall be 5 years:				Note		
2.1	<b>Battery Capacity :100AH</b>	Pcs	4				

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ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>3</b>	<b>DC Cabling</b>						
3.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
3.1	(1C*25 sqr.mm) (Red& Black)	M	16				
<b>4</b>	<b>Earthing System Rehabilitation</b>						
4.1	"Rehabilitation of the earthing system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				

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**ELECTRICAL WORKS**

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>5</b>	<b>Lighting Protection System Rehabilitation</b>						
5.1	Rehabilitation of the Lighting system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
<b>6</b>	<b>Data Logging and Monitoring System Rehabilitation and updating</b>						
6.1	Rehabilitation of Data Logging and Monitoring System "Brand: Victron" includes the following: 1- Check all components of the monitoring system, including data cables. 2- Change all data cables and data storage memories that need to be changed. 3- Update all devices to the latest version, including the CCGX, MPPT, inverters, and BMV. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
<b>7</b>	<b>ventilation System Rehabilitation</b>						
7.1	Rehabilitation of the ventilation system for the battery room including to: 1- Rehabilitation of Control panel. 2- Rehabilitation of Two 1 RT Spilt Air Condition inverter type. 3- Rehabilitation of Inlet and Outlet fans. 4- Organizing the work of ventilation fans and Spilt Air Conditioners alternately so that each one works for a maximum of four hours." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
<b>8</b>	<b>Other Components</b>						
8.1	Rehabilitation of the MC4 and DC cables of PV Module and Repair or Change all damaged materials in the system that need to be replaced.	L.S	1				



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### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
8.2	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	33				
8.3	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one,</b>	Pcs	22				

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**ELECTRICAL WORKS**

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>9</b>	<b>Project sign boards</b>						
9.1	Supply, installation, and maintenance of project signboard <b>(1.6m x 1.4m and 1.2m from ground)</b> as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>10</b>	<b>Cable Tray Rehabilitation</b>						
10.1	Rehabilitation of the cable trays <b>almost (60 ML)</b> including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall cable trays if needed. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
<b>11</b>	<b>Rooftop Mounting Structure &amp; DC Combiner Box (DCCB) Rehabilitation</b>						
11.1	Rehabilitation of the Rooftop Mounting Structure <b>almost (70 m2)</b> including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall Rooftop Mounting Structure & DCCB if needed." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
SUB TOTAL							



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ملاحظة: يجب ارفاق جميع الكتلوجات ومواصفات وصور العينات

ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commission <b>TRINA solar panels 365W or equivalent Solar panels with the same Voltage and Current</b> should be comprised of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 19 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	1				



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BOQs for Supplying and installing a solar energy system for 5 School, Education Office Building With Solar System Maintenance for 3 schools in Khawr Maqsar District  
- Aden Gov.-Aden

جداول الكميات والمواصفات لتوريد وتركيب واختبار منظومة طاقة شمسية لعدد ٥ مدارس بالإضافة إلى مكتب التربية مع صيانة منظومة شمسية ل ٣ مدارس في مديرية خور مكسر - محافظة عدن

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### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
2	<b>Solar Battery with Racks</b>						
2.0	Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts <b>with built in battery rack</b> as per technical specifications and drawings . - <b>Batteries shall be Lithium-ion type LiFePO4 with integrated BMS.</b> - <b>Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b> - Built-in intelligent <b>BMS and RS, CAN,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely & real time, and protect the battery pack at any time to prolong its service life - Reliable performance at high operating temperatures of up to 50° C; - One brand of battery shall be used for the entire installation; - The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks - Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3. - <b>Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b> - Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware; -This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations - Product warranty shall be 5 years;				Note		
2.1	<b>Battery Capacity :100AH</b>	Pcs	4				



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### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>3</b>	<b>DC Cabling</b>						
3.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
3.1	(1C*25 sqr.mm) (Red& Black)	M	16				
<b>4</b>	<b>Earthing System Rehabilitation</b>						
4.1	"Rehabilitation of the earthing system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				





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ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>5</b>	<b>Lighting Protection System Rehabilitation</b>						
5.1	Rehabilitation of the Lighting system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
<b>6</b>	<b>Data Logging and Monitoring System Rehabilitation and updating</b>						
6.1	Rehabilitation of Data Logging and Monitoring System "Brand: Victron" includes the following: 1- Check all components of the monitoring system, including data cables. 2- Change all data cables and data storage memories that need to be changed. 3- Update all devices to the latest version, including the CCGX, MPPT, inverters, and BMV. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
<b>7</b>	<b>ventilation System Rehabilitation</b>						
7.1	Rehabilitation of the ventilation system for the battery room including to: 1- Rehabilitation of Control panel. 2- Rehabilitation of Two 1 RT Spilt Air Condition inverter type. 3- Rehabilitation of Inlet and Outlet fans. 4- Organizing the work of ventilation fans and Spilt Air Conditioners alternately so that each one works for a maximum of four hours." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				



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ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>8</b>	<b>Other Components</b>						
8.1	Rehabilitation of the MC4 and DC cables of PV Module and Repair or Change all damaged materials in the system that need to be replaced.	L.S	1				
8.2	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	84				
8.3	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one,</b>	Pcs	43				



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ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
<b>9</b>	<b>Project sign boards</b>						
9.1	Supply, installation, and maintenance of project signboard (1.6m x 1.4m and 1.2m from ground) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
<b>10</b>	<b>Cable Tray Rehabilitation</b>						
10.1	Rehabilitation of the cable trays <b>almost (60 ML)</b> including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall cable trays if needed. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
<b>11</b>	<b>Rooftop Mounting Structure &amp; DC Combiner Box (DCCB) Rehabilitation</b>						
11.1	Rehabilitation of the Rooftop Mounting Structure <b>almost (70 m2)</b> including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall Rooftop Mounting Structure & DCCB if needed." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
SUB TOTAL							



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ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
1.1	Supply, install, test, and commission <b>TRINA solar panels 365W or equivalent Solar panels with the same Voltage and Current</b> should be comprised of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 19 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	3				



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#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
2	<b>Solar Battery with Racks</b>						
2.0	Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts <b>with built in battery rack</b> as per technical specifications and drawings . <b>-Batteries shall be Lithium-ion type LiFePO4 wirh integrated BMS.</b> <b>- Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C°</b> - Built-in intelligent <b>BMS and RS, CAN,,</b> and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely & real time, and protect the battery pack at any time to prolong its service life - Reliable performance at high operating temperatures of up to 50° C; - One brand of battery shall be used for the entire installation; - The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks - Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3. <b>- Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered.</b> - Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware; -This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc"				Note		
2.1	<b>Battery Capacity :100AH</b>	Pcs	4				



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#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
3	<b>DC Cabling</b>						
3.0	Supply, install, test, and commissioning of DC Cabling <b>1KV, Flexible stranded copper per EN 60228</b> , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) <b>to be sized for maximum 3% voltage drop</b> at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays <b>Cable Tray :- 1mm thickness</b> , Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note		
3.1	(1C*25 sqr.mm) (Red& Black)	M	16				



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#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
4	<b>Earthing System Rehabilitation</b>						
4.1	"Rehabilitation of the earthing system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
5	<b>Lighting Protection System Rehabilitation</b>						
5.1	Rehabilitation of the Lighting system includes the following: 1- Reducing the resistance to the permissible values of less than 5 ohms. 2- Change all damaged materials in the system that need to be replaced, including rods, busbars, and cables. 3- Check and fix all the parts that need to be repaired or edit. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				
6	<b>Data Logging and Monitoring System Rehabilitation and updating</b>						
6.1	Rehabilitation of Data Logging and Monitoring System " <b>Brand: Victron</b> " includes the following: 1- Check all components of the monitoring system, including data cables. 2- Change all data cables and data storage memories that need to be changed. 3- Update all devices to the latest version, including the CCGX, MPPT, inverters, and BMV. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	SYSTEM	1				



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#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
7	<b>ventilation System Rehabilitation</b>						
7.1	Rehabilitation of the ventilation system for the battery room including to: 1- Rehabilitation of Control panel. 2- Rehabilitation of Two 1 RT Spilt Air Condition inverter type. 3- Rehabilitation of Inlet and Outlet fans. 4- Organizing the work of ventilation fans and Spilt Air Conditioners alternately so that each one works for a maximum of four hours." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
8	<b>Other Components</b>						
8.1	Rehabilitation of the MC4 and DC cables of PV Module and Repair or Change all damaged materials in the system that need to be replaced.	L.S	1				





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#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
8.2	Supply, install, test and commissioning of <b>LED light fixture (16 W) 1x1200 mm length</b> to replace existing florescent including dismantling the old units as per technical specification - Mount type: Surface Mount; - Color: White; - Lamp luminous efficacy: not less than 100 lm/W; - Housing: Metal; - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; <b>- Including all accessories, removing old items and installing the new ones,</b>	Pcs	65				
8.3	Supply, install, test and commissioning of energy efficient <b>ceiling fans (30W -50W)</b> to replace existing ceiling fans including dismantling the old units as per technical specification - No. of blades:3 - Air delivery : not less than 200CMM ; <b>-speed controller &amp; Remote control</b> - metal components must be rust proof - Input Voltage and frequency: 220-240V, 50 Hz; - Certification: All related certificates shall be provided such CE, RoHS; - Warranty at least two years. <b>- Including all accessories, removing old items and installing the new one,</b>	Pcs	38				



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#### Specifications & BOQ of the Project : Solar System Maintenance for Al-Sa'adah School - Khormakser - Aden

ملاحظة: يجب ارفاق جميع الكتلوجات ومواصفات وصور العينات

#### ELECTRICAL WORKS

Item No.	Item Details	Unit	Qty.	Brand	Origin	Unit Price [USD]	Total Price [USD]
1	<b>Solar PV Module:</b>						
9	<b>Project sign boards</b>						
9.1	Supply, installation, and maintenance of project signboard (1.6m x 1.4m and 1.2m from ground) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1				
10	<b>Cable Tray Rehabilitation</b>						
10.1	Rehabilitation of the cable trays almost (60 ML) including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall cable trays if needed. And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
11	<b>Rooftop Mounting Structure &amp; DC Combiner Box (DCCB) Rehabilitation</b>						
11.1	Rehabilitation of the Rooftop Mounting Structure almost (70 m2) including to: 1- Removing rust and painting it with anti rust paint two coats. 2- Repair all damaged parts. 3-Reinstall Rooftop Mounting Structure & DCCB if needed." And other all required accessories to rehabilitation the item according to the recommendations of the supervision team	L.S	1				
<b>SUB TOTAL</b>							