



**UNITED NATIONS DEVELOPMENT PROGRAMME**

**PAL10- 000116664 - Supporting transitions to solar energy in education and improving energy efficiency in three schools in efficiency in refugee camps .**

**ITB-PAL-0000143263: Supporting transitions to solar energy in education and improving energy efficiency in three schools in the Gaza Strip**

## **Bill of Quantities**

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
	<b>Solar PV System</b>				
	<p>Supplying, installing, commissioning &amp; testing the following items with all the required materials to complete the job in accordance with the BOQ, drawings, specifications and the supervising engineer's instructions.</p> <p>-The prices should include all the materials and accessories needed to complete the job.</p> <p>-The Contractor has to submit Detailed shop drawings (single line diagram, Equipment Layout inside room, PV distribution panels, DC &amp; AC distribution bards...etc) for the propoused PV system to be approved by the Engineer before commencement of the work.</p> <p>-The Contractor has to submit Detailed shop drawings (single line diagram, Equipment Layout inside room, PV distribution panels, DC &amp; AC distribution bards...etc) for the propoused PV system to be approved by the Engineer before commencement of the work.</p> <p>-The contractor must submit the original catalogues with all certified and calculation sheets test for all system component according to the required parameters and supervising engineer's instructions.</p> <p>-The contractor shall submit the Manufacture testing certificate, country of origin, certified characteristics, test performance curves, spare parts regular (as recommended by manufacturer , maintenance manuals and manufacturers warranty for each components of the system.</p> <p>-The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables should be less than 1%.</p> <p>- As-built drawings and writting setting parameters shall be submitted after handing over the work.</p> <p>- All junction boxes and DBs will be lockable type.</p> <p>- Upon completion of the installation, the contractor shall organize an on site training program for operation and maintainance purpouse involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates.</p> <p>- The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</p> <p>-The unit rates include solving all the obstacles that will face the contractor on the building's roofs such as water tanks and all other components and any other obstacles. The contractor will be responsible for safely dismantling, removing and re-installing them in other places and operate them successfully with all needed new materials and workmanship to provide the required space to install the structures for the photovoltaic panels as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</p> <p>The work includes maintenance period for each device according to BOQ and Specifications.</p> <p>The price include dismantling and transfering the existing solar pv systemequipment and materials from target school to the owner store or schools.</p> <p>-The rates include all restatement of civil works (concrete, Block, Finishing, carpentry , metal ,...ect) resulting of electrical work .</p>				

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
	<b>Bill No (1)</b>				
<b>A</b>	<b>Mustafa Hafez School</b>				
<b>1</b>	<b>PV Solar System</b>				
	<p>Supplying, installing, commissioning &amp; testing the following items with all the required materials to complete the job in accordance with the BOQ, drawings, specifications and the supervising engineer's instructions. The prices should include all the materials and accessories needed to complete the job.</p> <p>The Contractor has to submit Detailed design drawings (single line diagram, Equipment Layout inside room, PV distribution panels, DC &amp; AC distribution bards...etc) for the proposed PV system to be approved by the Engineer before commencement of the work.</p> <p>The contractor must submit the original catalogues with all certified and calculation sheets test for all system component according to the required parameters and supervising engineer's instructions.</p> <p>- The contractor must submit all calculation sheets from system manufacturer for the required parameters and supervisor engineer's instructions.</p>				
	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• The system will be grid interactive connected with battery backup system, which will allow many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the batteries when PV generates more than the loads, the batteries can be charged from Grid if PV output is not enough for loads and batteries.</li> <li>• Contractor shall submit shop drawings for all architectural, civil, electrical and a complete photovoltaic solar system works, including a single line diagram showing all the components of the PV system, DC and AC distribution boards, PV Arrays lay out and battery backup systems connections and cables, wires cross section for all the system to be approved by the Engineer before executing the work.</li> <li>• Contractor shall submit the catalogs of each component showing the requested specifications stated at the bill of quantity.</li> <li>• The contractor shall submit the Manufacture testing certificate, country of origin, certified characteristics, test performance curves, spare parts regular (as recommended by manufacturer , maintenance manuals and manufacturers warranty for each components of the system.</li> </ul> <p>• As-built drawings and writing settemg parameters shall be submitted after handing over the work.</p> <p>• All junction boxes and DBs will be lockable type.</p> <p>• Upon completion of the installation, the contractor shall organize an on site training program for operation and maintainance purpouse involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates.</p> <p>• The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</p> <p>• All the following items include supply, install, commission and operate of the complete PV solar system.</p> <p>• The work includes maintenance period for each device according to BOQ and Specifications.</p>				

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.1	<p><b><u>PV Modules – 30 Kw:</u></b> Supply, install, connect and operate Mono Crystalline or Polycrystalline Photovoltaic Solar Modules with all material needed to have complete job ready for installing high quality PV modules with total arrays capacity to achieve 30 Kw. The item Includes supply, install &amp; connect the following:</p> <ul style="list-style-type: none"> <li>• Water proof PV junction boxes IP65 for each array including DC Fuses, DC LTL, bus bars ,terminals, ducts or trays, supports &amp; labels suitable to the PV arrays loads.</li> <li>• Solar DC cables appropriately sized to connect the PV solar cells together and to the J.B and from J.B to the inverter directly to have a complete operational circuit with all conduits, clamps , trays and cable end terminations which shall be DC plug and socket connectors . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 1%.</li> <li>• The price includes all works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</li> <li>• The contractor has to obtain 30kw from PV system as minimum. In case the proposed PV modules results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 30kw.</li> <li>• Contractor must submit manufacturer warranty for solar panels as recommended by manufacturer.</li> <li>• Contractor must submit all the required certificates for each PV solar panel from.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWp	30		
1.2	<p><b><u>Inverters – 30 KW:</u></b> Supply, install, connect and operate DC/AC grid tie 3-phase inverter with data communication unit with Ethernet connection . <b>(Type is SMA or equivalent)</b>. The inverter must be suited to any PV module configuration, and depending on the system design and installation proposed and for the future extended also. The DC max power input rating should be equal or more than 30 KW of the PV modules capacity at standard test condition. The inverter unit shall be suitable for indoor and outdoor installations with IP65. The inverter AC nominal power output rating must be equal or greater than 30 KW compatible with the AC loads design. The inverter must include the safety concepts such as (triple protection with optiprotect, electronic strings fuses, self-learning string failure detection, DC surge arrestor type 2 ) to ensure max availability. Total inverter capacity must be divided at least 2 inverters . The price includes :</p> <ul style="list-style-type: none"> <li>• Supply, install and connect (monitoring and controlling unit) for all PV solar system installed especially compatible with the inverters, with all needed accessories, interface modules &amp; data cables and all connections needed to complete and connect the monitoring system to internet.</li> <li>• Supply ,install and connect all DC cables appropriately sized in accordance with the installation requirements and to connect the inverters with PV system designed with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors to have a complete job, the allowable voltage drop for DC cables between inverters and PV system not less than 1%.</li> <li>• Inverters shall allow an adjustable power factor minimum AC output power with all necessary electrical cables, earthing system, Conduits, trays and all other materials and workmanship needed to connect with the main distribution panel according to the engineer's instruction and approval and have a complete job.</li> <li>• The contractor has to obtain 30kw from PV inverters capacity as minimum. In case the proposed PV inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 30kw.</li> <li>• The contractor must submit manufacturer warranty for each inverter as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.3	<p><b>Battery Inverters – 36 KW:</b> Supply, install, connect and operate Battery Inverters compatible with on grid inverter rated power 36 Kw with all necessary interface modules and connections for masters &amp; slaves , electrical cables and data communication unit with Ethernet connection, connectable in parallel and modularly extendable. The Battery Inverter must include the following concepts such as (Ac and DC coupling, High efficiency, intelligent battery management for maximum battery life, charge level calculation, extreme overload capability, and battery temperature sensing and battery current measurements).Total battery inverters capacity must be compatible with the number of the inverters. <b>(Type is VICTRON or equivalent).</b> The price includes:</p> <ul style="list-style-type: none"> <li>• Supply, install and connect <b>Remote Control Unit (RC Unit)</b> for the installed battery inverters with all data &amp; communication cables and connection needed to complete the job.</li> <li>• Supply, install and connect: DC cables appropriately sized in accordance with the installation requirements to connect the battery inverters with DC battery fuses box. AC electrical cables to connect the battery inverters with the main distribution panel(AC Out). the works includes all conduits, clamps, trays and cable terminations end and workmanship needed to have a complete job,</li> <li>• The allowable voltage drop for DC cables between battery inverter and batteries less than 1%.</li> <li>•The contractor has to obtain 36kw from Battery inverters capacity as minimum. In case the proposed battery inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 36kw.</li> <li>• The contractor must submit manufacturer warranty for each battery inverter as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.4	<p><b>Battery Bank :</b> Supply, install, connect and operate VRLA tubular design deep cycle batteries, the total demand energy is 130 KWh, @ C10 , 1.8V per cell, 3000 cycle @ C10. The battery bank voltage is 48 Vdc, each battery 2 volt. <b>(GERMANY MADE BRAND NAME)</b></p> <p>The batteries must provide high-quality and achieving superior performance, the manufacturing date must be new and not more than 6 months, suitable for every type of applications especially for solar renewable energy, designed Service Life 10 years with low internal resistance, designed to be deeply discharged. The Battery should provide benefits of being maintenance free, case flame retardant &amp; non-hazardous. The price Includes supply, install &amp;connect Battery temp. sensor (BTS) and the following:</p> <ul style="list-style-type: none"> <li>• All necessary DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all bus bars, conduits, clamps, stainless steel bolts, washers and cable end terminations and all needed materials to complete the job. All DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.</li> <li>• Battery Banks rack from the same manufacturer of the batteries with dividers and all needed accessories to finish the job. the rack must be enough to carry all the weight of the required batteries for the system.</li> <li>• The contractor has to obtain minimum 130kwh functional battery bank. In case the proposed batteries in stings provide more capacity. The contract will pay only for 150kwh and contractor will include in his price the extra kwh on the relevant ratio.</li> <li>• The contractor must submit manufacturer warranty for each battery cell as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWh	130		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.5	<p><b><u>PV Mounting structure:</u></b>            PV Mounting structure:            Supply and install module steel foundation( PV roof top structure mounting frame ) with painting layers approved type suitable to the dimension of selected PV modules and PV numbers , to fix the photovoltaic panels on the PV parking structure including galvanized steel angles size 50 * 50 * 4 mm an must be doubled between the cells, rivcts with seal of stainless steel and all accessories and supports. The mounting provides a fixed inclination of the modules 26-28 degree to the south with vertical support , galvanized steel plates 200*200*10mm, screwa and casting reinforced concrete foundations B 250 for each leg 30 *30 * 30 cm according to the approved Load designs , It must fixed perfectly with proper insulated for the roof top and according to specification , drawing and engineer instructions</p> <p>The structure includes pracing and double hot galvanized angles for deviders .The PV roof top mounting structure and the foundations must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads,... etc.) that might occure according to the site conditions .</p> <p>The price includes retesting Leakage of the roof insulation for the implemented area for the PV solar system before the installation and after completion of PV system, and making good of any damages to insulation membrane if occurred.</p> <p>All works and materials must be according to drawings, specifications and supervisor instructions and approval.</p>	L.S	1		
1.6	<p><b><u>Battery Fuse Panel:</u></b>            Supply, install, connect and operate battery DC fuse board as an external DC distributor to protect the battery connections of the inverters . The box must be suitable connections for three battery inverters and up to six DC connections inlet on the battery side and six DC connections for inverter side, the item includes (4 LTL 250/400A , 12 fuses 250A , cable glands, with all necessary DC cables to have a complete operational circuit, positive &amp; negative busbars with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.</p> <p>• The contractor must submit manufacturer warranty for each battery fuse box for a period not less than 1 years.</p> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	No	1		
1.7	<p><b><u>3-Phase SMART Bidirectional Digital KWH Meter:</u></b>            Supply,install,connect and operate 3-phase 3x100 A SMART Bidirectional digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p> <p>(Type is holley or equivalent)</p>	No	1		
1.8	<p><b><u>3-Phase Digital KWH Meter:</u></b>            Supply,install,connect and operate 3-phase digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	2		
1.9	<p><b><u>Earthing System For AC Side:</u></b>            Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance.</p> <p>the item includes (all required copper electrodes 15mm2 driven into ground to achive the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the AC system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.10	<b>Earthing for PV Structure:</b> Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance. the item includes (all required copper electrodes 15mm2 driven into ground to achieve the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the PV system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.	Unit	1		
<b>2</b>	<b>SOLAR POWER DISTRIBUTION BOARD (PV-MDB)</b>				
2.1	Supply, install and commission distribution board with double door and switch key. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -Metallic partition between AC-IN part and AC-OUT . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent).	unit	1		
2.2	Supply, install M.C.C.B 4x63A In existing MDB. Type Moeller NZMN1-4-63A or approved equivalent.	No.	1		
2.3	Supply, install M.C.C.B 4x63A . Type Moeller NZMB1-4-63A or approved equivalent.	No.	1		
2.4	Supply, install M.C.C.B 3x63A . Type Moeller NZMB1-3-63A or approved equivalent.	No.	1		
2.5	Supply, install M.C.C.B 3x40A . Type Moeller NZMB1-3-40A or approved equivalent.	No.	1		
2.6	Supply, install MCB 3X40/32A. (Type is MOELLER FAZ-C(40,32)/3 or equivalent).	No.	2		
2.7	Supply, install MCB 2X32A. (Type is MOELLER FAZ-C(32) or equivalent).	No.	3		
2.8	Ditto,but MCB 3X20A. (Type is MOELLER FAZ-C20/3 or equivalent).	No.	1		
2.9	Ditto,but RCCB 4X40/0.003A.	No.	1		
2.10	Ditto,but MCB 1X10/16/20A. (Type is MOELLER FAZ-C10/16/20/1 or equivalent).	No.	4		
2.11	Supply and install Four Poles 3ph. Lightening Arrestor, 380V ,40KA type moeller or equivalent ,the item include Triple poles Fused Switch (LTL) 125/160A With HRC fuses 125A. (Type is EATON or equivalent).	No.	1		
2.12	Suuply and install Digital multimeter with 3 CTs and LTL fuse 3x36/6A. Type ENTES or equivalent.	No.	2		
2.13	Supply and install frequency protection relay,under/overvoltage, phase sequence/ phase failure relay , with LTL fuse3x36/6A and with all necessary control. Type Foxtam or approved equivalent.	No	1		
2.14	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
<b>3</b>	<b>DB-ESSENTIAL LOAD DISTRIBUTION BOARD</b>				
3.1	Supply, install and commission DB-ESSENTIAL LOAD distribution board. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent). -The unit rate include Rearrange exiting distribution board to separate essential loads and transfer to new panel, the item includes dismantling exiting C.Bs,wires and deliver to owner, cleaning and all needed works as per approved shopdrawing ,specifications and supervisor engineer instruction's.	unit	1		
3.2	Supply and install Molded Case Circuit Breaker MCCB 3X63A, with overload trip Ir (50-63A). (Type is EATON MOELLER NZMB1-63A or equivalent).	NO.	3		



No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
3.3	Supply and install 3-PH Mains/Solar. Automatic Change Over switch(ATS), contactor type, made of two contactors (160A- 400V four pole) , with electrical and mechanical inter-lock, including control unit, protection and all needed accessories. Type Moeller or equivalent..	NO.	1		
3.4	Supply and install Manual transfer switch MTS 4x160A with all needed connections and accessories.Type Moeller or equivalent..	NO.	1		
3.5	Supply and install Minture Circuit Breaker MCB 3X63/50A.Type EATON FAZ-D or equivalent).	NO.	2		
3.6	Supply and install Minture Circuit Breaker MCB 3X40/32A.Type EATON FAZ-D or equivalent).	NO.	3		
3.7	Supply and install Minture Circuit Breaker MCB 3X25/20/16A.Type EATON FAZ-D or equivalent).	NO.	2		
3.8	Supply and install Minture Circuit Breaker MCB 2X25/20A.Type EATON or equivalent.	NO.	2		
3.9	Supply and install Minture Circuit Breaker MCB 1X16A.Type EATON or equivalent.	NO.	2		
3.10	Supply and install Minture Circuit Breaker MCB 1X10A.Type EATON or equivalent.	NO.	2		
3.11	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
4	Supply and install, connect electrical board size of 24 C.B.The unit rate include Terminals, busbars, wires and all needed materials , accessories and workmanship for proper installation. Type is GEWISS or equivalent.	Unit	1		
5	Ditto but 12 C.B.	Unit	1		
6	<b>Underground Pipes, and Manholes</b>				
	Supply & lay under ground PVC piping system (90 cm under ground). The work includes excavation, warning tapes, backfilling and all required civil works to finish the work . According specifications and demands of the supervising engineer. (the price include dismantling, and reinstating the existing pavement layers (Interlock, tiles,...etc.) as well as the soil layers at the places of excavation of cables. The price also includes testings,material and workmanship, supplying and replacing the damaged tiles by new materials to match the existing .) as follow:				
6.1	Supply & install 4" UPVC , SN8 Pipes	R.M	20		
6.2	Ditto, but 3" PVC heavy duty Flexible Conduit	R.M	20		
6.3	Ditto, but 2" PVC heavy duty Flexible Conduit	R.M	40		
6.4	Supply and Install electrical manhole 80cm cm with (8 ton) cast iron cover iron ring marked with the word Electrical Supply. Manhole must be internally and externally tar coated for isolation and sealing. The price should include all excavation, fittings, leveling, connections, sealing, backfilling, etc.. All according to the relevant international standards, drawings, specifications, and Engineers instructions	No.	1		
6.5	Ditto but 60 cm dia with (8 ton) cast iron cover iron ring marked with the word Electrical Supply .	No.	1		
7	<b>Cables</b>				
	Supply, laying and termination of XLPE CU cable, including labeling cable lugs, cable glands ,cable joints (if needed), pipes. Ducts with all required electrical and civil works to connect cable terminals from source to destination. According to drawings, specifications and the engineer's approval and any other needed materials and workmanship to complete the job.				
7.1	XLPE cable 5x16 mm <sup>2</sup>	R.M.	40		
7.2	XLPE cable 5x10 mm <sup>2</sup>	R.M.	30		
7.3	XLPE cable 5x6 mm <sup>2</sup>	R.M.	40		
7.4	XLPE cable 5x4 mm <sup>2</sup>	R.M.	40		
7.5	XLPE cable 3x4 mm <sup>2</sup>	R.M.	20		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
<b>8</b>	<b>Cable tray</b>				
8.1	Supply and erect hot galv. wall mounting channel cable tray with cover width 10cm,(0.7-1mm) thickness complete with all needed fitting to lay and arrange cable according to specification and instruction. The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before commencement of the work.	R.M.	20		
<b>9</b>	<b>Duct</b>				
9.1	Supply and install 4 x 6cm, PVC duct with all needed accessories.	R.M.	20		
<b>10</b>	<b>Lighting System</b>				
10.1	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 2x18W type Nipton or equavilant, T8 , 1200mm ,230V, 30000 hr, 1600 Lumen, daylight 6500 K. (Type is Philips or equivalent). The item includes dismantling and removing the existing fluorescent fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	60		
10.2	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 15W type Nisco or equavilant,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent). The item includes dismantling and removing the existing fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	20		
10.3	Supply, install, connect and test Ac LED tube length 1200mm, 18 Watt , T8 lamp, with 1600 LM Efficacy and Power factor > 95%. The item includes dismantling and removing the existing fluorescent tubes, ballasts, condensers and rewiring to be compatible with instant Start and allows fixture to maintain original compliance. All works must be according to engineer's instruction. (Type is Nipton or equivalent)	No.	360		
10.4	Supply ,install and operate LED lamp 15W ,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent).	No.	25		
10.5	Rearrange the exiting distribution board, the work include dismantling the exiting C.Bs, wires, all internal connections and terminals and deliver to owner, civil works and cleaning. The item include new internal panel with required C.Bs, RCCD, wires, PVC ducts, terminals and connection and all needed works as per approved shop drawing , specifications and supervisor engineer instruction's.	Set	6		
<b>Total of Bill No. (1-A) US \$</b>					

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
	<b>Bill No (1)</b>				
<b>B</b>	<b>Mamdouh Sidam School</b>				
<b>1</b>	<b>PV Solar System</b>				
	<p>Supplying, installing, commissioning &amp; testing the following items with all the required materials to complete the job in accordance with the BOQ, drawings, specifications and the supervising engineer's instructions. The prices should include all the materials and accessories needed to complete the job.</p> <p>The Contractor has to submit Detailed design drawings (single line diagram, Equipment Layout inside room, PV distribution panels, DC &amp; AC distribution bards...etc) for the proposed PV system to be approved by the Engineer before commencement of the work.</p> <p>The contractor must submit the original catalogues with all certified and calculation sheets test for all system component according to the required parameters and supervising engineer's instructions.</p> <p>- The contractor must submit all calculation sheets from system manufacturer for the required parameters and supervisor engineer's instructions.</p>				
	<p>General:</p> <ul style="list-style-type: none"> <li>• The system will be grid interactive connected with battery backup system, which will allow many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the batteries when PV generates more than the loads, the batteries can be charged from Grid if PV output is not enough for loads and batteries.</li> <li>• Contractor shall submit shop drawings for all architectural, civil, electrical and a complete photovoltaic solar system works, including a single line diagram showing all the components of the PV system, DC and AC distribution boards, PV Arrays lay out and battery backup systems connections and cables, wires cross section for all the system to be approved by the Engineer before executing the work.</li> <li>• Contractor shall submit the catalogs of each component showing the requested specifications stated at the bill of quantity.</li> <li>• The contractor shall submit the Manufacture testing certificate, country of origin, certified characteristics, test performance curves, spare parts regular (as recommended by manufacturer , maintenance manuals and manufacturers warranty for each components of the system.</li> </ul> <p>• As-built drawings and writing settemg parameters shall be submitted after handing over the work.</p> <ul style="list-style-type: none"> <li>• All junction boxes and DBs will be lockable type.</li> <li>• Upon completion of the installation, the contractor shall organize an on site training program for operation and maintainance purpouse involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates.</li> </ul> <p>• The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</p> <ul style="list-style-type: none"> <li>• All the following items include supply, install, commission and operate of the complete PV solar system.</li> <li>• The work includes maintenance period for each device according to BOQ and Specifications.</li> </ul>				

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.1	<p><b>PV Modules – 25 KwP:</b> Supply, install, connect and operate Mono Crystalline or Polycrystalline Photovoltaic Solar Modules with all material needed to have complete job ready for installing high quality PV modules with total arrays capacity to achieve 25 KwP. The item Includes supply, install &amp; connect the following:</p> <ul style="list-style-type: none"> <li>• Water proof PV junction boxes IP65 for each array including DC Fuses, DC LTL, bus bars ,terminals, ducts or trays, supports &amp; labels suitable to the PV arrays loads.</li> <li>• Solar DC cables appropriately sized to connect the PV solar cells together and to the J.B and from J.B to the inverter directly to have a complete operational circuit with all conduits, clamps , trays and cable end terminations which shall be DC plug and socket connectors . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 1%.</li> <li>• The price includes all works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</li> <li>• The contractor has to obtain 25kwP from PV system as minimum. In case the proposed PV modules results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 25kwP.</li> <li>• Contractor must submit manufacturer warranty for solar panels as recommended by manufacturer.</li> <li>• Contractor must submit all the required certificates for each PV solar panel from.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWp	25		
1.2	<p><b>Inverters – 25 KW:</b> Supply, install, connect and operate DC/AC grid tie 3-phase inverter with data communication unit with Ethernet connection . (Type is SMA or equivalent). The inverter must be suited to any PV module configuration, and depending on the system design and installation proposed and for the future extended also. The DC max power input rating should be equal or more than 25 KW of the PV modules capacity at standard test condition. The inverter unit shall be suitable for indoor and outdoor installations with IP65. The inverter AC nominal power output rating must be equal or greater than 25 KW compatible with the AC loads design. The inverter must include the safety concepts such as (triple protection with optiprotect, electronic strings fuses, self-learning string failure detection, DC surge arrestor type 2 ) to ensure max availability. The price includes :</p> <ul style="list-style-type: none"> <li>• Supply, install and connect (monitoring and controlling unit) for all PV solar system installed especially compatible with the inverters, with all needed accessories, interface modules &amp; data cables and all connections needed to complete and connect the monitoring system to internet.</li> <li>• Supply ,install and connect all DC cables appropriately sized in accordance with the installation requirements and to connect the inverters with PV system designed with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors to have a complete job, the allowable voltage drop for DC cables between inverters and PV system not less than 1%.</li> <li>• Inverters shall allow an adjustable power factor minimum AC output power with all necessary electrical cables, earthing system, Conduits, trays and all other materials and workmanship needed to connect with the main distribution panel according to the engineer's instruction and approval and have a complete job.</li> <li>• The contractor has to obtain 25kw from PV inverters capacity as minimum. In case the proposed PV inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 25kw.</li> <li>• The contractor must submit manufacturer warranty for each inverter as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.3	<p><b>Battery Inverters – 30 KW:</b> Supply, install, connect and operate Battery Inverters compatible with on grid inverter rated power 30 Kw with all necessary interface modules and connections for masters &amp; slaves , electrical cables and data communication unit with Ethernet connection, connectable in parallel and modularly extendable. The Battery Inverter must include the following concepts such as (Ac and DC coupling, High efficiency, intelligent battery management for maximum battery life, charge level calculation, extreme overload capability, and battery temperature sensing and battery current measurements).Total battery inverters capacity must be compatible with the number of the inverters. (Type is VICTRON or equivalent). The price includes:</p> <ul style="list-style-type: none"> <li>• Supply, install and connect Remote Control Unit (RC Unit) for the installed battery inverters with all data &amp; communication cables and connection needed to complete the job.</li> <li>• Supply, install and connect:</li> </ul> <p>DC cables appropriately sized in accordance with the installation requirements to connect the battery inverters with DC battery fuses box. AC electrical cables to connect the battery inverters with the main distribution panel(AC Out). the works includes all conduits, clamps, trays and cable terminations end and workmanship needed to have a complete job,</p> <ul style="list-style-type: none"> <li>• The allowable voltage drop for DC cables between battery inverter and batteries less than 1%.</li> <li>•The contractor has to obtain 30kw from Battery inverters capacity as minimum. In case the proposed battery inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 30kw.</li> </ul> <p>• The contractor must submit manufacturer warranty for each battery inverter as recommended by manufacturer. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.4	<p><b>Battery Bank :</b> Supply, install, connect and operate VRLA tubular design deep cycle batteries, the total demand energy is 130 KWh, @ C10 , 1.8V per cell, 3000 cycle @ C10. The battery bank voltage is 48 Vdc, each battery 2 volt. (GERMANY MADE BRAND NAME)</p> <p>The batteries must provide high-quality and achieving superior performance, the manufacturing date must be new and not more than 6 months, suitable for every type of applications especially for solar renewable energy, designed Service Life 10 years with low internal resistance, designed to be deeply discharged. The Battery should provide benefits of being maintenance free, case flame retardant &amp; non-hazardous. The price Includes supply, install &amp;connect Battery temp. sensor (BTS) and the following:</p> <ul style="list-style-type: none"> <li>• All necessary DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all bus bars, conduits, clamps, stainless steel bolts, washers and cable end terminations and all needed materials to complete the job. All DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.</li> <li>• Battery Banks rack from the same manufacturer of the batteries with dividers and all needed accessories to finish the job. the rack must be enough to carry all the weight of the required batteries for the system.</li> <li>• The contractor has to obtain minimum 130kwh functional battery bank. In case the proposed batteries in stings provide more capacity. The contract will pay only for 150kwh and contractor will include in his price the extra kwh on the relevant ratio.</li> <li>• The contractor must submit manufacturer warranty for each battery cell as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWh	130		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.5	<p>PV Mounting structure:            PV Mounting structure:            Supply and install module steel foundation( PV roof top structure mounting frame ) with painting layers approved type suitable to the dimension of selected PV modules and PV numbers , to fix the photovoltaic panels on the PV parking structure including galvanized steel angles size 50 * 50 * 4 mm an must be doubled between the cells, rivets with seal of stainless steel and all accessories and supports. The mounting provides a fixed inclination of the modules 26-28 degree to the south with vertical support , galvanized steel plates 200*200*10mm, screwa and casting reinforced concrete foundations B 250 for each leg 30 *30 * 30 cm according to the approved Load designs , It must fixed perfectly with proper insulated for the roof top and according to specification , drawing and engineer instructions The structure includes pracing and double hot galvanized angles for deviders .The PV roof top mounting structure and the foundations must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads,... etc.) that might occure according to the site conditions .</p> <p>The price includes retesting Leakage of the roof insulation for the implemented area for the PV solar system before the installation and after completion of PV system, and making good of any damages to insulation membrane if occurred.            All works and materials must be according to drawings, specifications and supervisor instructions and approval.</p>	L.S	1		
1.6	<p><b>Battery Fuse Panel:</b>            Supply, install, connect and operate battery DC fuse board as an external DC distributor to protect the battery connections of the inverters . The box must be suitable connections for three battery inverters and up to six DC connections inlet on the battery side and six DC connections for inverter side, the item includes (4 LTL 250/400A , 12 fuses 250A , cable glands, with all necessary DC cables to have a complete operational circuit, positive &amp; negative busbars with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.            • The contractor must submit manufacturer warranty for each battery fuse box for a period not less than 1 years.            All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	No	1		
1.7	<p><b>3-Phase SMART Bidirectional Digital KWH Meter:</b>            Supply,install,connect and operate 3-phase 3x100 A SMART Bidirectional digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.            (Type is holley or equivalent)</p>	No	1		
1.8	<p><b>3-Phase Digital KWH Meter:</b>            Supply,install,connect and operate 3-phase digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	2		
1.9	<p><b>Earthing System For AC Side:</b>            Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance.            the item includes (all required copper electrodes 15mm2 driven into ground to achive the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the AC system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.10	<b>Earthing for PV Structure:</b> Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance. the item includes (all required copper electrodes 15mm2 driven into ground to achieve the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the PV system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.	Unit	1		
2	<b>SOLAR POWER DISTRIBUTION BOARD (PV-MDB)</b>				
2.1	Supply, install and commission distribution board with double door and switch key. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -Metallic partition between AC-IN part and AC-OUT . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent).	unit	1		
2.2	Supply, install M.C.C.B 4x63A In existing MDB. Type Moeller NZMN1-4-63A or approved equivalent.	No.	1		
2.3	Supply, install M.C.C.B 4x63A . Type Moeller NZMB1-4-63A or approved equivalent.	No.	1		
2.4	Supply, install M.C.C.B 3x63A . Type Moeller NZMB1-3-63A or approved equivalent.	No.	1		
2.5	Supply, install M.C.C.B 3x40A . Type Moeller NZMB1-3-40A or approved equivalent.	No.	1		
2.6	Supply, install MCB 3X40/32A. (Type is MOELLER FAZ-C(40,32)/3 or equivalent).	No.	2		
2.7	Supply, install MCB 2X32A. (Type is MOELLER FAZ-C(32) or equivalent).	No.	3		
2.8	Ditto,but MCB 3X20A. (Type is MOELLER FAZ-C20/3 or equivalent).	No.	1		
2.9	Ditto,but RCCB 4X40/0.003A.	No.	1		
2.10	Ditto,but MCB 1X10/16/20A. (Type is MOELLER FAZ-C10/16/20/1 or equivalent).	No.	4		
2.11	Supply and install Four Poles 3ph. Lightning Arrestor, 380V ,40KA type moeller or equivalent .the item include Triple poles Fused Switch (LTL) 125/160A With HRC fuses 125A. (Type is EATON or equivalent).	No.	1		
2.12	Supply and install Digital multimeter with 3 CTs and LTL fuse 3x36/6A. Type ENTES or equivalent.	No.	2		
2.13	Supply and install frequency protection relay,under/overvoltage, phase sequence/ phase failure relay , with LTL fuse3x36/6A and with all necessary control. Type Foxtam or approved equivalent.	No	1		
2.14	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
3	<b>DB-ESSENTIAL LOAD DISTRIBUTION BOARD</b>				
3.1	Supply, install and commission DB-ESSENTIAL LOAD distribution board. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent). -The unit rate include Rearrange exiting distribution board to separate essential loads and transfer to new panel, the item includes dismantling exiting C.Bs,wires and deliver to owner, cleaning and all needed works as per approved shopdrawing ,specifications and supervisor engineer instruction's.	unit	1		
3.2	Supply and install Molded Case Circuit Breaker MCCB 3X63A, with overload trip Ir (50-63A). (Type is EATON MOELLER NZMB1-63A or equivalent).	NO.	3		



No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
3.3	Supply and install 3-PH Mains/Solar. Automatic Change Over switch(ATS), contactor type, made of two contactors (160A- 400V four pole) , with electrical and mechanical inter-lock, including control unit, protection and all needed accessories. Type Moeller or equivalent..	NO.	1		
3.4	Supply and install Manual transfer switch MTS 4x160A with all needed connections and accessories.Type Moeller or equivalent..	NO.	1		
3.5	Supply and install Minture Circuit Breaker MCB 3X63/50A.Type EATON FAZ-D or equivalent).	NO.	2		
3.6	Supply and install Minture Circuit Breaker MCB 3X40/32A.Type EATON FAZ-D or equivalent).	NO.	3		
3.7	Supply and install Minture Circuit Breaker MCB 3X25/20/16A.Type EATON FAZ-D or equivalent).	NO.	2		
3.8	Supply and install Minture Circuit Breaker MCB 2X25/20A.Type EATON or equivalent.	NO.	2		
3.9	Supply and install Minture Circuit Breaker MCB 1X16A.Type EATON or equivalent.	NO.	2		
3.10	Supply and install Minture Circuit Breaker MCB 1X10A.Type EATON or equivalent.	NO.	2		
3.11	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
4	Supply and install, connect electrical board size of 24 C.B.The unit rate include Terminals, busbars, wires and all needed materials , accessories and workmanship for proper installation. Type is GEWISS or equivalent.	Unit	1		
5	Ditto but 12 C.B.	Unit	1		
6	<b>Cables</b>				
	Supply, laying and termination of XLPE CU cable, including labeling cable lugs, cable glands ,cable joints (if needed), pipes. Ducts with all required electrical and civil works to connect cable terminals from source to destination. According to drawings, specifications and the engineer's approval and any other needed materials and workmanship to complete the job.				
6.1	XLPE cable 5x16 mm2	R.M.	40		
6.2	XLPE cable 5x10 mm2	R.M.	30		
6.3	XLPE cable 5x6 mm2	R.M.	40		
6.4	XLPE cable 5x4 mm2	R.M.	40		
6.5	XLPE cable 3x4 mm2	R.M.	20		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
<b>7</b>	<b>Cable tray</b>				
7.1	Supply and erect hot galv. wall mounting channel cable tray with cover width 10cm,(0.7-1mm) thickness complete with all needed fitting to lay and arrange cable according to specification and instruction. The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before commencement of the work.	R.M.	20		
<b>8</b>	<b>Duct</b>				
8.1	Supply and install 4 x 6cm, PVC duct with all needed accessories.	R.M.	20		
<b>9</b>	<b>Lighting System</b>				
9.1	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 2x18W type Nipton or equavilant, T8 , 1200mm ,230V, 30000 hr, 1600 Lumen, daylight 6500 K. (Type is Philips or equivalent). The item includes dismantling and removing the existing fluorescent fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	10		
9.2	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 15W type Nisco or equavilant,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent). The item includes dismantling and removing the existing fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	20		
9.3	Supply, install, connect and test Ac LED tube length 1200mm, 18 Watt , T8 lamp, with 1600 LM Efficacy and Power factor > 95%. The item includes dismantling and removing the existing fluorescent tubes, ballasts, condensers and rewiring to be compatible with instant Start and allows fixture to maintain original compliance. All works must be according to engineer's instruction. (Type is Nipton or equivalent)	No.	218		
9.4	Supply ,install and operate LED lamp 15W ,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent).	No.	30		
<b>Total of Bill No. (1-B) US \$</b>					

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
	<b>Bill No (1)</b>				
<b>C</b>	<b>Hammad School</b>				
<b>1</b>	<b>PV Solar System</b>				
	<p>Supplying, installing, commissioning &amp; testing the following items with all the required materials to complete the job in accordance with the BOQ, drawings, specifications and the supervising engineer's instructions. The prices should include all the materials and accessories needed to complete the job.</p> <p>The Contractor has to submit Detailed design drawings (single line diagram, Equipment Layout inside room, PV distribution panels, DC &amp; AC distribution bards...etc) for the proposed PV system to be approved by the Engineer before commencement of the work.</p> <p>The contractor must submit the original catalogues with all certified and calculation sheets test for all system component according to the required parameters and supervising engineer's instructions.</p> <p>- The contractor must submit all calculation sheets from system manufacturer for the required parameters and supervisor engineer's instructions.</p>				
	<p>General:</p> <ul style="list-style-type: none"> <li>• The system will be grid interactive connected with battery backup system, which will allow many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the batteries when PV generates more than the loads, the batteries can be charged from Grid if PV output is not enough for loads and batteries.</li> <li>• Contractor shall submit shop drawings for all architectural, civil, electrical and a complete photovoltaic solar system works, including a single line diagram showing all the components of the PV system, DC and AC distribution boards, PV Arrays lay out and battery backup systems connections and cables, wires cross section for all the system to be approved by the Engineer before executing the work.</li> <li>• Contractor shall submit the catalogs of each component showing the requested specifications stated at the bill of quantity.</li> <li>• The contractor shall submit the Manufacture testing certificate, country of origin, certified characteristics, test performance curves, spare parts regular (as recommended by manufacturer , maintenance manuals and manufacturers warranty for each components of the system.</li> </ul> <p>• As-built drawings and writing setting parameters shall be submitted after handing over the work.</p> <p>• All junction boxes and DBs will be lockable type.</p> <p>• Upon completion of the installation, the contractor shall organize an on site training program for operation and maintenance purpose involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates.</p> <p>• The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</p> <p>• All the following items include supply, install, commission and operate of the complete PV solar system.</p> <p>• The work includes maintenance period for each device according to BOQ and Specifications.</p>				

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.1	<p><b>PV Modules – 25 Kw:</b> Supply, install, connect and operate Mono Crystalline or Polycrystalline Photovoltaic Solar Modules with all material needed to have complete job ready for installing high quality PV modules with total arrays capacity to achieve 25 Kw. The item Includes supply, install &amp; connect the following:</p> <ul style="list-style-type: none"> <li>• Water proof PV junction boxes IP65 for each array including DC Fuses, DC LTL, bus bars ,terminals, ducts or trays, supports &amp; labels suitable to the PV arrays loads.</li> <li>• Solar DC cables appropriately sized to connect the PV solar cells together and to the J.B and from J.B to the inverter directly to have a complete operational circuit with all conduits, clamps , trays and cable end terminations which shall be DC plug and socket connectors . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 1%.</li> <li>• The price includes all works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer to complete the job successfully.</li> <li>• The contractor has to obtain 25kw from PV system as minimum. In case the proposed PV modules results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 25kw.</li> <li>• Contractor must submit manufacturer warranty for solar panels as recommended by manufacturer.</li> <li>• Contractor must submit all the required certificates for each PV solar panel from.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWp	25		
1.2	<p><b>Inverters – 25 KW:</b> Supply, install, connect and operate DC/AC grid tie 3-phase inverter with data communication unit with Ethernet connection . (Type is SMA or equivalent). The inverter with must be suited to any PV module configuration, and depending on the system design and installation proposed and for the future extended also. The DC max power input rating should be equal or more than 25 KW of the PV modules capacity at standard test condition. The inverter unit shall be suitable for indoor and outdoor installations with IP65. The inverter AC nominal power output rating must be equal or greater than 25 KW compatible with the AC loads design. The inverter must include the safety concepts such as (triple protection with optiprotect, electronic strings fuses, self-learning string failure detection, DC surge arrestor type 2 ) to ensure max availability. The price includes :</p> <ul style="list-style-type: none"> <li>• Supply, install and connect (monitoring and controlling unit) for all PV solar system installed especially compatible with the inverters, with all needed accessories, interface modules &amp; data cables and all connections needed to complete and connect the monitoring system to internet.</li> <li>• Supply ,install and connect all DC cables appropriately sized in accordance with the installation requirements and to connect the inverters with PV system designed with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors to have a complete job, the allowable voltage drop for DC cables between inverters and PV system not less than 1%.</li> <li>• Inverters shall allow an adjustable power factor minimum AC output power with all necessary electrical cables, earthing system, Conduits, trays and all other materials and workmanship needed to connect with the main distribution panel according to the engineer's instruction and approval and have a complete job.</li> <li>• The contractor has to obtain 25kw from PV inverters capacity as minimum. In case the proposed PV inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 25kw.</li> <li>• The contractor must submit manufacturer warranty for each inverter as recommended by manufacturer.</li> </ul> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.3	<p><b>Battery Inverters – 30 KW:</b> Supply, install, connect and operate Battery Inverters compatible with on grid inverter rated power 30 Kw with all necessary interface modules and connections for masters &amp; slaves , electrical cables and data communication unit with Ethernet connection, connectable in parallel and modularly extendable. The Battery Inverter must include the following concepts such as (Ac and DC coupling, High efficiency, intelligent battery management for maximum battery life, charge level calculation, extreme overload capability, and battery temperature sensing and battery current measurements).Total battery inverters capacity must be compatible with the number of the inverters. (Type is VICTRON or equivalent). The price includes:</p> <ul style="list-style-type: none"> <li>• Supply, install and connect Remote Control Unit (RC Unit) for the installed battery inverters with all data &amp; communication cables and connection needed to complete the job.</li> <li>• Supply, install and connect:</li> </ul> <p>DC cables appropriately sized in accordance with the installation requirements to connect the battery inverters with DC battery fuses box. AC electrical cables to connect the battery inverters with the main distribution panel(AC Out). the works includes all conduits, clamps, trays and cable terminations end and workmanship needed to have a complete job,</p> <ul style="list-style-type: none"> <li>• The allowable voltage drop for DC cables between battery inverter and batteries less than 1%.</li> <li>•The contractor has to obtain 30kw from Battery inverters capacity as minimum. In case the proposed battery inverters capacity results in extra kw than this is deemed to be accounted for the proposed ratio. Contract will be pay only 30kw.</li> </ul> <p>• The contractor must submit manufacturer warranty for each battery inverter as recommended by manufacturer. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.4	<p><b>Battery Bank :</b> Supply, install, connect and operate VRLA tubular design deep cycle batteries, the total demand energy is 130 KWh, @ C10 , 1.8V per cell, 3000 cycle @ C10. The battery bank voltage is 48 Vdc, each battery 2 volt. (GERMANY MADE BRAND NAME)</p> <p>The batteries must provide high-quality and achieving superior performance, the manufacturing date must be new and not more than 6 months, suitable for every type of applications especially for solar renewable energy, designed Service Life 10 years with low internal resistance, designed to be deeply discharged. The Battery should provide benefits of being maintenance free, case flame retardant &amp; non-hazardous. The price Includes supply, install &amp;connect Battery temp. sensor (BTS) and the following:</p> <ul style="list-style-type: none"> <li>• All necessary DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all bus bars, conduits, clamps, stainless steel bolts, washers and cable end terminations and all needed materials to complete the job. All DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.</li> <li>• Battery Banks rack from the same manufacturer of the batteries with dividers and all needed accessories to finish the job. the rack must be enough to carry all the weight of the required batteries for the system.</li> </ul> <p>• The contractor has to obtain minimum 130kwh functional battery bank. In case the proposed batteries in stings provide more capacity. The contract will pay only for 150kwh and contractor will include in his price the extra kwh on the relevant ratio.</p> <p>• The contractor must submit manufacturer warranty for each battery cell as recommended by manufacturer.</p> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	KWh	130		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.5	<p><b><u>PV Mounting structure:</u></b> Supply and install module steel foundation( PV roof top structure mounting frame ) with painting layers approved type suitable to the dimension of selected PV modules and PV numbers , to fix the photovoltaic panels on the PV parking structure including galvanized steel angles size 50 * 50 * 4 mm an must be doubled between the cells, rivets with seal of stainless steel and all accessories and supports. The mounting provides a fixed inclination of the modules 26-28 degree to the south with vertical support , galvanized steel plates 200*200*10mm, screwa and casting reinforced concrete foundations B 250 for each leg 30 *30 * 30 cm according to the approved Load designs , It must fixed perfectly with proper insulated for the roof top and according to specification , drawing and engineer instructions</p> <p>The structure includes pracing and double hot galvanized angles for deviders .The PV roof top mounting structure and the foundations must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads,... etc.) that might occure according to the site conditions .</p> <p>The price includes retesting Leakage of the roof insulation for the implemented area for the PV solar system before the installation and after completion of PV system, and making good of any damages to insulation membrane if occurred.</p> <p>All works and materials must be according to drawings, specifications and supervisor instructions and approval.</p>	L.S	1		
1.6	<p><b><u>Battery Fuse Panel:</u></b> Supply, install, connect and operate battery DC fuse board as an external DC distributor to protect the battery connections of the inverters . The box must be suitable connections for three battery inverters and up to six DC connections inlet on the battery side and six DC connections for inverter side, the item includes (4 LTL 250/400A , 12 fuses 250A , cable glands, with all necessary DC cables to have a complete operational circuit, positive &amp; negative busbars with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 1%.</p> <p>• The contractor must submit manufacturer warranty for each battery fuse box for a period not less than 1 years.</p> <p>All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.</p>	No	1		
1.7	<p><b><u>3-Phase SMART Bidirectional Digital KWH Meter:</u></b> Supply,install,connect and operate 3-phase 3x100 A SMART Bidirectional digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p> <p>(Type is holley or equivalent)</p>	No	1		
1.8	<p><b><u>3-Phase Digital KWH Meter:</u></b> Supply,install,connect and operate 3-phase digital KWH meter,with all CT's and any other material needed to have a complete job ,The KWh meter has monitoring LCD with all needed data &amp; interface cables to connect with the Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	2		
1.9	<p><b><u>Earthing System For AC Side:</u></b> Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance.</p> <p>the item includes (all required copper electrodes 15mm2 driven into ground to achive the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the AC system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.</p>	Unit	1		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
1.10	<b>Earthing for PV Structure:</b> Supply,install,connect and operate complete independent earthing system for PV solar system, must be separated of the main earthing system to obtain 2 ohm max resistance. the item includes (all required copper electrodes 15mm2 driven into ground to achieve the resistance low than 2 ohm, manholes with iron cover, earth joints, clamps, ducts , conduits and 25 mm2 flexible earthing copper wires and cables from the PV system components to the electrode to complete the system as specifications and supervisor engineer instruction's and approval.	Unit	1		
2	<b>SOLAR POWER DISTRIBUTION BOARD (PV-MDB)</b>				
2.1	Supply, install and commission distribution board with double door and switch key. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -Metallic partition between AC-IN part and AC-OUT . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent).	unit	1		
2.2	Supply, install M.C.C.B 4x63A In existing MDB. Type Moeller NZMN1-4-63A or approved equivalent.	No.	1		
2.3	Supply, install M.C.C.B 4x63A . Type Moeller NZMB1-4-63A or approved equivalent.	No.	1		
2.4	Supply, install M.C.C.B 3x63A . Type Moeller NZMB1-3-63A or approved equivalent.	No.	1		
2.5	Supply, install M.C.C.B 3x40A . Type Moeller NZMB1-3-40A or approved equivalent.	No.	1		
2.6	Supply, install MCB 3X40/32A. (Type is MOELLER FAZ-C(40,32)/3 or equivalent).	No.	2		
2.7	Supply, install MCB 2X32A. (Type is MOELLER FAZ-C(32) or equivalent).	No.	3		
2.8	Ditto,but MCB 3X20A. (Type is MOELLER FAZ-C20/3 or equivalent).	No.	1		
2.9	Ditto,but RCCB 4X40/0.003A.	No.	1		
2.10	Ditto,but MCB 1X10/16/20A. (Type is MOELLER FAZ-C10/16/20/1 or equivalent).	No.	4		
2.11	Supply and install Four Poles 3ph. Lightening Arrestor, 380V ,40KA type moeller or equivalent .the item include Triple poles Fused Switch (LTL) 125/160A With HRC fuses 125A. (Type is EATON or equivalent).	No.	1		
2.12	Supply and install Digital multimeter with 3 CTs and LTL fuse 3x36/6A. Type ENTES or equivalent.	No.	2		
2.13	Supply and install frequency protection relay,under/overvoltage, phase sequence/ phase failure relay , with LTL fuse3x36/6A and with all necessary control. Type Foxtam or approved equivalent.	No	1		
2.14	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
3	<b>DB-ESSENTIAL LOAD DISTRIBUTION BOARD</b>				
3.1	Supply, install and commission DB-ESSENTIAL LOAD distribution board. the frame is made of hot galvanized steel sheets 2mm thickness, painted by antistatic and insulation paint. The unit rate for the below items include Wires, connections terminals , PVC ducts, suitable rating busbars, civil works, earthing and all needed accessories. -Labeling and S.L.D diagram fixed inside panel . -The panel size will have to include into consideration all electrical Components with 30% free space. ( Type is Eaton or equivalent). -The unit rate include Rearrange exiting distribution board to separate essential loads and transfer to new panel, the item includes dismantling exiting C.Bs,wires and deliver to owner, cleaning and all needed works as per approved shopdrawing ,specifications and supervisor engineer instruction's.	unit	1		
3.2	Supply and install Molded Case Circuit Breaker MCCB 3X63A, with overload trip Ir (50-63A). (Type is EATON MOELLER NZMB1-63A or equivalent).	NO.	3		



No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
3.3	Supply and install 3-PH Mains/Solar. Automatic Change Over switch(ATS), contactor type, made of two contactors (160A- 400V four pole) , with electrical and mechanical inter-lock, including control unit, protection and all needed accessories. Type Moeller or equivalent..	NO.	1		
3.4	Supply and install Manual transfer switch MTS 4x160A with all needed connections and accessories.Type Moeller or equivalent..	NO.	1		
3.5	Supply and install Minture Circuit Breaker MCB 3X63/50A.Type EATON FAZ-D or equivalent).	NO.	2		
3.6	Supply and install Minture Circuit Breaker MCB 3X40/32A.Type EATON FAZ-D or equivalent).	NO.	3		
3.7	Supply and install Minture Circuit Breaker MCB 3X25/20/16A.Type EATON FAZ-D or equivalent).	NO.	2		
3.8	Supply and install Minture Circuit Breaker MCB 2X25/20A.Type EATON or equivalent.	NO.	2		
3.9	Supply and install Minture Circuit Breaker MCB 1X16A.Type EATON or equivalent.	NO.	2		
3.10	Supply and install Minture Circuit Breaker MCB 1X10A.Type EATON or equivalent.	NO.	2		
3.11	Supply and install 3 Indication Lamps R-S-T the item includes Triple poles Fused Switch Moeller (LTL) 6/10A With HRC fuses and test push button.	Set	2		
4	Supply and install, connect electrical board size of 24 C.B.The unit rate include Terminals, busbars, wires and all needed materials , accessories and workmanship for proper installation. Type is GEWISS or equivalent.	Unit	1		
5	Ditto but 12 C.B.	Unit	1		
6	<b>Cables</b>				
	Supply, laying and termination of XLPE CU cable, including labeling cable lugs, cable glands ,cable joints (if needed), pipes. Ducts with all required electrical and civil works to connect cable terminals from source to destination. According to drawings, specifications and the engineer's approval and any other needed materials and workmanship to complete the job.				
6.1	XLPE cable 5x16 mm2	R.M.	40		
6.2	XLPE cable 5x10 mm2	R.M.	30		
6.3	XLPE cable 5x6 mm2	R.M.	40		
6.4	XLPE cable 5x4 mm2	R.M.	40		
6.5	XLPE cable 3x4 mm2	R.M.	20		

No.	Item	Unit	Qty.	Unit Rate US \$	Total US \$
<b>7</b>	<b>Cable tray</b>				
7.1	Supply and erect hot galv. wall mounting channel cable tray with cover width 10cm,(0.7-1mm) thickness complete with all needed fitting to lay and arrange cable according to specification and instruction. The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before commencement of the work.	R.M.	20		
<b>8</b>	<b>Duct</b>				
8.1	Supply and install 4 x 6cm, PVC duct with all needed accessories.	R.M.	20		
<b>9</b>	<b>Lighting System</b>				
9.1	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 2x18W type Nipton or equivalent, T8 , 1200mm ,230V, 30000 hr, 1600 Lumen, daylight 6500 K. (Type is Philips or equivalent). The item includes dismantling and removing the existing fluorescent fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	10		
9.2	Supply ,install and operate Surfaced mounted lighting fixture, including LED lamps 15W type Nisco or equivalent,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent). The item includes dismantling and removing the existing fixtures and delivery to the owner store, 3x1.5mm2 NYA wires and PVC conduit/duct if needed and all connection and material to complete the job as per engineer instruction.	No.	20		
9.3	Supply, install, connect and test Ac LED tube length 1200mm, 18 Watt , T8 lamp, with 1600 LM Efficacy and Power factor > 95%. The item includes dismantling and removing the existing fluorescent tubes, ballasts, condensers and rewiring to be compatible with instant Start and allows fixture to maintain original compliance. All works must be according to engineer's instruction. (Type is Nipton or equivalent)	No.	460		
9.4	Supply ,install and operate LED lamp 15W ,230V, 30000 hr, 1500 Lumen, daylight 6500 K. (Type is Nisco or equivalent).	No.	30		
<b>Total of Bill No. (1-C) US \$</b>					

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
<b>Bill No (2)</b>					
<b>Civil Works</b>					
	<b>General Notes:</b> 1- Complete detailed shop drawings should be delivered to the Engineer to take his approval prior the commencement of work. Samples of all materials shall also be delivered to the Engineer to take his approval, 2-All works and installations listed here below should be carried out, tested and commissioned by specialized responsible skilled labours in full coordination with engineering office , all in accordance with drawings, specifications and relevant standards, and the instruction of the Engineer. The Engineer has the right to reject any component of the work not complying with the specifications and the terms of the contract. 3- The contractor shall submit detailed implementation work plan and method of statement Coordination with the engineer .				
1	<b>EARTHWORKS - Leveling &amp; Excavation Works:</b>				
	<p>Notes:</p> <p>Contractor shall take into consideration that all – direct and indirect works and expenses required for the completion of Earth works items' Prices. Excavation item shall include the removal of any buried structure not to be part of the proposed construction, including transport of excavated, surplus material and buried structure (not to be part of the proposed construction) to a location approved by the engineer or his representative outside the site, workmanship and any where else, needed, all according to drawings, specifications, conditions and directed instructions by the Engineer. the following will be in the items prices but not limited to:</p> <p>Contractor shall take into consideration that all – direct and indirect works and their relevant expenses required for proper implementation of the project including temporary facilities, fencing, securing utilities (water, wastewater, telephone and electricity systems) as well as making access to project implementation location area is running safely without disturbance. The contractor will be accountable for all necessary equipment, materials and activities to assure the safety of people within the vicinity, where an approved safety plan will be prerequisite to initiating activities along with installing all required components and materials necessary for safety of workers, project team as well as people at the project. All relevant costs are deemed to be included in the unit price in addition to the required re-instatement works needed to bring the original facilities to its original status before addition of temporary works.</p> <p>1. Shore up the sides of excavation and take all precautions to keep the adjacent buildings and existing infrastructure utilities (sewage, water, electricity, telecommunication and pavement works) safe. And repair any damage that may occur in the site.</p> <p>2.The cadastral survey and leveling of existing status at grids. And the contractor should get Approval of Bench mark and leveling network before excavation works.</p> <p>3. Safety precautions to protect neighbor utilities and persons.</p> <p>4. All required Tests should be accommodated by an approved lab.</p> <p>5. Laying out the buildings coordinates to be carried out by profesional surveyor using total station device.</p> <p>6.Price includes leveling and backfilling from surplus clean sand (Safia) from site to make up level around buildings up to the top of external ground beams levels.</p> <p>7.All the above mentioned and following specifications is part of the contractor obligations.</p>				

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
	<p>8. Quantities of Excavation shall be measured according to the elements' dimensions mentioned in the drawings</p> <p>9. The Price for excavation includes Cleaning the site and demolishing and removal of any existing structures. Debris material shall be disposed off to approved site as directed by the Engineer.</p> <p>10. Back-filling item should be in layers (25cm max. each &amp; compaction test 98%). Prices shall include supply, water, compaction, transporting, testing and any needed workmanship and material, all according to drawings, specifications, conditions and as directed by the Engineer.</p> <p>11. Cleaning the site and removing all debris, surplus unwanted materials and rubbles to approved dump site.</p> <p>12. All existing Material dismantled must be transferred to places as specified by the supervisor Engineer</p>				
1.1	Demolition works for the existing insulation layer , foam concrete layer, stop columns and any existing obstacles .	Unit	3		
2	Concrete Works:				
	<p>Rates of Concrete Works shall include:-</p> <p>1. All form works and shuttering (new lumber for shuttering painted by special oil (fuel or burnt oil is not accepted) in any form, shape and size. Making chamfered and curved edges, allowing for and making grooves and sleeves and using Tie Rods (Batant) for concrete walls; removal of forms and cleaning of all exposed tie wires and rods. Steel forms must be used in shuttering the external decorations.</p> <p>2. Supplying, Casting, vibrating and curing as per specifications.</p> <p>3. Approved additives and admixtures.</p> <p>4. Developing new Concrete Job Mix Designs, Sampling , testing and providing test results certificates, storing and saving of samples.</p> <p>5. Painting of exposed surfaces of underground reinforced concrete elements with two coats of hot bituminous paint (75/25) after primer layer , the strokes of each layer to be opposite to each other.</p> <p>6. Preliminary installations for Electrical, plumbing and floor drainage in floor slabs including final floor slab.</p> <p>7. Compaction and testing under the foundation, ground beams, ground slabs and Apron. the compaction should not be less than 98% of MDD.</p> <p>8. All works according to specifications, drawings and supervisor engineer instructions</p> <p>9. Supply, fabricate and fix reinforcement steel (<math>f_y = 410 \text{ N/mm}^2</math>) for all the structural elements according to drawings and engineer's instructions for any grade, size and length as detailed in the drawings, storing on site including cutting, bending and fixing in position and providing all tying wires, spacers, shop drawings, testing and bar bending schedules .All works according to specifications , drawings and supervisor engineer instructions</p> <p>10. In rehabilitation works, supply fabricate and fix steel dowels to the existing concrete using special materials. In case of lapping with existing steel reinforcement, rates will include cleaning rust and treatment with special materials</p> <p>11. In case after excavation the new columns locations and relevant footings coincide with the existing ones, the contractor will make modification to adapt implementation to the existing conditions and deemed to include in his rates relevant costs accordingly.</p> <p>12. The unit price includes demolish and removal of any required elements to complete the work according to the new design.</p> <p>13. All rehabilitation works will include the necessary excavation , backfilling with clear sand to the design level , extra steel reinforcement and concrete to be applied in layers if necessary in addition to the necessary special materials and accessories.</p>				
2.1	Supply and cast ready mix reinforced concrete B250 kg/ cm2 for suspended hollow block slab 25 cm thick , including the reinforced steel, drop and inverted beams, hollow cement block 40*25*17, and all other materials needed to finish the work as per specifications and drawings. drainage, electrical, air conditioning, mechanical ducts & workmanship with all required works as per Engineer instructions.	m2	90		
2.2	Ditto but for lintels and sills.	m3	3		
2.3	Ditto but B300, for columns and column necks	m3	8.5		

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
3	<b>BLOCK WORKS:</b>				
	The price include: 1- supplying hollow cement block from good and approved factory in perfect dimension and build it in good manner with a compressive strength 35 kg/cm2 for hollow block. This item will include cement mortars, reinforced concrete infill (B250) between columns & block walls (10-20 cm wide) with 1Ø8mm/40cm horizontally and 2Ø8mm vertically according to drawings, pipes encasement, false columns 20x20 cm/4.0m among the parapet wall with 4Ø12mm and bituminous paper between block work and drop beams & all requirements needed to finish the works according to the drawings, specification and to the supervision engineer instructions.				
3.1	Supply and build hollow cement blocks 40x20x20cm.	m2	200		
4	<b>Plastering Works</b>				
	All works must be according to drawings, specification and engineer instructions. Rates shall include: Supply of all needed materials, including galvanized angles for the corners as well as the use of galvanized wire mesh between concrete and block work. Preparation works by covering all conduits of electricity, water supplies, etc, with a galvanized wire mesh at least 20cm width coated by mortar (1:1) cement: sand and the work includes removal of wires and nails and cleaning of surfaces to be ready for plastering. Contractor shall take into consideration that all – direct and indirect works and expenses required for the completion of the coming items are included in the unit price. The work includes closing all opening in existing walls, as opening around existing (plumbing, electrical) and between existing walls and slabs by using Galvanized mesh and mortar cement. Complete and repair all defects, cracks, opening and etc. in existing plastering according to engineer's instruction. Trimming of concrete chippings, removing the wires and etc. from existing concrete, and cleaning of existing surfaces to be ready for plastering. The work shall include checking out all of the preliminary installation in ceilings and walls such as electrical, water supply and waste water pipes and repairing the damages if any. This should be done prior to commencement of plastering and after obtaining a written approval from the supervisor engineer. Curing with water for at least three days for each coat.				
4.1	Supply and make internal plastering 13 mm thick for ceiling, walls and soffits. The work includes rough primer nail rendering to form a key with (mix 1:1) cement sand, second layer 13mm: Base-Coat "Rendering" with (1:3:0.25) cement: sand mortar: lime and third layer: Finishing Coat with (1:4:0.50) cement: sand mortar: lime. Works include all materials needed to finish the works according to specifications, drawings and supervisor engineer's instructions	m2	290		
4.2	Supply and make external plastering 20mm thick to walls with four faces: the first is the rough nail rendering (mix 1:1) cement sand; the second is 5mm thick mortar (mix 1: 2) cement:sand, the third is the undercoat 13mm (mix 1: 3 :0.25) cement:sand:lime, the forth is as per the existing finish Italian plastering or two coats of Tyrolean finish (mix 1: 3) white cement to fine aggregate (Quartz) and all is according to specifications, drawings and supervisor engineer's instructions	m2	250		
5	<b>Painting Works:</b>				
	1-All the painting materials used should be approved and tested by approved local laboratory and have the final approved from the supervisor engineer. 2- The surface must be dry and clean before painting. 3- All painting works should provide the required coverage. 4- All paint works must be according to specifications, drawings and supervisor engineer instructions. 5- Contractor shall take into consideration that all – direct and indirect works and expenses required for the completion of the coming items are included in the unit price. 6-Smoothen surfaces of existing plastering before the Commencement paint				

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
5.1	Supply and Paint the internal walls and ceiling with one coat primer and at least two coats of approved supercrile as specifications, drawings and supervisor engineer instructions.	m2	290		
5.2	Supply and Paint, external walls with one coat of Pendrole primer and at least two coats of External quality of white and colored emulsion (Weather Shield) or equal approved as specification and drawings including the maintenance of the existing tryolyne (Rashga) if needed.	m2	540		
6	METAL works:				
6.1	The item include supplying white aluminum windows section 7000 with two rails, with min. wall thick 1.25mm (be approved by representative engineer ) as frame, glass 4 mm thick, ironmongery , accessories and hard ware as per specification and drawings. -Steel work should be Paint with two coats of oil paint & one primer (polyzinc).				
6.2	Supply and fix aluminum window, overall size 160x100cm.	No	3		
6.3	Supply and install galvanized metal door 100x 220 cm (type DS1) with new double sheet (2-mm) complete with frame, the bottom of door must be louver type as per drawings, ironmongery, for electrical room. The price shall include painting with two coats and base coat and union type lock or equivalent, all according to Drawings, Specifications and instructions of the Engineer.	No	3		
6.4	Supply and fix galvanized steel protection for windows over all size 140x120 cm as per drawings , Fixed on walls by steel plate ties, painting with oil paint, all according to drawing, specification and engineer instructions.	No	3		
7	Tiles & site works:				
	All works must be according to drawings, specification and engineer instructions. Rates shall include : 1. Samples for approval and all the required tests. 2. Cleaning, mechanical polishing and pointing using grout. 3. Insulation works under ceramic floor tiles for upstairs bath rooms and kitchens using primer coat, two hot bitumen coats (75/25) 4. Plastic angle beads for ceramic wall tiles and Aluminum angle for ceramic of walls at the corners and top and sides of ceramic edges. 5. Local marble must be Grade (A) free cracks and clay flaws. 6. Measuring the stockpiled quantities of tiles and obtaining the engineer approval prior to shipment to the site. 7. Transporting and carefully handling the stored quantities to the site.				
7.1	Supply and install terrazzo floor tiles size 25cmx25cmx2.5cm (with marble chips) laid on 2cm mortar bed and 5 cm thick sand bed and the price including terrazzo skirting of same kind and color of the floor tiles 25cmx7cm x1cm thick laid on 1 cm mortar	m2	90		
7.2	Supply and install granite marble (grade A) first class (Rozabitta type) 3cm thick, laid on 2cm mortar bed for and 5cm sand bed for edges of main entrance, including landing of main entrance. size 25 cm wide x 3cm thick for windows sills laid on 2 cm thick mortar bed as approved by the engineer.	r.m	8		
8	Roofing works				
	(1) Rates for foam concrete/ cement and mortar work shall include: 1. Supply and storage of cement. 2. Supply and storage of aggregates and water, 3. Mixing, 4. Hacking concrete, applying cement slurry or raking out joints of block work to form key, 5. Application to any surface, 6. Finish to surface, 7. Finish to falls and cross falls, 8. Forming bays including joints, 9. Finish to edges, 10. Making good around steel sections, pipes, tubes, bars, brackets, outlets, and the like, 11. Ends, intersections, ramps, and the like, on fillets,				

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
	(2) Rates for waterproofing shall include for: 1. Preparation of surface, 2. Any area or width, 3. Cutting in edges. 4. Over laps, priming and treatment at the corners and floor drains. 5. Testing for the roof with water 6. Dressing over parapets and stub columns including forming groove to receive edge of plasticised bitumen membrane and sealing with elastic sealer.				
	(3) Rates for roof sheets shall include: 1. Side and end laps, Fittings including bolts, hook bolts, screws and washers, 2. Sheets of any width or length.				
8.1	Supply and cast foam concrete with fine aggregates for roof screeding of average thickness 8 cm as shown in drawing. The item will include making the angle fillet 5x5cm around the boundary of the parapet and around opening in roof if exists.	M2	90		
8.2	Supply and lay one layer of plasticized bitumen roofing membrane with chipping 4 mm thick, including priming concrete surface prior to laying, dressing into rain water outlets to form water proofing seal and cover the angle fillets. The rate include verticals parts skirting as per specification and drawings. Note: Measurement will be for the horizontal projection only.	M2	90		
9	PLUMBING works				
	(1)In general rates for plumbing works shall include for: Developing shop and as built drawings 2. Cutting and forming all chases, recesses, holes, and the like, 3. Pipe sleeves, 4. Building of concrete and/or brick ducts in floors, walls ...etc., 5. Excavation, forming of trenches for services, concreting, bedding and back filling and ramming after laying, 6. Fixing brackets, clips, holder bats, hangers, and the like, 7. Temporary and final fixing, 8. Nails, screws, bolts, nuts, washers, holes, plugs, sleeves and the like, 9. Building in or cutting and pinning, 10. Testing and drawings, 11. Painting of pipes, 12. All work of other trades in connection with plumbing work including all making good. 13. Rates for manholes and pits shall include excavation, concrete, benching, plastering, backfilling and cover as per Drawings and Specifications, 14. Rates for sanitary fittings, isolated taps and gullies shall also include all pipe work in connection therewith and connections thereto including connection to the nearest manhole or gully and to the cold water storage tank. 15. Rates for pipe work including pipe work in frames to shading sheds shall include for: 1. Joints in the running length, 16.Nipples, connections, sockets, ferrules, couplings, back nuts, unions, and the like, 17. Bends, elbows, tees, reducers, access doors, cleaning eyes, blank caps, stop valves, and the like, 18. Welded joints and connections including grinding, 19. Lagging and wrapping, 20. Excavation, bedding and backfilling.				
9.1	Supply, Install, test, and commission 4" UPVC pipe for rain water drainage as per Specifications and Engineers instructions.	MR	15		

Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
9.2	<b>AC Air Condition:</b> Supply , install, test and commission air conditioning Inverter type Split Unit, composed of outdoor unit. filled with environment friendly refrigerant such as (R410, R407c,...) and COP not less than 3.5, Condensing unit shall be complete with Inverter compressor/s & air cooled condenser with fan, Well supported on hot galvanized steel base on the roof, indoor unit with plasma filter as indicated on drawings to be tight installed completed with all necessary supports, hangers, drain pipes from indoor unit to the ground floor drain, (PVC Ø 0.75"), copper pipes , sleeves, thermostat , Remote control , The price includes all aircondition power socket with lamp switch and all required electrical power cables 3*4 mm2 from SDB inside the room to the unit according to drawings and engineers approval. CAPACITY:(12000 BTU/HR). (Type is TORNADO or equivalent ) .	Unit	3		
4	MISCELLANEOUS				
4.1	Supply and install the following items , the price includes 3x1.5mm <sup>2</sup> wires (Type ITAC orequivalent) , PVC conduites, Cable ducts with accessories ,ducts, clamps, supports, labeling , junction box ,civil works with all needed connection and accessories and other needed materials and workmanship to complete the job as per specification drawing and engineer's instructions				
4.1.1	Supply and install Surfaced Mounted Lighting Fixture with dual LED lamp 16w philips Type. (Type of fixture is Matix or equivalent)	No.	12.0		
4.1.2	Supply and install signle gang one way switch 220V,10A. (Type is GEWISS Chorus or equivalent)	No.	4.0		
4.1.3	Ditto but double pole.	No.	4.0		
4.2	Supply and install 20A switch socket outlet for AC split units, with XLPE Cu. Cable 3x4mm <sup>2</sup> , PVC conduites, ducts , supports, labeling , junction box ,civil works with all needed connection and accessories and other needed materials and workmanship to complete the job as per specification drawing and engineer's instructions (Type is GEWISS CHORUS or equivalent).	No.	3.0		
4.3	Supply and install Surfaced Mounted Single phase flush 220V,16A socket outlet with 3x1.5mm <sup>2</sup> wires, PVC conduites, ducts , supports, labeling , junction box ,civil works with all needed connection and accessories and other needed materials and workmanship to complete the job as per specification drawing and engineer's instructions. (Type is GEWISS Chorus or equivalent)	No.	12.0		



Item No.	Description	Unit	Quantity	Unit Rate US \$ (Numbers)	Total Amount US \$
4.4	Supply, install connect and, testing complete STP Rj45 Data outlet (Type is Premium Line or equivalent). The unit rates include supply, install and terminate Cat 6 FTP cable (D-Link or equivalent) from outlet inside the room to the nearest patch panel with all needed ducts , boxes, covers and all needed connection and accessories to complete the job.	No.	3.0		
4.5	Supplying and installing Portable ABC Powder Fire Extinguisher as per engineer instructions and the following specifications: <ul style="list-style-type: none"> <li>• 6 kg</li> <li>• 14 Bar operating pressure</li> <li>• Suitable to Electrical equipment fires</li> <li>• Up to 6m range of throw</li> </ul> The item includes all necessary equipment's for installation and operation as per specifications and engineer instructions.	No.	3.0		
4.6	Supply , install and operate water-jet spray pump of Q= 7.2 liters/min and 130 bar, 220V for washing the PV modules with all accessories, control and protection. <ul style="list-style-type: none"> <li>• the item includes all required heavy flexible 3x2.5 mm2 power &amp; control cables with length from the nearest DB to the PV panels, and all required 1/2 inch water pressure pipes 50m and 15 meters cable connections from the nearest source in order to operate the pump with auto stop function.</li> </ul> The item includes all necessary equipment's, materials, accessories and workmanship for installation and operation as per specifications and engineer instructions.	L.S	3.0		
<b>Total Of Bill (2) - US \$</b>					

SUMMARY

	Bill	Total US \$
1-A	Mustafa Hafez School	
1-B	Mamdouh Sidam School	
1-C	Hammad School	
2	Civil works	
	Total (US \$)	

Total in numbers .....

Total in letters .....

Name of the contractor .....

Authorized signature .....

Signature and Sealing.....

Title .....

Telephone.....

Fax / Email .....

Mobile .....