



ANNEX A: TERMS OF REFERENCE (TOR): RFQ/HCR/KAD/SUP/2022/07

General Objectives:

The work includes the furnishing of materials, consumable materials, facilities, civil works, labor, tools, equipment, test instruments, apparatus, specialties, and other services necessary to complete the installation and commissioning of the solar system at the UNHCR above-mentioned community centers which should include all peripheral equipment system necessary for the completion of the project.

The contractor shall be responsible for any additional electrical power requirements with the coordination and approval of UNHCR.

The contractor shall submit the following documentation to UNHCR upon completion of the project:

- System brochures/documentation for systems operational & maintenance/user manuals.
- Detailed equipment list stating the location, make model, serial numbers, firmware, etc.
- Result of system test as per manufacturer standards.
- System and workmanship warranty/guarantee.

Installation:

The contractor shall perform the installation, testing, and commissioning of all equipment. All necessary tests, services, and inspections to ensure the solar systems function shall be checked and approved before the acceptance test. The proposal shall include a detailed schedule so as not to cause interruptions in the operation of UNHCR.

The contractor shall prepare and furnish fully dimensioned scaled drawings of the builder's work arising from the installation of the equipment and system as well as for the equipment layout plans at various locations.

Training and Knowledge Transfer:

The technical staff shall give the trainees detailed knowledge of the technical functions. Upon completion of the training, the trainees shall be able to perform tests of the system, to maintain the system.

Inspection and Testing:

Before the final acceptance of the work, the contractor shall test the system to demonstrate compliance with contract requirements.

The whole system shall be subjected to complete functional and operational tests.



When these tests have been completed and corrections made as necessary, the contractor shall submit a signed and dated certificate with a request for formal inspection and test.

Warranty:

Upon completion and before final acceptance of the work, the contractor shall furnish UNHCR with a written guarantee, stating that all works executed under this project are free from material defects and workmanship; and

The guarantee for supplied equipment shall have a period of at least two (2) years inclusive of labor, transportation, and expenses that are needed for the repair/replacement of defective equipment.

Maintenance:

Certification of parts availability and support for One [1] year.

Training Certification of attendees for operations and maintenance of the system.

Bill of Quantity/Technical Specifications:

Lot (01): Al Meiram:

No	Item	Specifications	UoM	Quantity
1	Batteries	Supply Lead Acid (GEL) deep cycle batteries 150 Ah 12 - Volt & batteries. Must have one of these accreditation certificates such as ISO, CE, RoHS, IEC...etc. Or has passed the UNDP lab test (Sudan). They must be manufactured at most in the latest (06) six months.	Pcs	4
2	Modules Mounting Support Structure (MMSS)	Supply, fabrication, construction, and installation of the bolted support structure to hold modules, the support structure should be made from hot dip galvanized steel or heavy pipe & angles with pre-coated anti-rust as base paint & color paint, and the support structure withstands wind speed of 40 m/sec if the support structure it's a ground-mounted, the base of concrete (30*30*50) cm. The MSS is to hold 8 Pcs of solar panels *Please see the drawings Fig.1 & 2.	Set	1
3	Batteries racks	The rack should be from Aluminium or heavy iron angles & pipe with pre-coated anti-rust as base painting + color painting. To hold (8) pcs of batteries.	Set	1



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4	DC Cables 16 mm	Supply DC cables (100 yards) single core with red & black color the cables must be hosing with conduit or plastic (PVC) pipe for protection, cables shall meet the requirements of one of these certifications ISO, RoHS, IEC, and TUV.	Rolls	2
5	Junction boxes for solar panels with DC fuses	The Junction box must be manufactured from fiberglass reinforced plastic (FRP)/ thermos plastic with IP65 protection, & shall be waterproof, and dustproof. The terminals should be connected to copper bus bar arrangement of proper sizes to connect cables from solar modules arrays & Inverter. The Junction box must have protection devices below: DC -Fuses (8) Pcs (15 Amp 500 Volt) with Busbars embedded with cable glands, & conduit.	Set	1
6	Junction boxes for batteries with DC circuit breakers	The Junction box must be manufactured from fiberglass reinforced plastic (FRP)/ thermos plastic with IP65 protection, & shall be waterproof, and dustproof. The terminals should be connected to copper bus bar arrangement of proper sizes to connect cables from batteries & inverters. The Junction box must have protection devices below: DC Circuit Breakers (4) Pcs 500 Volt, 250 Amperes with Busbars embedded in addition to that cable glands, and conduit.	Set	1
7	Cables	DC cables 25 mm, ready-made jumpers. for interconnections batteries.	Rolls	10
8	Fencing	Providing & construct galvanized iron poles 2-inch Dim, height 2 m with concrete base 30*30*40 cm with chain-link wire with a secure distance of 3.5 m for each direction (distance between fence & solar panels).	Lump sum	1
9	Accessories	Nuts, clips, tapes cables clamps etc.	Lump sum	1
10	Inverter	Supply & install with capacity power 4000 VA, Volt 48 V rated, The Inverter must meet one of these, ISO, CE, RoHS, IEC Certificates. The Inverter must meet below: *Charge controller MPPT build-in. * Output details: Pure sine wave, 220 V, Single phase, 50Hz. * Efficiency: >95%. * Overloading features: is 150 % for 1 min (Surge Power). * Cooling: Forced air-cooling with temperature-controlled automatic cooler fan. * Operating temperature :0 to 50 deg C. * Can work efficiently under condition relative humidity: 95% * Enclosure protection IP 54. * Protections must be provided: * Input voltage protection: (Undervoltage, over-voltage) * Output voltage protection: (Undervoltage, overvoltage). * DC reverse polarity.	Pcs	1



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11	Lighting arrester	Has cable 16 mm, 20 Meters, equipotential busbar, earthing rods, set of joint cable, set of screws to the joint module via the support structure.	Set	1
12	Installation, testing, and commission	For the solar system above.	Work	1

Existing items in Al Meriam:

No	Item	Specifications	UoM	Quantity
1	Solar Panels	275-Watt peak.	Pcs	8
2	Batteries	150 Amp 12- Volt.	Pcs	4

Lot (02) Karassana:

No	Item	Specifications	UoM	Quantity
1	Solar Panels	Supply & installation of robust 330-watt peak 24 volts,8,8 Amp, solar panels must have these ISO, CE RoHS, UL, IEC, and TUV Certificates. Each PV module deployed must identification tag which should be able to withstand harsh environmental conditions and consist of the following information: * Name of the manufacturer of the solar panels. (PV modules) * Month and year of manufacture for each solar Panel. * Panel (Module) Wattage, I _{max} , V _{max} , FF ...etc. * Unique serial number of the Panels (PV modules).	Pcs	8
2	Batteries	Supply Lead Acid (GEL) deep cycle batteries 150 Ah 12-Volt & batteries must have one of these accreditation certificates such as ISO, CE, RoHS, IEC...etc. Or has passed the UNDP lab test (Sudan). They must be manufactured at most in the latest (06) six months.	Pcs	8
3	Modules Mounting Support Structure (MMSS)	Supply, fabrication, construction, and installation of the bolted support structure to hold modules, the support structure should be made from hot dip galvanized steel or heavy pipe & angles with precoated anti-rust as base paint & color paint, and the support structure withstands wind speed (40 m/sec) if the support structure it's a ground-mounted, the base of concrete (30*30*50) cm. To hold 8 Pcs of solar panels. *Please see the drawings below (Fig.1 &2).	Set	1



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4	Batteries Racks	The rack should be from Aluminum or heavy iron angles & pipe with precoated anti-rust as base painting + color painting. To hold (8) Pcs of batteries	Set	1
5	DC Cables 16 mm	Supply DC cables (100 yards) single core with red & black color the cables must be hosing with conduit or plastic (PVC) pipe for protection, cables shall meet the requirements of one of these certifications ISO, RoHS, IEC, and TUV.	Rolls	2
6	Junction boxes for Solar Panels with DC Fuses	The Junction box must be manufactured from fiberglass reinforced plastic (FRP)/ thermos plastic with IP65 protection and shall be waterproof, and dustproof. The terminals should be connected to copper bus bar arrangement of proper sizes to connect cables from solar modules arrays & Inverter. The Junction box must have protection devices below: DC-Fuses (8) Pcs (15 Amp 500 Volt) with Busbars embedded with cable glands, & conduit.	Each	1
7	Junction boxes for batteries with DC Circuit breakers	The Junction box must be manufactured from fiberglass reinforced plastic (FRP)/ thermos plastic with IP65 protection and shall be waterproof, and dustproof. The terminals should be connected to copper bus bar arrangement of proper sizes to connect cables from batteries & inverters. The Junction box must have protection devices below: DC Circuit Breakers (4) Pcs 500 Volt, 250 Amperes with Busbars embedded in addition to that cable glands & conduit.	Each	1
8	Cables	DC cables 25 mm, ready-made jumpers. For interconnections batteries.	Set	10
9	Fencing	Providing & construct galvanized iron poles 2-inch Dim, height 2 m with concrete Base 30*30*40 cm with chain-link wire with a secure distance of 3.5 m for each direction (Distance between fence & solar panels).	Work	1
10	Inverter	Supply & install with capacity power 4000 VA, Volt 48 V rated, The Inverter must meet one of these, ISO, CE, RoHS, IEC Certificates. The Inverter must meet below requirements: * Charge controller MPPT build-in. * Output details: Pure sine wave, 220 V, single phase, 50Hz. * Efficiency: >95%. * Overloading features: is 150 % for 1 min (Surge Power). * Cooling: Forced air-cooling with temperature-controlled automatic cooler fan. * Operating temperature :0 to 50 deg C. * Can work efficiently under relative humidity: 95% * Enclosure protection IP 54. * Protections must be provided:	Pcs	1



		* Input voltage protection: (Undervoltage, over-voltage) * Output voltage protection: (Undervoltage, overvoltage). * DC reverse polarity.		
11	Accessories	Nuts, clips, tapes, cables, clamps etc.	Lump sum	1
12	Lighting arrester	Has cable 16 mm, 20 meters, equipotential busbar, earthing rods, set of joint cable, set of screws to the joint module via the support structure.	Set	1
13	Installation & testing & commission of solar system above.	For the solar system above.	Lump sum	1

Drawings:

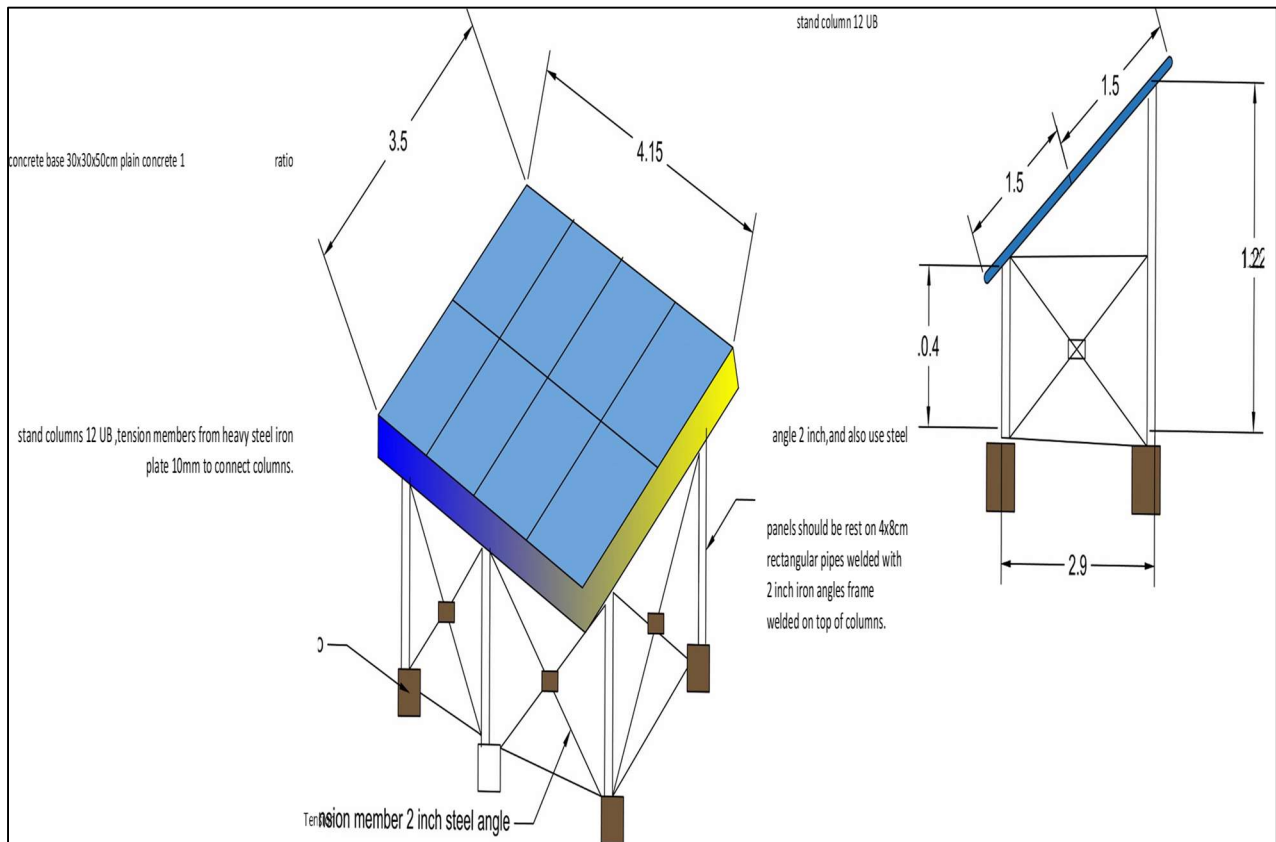


Figure 1: PV super structure details

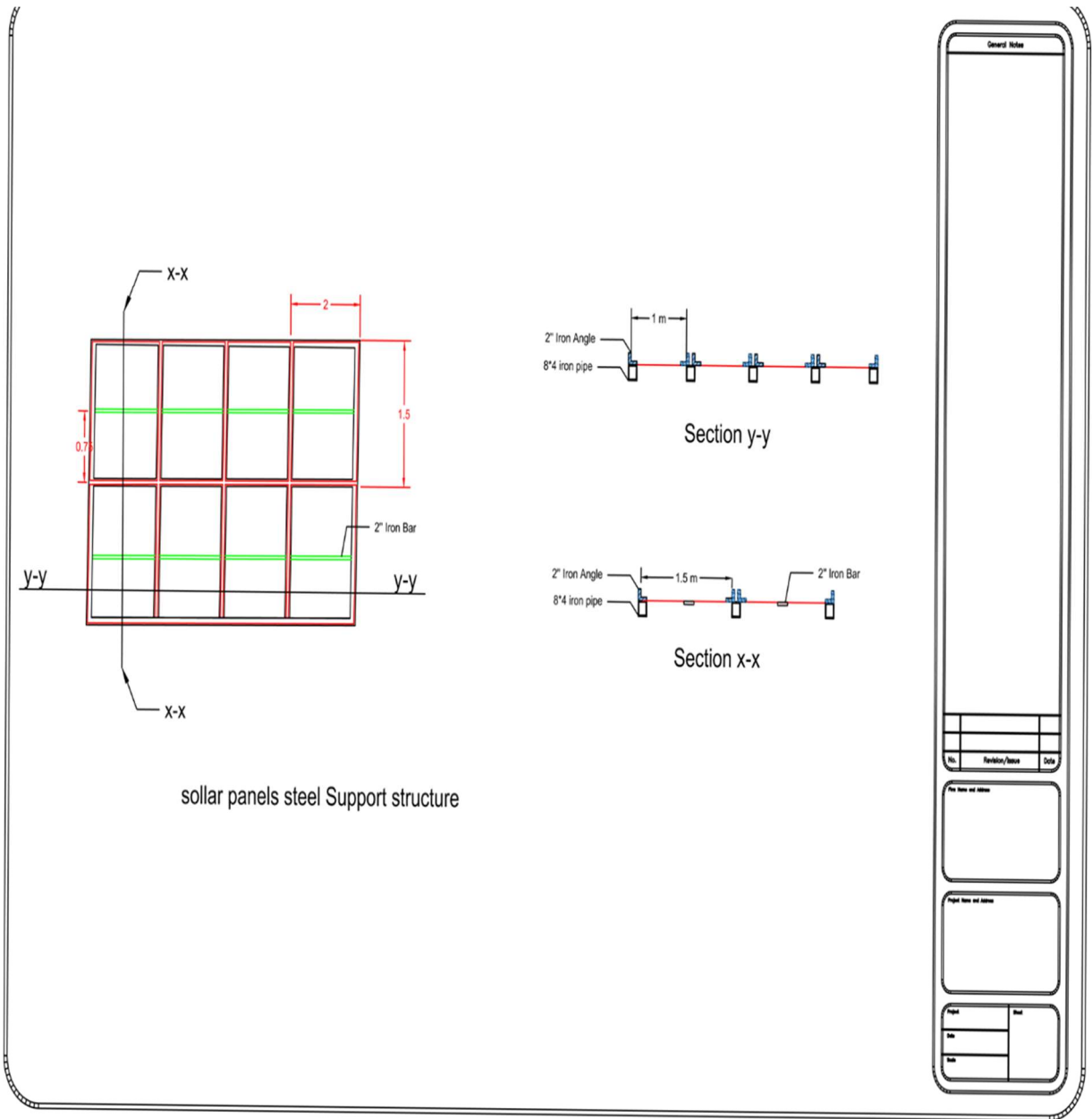


Figure 2: PV super structure plan and sections