

Provision of Water to Tal Banat and Tal Qasab via Reverse Osmosis System-Sin

#	Summary
1-	Provision of water in Tal Banat via RO system (36.261011, 4
2-	Provision of water in New Tal Qasab via RO system (36.259503, 41.9
3-	Provision of water in OLD Tal Qasab via RO system (36.256817, 41
	Total

jar-Ninawa Governorate

Amount \$
0.00
0.00
0.00
0.00



Provision of water in Tal Banat via RO system (36.261011, 42.011498)						
General Specification						
1	All works and the materials supplied by the contractor must be in according with the relevant Iraq's standard Specifications (It's the contractor responsibility to obtain any relevant Iraqi specifications by visiting ministry of construction and housing web site: WWW.moch.gov.iq (or physically obtain those documents from the mentioned ministry) in addition to Iraqi technical specification for building works.					
2	The contractor must provide samples, mockup, catalogues for testing / inspection and approval by the site engineer.					
3	Contractor must pay the cost for samples including any laboratory tests, both inside and outside the country as required.					
4	Permanent signage (after implementation is completed): (60cm x 40cm), printed on white aluminum composite (trade name - Dibond). To be placed in a prominent position at the main entry door of the site, at eye level.					
5	Temporary signage (during implementation): (W 190cm x H 90cm) printed on mounted plastic sheeting					
6	The price of works includes all job requirements as per Iraq's standard specification.					
7	The contractor must provide PPE for all laborer's, personnel, engineers and possible visitors to the site.					
#	Item Description	Uni	Qty	Price\$	Total \$	
CIVIL WORKS						
1	Site preparation (2000 m2): Supply of materials, tools, machinery and manpower for site preparation. The work includes : 1-Clearing, stripping and leveling of the site. 2-Removing undesired plants and other natural vegetation. 3-Dumping of all the debris and rubble to a site approved by the local authorities. All needed work to complete the job will be included within the price.	LS	1.00		0.00	
2	Filling works: Supply of materials, tools and manpower for filling (in layers not exceeding 25cm, including compaction up to 95% of (MDD) with sub base (type A) where required within the area inside the fence such as open yard, aprons, walkways, garden, etc. All needed work to complete the job will be included within the price.	M3	265.00		0.00	
3	Reinforced Concrete Mat Foundation: Supply of materials, tools and manpower for casting reinforced concrete mat foundation using (C25MPa) concrete and using sulphate resistance cement for foundations. The price includes adding bonding agent material between the old and new concrete (if any). The work includes all the requirements of steel reinforcement, concrete covers and form works(if required). All needed works to complete the job will be included within the price.	M3	40.00		0.00	
4	Reinforced Concrete slab, beam, column, lintel and staircase: Supply of materials, tools and manpower for casting reinforced concrete slab, beam, column, lintel, louver, parapet, decoration and staircase using concrete (C25MPa). The price includes adding bonding agent material between the old and new concrete(if any). The work includes all the requirements of steel reinforcement, concrete covers and form works. All needed works to complete the job will be included within the price. See attached drawing.	M3	35.00		0.00	
5	Concrete with BRC: Supply of materials, tools and manpower for casting (15cm) concrete with BRC(150x150x5mm) using sulphate resistant cement for (C25MPa) concrete. The price includes providing expansion joints every 4m both directions. All needed works to complete the job will be included within the price.	M2	150.00		0.00	

6	Main gate foundation and columns: Supply of materials, tools and manpower to cast reinforced concrete using (C30 Mpa) for foundations (0.8x0.8x0.40m) and columns (0.4x0.4x2.5m) for main gate. Including rebars, form works and all requirements. All needed work to complete the job will be included within the price. See attached drawings	NO	2.00		0.00			
7	Masonry works above DPC level: Supply of materials, tools and manpower to rebuild walls above DPC level (20cm width) using hollow concrete blocks (20x20x40) cm with cement sand mortar (1:3). The wall should be leveled vertically and horizontally. The price includes demolishing of all the damaged parts and removing of all debris and rubble to a site approved by the local authority. All needed works to complete the job will be included within the price.	M3	54.00		0.00			
8	Cement Plastering For New Walls: Supply of materials, tools and manpower for cement plastering with 20mm thickness smooth-finished for exterior walls and fences walls using aluminum straight edges. The price includes three layers as follows: one layer of cement splash dash, one layer of rough (kafmal) and finally smooth finished cement plastering with cement-sand mortar. All needed works to complete the job will be included within the price.	M2	525.00		0.00			
9	Chain Link Fence with Precast Concrete Pole: Supply of materials, tools and manpower to install galvanized chain link fence (50x50x3mm) of (2.40m) height on precast concrete poles (10x10cm) and (2.40m) height spaced every (2.0m). The price includes the following: 1-Removing of the old and damaged chain fence. 2-Excavation (40x40x40cm) for the precast concrete pole footings . 3-Providing precast concrete pole(column) 100x100mm and 2.40m height. 4-Plain concrete footing (40x40x40cm) after installing the poles. 5-Three tie/binding strand wire 5mm at (bottom, middle and top) of the poles. 6-Bracing inclined poles for the corners and at every 20m of straight lines. 7-Providing three barbed wires at the top of the poles (for security). All needed work to complete the job will be included within the price. See attached annexes.	ML	190.00		0.00			
10	Plastic painting: Supply of materials, tools and manpower to paint the exterior walls and fence, with three layers of plastic (silicon water proof) paint (Jotun, Betek, CAPAROL, Polisan, dyo or equivalent). The paint should be diluted (10%--15%) with water to achieve the coverage of painting of not more than (10-12) m2/Liter/layer. The job includes cleaning the walls, removing the dirt and dust, repairing all the cracks and filling all the holes before painting. All needed works to complete the job, shall be included within the price.	M2	525.00		0.00			
11	Ceramic tiles for Walls: Supply of materials, tools and manpower to remove the damaged ceramic tiles and dumping it to a place approved by local authority, then apply ceramic tiles for walls (25x50cm) or same as the existing size and color, using cement sand mortar(1:3), filling the joints with white cement paste. All needed work to complete the job will be included within the price.	M2	15.00		0.00			
12	Steel windows: Supply of materials, tools and manpower to install steel windows (using T, L and Z shapes). The price of works includes anti rust painting and two layers of oil painting, anti-insects wire mesh, handles, windows stopper and crystal clear class 4mm thickness with paste. All needed work to complete the job will be included within the price.	M2	22.00		0.00			
13	Steel Door with the Frame(1.0x2.10m): Supply of materials, tools and manpower to install steel door with frame, with steel plate gauge 18 (1.41mm) on double face, using steel tube 40x40x2mm, including a layer of Styrofoam to be placed between the two faces, hinges, doors handles, locks and fixing a stopper on the floor or wall. The price of work includes the painting of steel door using anti-rust and 2 layers of oil paint. All needed work to complete the job will be included within the price. See attached drawing.	NO.	3.00		0.00			

14	Main gate (H3.0m, W3.0m): Supply of materials , tools and manpower to install new main gate steel doors, by using plate gauge18 (1.41mm) and steel tube 40x40x2mm, including door handles, hinges and locks. Price of the work shall include painting of steel door with anti-rust and two layers of oil paints. The price also includes removing of the damaged door and dump it to a place approved by local authority. All needed work to complete the job will be included within the price. See attached drawing.	NO.	3.00		0.00			
15	Sliding Steel Door (2.0x4.0m) One Leaf with small door (1.0x2.0m): Supply of materials, tools and manpower to remove the damaged sliding steel door and removing the debris and rubble to a site approved by local authority, then install new slide steel door (one leaf), including plate gauge 18(1.41mm) on double faces, the gate has a frame of square steel pipe (75x75x3mm) and sub divider of pipe (50x50x3mm) @ 40cm c/c, slide steel frame U channel (84mm) top and bottom and making a small door within the gate (1x2m) with a frame of angle steel (75x75x3mm). The price of work shall include painting with anti-rust and 2 layers oil paint, rollers, door handles and locks. All needed works to complete the job, will be included within the price	NO.	1.00		0.00			
16	Steel door cover for well opening (1.2x1m): Supply of materials, tools and manpower to install steel door cover made by using plate gauge 18(1.41mm) and steel frame of dimensions 75x75x3mm. Including locks and painting by using two (2) layers of anti-rust and three (3) layers of oil painting. All needed works to complete the job will be included within the price. See attached drawings No.	No.	1.00		0.00			
17	Billboard: Supply of materials, tools and manpower to install billboard made of frame of size 3x1 m, including LED printed sticker. The frame shall be made of square pipe section 4x4cm. Price of the work shall include all requirements to complete the job.	NO.	1.00		0.00			
18	Room title board: Supply of materials and manpower to install room title name made of plastic sheet size 15x25 cm, using screws to fix. All needed work to complete the job will be included within the price.	NO.	3.00		0.00			
SUB TOTAL FOR CIVIL WORKS						0.00		
SANITARY WORKS								
1	Water tank: Supply of materials, tools and manpower for installing galvanized water tank of 1250 liters. Cylindrical shape and with plate gauge 16(1.56mm), supported by steel base made with 50mm (2") angle shape, including the connection of the inlet and outlet pipes. The price of work includes all piping and fittings, valves, float valves, accessories. All needed work to complete the job will be included within the price	NO.	1.00		0.00			
2	Taps: Supply of materials, tools and manpower to connect chrome water taps 1/2" or 3/4". Price of the work shall include water connections. All needed work to complete the job will be included within the price.	NO.	3.00		0.00			
3	Mixer taps : manpower to install mixer taps , locks and all accessories with complete water connections. All needed work to complete the	NO.	1.00		0.00			
4	Ceramic wash basin: manpower to install ceramic wash basin with stand, mixer taps , valves , mirror(60x50)cm and all fittings with complete water connections . All needed work to complete the job will be included within the price.	NO.	1.00		0.00			
5	Eastern toilet: Supply of materials, tools and manpower to install new ceramic eastern toilet. Including siphon(flush tank), gully trap Ø100mm (4"), flexible hose and water connections. All needed work to complete the job will be included within the price.	NO.	1.00		0.00			
6	Roof Drain pipes (4"): Supply of materials, tools and manpower to remove the damaged water roof drain pipes and install new galvanized steel pipes 4" (100mm). Including all connections and needed accessories to fix on roof and walls. All needed work to complete the job will be included within the price. See attached drawing.	M.L	30.00		0.00			

7	PVC pipe 4" (Ø 100mm): Supply, installation, testing and commissioning of PVC 4"(100mm) 6 bar for drainage and ventilation pipes down to manholes with all required fittings including excavation, back filling, encasing with sulphate resistant cement concrete and roof vent caps. All needed works to complete the job, will be included within the price.	M.L	25.00		0.00			
8	Galvanized iron water pipes(1/2"): Supply and install galvanized water pipes. The price includes all fittings and accessories, excavation, backfilling, painting the pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and thermal tape and Teflon seal for connections of cold and hot water pipes and concreting 10cm around the pipes. All needed work to complete the job will be included within the price.	M.L	25.00		0.00			
9	Galvanized iron water pipes(3/4"): Supply and install galvanized water pipes. The price includes all fittings and accessories, excavation, backfilling, painting the pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and thermal tape and Teflon seal for connections of cold and hot water pipes and concreting 10cm around the pipes. All needed work to complete the job will be included within the price.	M.L	15.00		0.00			
10	PPR pipes(3/4"): Supply and install PPR pipes (3/4)" diameter. The price includes all fittings and accessories, excavation, backfilling, isolate all hot water pipes by using arm flex and thermal tape and concreting 10cm around the pipes. All needed work to complete the job will be included within the price.	M.L	25.00		0.00			
11	Masonry manholes: Supply of materials and construction of manholes of different depths with internal dimension (40x40cm) using solid concrete blocks 15X20X40 cm for walls. The price includes excavation, crushed stone, plain concrete, walls, plastering both sides, & cast iron covers. See attached drawing.	NO.	1.00		0.00			
12	Septic Tank: Supply of materials, tools and manpower to build septic tank of internal dimension (L=2.5m, W=2.0m and H=2.7m). The price includes: 1-Soil excavations in any types of soil. 2-Provide a layer of crushed stones 10cm under the foundation concrete. 3-Casting (25cm) plain concrete for the foundation using (C25Mpa) Concrete and using sulphate resistant cement. 4-Build the walls of 40 cm width with solid blocks (15x20x40cm) and cement mortar (1:3). 5-Casting reinforced concrete slab (20cm) with two layers of 12mmØ spaced @20cm both directions. 6-Installation of two manhole steel covers of (60 x 60)cm. 7-Supplying maintenance ladders. 8-Plastering of the interior and exterior walls with two layers of cement plastering 20mm thickness. The price includes a layer of cement splash dash. All needed work to complete the job will be included within the price. See attached drawing.	NO.	1.00		0.00			
SUB TOTAL FOR SANITARY WORKS						0.00		
Mechanical Works								
1-	BOREHOLE WORK: Provide equipment, manpower, tools, any required stuff to carry out the work of drilling, casing, cleaning, testing, and other details as per each item below; to drill and put in service the well at designated positions by the supervisor engineer. the price includes any requirements may be not listed through the details, to ensure optimized quality and functionality. The work should be according to the following details and directions of the competent engineer:							
1.1	Drill for main borehole body (Filtering zone & reservation): Supply materials, equipment and manpower to drill the borehole, up to 200 meters depth, with min. 17.5/8" bit using hammer drill or rotary drill according to the supervision of geologist committee and site supervisor..	M.L	200.00		0.00			

1.2	<p>Casing pipes: Installing casing and slotted (holes size is 3-5 mm.) galvanized steel pipes having a diameter of 8/8.5" and thickness not less than 5 mm for the whole depth of (200 m). The pipes must comply with BS 1387 standard specification. The first (100 m) of the pipes should be perforated pipes, and the rest of pipes should be unperforated pipes. The bottom of the first pipe shall be sealed by steel plate with thickness not less than 10 mm, according to the instruction and supervision of geologist committee and the site supervisor. The price includes pipe welding and putting them down inside the borehole besides any other requirements to do a perfect job</p>	M.L	200.00		0.00			
1.3	<p>Filtration: Supply tools, equipment and manpower to lay the gravel between casing pipes and the wall of the borehole, The gravel have to be used comply with the Iraqi Measurement Standard number 1555, having a size from 6.5 to 8 mm, all works should be implemented according to the instruction and supervision of geologist committee and the site supervisor. The price includes applying the pebbles down inside the borehole to (100 m) from the well bottom, besides any other requirements to do a perfect job.</p>	L.S.	1.00		0.00			
1.4	<p>Grouting Concrete for Well reservation + Casting well cover: Supply materials, special equipment, machinery and manpower to grout the space between the casing pipes and borehole wall for the upper (100 m) by using grouting machine to inject a mixture of (Sulfates Resisting Cement with litte quantity of clean sand) adding a binding material additives (SBR, RP9, or other approved material of well-known brand). The price includes to cast a concrete slab around the head of the borehole and install a Galvanized steel plate Of (10 mm at least) on the top of the slab, according with the instructions of the supervisor engineer.</p>	LS	1.00		0.00			
1.5	<p>Cleaning and Hydraulic Test: Provide equipment, skill staff, tools, and other requirements to perform the washing and cleaning of the borehole by using an air compressor with pressure not less than 15 bars until the water get clear; and achieving a hydraulic test of (S.D.T.) standard drawdown test; The test must comprise all necessary information about static and dynamic water level, well loss, well efficiency, wellbore skin factor and effective well radius. Test to be in time frame not less than 12 hours, under the supervision of site supervisor from (UNDP) . All works should be implement according to the instructions and supervision of geologist committee and the site supervisor</p>	L.S.	1.00		0.00			
1.6	<p>Laboratory tests: Samples of water must be delivered to an authorized laboratory for chemical and biological tests to identify the parameters of</p>	L.S.	1.00		0.00			
1.7	<p>Submersible pump with electrical board: Supply and install submersible pump (including motor) with cable (3 x 16mm²), nominal duty point is: Q=30 m³/hr @ H=139 meter with electrical control panel (including: starter, phase failure, main and secondary circuit breakers, overload protection, ammeter, voltmeter with selector switch, frequency meter, indication lamps, and contactors) supplied by (ABB, Siemens, Schneider or equivalent). - The price includes steel cover for the well opening (galvanized plate, min. 10 mm thickness), 3" Union, and (3" Elbow of 90 degree bended). - Any other needed or required to complete the job as optimum, as indicated by the competent engineer. - The cable size may chane according to the manufacturer, and as will requested by the supervisor engineer. (See attached</p>	L.S.	1.00		0.00			
1.8	<p>3" GI Steel Delivery pipe: Supply, transport and install of 3" Galvanized pipe(4.5 mm) thickness to the outlet of the pump, complying with BS1387 standards. The price includes all the necessary fittings.</p>	ML.	130.00		0.00			
2-	STEEL TANKS:							
	RAW Water collecting Tanks 60 m3 (Ø3.6 m X 6 m Length) Horizontal steel tank:							

2.1	<p>General Specification and Standards: Supply, install and test galvanized steel tank with the following description and requirement and: #- Should meet the Steel Tank Institute (STI) standards at highest standards for common items unless designated. #-The galvanization work should be "processed by a member of Galvanizers Association". #- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization work processed meets the requirement of BS EN ISO 1461: 2009. #- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.25 or equivalent) with high tech. machines to ensure excellent job. (Details Are Shown In The Attached Drawings)</p>	No.	1.00	0.00			
	#- The tank is cylindrical shape, the used plate sheet thickness not less than (5 mm) for whole tank (shell and heads).						
	#- The tank lays horizontally on (2) fixed iron bases (H section beam 20 cm x 20 cm) welded to the tank. A strip patch of 30 cm width of (8 mm) steel plate should be applied and welded to the tank at the area of contact between the base and the tank shell. The price including to provide and weld a steel strip of (40 cm) width and (12 mm) thickness along the contacting area						
	#- (6 Inch) Flanged openings for inlet, discharge, and drainage.						
	#- The tank should be braced with (3) crosssectional internal partitions made from heavy galvanized steel.						
	#- (6 Inch) Ventilation opening with 180° elbow ends with mesh; And (4 inch) overflow opening with 90° elbow and leading discharge pipe toward the base of the tank and as directed by the supervising engineer.						
	#- (70 cm dia) circular main opening with tight cover with ventilator.						
	#- Water level scale with sight glass fixed in the front of the tank.						
	#- Internal ladder descending inside the tank from the main opening made of galvanized iron pipe (1.5 " dia) and (2 mm)						
	#- External ladder : (4.7 m total height and 0.60 m width) made of U-shape iron channel (10 x 5 x 0.5 cm thick) with a banner on both sides using (circular section iron pipe 2" and thickness not less than 5mm).						
	#- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water tanks (preferred, HEMPADUR 35560 or equivalent , thickness not less than 250 micron). The outside tank and the bases should be painted with a high quality 2 plies anti-rust paint and 3 plies H.Q. oil paint. The price includes all requirements to complete the job as perfect.						
	#- The tanks should be connected to other from bottom throughout the drain openings using (6" dia.) galvanized steel pipes with isolating valves as will be directed by the supervising engineer.						
	#- The price includes providing all fittings needed to make connections between (pipes, tanks, main receiving pipe, descending pipe to the pumping station next the tanks), any other requirements to complete the work at the optimum functionality.						
RO water Tank 45 m3 (Ø3.8 m X 4.0 m Height) Elevated Vertical Galvanized steel tank:							

2.2	<p>Supply, install and test galvanized steel tank with the following description and requirement and:</p> <ul style="list-style-type: none"> #- Should meet the Steel Tank Institute (STI) standards at highest standards for common items unless designated. #-The galvanization work should be "processed by a member of Galvanizers Association". #- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization work processed meets the requirement of BS EN ISO 1461: 2009. #- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.25 or equivalent) with high technique machines to ensure excellent job. <p>Tank Description:</p> <ul style="list-style-type: none"> #- Galvanized water storage tank capacity (45 m³) vertical cylindrical shape thickness of the base is (8 mm), and for walls and cover (5 mm). #- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water tanks (preferred, HEMPADUR 35560 or equivalent), thickness not less than (250 micron), while the outside of the tank and the bases should be painted with a high quality 2 plies antirust paint and 3 plies H.Q. oil paint. #- (70 cm dia) circular main opening with tight cover. #- Internal ladder descending inside the tank from the main opening made of galvanized iron pipe (1.5 " dia) and 2mm thickness. #- External ladder : (7.5 m total height and 0.60 m width) made of U-shape iron channel (10 x 5 x 0.5 cm thick) with a banner on both sides using (circular section iron pipe 2" and thickness not less than 2.5mm). #- The price includes to transport the tank to the field and installing it above the base. <p>#- Provision of materials and Connecting the following accessories:</p> <ul style="list-style-type: none"> @- Ascending pipe (3" Gl iron pipe of thickness not less than 2.5 mm) to be connected with the coming pipe from the RO plant. @- Excess water pipe (3" Gl iron pipe of thickness not less than 2.5 mm) descending to ground level. @- Connecting a Spigot pipe (Ø2.5" Gl iron pipe of thickness not less than 3.5 mm with a ball valve (for filling tankers) as directed by the supervising Engineer and as to location demands. @- Connecting (6) branches of 1" galvanized steel pipe heavy grade with isolating valve around the tank descending to 80 Cm from ground level (for filling water drums). @- Drainage pipe (Ø2.5" Gl iron pipe of thickness not less than 2.5 mm) with ball valve. @- Water level scale with sight glass fixed in the front of the tank. @- All fittings needed to complete the job and any other proposed by supervising engineer. 	No.	1.00		0.00		
3-	<p>REJECTED water (SALINE) Tank (20 m3) / Vertical POLYETHYLENE Tank</p> <p>Supply, transport and install, and connect of (20 m3) Polyethylene vertical cylindrical tank for collecting rejected Saline from the RO Plant. The tank should be made from linear low-density polyethylene (LLDPE) Grade R 50035E. which complies with US and European recommendations and statutory regulations for drinking water tank production.</p> <p>The price includes to provide materials, fittings and other requirements to connect the followings:</p> <ul style="list-style-type: none"> #- the main pipe coming from the RO plant (to be determined later as required at position). #- Delivery pipe with SS314 ball valve (2.0" RC - HDPE - SDR 11) connected to a spigot through a specified pump embedded in the RO unit and as directed by the supervising engineer. #- Drainage pipe with UPVC ball valve (2.0" RC - HDPE - SDR 11). ##- The price includes providing (15-20 mm thickness) rubber sheet between the concrete foundation and the tank base the tank. 	No.	1.00		0.00		
4-	<p>Gasoline Water Pump:</p> <p>Supply, transport, test, and commission gasoline water pump unit (Honda, Yamaha, Koshin, or equivalent Japanese brand) , (3" outlet dia.), the entire unit to be protected by sturdy Rollover Pipe Frame.</p> <p>All Requested Details of the unit are in the compliance sheet.</p>	NO.	1.00		0.00		
5-	<p>12,000 liter/hour Reverse Osmosis Desalination Unit:</p> <p>#- All Requested Details of the plant are in the compliance sheet.</p>						

	<p>GENERAL NOTES: The price shall include but not limited to the following: 1- Complete detailed shop drawings should be delivered to the Engineer to take his approval prior to commencement of work. Samples of all materials shall also be delivered to the Engineer to take the approval.</p>							
	<p>2-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). The contractor will be accountable for all necessary equipment, materials and activities to assure the safety of people within the site of the project and 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 there.</p>							
	<p>3- All works and installations should be carried out, tested and commissioned by specialized responsible skilled labors in full coordination with supervisor Engineer, 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.</p>							
	<p>4-The contractor have to submit detailed schedule for commissioning the desalination plant for 7 days/24 hours for each electrical and mechanical component of the plant and certified by the engineer. The contractor will submit Chemical and biological tests for the permeate and saline waters and the price includes training of three technicians in the commissioning period for 7 hours daily and 7 days, all under the approval and monitoring of the engineer.</p>							
	<p>RO Desalination Unit: Supply, install, test, and commission a skid-mounted brackish water desalination unit for raw water input TDS salinity of ≤ 3000 PPM, to produce (10m³/hour) water with the following facts: - Salinity (less than 100 ppm), (PH 7-7.8), - Recovery rate of the system not less than (65% -75%). - Total hardness (TH) (60-80 mg/liter) CaCO₃. - Max. Fe < 0.05 mg/l - Silt Density Index (SDI) < 3 #- The plant should comprise but not limited to, raw water tank feed pump, fully controlled Multimedia filtration made of rubber-lined steel vessels and externally epoxy painted with automatic back-washing and air blowers, FRP cartridge filtration vessel,(chlorination, dechlorination and antiscalant dosing system each with 500 liters PP tank with level controls), two-stage FRP, PN25 high-pressure vessels and RO membranes 99% salt rejection(at least), VFD controlled high-pressure pump, limestone filter, Product water booster pump, stainless steel grade 317 high-pressure piping, PN16 CPVC piping for low-pressure side, pipes, valves, gauges, electro-mechanical European origin digital flow meters for raw product and brine water flows, Caustic soda dosing system and sodium Hypochlorite dosing system, Digital EC, PH and turbidity meters for both raw and produced water monitoring, PLC controlled electrical power and control switchboard, TDS Water Blending Valve must be included, Water Leak Detection Alarm. The price also includes connecting with the other accessories of the plant. #- The contractor should submit a detailed process schematic diagram for the established plant with full details of each item of the plant supported with documentation before the commencement of the work to get approval. #- All pipes and fittings, pump components in contact with brackish water should be made of CPVC PN10 for low pressure, and stainless steel 317 for the high-pressure side. #- The price includes a control system to govern the plant operation with levels in the water tanks and controlling the operation of the well pump.</p>	No.	1.00		0.00			

Sub-total Mechanical Works				0.00			
Electrical Work							
Solar Energy Plant:							
1	PV-Solar Package: #- The contractor should equip the solar package under the requirements of the RO unit and the well's pump to ensure a perfect operation of the whole plant to produce the designated capacity of the unit throughout the year. #-The contractor will be accountable for all necessary equipment, materials, and activities to assure the safety of people within the desalination plant building and vicinity, where an approved safety plan will be a prerequisite to initiating activities along with installing all required components and materials necessary for the safety of workers, project team as well as people at the desalination plant. All relevant costs are deemed to be included in the unit price. #. In case of any difference between BOQ, designs, and/or drawings; the instruction of the supervisor Engineer will govern. #- The price shall includes: • Design concept drawing , including electrical drawing for (PV,DC combine box, inverter, Ac switch board, MDB, etc..) and structural design drawings for PV modules mounting support structure. complete detailed shop drawings should be delivered to the Engineer to take his approval prior to commencement of work. Samples of all materials shall also be delivered to the Engineer to take the approval. • The Contractor shall submit “as built” drawings after the completion of the work. • Any other material, accessories and/or fitting, not expressly mentioned but required for the successful installation of the Solar plant components, shall be supplied and installed by the contractor. • General notes and specifications in the Annex_1_ are applicable for solar works.						
1.1	Solar PV Module: Supply and install Min (55 kW) power Solar Panels, Mono Crystalline PV Solar Modules, desert type, Min 440 W, electrical characteristics to be at standard test conditions (STC: irradiance 1000W/m2), PID free certificate, Min 20.5 % Efficiency, internationally certified by TUV Rheinland to ISO, BS and UV standards, (10 Years product Warranty & 25 Years performance Warranty) with Certificate of origin (COO). The work includes specified cables according to approved design to connect between all PV module and DC combiner, installation, connection, testing and commission with any other accessories to complete works as required. All works should be according to (GTP/Compliance sheet)	LS	1.00	0.00			
1.2	DC combiner box: Supply, install, erect and commission of PV panel connection box (DC Combiner) with DC Fuse Box. Enclosure protection shall be IP65. Operational Environment Temperature: (-30 °C ~+70 °C). Max Input/ Output Voltage Rating: 1000Vdc. The price shall include the required cable sizes for input/out and according to approved design to connect between all PV module and solar combiner box with MC4 Links & with supply of all required touch DC fuse-holders, DC fuses, reverse protection diodes, lightning induced DC surge arresters and load disconnect switches and with any other accessories to complete work as required.	SET	4.00	0.00			
1.3	Earthing and lightning protection: Supply, install and connect AC and DC earthing and protection system in accordance to the manufacturer instruction to protect the modules AC and DC, inverters and monitoring systems from the effects of electromagnetic impulses. The system shall containing with a copper rod of 20 mm dia 1.5m length connect with all accessories such as copper nut and bolts with required bare Cu conductor and to connect with all associated frame and structure (PV panel & rack, connection box, etc.) by required cable sizes according to approved design yellow /green color separately. Work includes supply and install Lighting arrester with minimum height of 1.5m. Price includes supplying of all necessary materials /accessories (mixture of coal, salt and fine sand etc.), installing, laying, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m for the cu rod and refill with mixture of coal, salt and fine sand etc. to complete work as required. The resistance of earthing system shall less than 3.0 ohm. Lightning System shall be comply with IEC 60364, BS EN 61643-11 and IEC/BS EN 62305-3.	SET	5.00	0.00			

1.4	<p>Mounting Structure Foundation: Provide material, equipment, skilled manpower, and any required stuff to cast reinforced Concrete blocks (C25MPa) foundation of (0.40 m width X 0.25 m thickness X 4 m Length), the number of the blocks will be according to the No. of strings required for the whole system. The Preparation of the Yard of Solar panels has been included with the civil work (Item 1& 2) and should be duly prepared as will be directed by the competent Engineer.</p>	LS	1.00		0.00			
1.5	<p>Solar Mounting Steel Structure : Supply install and test 70mm fixed support with pined support 40 mm, and aluminum Z and U clamp with adjustable angle stand. The structure should be capable of withstanding a wind load of 120 km/hr., should be reliable to bear the weight of the panels and resists the wind forces and other affecting factors and according to ASTM A123 , ASTM A153 and ASTM A385. The details below is required: 1- Structure: Hot dip galvanized steel with a standard of Zinc 80-120 (ASTM A526). 2- Module Rail: Aluminum EN AW-6063 T66. 3- Fixtures: Hot dip galvanized steel (grade 8.8) Clamps: Z and U profile aluminum EN AW-6063 T66. 4- Stand to be fixed above concrete base by using clamps of aluminum EN AW-6063 T66 to be fixed by steel roll bolt M10x135 mm, with any other accessories to complete works as required. All works should be according to (GTP/Compliance sheet).</p>	LS	1.00		0.00			
1.6	<p>25kW Hybrid Solar Pump Controller: Supply, install, test, and commission of 25kW, 3 Phase hybrid driver for water pump (Submersible pump of well), with supply and install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Running Sensor, Filter/Sine Wave Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable sizes for connection purposes and with all other fittings, accessories and required works. It should be internationally certified by TUV Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according to approved design to connect between all PV module, surge protection with all other fittings and accessories. All works should be according to (GTP/Compliance sheet).</p>	SET	1.00		0.00			
1.7	<p>10kW Hybrid Solar Pump Controller: Supply, install, test, and commission of 10kW, 3 Phase hybrid driver for water pump (Submersible pump of well), with supply and install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Running Sensor, Filter/Sine Wave Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable sizes for connection purposes and with all other fittings, accessories and required works. It should be internationally certified by TUV Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according to approved design to connect between all PV module, surge protection with all other fittings and accessories. All works should be according to (GTP/Compliance sheet).</p>	SET	2.00		0.00			
1.8	<p>5.5 kW Hybrid Solar Pump Controller: Supply, install, test, and commission of (5.5KW), 3 Phase hybrid driver for water pump (Submersible pump of well), with supply and install of (Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Running Sensor, Filter/Sine Wave Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable sizes for connection purposes and with all other fittings, accessories and required works). It should be internationally certified by TUV Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according to approved design to connect between all PV module, surge protection with all other fittings and accessories. All works should be according to (GTP/Compliance sheet).</p>	SET	1.00		0.00			
1.9	<p>3 kW Hybrid Solar Pump Controller: Supply, install, test, and commission of 3kW, 3 Phase hybrid driver for water pump (Submersible pump of well), with supply and install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Running Sensor, Filter/Sine Wave Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable sizes for connection purposes and with all other fittings, accessories and required works. It should be internationally certified by TUV Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according to approved design to connect between all PV module, surge protection with all other fittings and accessories. All works should be according to (GTP/Compliance sheet).</p>	SET	1.00		0.00			

1.10	Solar Hybrid Inverter (3 kW): Supply, install, test, and commission of (3kW), 1 Phase, hybrid Inverter (Rated DC Voltage 24- 48 V) (for general use), with supply and install MPPT, Filter/Sine Wave Filter, Circuit Breakers, Surge Protection & Protection System, required cable sizes for connection purposes and with all other fittings, accessories and required works. It should be internationally certified by TUV Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according to approved design to connect between all PV module, surge protection with all other fittings and accessories. All works should be according to (GTP/ Compliance sheet)	SET	1.00		0.00			
1.11	MAIN AC Switch and control board: Supply and install of AC switch board for connecting the inverters to the loads, and AC Control Board for control switching system between Solar System, National Grid and/or Generator with preset priority. The requested enclosure protection: IP65. The work includes all required MCCB breakers, DC And AC protection devices, contactors, and required types and sizes of electrical cables with all accessories carried out as per the design and approved by the project engineers to connect the system with National Grid and terminal electrical boxes. Connect the board with earthing system through required copper earth cables. The work includes rewiring and separating the existing installation to Emergency Load (feed just by Solar) and None Emergency Load (feed by National Grid & Generator). The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning to complete works as required.	SET	1.00		0.00			
1.12	Testing all the Solar system with end user staff training: Testing, Commissioning of the solar system considering any requirements to complete a perfect job to operating the whole plant (RO plant + Solar Plant + water well). The work includes site training of the end-user team to operating and maintenance of the solar system for (3 days, 7 hours a day) to the level that qualifies them to carry out routine and urgent maintenance, a final evaluation of participants at the end of the course will be required. Training plans, schedules, and manuals must be provided. Training must be done by a certified trainer and a CV must be provided.	LS	1.00		0.00			
2	General Electrical works Note:- The price include removal and disposal all defective and damage items to designated stores "The following items shall include supply, replace, install, connect and commission lighting points and power socket outlets, including PVC conduits and fittings, laying wires/ cables, Work includes supply, install, test, connect, commission and replace the damaged wires with new suitable size for offices, conference hall, canteen, guest house, corridors, toilets also including street light and periphery lighting ,repair and maintenance for Main Distribution Board. replace (if any) damaged bulbs, tube lights, switches, sockets, holders, fans, lighting fixtures, switch boards, MCBs, Maintenance of internal Telephone lines, instruments, junction boxes and wiring for new connections if required. All the necessary equipment/items (if any) must be earthed properly with specific wire/ cable size.							
2.1	Socket Switch (13A): Supplying & fixing of combine 13A, universal switch-socket with shuttered & indicator outlet, on PVC molded tough surface box includes wiring/connecting with 1.0 kV grade 3*2.5mm ² PVC insulated copper cable/wires laid inside existing concealed PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with all accessories. The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning to complete works as required.	NO	14.00		0.00			
2.2	Fluorescent Lighting: Supplying ,Installation, testing and commissioning of prewired fluorescent fittings of all pendant type complete set with tube rod 36W/19mm dia (4feet) includes wiring/connecting with 1.0 kV grade 2*1.5mm ² PVC insulated copper cable/wires laid inside existing concealed PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with 6 A switches with all accessories. The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning to complete works as required.	NO	12.00		0.00			

2.3	Projector LED fixture 200W: Supplying , Installing , connection ,and commissioning of LED light projector fixture 230V, 200 watt, includes wiring with 1.0 kV grade, PVC insulated copper wire (2x1.5mm ²) with 5A photo cell should be connect with fitting directly, laid through PVC conduit pipe (20 mm dia)/cable tray and connecting with all accessories. The price includes supplying, installing, connecting, laying and commissioning drilling, cutting to complete works as required.	NO	8.00		0.00			
2.4	Bracket waterproof wall: Supplying & Installing of bracket waterproof wall prewired outdoor lighting luminaries suitable for GLS lamp 230VAC/23 watts complete with all accessories such as base, LED drive & LED bulb, glass, reflector, louvered, includes wiring/connecting with 1.0 kV grade 2*1.5mm ² insulated copper cable/wires laid inside existing concealed PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with 6 A switches with all accessories. The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning to complete works as required.	NO	10.00		0.00			
2.5	SDB (6 ways): Supplying, installing, testing and commissioning of sub distribution boards 6 ways, TPN DB (DIN type, horizontal/vertical) with single door complete set to accommodate incoming miniature circuit breaker (MCB) triple pole, 1x63 Amps, and outgoing SP MCB, (6X16) Amps on/in prefabricated MS surface /MS cubical control panel board with neutral strip/bar with all accessories. The price includes supplying, installing, connecting, drilling & cutting (concrete wall if required) and commissioning include (cable termination with Cu lugs at end) to complete works as required.	NO	2.00		0.00			
2.6	Power Cable (4x16 mm²): Supplying, laying and connecting 1.0kV grade, 4 core 16 mm ² PVC insulated and sheathed power copper, un-armored extend form MDB To SDB distribution board with all accessories. Price includes supplying, installing, laying, testing and commissioning, include (cable termination with lugs at both end) to complete the work as required. All works should be according to Iraqi Technical Specifications shown on (Annex 2)	M	25.00		0.00			
2.7	Cable (3x70+35mm²): Supply, install, test and lay 1.0 kV grade (3x70+35 mm ²) PVC insulated sheath-un-armored copper cable. (From RO Plant to MDB and Distribution Board) laid through PVC pipe (4" dia) with cable termination lugs in both sides with all accessories. The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning include (cable termination with Cu lugs at both end) to complete works as required. All works should be according to Iraqi Technical Specifications shown on (Annex 2)	M	45.00		0.00			
2.8	Cable (3X95+50 mm²): Supply, install, test and lay 1.0 kV grade (3X95+50 mm ²) PVC insulated sheath-un-armored copper cable. (From Transformer to the main distribution board) laid through PVC pipe (4" dia) with cable termination lugs in both sides with all accessories. The price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning include (cable termination with Cu lugs at both end) to complete works as required. All works should be according to Iraqi Technical Specifications shown on (Annex 2)	M	50.00		0.00			
2.9	Distribution Board: Supply, install, test, commission prefabricated a distribution board for the Well room with size (80cm x 60cmx40cm) incorporated in DIN bar with following incoming and outgoing. The price includes supplying, installing, connecting, drilling & cutting (concrete wall if required) and commissioning include (cable termination with Cu lugs at both end) to complete works as required. The paint finish should be suitable for installation inside the Well room with Minimum IP44. A- [(1 No.) 150 A, 3 pole MCCB type, breaking capacity 36 kA]. B- [4 strips= 1 set] copper bus bar 200 A phase and neutral with separate earthing bar/strip.]	NO	1.00					

2.10	<p>Main Distribution Board (MDB): Supply, install, test, commission prefabricated Main Distribution Board (MDB) (100cm x 80cm x 40cm) incorporated in DIN bar with following incoming and outgoing. The price includes supplying, installing, connecting, drilling & cutting (concrete wall if required) and commissioning include (cable termination with Cu lugs at both end) to complete works as required.</p> <p>A- [(1 No.) 400 A, 3 pole MCCB type, breaking capacity 36 kA]. B- (2No.) 150 A, 3Ph. 3P, MCB type, breaking capacity 25 kA]. C- (1 Set) Ammeter (0 -300 A), 300/5A with required CTs. D- (1 No.) Voltmeter (0- 400 V) with selector switch (all Ph-Ph and Ph. -N), (1 No.)Hertz meter (48- 52)Hz. E- (1 No.) selector switch.(ON & OFF position) F- (3 No.) Indicator lamp 230VAC G- Three-phase, four wires Kilowatt-hour meter with all accessories. H- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/strip.]</p>	NO	1.00				
2.11	<p>10 meter street lighting pole: Supply, install, test and commissioning of Lighting pole 10m height with single arm and 400 watt LED lighting fixture, fix to metal plate (40x40x2.5)cm. The pole consist of galvanized pipe 6"dia, 4mm starting from the bottom and connect through 4" to 2" reducer to galvanized pipe 4"dia, 4 mm finally connect through 4" to 2" reducer with single arm elbow galvanized pipe 2", 1.5m length to hold the lighting fixture. Using 2x2.5 mm² cable from the base to the lamp through (2x3 Amp) MCB for line and neutral with inspection hole contain DIN-Bar for MCBs, the pole will be fixed on concrete basement 100x50x50cm³, 1:2:4 mix with four anchor bolts 19mm, 50cm length with 3" PVC elbow pipe to be used for cable installation, finally the mentioned concrete base should be leveled on 10cm height plain concrete. The price should cover any (single, double and multicore cables) required for connections and functioning the system. All works should be according to (GTP/Compliance sheet) and Iraqi Technical Specifications shown on (Annex_3_).</p>	NO	1.00				
2.12	<p>Earthing System: Supply, install and connect earthing system containing (3 number of 20 mm dia, 1.5m length copper rods each (triangle or straight formation based on space availability), connected together with 1x50 mm² bare Cu conductor passing to M.D.B and SMDBs inside the building with all accessories. Price includes supplying all necessary materials, accessories, installing, laying, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m (for each Cu rod and refill with a mixture of coal, salt, GEM, and Soft soil, etc.) to complete work as required. (Consider 3 pits = 1 set, where each pit consists of all materials, accessories as depicted in attached (Annex_4_)</p>	SET	1.00		0.00		
2.13	<p>Transformer (250) kVA: Supply, Install, test and commission pole mounted outdoor type distribution transformers (11/0.4kV, 250kVA), including (H-Poles), explosion fuse cutout, bracket channels, steel angle, transformer base, lighting arrestor, cable (PVC insulated (1X150 mm²) sheath-armored copper conductors) from Transformer to distribution board, earthing system, concrete works, etc.) with all accessories and connect to with national utility Electrical power network, in coordination with the local authority in electricity department according to supervise committee engineer to complete work as required. The price includes all necessary requirements for removing defective and damaged (Transformer)from the network and dispose to the designated location. All works should be according to (GTP/Compliance sheet) and Iraqi Technical Specifications shown on (Annex_5_) and (Annex_6_).</p>	NO	1.00		0.00		

2.14	<p>Distribution Board (Tr.250kVA): Supplying prefabricated chamber metal out door (MDB) pole mounted (80cm x 60 cm x 25cm) includes DIN bar/panel mounting the incoming and outgoing with all internal connection and installations accessories for below items. The price includes supplying, installing, testing, fixing and commissioning with all accessories to complete work as required.</p> <p>A- [(1NO) 400 A, 3Ph. MCCB type electronic release of breaking capacity 35 kA.] B- [(1NO.) 400V, Voltmeter with selector switch (ON, OFF Position) and accessories. C- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/strip.] D-[(1NO.) 400V , Ampere meter with selector switch (RST Position) and accessories. All works should be according to Iraqi Technical Specifications shown on (Annex_7_) and (GTP/Compliance sheet).</p>	NO	1.00		0.00			
2.15	<p>Supply and Installing (11m), 11kV Lattice Steel Pole: Supply and erecting and installing of 11m, Lattice Galvanized steel poles, type ST52 for Single Circuit 11kV. Work includes supply and install cross arm 1410mm, (100*50*6)mm hot deep galvanized to mount on the pole top for tension (Shackle), angle and terminal pole locations with it's bracket, GS bolts, nut, flat and spring washers. Work includes supply and install disc insulator and D-bracket complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each poles, with suitable GS bolts, nut, flat and spring washers and shackle strap. Excavation of pole pit with size not less than (200*100*60)cm and the pole foundation shall be filled with concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays shall be used to support the pole until the concrete is hardened. The concrete filing shall be up to a height not less than 100mm above ground level. The foundation face should be coated with two layers of asphaltic coat. Work includes supply and install earthing system accessories include copper wire 1x 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. All works should be according to Iraqi Technical Specifications shown on (Annex_8_) and (GTP/Compliance sheet).</p>	NO	4.00		0.00			
2.16	<p>Supply and Installing (11m), 11kV Tubular Steel Pole: Supply and erecting and installing of 11m, Tubular Galvanized steel poles, type ST52 for Single Circuit 11kV. Work includes supply and install cross arm 1250mm, (100*50*6)mm hot deep galvanized to mount on the pole top for intermediate pole locations with it's bracket, GS bolts, nut, flat and spring washers. Work includes supply and install pin insulator and D-bracket complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each poles, with suitable GS bolts, nut, flat and spring washers and shackle strap. Excavation of pole pit with size not less than (200*70*60)cm and the pole foundation shall be filled with concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays shall be used to support the pole until the concrete is hardened. The concrete filing shall be up to a height not less than 100mm above ground level. The foundation face should be coated with two layers of asphaltic coat. Work includes supply and install earthing system accessories include copper wire 1x 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. All works should be according to Iraqi Technical Specifications shown on (Annex_9_) and (GTP/Compliance sheet).</p>	NO	5.00		0.00			
2.17	<p>Supply and Installing (9m), Tubular Steel Pole: Supply and erecting and installing of 9m, Tubular Galvanized steel poles, type ST52. Work includes supply and install it's D-bracket hot dip galvanized to B.S 729, pole cap, GS bolts, Shackle insulator, nut, flat and spring washers. Excavation of pole pit with size not less than (150*70*60)cm and the pole foundation shall be filled with concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays shall be used to support the pole until the concrete is hardened. The concrete filing shall be up to a height not less than 100mm above ground level. The foundation face should be coated with two layers of asphaltic coat. Work includes supply and install earthing system accessories include copper wire 1x 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. All works should be according to Iraqi Technical Specifications shown on (Annex_9_) and (GTP/Compliance sheet).</p>	NO	2.00		0.00			

2.18	<p>ACSR Conductor: Supply and install of ACSR conductor size 120/20 mm² for 11kV Over Head Transmission Line. Preparing of tool, machines and manpower for installing, stringing and sagging the 11kV OHTL with ACSR '120/20' Single Circuit (3 conductors) and fixing the cross arms with mounting insulators Sets (disc and pin insulators with its hardware). Work includes supply and install midspan joints for connecting ACSR conductor. Installing insulators and hardware with all accessories and requirements. Work includes supply and install aluminum binding wire to bound conductors on pin insulators at each poles. Work includes supply and install parallel grove clamp, bolted type, Al 25-150/25-150 sqmm shall be use for connecting Aluminum conductor with Aluminum conductor, at section pole locations. All works should be according to (GTP/Compliance sheet) and Iraqi Technical Specifications shown on (Annex_10_).</p>	M	2,000.		0.00			
2.19	<p>LV-ABC cable: Supplying, stringing, connection of ABC overhead Al cable size (3*95+50+16)mm² with all accessories (suspension clamps, clamp tension, connectors) and any other requirements for work according to electricity directorate instruction. The work includes supplying, stringing, installation, connection and all other requirements of work. All works should be according to (GTP/Compliance sheet) and Iraqi Technical Specifications shown on (Annex_11_).</p>	M	400.00		0.00			
2.20	<p>Change Over Switch (Motorized Change Over switch) Board: Supplying of Automatic Change Over Board (HxWxB) 120cm x 80 cm x60cm or equivalent size) wall mounted , enclosed metal frame made of iron sheet 2mm thickness painted with two layers of gray color oil paint, with upper & lower ventilation louvers and exhaust fan on the top of the panel, (items below with twin internal and external door using rubber gaskets, Plastic trunk for wiring and accessories with glands, screws, insulators. The price includes supplying, installing, laying, connecting and commissioning with below items to complete works as required. (See attached GTP/Compliance sheet).</p> <p>A- (1 No.) Automatic change over (100 A); change over switch, twin three pole or four pole electrically interlocked mains/stand by change over circuit breakers with (Manual/Auto) selector, includes automatic control unit, local operation with handle.</p> <p>B- (1Set= 4 strips) Copper Bus-Bar 300 A for (lines and neutral) and with separate earth strips.</p> <p>C- (3No.) Signal lamps& control cabling terminal block and protection fuses, bottom cable entry.</p> <p>D- [(1NO.) 400V , Analog Voltmeter with selector switch (All Ph-Ph and Ph. -N Position).</p>	NO	1.00		0.00			
2.21	<p>Solar Energy lighting</p> <p>#- Solar LED unit: Supply and Installation of Solar Street Lights, Remote Control (All-In-two) High Efficiency, Luminous flux not less than 8500 Lumens, CRI not less than 85, Constant lighting with mode options for energy saving, Constant current output to achieve all night lighting when weather change and should be equipped with a battery charging management system (MPPT type) to monitor and control the charging and discharging of rechargeable batteries.</p> <p>- Solar Panel: High efficiency Mono-Crystalline Silicon panel, Adjustable solar panel to increase the charging efficiency, grade (A), Minimum 120 Watt, solar cell efficiency around 18.0%, lifespan ≥25 years.</p> <p>- LED: High Quality LED (1W= minimum 140 Lumen), output 60 W. color temperature (4000-6500K), type Philips (Europe) or Cree (USA) or PMMA (JAPAN) or equivalent efficiency & wide lighting angle. lighting time with 1 full charge not less than 3 Nights, Body: Aluminum die casting body, Waterproof with at least IP65.</p> <p>Replaceable lithium Iron battery (LifePO4). with not less than 2500 cycles 80%. (See attached GTP/Compliance sheet).</p>	NO	1.00		0.00			

#- Street Light Pole:

- Pole foundation:

Provide manpower and machinery to excavate the poles foundation with dimensions 70 X 70 X100 cm in all type of the soil, concrete, asphalt, etc. The depth of the foundation is 100 measured from the NGL (any extra excavation to reach the NGL, the contractor will be responsible for casting it with concrete at his expense). Casting the foundation will be in one stage with a kicker (20 cm above the ground) by ordinary concrete C20 (ready mix and job mix must be provided before casting). The work includes fixing Anchorage rods 102 cm length and diameter 18 mm 4 rods, coated totally with hot- dip galvanization, each rod has three HEX nut -M20 with Washer A21. The price includes all necessary stuff or requirements to accomplish perfect job.

- Light Poles:

Supply and install Galvanized steel lights pole 10m height and 4mm thickness, pole Diameter at the top about 70mm and the bottom 200mm (circular or polygon); The bearing flange (ground anchored) of dimensions 300mm X 300mm 18 mm thickness, Column stiffening plate (4 units) thickness 10 mm, the bearing flange holes must be following the anchored rod diameter. All works should be according to drawing shown on [\(Annex_13_\)](#).

Sub-total Electrical Works

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Grand Total

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Provision of water in New Tal Qasab via RO

General Specification

All works and the materials supplied by the contractor must be in accordance with the relevant Iraqi specifications by visiting ministry of construction and housing web site: (ministry) in addition to Iraqi technical specification for building works.

The contractor must provide samples, mockup, catalogues for testing / inspection and approval.

Contractor must pay the cost for samples including any laboratory tests, both inside and outside Iraq.

Permanent signage (after implementation is completed): (60cm x 40cm), printed on vinyl. To be placed in a prominent position at the main entry door of the site, at eye level.

Temporary signage (during implementation): (W 190cm x H 90cm) printed on mounted board.

The price of works includes all job requirements as per Iraq's standard specification.

The contractor must provide PPE for all laborer's, personnel, engineers and possible visitors.

Item Description

CIVIL WORKS

Site preparation (2000 m2):

Supply of materials, tools, machinery and manpower for site preparation. The work includes:

- 1-Clearing, stripping and leveling of the site.
- 2-Removing undesired plants and other natural vegetation.
- 3-Dumping of all the debris and rubble to a site approved by the local authorities.

All needed work to complete the job will be included within the price.

Filling works:

Supply of materials, tools and manpower for filling (in layers not exceeding 25cm, including sub base (type A) where required within the area inside the fence such as open yard, apron work to complete the job will be included within the price.

Reinforced Concrete Mat Foundation:

Supply of materials, tools and manpower for casting reinforced concrete mat foundation using sulphate resistance cement for foundations. The price includes adding bonding agent mat concrete (if any). The work includes all the requirements of steel reinforcement, concrete covers and complete the job will be included within the price.

Reinforced Concrete slab, beam, column, lintel and staircase:

Supply of materials, tools and manpower for casting reinforced concrete slab, beam, column and staircase using concrete (C25MPa). The price includes adding bonding agent material (if any). The work includes all the requirements of steel reinforcement, concrete covers and complete the job will be included within the price. **See attached drawing.**

Concrete with BRC:

Supply of materials, tools and manpower for casting (15cm) concrete with BRC(150x150x150) for (C25MPa) concrete. The price includes providing expansion joints every 4m both directions. All needed work to complete the job will be included within the price.

Main gate foundation and columns:

Supply of materials, tools and manpower to cast reinforced concrete using (C30 Mpa) for columns (0.4x0.4x2.5m) for main gate. Including rebars, form works and all requirements will be included within the price. **See attached drawings**

Masonry works above DPC level:

Supply of materials, tools and manpower to rebuild walls above DPC level (20cm width) u cm with cement sand mortar (1:3). The wall should be leveled vertically and horizontally the damaged parts and removing of all debris and rubble to a site approved by the local a

Cement Plastering For New Walls:

Supply of materials, tools and manpower for cement plastering with 20mm thickness smofences walls using aluminum straight edges. The price includes three layers as follows: on layer of rough (kafmal) and finally smooth finished cement plastering with cement-sand n

Chain Link Fence with Precast Concrete Pole:

Supply of materials, tools and manpower to install galvanized chain link fence (50x50x3m concrete poles (10x10cm) and (2.40m) height spaced every (2.0m). The price includes the 1-Removing of the old and damaged chain fence.

2-Excavation (40x40x40cm) for the precast concrete pole footings .

3-Providing precast concrete pole(column) 100x100mm and 2.40m height.

4-Plain concrete footing (40x40x40cm) after installing the poles.

5-Three tie/binding strand wire 5mm at (bottom, middle and top) of the poles.

6-Bracing inclined poles for the corners and at every 20m of straight lines.

7-Providing three barbed wires at the top of the poles (for security).

All needed work to complete the job will be included within the price. **See attached ann**

Plastic painting:

Supply of materials, tools and manpower to paint the exterior walls and fence, with three paint (Jotun, Betek, CAPAROL, Polisan, dyo or equivalent). The paint should be diluted (1 coverage of painting of not more than (10-12) m²/Liter/layer. The job includes cleaning repairing all the cracks and filling all the holes before painting. All needed works to comp the price

Ceramic tiles for Walls:

Supply of materials, tools and manpower to remove the damaged ceramic tiles and dump authority, then apply ceramic tiles for walls (25x50cm) or same as the existing size and cc filling the joints with white cement paste. All needed work to complete the job will be in

Steel windows:

Supply of materials, tools and manpower to install steel windows (using T, L and Z shapes) painting and two layers of oil painting, anti-insects wire mesh, handles, windows stopper with paste. All needed work to complete the job will be included within the price.

Steel Door with the Frame(1.0x2.10m):

Supply of materials, tools and manpower to install steel door with frame, with steel plate using steel tube 40x40x2mm, including a layer of Styrofoam to be placed between the tw and fixing a stopper on the floor or wall. The price of work includes the painting of steel paint. All needed work to complete the job will be included within the price. **See attache**

Main gate (H3.0m, W3.0m):

Supply of materials , tools and manpower to install new main gate steel doors, by using p 40x40x2mm, including door handles, hinges and locks. Price of the work shall include pair two layers of oil paints. The price also includes removing of the damaged door and dump authority. All needed work to complete the job will be included within the price. **See att**

Sliding Steel Door (2.0x4.0m) One Leaf with small door (1.0x2.0m):

manpower to remove the damaged sliding steel door and removing the debris and rubble then install new slide steel door (one leaf), including plate gauge 18(1.41mm) on double 1 steel pipe (75x75x3mm) and sub divider of pipe (50x50x3mm) @ 40cm c/c, slide steel fra and making a small door within the gate (1x2m) with a frame of angle steel (75x75x3mm) painting with anti-rust and 2 layers oil paint, rollers, door handles and locks. All needed v included within the price

Steel door cover for well opening (1.2x1m):

Supply of materials, tools and manpower to install steel door cover made by using plate g dimensions 75x75x3mm. Including locks and painting by using two (2) layers of anti-rust a needed works to complete the job will be included within the price. See attached drawin

Billboard:

Supply of materials, tools and manpower to install billboard made of frame of size 3×1 m, frame shall be made of square pipe section 4x4cm. Price of the work shall include all req

Room title board:

Supply of materials and manpower to install room title name made of plastic sheet size 1 needed work to complete the job will be included within the price.

SUB TOTAL FOR CIVIL WORKS**SANITARY WORKS****Water tank:**

Supply of materials, tools and manpower for installing galvanized water tank of 1250 liter gauge 16(1.56mm), supported by steel base made with 50mm (2") angle shape, including pipes. The price of work includes all piping and fittings, valves, float valves, accessories.

Taps:

Supply of materials, tools and manpower to connect chrome water taps 1/2" or 3/4". Pric connections. All needed work to complete the job will be included within the price.

Mixer taps :

manpower to install mixer taps , locks and all accessories with complete water connectic

Ceramic wash basin:

manpower to install ceramic wash basin with stand, mixer taps , valves , mirror(60x50)cm connections . All needed work to complete the job will be included within the price.

Eastern toilet:

Supply of materials, tools and manpower to install new ceramic eastern toilet. Including : (4"), flexible hose and water connections. All needed work to complete the job will be inc

Roof Drain pipes (4"):

Supply of materials, tools and manpower to remove the damaged water roof drain pipes a 4" (100mm). Including all connections and needed accessories to fix on roof and walls. All be included within the price. **See attached drawing.**

PVC pipe 4" (Ø 100mm):

Supply, installation, testing and commissioning of PVC 4"(100mm) 6 bar for drainage and vent with all required fittings including excavation, back filling, encasing with sulphate resistant concrete caps. All needed works to complete the job, will be included within the price.

Galvanized iron water pipes(1/2"):

Supply and install galvanized water pipes. The price includes all fittings and accessories, galvanized pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and thermal connections of cold and hot water pipes and concreting 10cm around the pipes. All needed works to complete the job will be included within the price.

Galvanized iron water pipes(3/4"):

Supply and install galvanized water pipes. The price includes all fittings and accessories, galvanized pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and thermal connections of cold and hot water pipes and concreting 10cm around the pipes. All needed works to complete the job will be included within the price.

PPR pipes(3/4"):

Supply and install PPR pipes (3/4)" diameter. The price includes all fittings and accessories, galvanized hot water pipes by using arm flex and thermal tape and concreting 10cm around the pipes. All needed works to complete the job will be included within the price.

Masonry manholes:

Supply of materials and construction of manholes of different depths with internal dim blocks 15X20X40 cm for walls. The price includes excavation, crushed stone, plain concrete and iron covers. **See attached drawing.**

Septic Tank:

Supply of materials, tools and manpower to build septic tank of internal dimension (L=2.1m x W=1.5m x H=1.5m) includes:

- 1-Soil excavations in any types of soil.
- 2-Provide a layer of crushed stones 10cm under the foundation concrete.
- 3-Casting (25cm) plain concrete for the foundation using (C25Mpa) Concrete and using sulphate resistant concrete.
- 4-Build the walls of 40 cm width with solid blocks (15x20x40cm) and cement mortar (1:3).
- 5-Casting reinforced concrete slab (20cm) with two layers of 12mmØ spaced @20cm both horizontally and vertically.
- 6-Installation of two manhole steel covers of (60 x 60)cm.
- 7-Supplying maintenance ladders.
- 8-Plastering of the interior and exterior walls with two layers of cement plastering 20mm of cement splash dash.

All needed work to complete the job will be included within the price. **See attached drawing.**

SUB TOTAL FOR SANITARY WORKS**Mechanical Works****BOREHOLE WORK:**

Provide equipment, manpower, tools, any required stuff to carry out the work of drilling details as per each item below; to drill and put in service the well at designated positions. The price includes any requirements may be not listed through the details, to ensure optimum performance.

The work should be according to the following details and directions of the competent authority.

Drill for main borehole body(Filtering zone & reservation):

Supply materials, equipment and manpower to drill the borehole, up to 200 meters depth using hammer drill or rotary drill according to the supervision of geologist committee and site engineer.

Casing pipes:

Installing casing and slotted (holes size is 3-5 mm.) galvanized steel pipes having a diameter than 5 mm for the whole depth of (200 m). The pipes must comply with BS 1387 standard the pipes should be perforated pipes, and the rest of pipes should be unperforated pipes. sealed by steel plate with thickness not less than 10 mm, according to the instruction and the site supervisor.

The price includes pipe welding and putting them down inside the borehole besides any

Filtration:

Supply tools, equipment and manpower to lay the gravel between casing pipes and the well be used comply with the Iraqi Measurement Standard number 1555, having a size from 6.3 to 12.5 mm implemented according to the instruction and supervision of geologist committee and the site supervisor. The price includes applying the pebbles down inside the borehole to (100 m) from the wellhead according to the requirements to do a perfect job.

Grouting Concrete for Well reservation + Casting well cover:

Supply materials, special equipment, machinery and manpower to grout the space between casing pipes for the upper (100 m) by using grouting machine to inject a mixture of (Sulfates Resisting concrete) adding a binding material additives (SBR, RP9, or other approved material of well-knowledge). The price includes to cast a concrete slab around the head of the borehole and install a well cover (at least) on the top of the slab, according with the instructions of the supervisor engineer.

Cleaning and Hydraulic Test:

Provide equipment, skill staff, tools, and other requirements to perform the washing and air compressor with pressure not less than 15 bars until the water get clear; and achieving drawdown test; The test must comprise all necessary information about static and dynamic efficiency, wellbore skin factor and effective well radius. Test to be in time frame not less than 24 hours of site supervisor from (UNDP) . All works should be implement according to the instruction and the site supervisor

Laboratory tests:

Samples of water must be delivered to an authorized laboratory for chemical and biological analysis.

Submersible pump with electrical board:

Supply and install submersible pump (including motor) with cable (3 x 16mm²), nominal current 10 amp meter with electrical control panel (including: starter, phase failure, main and secondary ammeter, voltmeter with selector switch, frequency meter, indication lamps, and contactor Schneider or equivalent).

- The price includes steel cover for the well opening (galvanized plate, min. 10 mm thick and 90 degree bended).

- Any other needed or required to complete the job as optimum, as indicated by the committee and the site supervisor.

- The cable size may change according to the manufacturer, and as will requested by the site supervisor.

3" GI Steel Delivery pipe:

Supply, transport and install of 3" Galvanized pipe(4.5 mm) thickness to the outlet of the wellhead according to the standards. The price includes all the necessary fittings.

STEEL TANKS:

RAW Water collecting Tanks 60 m³ (Ø3.6 m X 6 m Length) Horizontal steel tank:

General Specification and Standards:

Supply, install and test galvanized steel tank with the following description and requirements:

- #- Should meet the Steel Tank Institute (STI) standards at highest standards for common iron tanks.
- #- The galvanization work should be "processed by a member of Galvanizers Association".
- #- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization meets the requirement of BS EN ISO 1461: 2009.
- #- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.25) to ensure excellent job. **(Details Are Shown In The Attached Drawings)**

#- The tanks are cylindrical shape, the used plate sheet thickness not less than (5) mm for the shell.

#- The tank lays horizontally on (2) fixed iron bases (H section beam 20 cm x 20 cm) welded to the tank. A (8 mm) steel plate should be applied and welded to the tank at the area of contact with the concrete base plus (20 cm) from each end.

#- (6 Inch) Flanged openings for inlet, discharge, and drainage.

#- The tank should be braced with (3) cross-sectional internal partitions made of heavy galvanized steel.

#- (6 Inch) Ventilation opening with 180° elbow ends with mesh; And (4 inch) overflow opening and (4 inch) discharge pipe toward the base of the tank and as directed by the supervising engineer.

#- (70 cm dia) circular main opening with tight cover with ventilator.

#- Water level scale with sight glass fixed in the front of the tank.

#- **Internal ladder** descending inside the tank from the main opening made of galvanized steel.

#- **External ladder** : (4.7 m total height and 0.60 m width) made of U-shape iron channel on both sides using (circular section iron pipe 2" and thickness not less than 5mm).

#- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water or equivalent, (thickness not less than 250 micron). The outside tank and the bases should be painted with anti-rust paint and 3 plies H.Q. oil paint. The price includes all requirements to complete the work.

#- The tanks should be connected to other tanks from bottom throughout the drain openings using isolating valves as will be directed by the supervising engineer.

#- The price includes providing all fittings needed to make connections between (pipes, tanks, and pipe to the pumping station next the tanks), any other requirements to complete the work.

RO water Tank 45 m3 (Ø3.8 m X 4.0 m Height) Elevated Vertical Galvanized steel tank

Supply, install and test galvanized steel tank with the following description and requirements:

- #- Should meet the Steel Tank Institute (STI) standards at highest standards for common iron tanks.
- #- The galvanization work should be "processed by a member of Galvanizers Association of America (GAA) or equivalent."
- #- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization meets the requirement of BS EN ISO 1461: 2009.
- #- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.22) using automatic machines to ensure excellent job.

Tank Description:

#- Galvanized water storage tank capacity (45 m³) vertical cylindrical shape thickness of tank shell and cover is (5 mm).

#- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water (or equivalent), thickness not less than (250 micron), while the outside of the tank and the cover should be painted with quality 2 plies antirust paint and 3 plies H.Q. oil paint.

#- (70 cm dia) circular main opening with tight cover.

#- Internal ladder descending inside the tank from the main opening made of galvanized steel with 1" thickness.

#- External ladder : (7.5 m total height and 0.60 m width) made of U-shape iron channel with 1" flange on both sides using (circular section iron pipe 2" and thickness not less than 2.5mm).

#- The price includes to transport the tank to the field and installing it above the base.

#- Provision of materials and Connecting the following accessories:

@- Ascending pipe (3" GI iron pipe of thickness not less than 2.5 mm) to be connected with the tank.

@- Excess water pipe (3" GI iron pipe of thickness not less than 2.5 mm) descending to the ground.

@- Connecting a Spigot pipe (Ø2.5" GI iron pipe of thickness not less than 3.5 mm with a flange) as directed by the supervising Engineer and as to location demands.

@- Connecting (6) branches of 1" galvanized steel pipe heavy grade with isolating valve at the ground level (for filling water drums).

@- Drainage pipe (Ø2.5" GI iron pipe of thickness not less than 2.5 mm) with ball valve.

@- Water level scale with sight glass fixed in the front of the tank.

@- All fittings needed to complete the job and any other proposed by supervising engineer.

REJECTED water (SALINE) Tank (20 m³) / Vertical POLYETHYLENE Tank

Supply, transport and install, and connect of (20 m³) Polyethylene vertical cylindrical tank above the RO Plant. The tank should be made from linear low-density polyethylene (LLDPE) conforming to US and European recommendations and statutory regulations for drinking water tank production. The price includes to provide materials, fittings and other requirements to connect the tank to the RO plant.

#- the main pipe coming from the RO plant (to be determined later as required at position).

#- Delivery pipe with SS314 ball valve (2.0" RC - HDPE - SDR 11) connected to a spigot of the RO unit and as directed by the supervising engineer.

#- Drainage pipe with UPVC ball valve (2.0" RC - HDPE - SDR 11).

##- The price includes providing (15-20 mm thickness) rubber sheet between the concrete and the tank.

Gasoline Water Pump:

Supply, transport, test, and commission gasoline water pump unit (Honda, Yamaha, Kohler, etc. with 1.5" outlet dia.), the entire unit to be protected by sturdy Rollover Pipe Frame.

All Requested Details of the unit are in the compliance sheet.

12,000 liter/hour Reverse Osmosis Desalination Unit:

#- All Details of the requested plant are in the compliance sheet.

GENERAL NOTES:

The price shall include but not limited to the following:

1- Complete detailed shop drawings should be delivered to the Engineer to take his approval. Samples of all materials shall also be delivered to the Engineer to take the approval.

2- Contractor shall take into consideration that all - direct and indirect works and their implementation of the project including temporary facilities, fencing, securing utilities (and electricity systems).

The contractor will be accountable for all necessary equipment, materials and activities at the site of the project and vicinity, where an approved safety plan will be prerequisite to installing all required components and materials necessary for safety of workers, project

3- All works and installations should be carried out, tested and commissioned by specialized coordination with supervisor Engineer, all in accordance with drawings, specifications and instruction of the Engineer. The Engineer has the right to reject any component of the work if it does not meet specifications and the terms of the contract.

4- The contractor have to submit detailed schedule for commissioning the desalination plant including electrical and mechanical component of the plant and certified by the engineer. The contract includes biological tests for the permeate and saline waters and the price includes training of the operator for 7 hours daily and 7 days, all under the approval and monitoring of the engineer.

RO Desalination Unit:

Supply, install, test, and commission a skid-mounted brackish water desalination unit for 1000 PPM, to produce (10m³/hour) water with the following facts:

- Salinity (less than 100 ppm), (PH 7-7.8),
 - Recovery rate of the system not less than (65% -75%).
 - Total hardness (TH) (60-80 mg/liter) CaCO₃.
- Max. Fe < 0.05 mg/l
- Silt Density Index (SDI) < 3

#- The plant should comprise but not limited to, raw water tank feed pump, fully controlled rubber-lined steel vessels and externally epoxy painted with automatic back-washing and backwash vessel, (chlorination, dechlorination and antiscalant dosing system each with 500 liters PF5 FRP, PN25 high-pressure vessels and RO membranes 99% salt rejection(at least), VFD controlled filter, Product water booster pump, stainless steel grade 317 high-pressure piping, PN16 Class C pipes, valves, gauges, electro-mechanical European origin digital flow meters for raw water and soda dosing system and sodium Hypochlorite dosing system, Digital EC, PH and turbidity water monitoring, PLC controlled electrical power and control switchboard, TDS Water Break Leak Detection Alarm. The price also includes connecting with the other accessories of the

#- The contractor should submit a detailed process schematic diagram for the establishment of the plant supported with documentation before the commencement of the work to get approval.

#- All pipes and fittings, pump components in contact with brackish water should be made of carbon steel and stainless steel 317 for the high-pressure side.

#- The price includes a control system to govern the plant operation with levels in the well and the well pump.

Sub-total Mechanical Works

Electrical Work

Solar Energy Plant:

PV-Solar Package:

#- The contractor should equip the solar package under the requirements of the RO unit a operation of the whole plant to produce the designated capacity of the unit throughout tl

#-The contractor will be accountable for all necessary equipment, materials, and activitie the desalination plant building and vicinity, where an approved safety plan will be a prere with installing all required components and materials necessary for the safety of workers, desalination plant. All relevant costs are deemed to be included in the unit price.

#. In case of any difference between BOQ, designs, and/or drawings; the instruction of th

#- The price shall includes:

- Design concept drawing , including electrical drawing for (PV,DC combine box, inverter structural design drawings for PV modules mounting support structure. complete detailed the Engineer to take his approval prior to commencement of work. Samples of all materia to the Engineer to take the approval.
- The Contractor shall submit “as built” drawings after the completion of the work.
- Any other material, accessories and/or fitting, not expressly mentioned but required fo Solar plant components, shall be supplied and installed by the contractor.
- General notes and specifications in the **Annex_1_** are applicable for solar works.

Solar PV Module:

Supply and install Min (55 kW) power Solar Panels, Mono Crystalline PV Solar Modules, des characteristics to be at standard test conditions (STC: irradiance 1000W/m²), PID free ce internationally certified by TUV Rheinland to ISO, BS and UV standards, (10 Years product Warranty) with Certificate of origin (COO). The work includes specified cables according t all PV module and DC combiner, installation, connection, testing and commission with any as required. All works should be according to (GTP/Compliance sheet)

DC combiner box:

Supply, install, erect and commission of PV panel connection box (DC Combiner) with DC I IP65. Operational Environment Temperature: (-30 °C ~+70 °C). Max Input/ Output Voltage include the required cable sizes for input/out and according to approved design to conne combiner box with MC4 Links & with supply of all required touch DC fuse-holders, DC fuse induced DC surge arresters and load disconnect switches and with any other accessories t

Earthing and lightning protection:

Supply, install and connect AC and DC earthing and protection system in accordance to th the modules AC and DC, inverters and monitoring systems from the effects of electromagi containing with a copper rod of 20 mm dia 1.5m length connect with all accessories such bare Cu conductor and to connect with all associated frame and structure (PV panel & ra cable sizes according to approved design yellow /green color separately. Work includes su minimum height of 1.5m. Price includes supplying of all necessary materials /accessories etc.), installing, laying, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m for the salt and fine sand etc. to complete work as required. The resistance of earthing system sl System shall be comply with IEC 60364, BS EN 61643-11 and IEC/BS EN 62305-3.

Mounting Structure Foundation:

Provide material, equipment, skilled manpower, and any required stuff to cast reinforced of (0.40 m width X 0.25 m thickness X 4 m Length), the number of the blocks will be acc the whole system. The Preparation of the Yard of Solar panels has been included with the duly prepared as will be directed by the competent Engineer.

Solar Mounting Steel Structure :

Supply install and test 70mm fixed support with pined support 40 mm, and aluminum Z ar stand. The structure should be capable of withstanding a wind load of 120 km/hr., should panels and resists the wind forces and other affecting factors and according to ASTM A123 details below is required:

- 1- Structure: Hot dip galvanized steel with a standard of Zinc 80-120 (ASTM A526).
 - 2- Module Rail: Aluminum EN AW-6063 T66.
 - 3- Fixtures: Hot dip galvanized steel (grade 8.8) Clamps: Z and U profile aluminum EN AW
 - 4- Stand to be fixed above concrete base by using clamps of aluminum EN AW-6063 T66 to mm, with any other accessories to complete works as required. All works should be accor
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25kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 25kW, 3 Phase hybrid driver for water pump (Subr install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

10kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 10kW, 3 Phase hybrid driver for water pump (Subr install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

5.5 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of (5.5KW), 3 Phase hybrid driver for water pump (Su and install of (Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, L Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cab with all other fittings, accessories and required works). It should be internationally certif years warranty. Circuit breakers, and cable size shall be according to approved design to protection with all other fittings and accessories. All works should be according to **(GTP/C**

3 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 3kW, 3 Phase hybrid driver for water pump (Subm install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

Solar Hybrid Inverter (3 kW):

Supply, install, test, and commission of (3kW), 1 Phase, hybrid Inverter (Rated DC Voltage supply and install MPPT, Filter/Sine Wave Filter, Circuit Breakers, Surge Protection & Protection connection purposes and with all other fittings, accessories and required works. It should be from Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according between all PV module, surge protection with all other fittings and accessories. All works

[Compliance sheet](#)

MAIN AC Switch and control board:

Supply and install of AC switch board for connecting the inverters to the loads, and AC Control system between Solar System, National Grid and/or Generator with preset priority. The work includes all required MCCB breakers, DC And AC protection devices, contactors, electrical cables with all accessories carried out as per the design and approved by the project with National Grid and terminal electrical boxes. Connect the board with earthing system. The work includes rewiring and separating the existing installation to Emergency Load (feed by National Grid & Generator). The price includes supplying, installing, connecting (concrete wall if required) and commissioning to complete works as required.

Testing all the Solar system with end user staff training:

Testing, Commissioning of the solar system considering any requirements to complete a project (RO plant + Solar Plant + water well). The work includes site training of the end-user team on the solar system for (3 days, 7 hours a day) to the level that qualifies them to carry out routine evaluation of participants at the end of the course will be required. Training plans, schedule. Training must be done by a certified trainer and a CV must be provided.

General Electrical works

Note:- The price include removal and disposal all defective and damage items to designated area. include supply, replace, install, connect and commission lighting points and power socket fittings, laying wires/ cables, Work includes supply, install, test, connect, commission and suitable size for offices, conference hall, canteen, guest house, corridors, toilets also include lighting ,repair and maintenance for Main Distribution Board. replace (if any) damaged bulbs, holders, fans, lighting fixtures, switch boards, MCBs, Maintenance of internal Telephone wiring for new connections if required. All the necessary equipment/items (if any) must be according to cable size.

Socket Switch (13A):

Supplying & fixing of combine 13A, universal switch-socket with shuttered & indicator outlet includes wiring/connecting with 1.0 kV grade 3*2.5mm² PVC insulated copper cable/wire: PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with all accessories. installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning

Fluorescent Lighting:

Supplying ,Installation, testing and commissioning of prewired fluorescent fittings of all power rod 36W/19mm dia(4feet) includes wiring/connecting with 1.0 kV grade 2*1.5mm² PVC in existing concealed PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with accessories. The price includes supplying, installing, connecting, laying, drilling & cutting and commissioning to complete works as required.

Projector LED fixture 200W:

Supplying , Installing , connection ,and commissioning of LED light projector fixture 230V, 200W, grade, PVC insulated copper wire (2x1.5mm²) with 5A photo cell should be connect with 1" conduit pipe (20 mm dia)/cable tray and connecting with all accessories. The price includes laying and commissioning drilling, cutting to complete works as required.

Bracket waterproof wall:

Supplying & Installing of bracket waterproof wall prewired outdoor lighting luminaries sui complete with all accessories such as base, LED drive & LED bulb, glass, reflector, louvere kV grade 2*1.5mm² insulated copper cable/wires laid inside existing concealed PVC pipe surface PVC pipe (20 mm dia) with 6 A switches with all accessories. The price includes su drilling & cutting (concrete wall if required) and commissioning to complete works as re

SDB (6 ways):

Supplying, installing, testing and commissioning of sub distribution boards 6 ways, TPN DE single door complete set to accommodate incoming miniature circuit breaker (MCB) triple MCB, (6X16) Amps on/in prefabricated MS surface /MS cubical control panel board with n The price includes supplying, installing, connecting, drilling & cutting (concrete wall if re (cable termination with Cu lugs at end) to complete works as required.

Power Cable (4x16 mm²):

Supplying, laying and connecting 1.0kV grade, 4 core 16 mm² PVC insulated and sheathed form MDB To SDB distribution board with all accessories. Price includes supplying, installir include (cable termination with lugs at both end) to complete the work as required. All w Technical Specifications shown on (Annex 2)

Cable (3x70+35mm²):

Supply, install, test and lay 1.0 kV grade (3x70+35 mm²) PVC insulated sheath-un-armored and Distribution Board) laid through PVC pipe (4" dia) with cable termination lugs in both includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if requ (cable termination with Cu lugs at both end) to complete works as required. All works shc Specifications shown on (Annex 2)

Cable (3X95+50 mm²):

Supply, install, test and lay 1.0 kV grade (3X95+50 mm²) PVC insulated sheath-un-armored the main distribution board) laid through PVC pipe (4" dia) with cable termination lugs in price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall i (cable termination with Cu lugs at both end) to complete works as required. All works shc Specifications shown on (Annex 2)

Distribution Board:

Supply, install, test, commission prefabricated a distribution board for the Well room with incorporated in DIN bar with following incoming and outgoing. The price includes supplyi cutting (concrete wall if required) and commissioning include (cable termination with Cu as required. The paint finish should be suitable for installation inside the Well room with . A- [(1 No.) 150 A, 3 pole MCCB type, breaking capacity 36 kA].

B- [4 strips= 1 set] copper bus bar 200 A phase and neutral with separate earthing bar/sti

Main Distribution Board (MDB):

Supply, install, test, commission prefabricated Main Distribution Board (MDB) (100cm x 80cm with following incoming and outgoing. The price includes supplying, installing, connecting (cable termination with Cu lugs at both end) and commissioning include (cable termination with Cu lugs at both end) to connect to the main supply.

A- [(1 No.) 400 A, 3 pole MCCB type, breaking capacity 36 kA].

B- (2No.) 150 A, 3Ph. 3P, MCB type, breaking capacity 25 kA].

C- (1 Set) Ammeter (0 -300 A), 300/5A with required CTs.

D- (1 No.) Voltmeter (0- 400 V) with selector switch (all Ph-Ph and Ph. -N), (1 No.) Hertz meter

E- (1 No.) selector switch. (ON & OFF position)

F- (3 No.) Indicator lamp 230VAC

G- Three-phase, four wires Kilowatt-hour meter with all accessories.

H- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/strip

10 meter street lighting pole:

Supply, install, test and commissioning of Lighting pole 10m height with single arm and 40x40x2.5cm metal plate. The pole consist of galvanized pipe 6"dia, 4mm starting from 2" reducer to galvanized pipe 4"dia, 4 mm finally connect through 4" to 2" reducer with size 1.5m length to hold the lighting fixture. Using 2x2.5 mm² cable from the base to the lamp. The pole will be fixed on concrete with four anchor bolts 19mm, 50cm length with 3" PVC elbow pipe to be used for cable in concrete base should be leveled on 10cm height plain concrete. The price should cover all materials (cables) required for connections and functioning the system. All works should be according to Technical Specifications shown on **(Annex_3_)**.

Earthing System:

Supply, install and connect earthing system containing (3 number of 20 mm dia, 1.5m length straight formation based on space availability), connected together with 1x50 mm² bare copper (SMDBs inside the building with all accessories. Price includes supplying all necessary materials, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m (for each Cu rod and refill with soft soil, etc.) to complete work as required. (Consider 3 pits = 1 set, where each pit is depicted in attached **(Annex 4_)**

Transformer (250) kVA:

Supply, Install, test and commission pole mounted outdoor type distribution transformers (Poles), explosion fuse cutout, bracket channels, steel angle, transformer base, lighting arm (25mm²) sheath-armored copper conductors) from Transformer to distribution board, earthing all accessories and connect to with national utility Electrical power network, in coordination with electricity department according to supervise committee engineer to complete work as per necessary requirements for removing defective and damaged (Transformer) from the network location. All works should be according to **(GTP/Compliance sheet)** and Iraqi Technical Specifications **(Annex_6_)**.

Distribution Board (Tr.250kVA):

Supplying prefabricated chamber metal out door (MDB) pole mounted (80cm x 60 cm x 2 the incoming and outgoing with all internal connection and installations accessories for b supplying, installing, testing, fixing and commissioning with all accessories to complete v

A- [(1NO) 400 A, 3Ph. MCCB type electronic release of breaking capacity 35 kA.]

B- [(1NO.) 400V, Voltmeter with selector switch (ON, OFF Position) and accessories.

C- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/str

D-[(1NO.) 400V , Ampere meter with selector switch (RST Position) and accessories. All wo Technical Specifications shown on **(Annex_7_)** and **(GTP/Compliance sheet)**.

Supply and Installing (11m), 11kV Lattice Steel Pole:

Supply and erecting and installing of 11m, Lattice Galvanized steel poles, type ST52 for 5 supply and install cross arm 1410mm, (100*50*6)mm hot deep galvanized to mount on the and terminal pole locations with it's bracket, GS bolts, nut, flat and spring washers. Work insulator and D-bracket complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each flat and spring washers and shackle strap. Excavation of pole pit with size not less than (2 shall be filled with concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays s the concrete is hardened. The concrete filing shall be up to a height not less than 100mm face should be coated with two layers of asphaltic coat. Work includes supply and install copper wire 1x 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. Technical Specifications shown on **(Annex_8_)** and **(GTP/Compliance sheet)**.

Supply and Installing (11m), 11kV Tubular Steel Pole:

Supply and erecting and installing of 11m, Tubular Galvanized steel poles, type ST52 for 1 supply and install cross arm 1250mm, (100*50*6)mm hot deep galvanized to mount on the locations with it's bracket, GS bolts, nut, flat and spring washers. Work includes supply ar complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each poles, with suitable G and shackle strap. Excavation of pole pit with size not less than (200*70*60)cm and the po concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays shall be used to supp hardened. The concrete filing shall be up to a height not less than 100mm above ground l coated with two layers of asphaltic coat. Work includes supply and install earthing system 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. All works should Specifications shown on **(Annex_9_)** and **(GTP/Compliance sheet)**.

Supply and Installing (9m), Tubular Steel Pole:

Supply and erecting and installing of 9m, Tubular Galvanized steel poles, type ST52. Work bracket hot dip galvanized to B.S 729, pole cap, GS bolts, Shackle insulator, nut, flat and with size not less than (150*70*60)cm and the pole foundation shall be filled with concret 20) and temporary stays shall be used to support the pole until the concrete is hardened. height not less than 100mm above ground level. The foundation face should be coated wi includes supply and install earthing system accessories include copper wire 1x 50mm² and 1.5m length for all poles. All works should be according to Iraqi Technical Specifications s **(Compliance sheet)**.

ACSR Conductor:

Supply and install of ACSR conductor size 120/20 mm² for 11kV Over Head Transmission Line. Provide manpower for installing, stringing and sagging the 11kV OHTL with ACSR '120/20' Single Core conductors and cross arms with mounting insulators Sets (disc and pin insulators with its hardware). Work joints for connecting ACSR conductor. Installing insulators and hardware with all accessories. Supply and install aluminum binding wire to bound conductors on pin insulators at each pole. Parallel groove clamp, bolted type, Al 25-150/25-150 sqmm shall be use for connecting Al conductor, at section pole locations. All works should be according to **(GTP/Compliance sheet)** shown on **(Annex_10_)**.

LV-ABC cable:

Supplying, stringing, connection of ABC overhead Al cable size (3*95+50+16)mm² with all accessories (tension, connectors) and any other requirements for work according to electricity directorate. Supplying, stringing, installation, connection and all other requirements of work. All work according to **(Compliance sheet)** and Iraqi Technical Specifications shown on **(Annex_11_)**.

Change Over Switch (Motorized Change Over switch) Board:

Supplying of Automatic Change Over Board (HxWxB) 120cm x 80 cm x60cm or equivalent size. Cabinet frame made of iron sheet 2mm thickness painted with two layers of gray color oil paint, ventilation fan and exhaust fan on the top of the panel, (items below with twin internal and external doors) for wiring and accessories with glands, screws, insulators. The price includes supplying, installation and commissioning with below items to complete works as required. **(See attached GTP/Compliance sheet)**

A- (1 No.) Automatic change over (100 A); change over switch, twin three pole or four pole with 4 change over circuit breakers with (Manual/Auto) selector, includes automatic control unit.

B- (1Set= 4 strips) Copper Bus-Bar 300 A for (lines and neutral) and with separate earth strip.

C- (3No.) Signal lamps & control cabling terminal block and protection fuses, bottom cable glands.

D- [(1NO.) 400V , Analog Voltmeter with selector switch (All Ph-Ph and Ph. -N Position).

Solar Energy lighting**#- Solar LED unit:**

Supply and Installation of Solar Street Lights, Remote Control (All-In-two) High Efficiency, High Lumens, CRI not less than 85, Constant lighting with mode options for energy saving, Constant lighting, Constant night lighting when weather change and should be equipped with a battery charging management system to monitor and control the charging and discharging of rechargeable batteries.

- Solar Panel:

High efficiency Mono-Crystalline Silicon panel, Adjustable solar panel to increase the charging efficiency. 120 Watt, solar cell efficiency around 18.0%, lifespan ≥25 years.

- LED:

High Quality LED (1W= minimum 140 Lumen), output 60 W.

Color temperature (4000-6500K), type Philips (Europe) or Cree (USA) or PMMA (JAPAN) or equivalent. Beam angle.

Lighting time with 1 full charge not less than 3 Nights,

Body: Aluminum die casting body, Waterproof with at least IP65.

Replaceable lithium Iron battery (LifePO4). with not less than 2500 cycles 80%. **(See attached GTP/Compliance sheet)**

#- Street Light Pole:

- Pole foundation:

Provide manpower and machinery to excavate the poles foundation with dimensions 70 X concrete, asphalt, etc. The depth of the foundation is 100 measured from the NGL (any contractor will be responsible for casting it with concrete at his expense). Casting the foundation (20 cm above the ground) by ordinary concrete C20 (ready mix and job mix must be included) includes fixing Anchorage rods 102 cm length and diameter 18 mm 4 rods, coated totally with zinc has three HEX nut -M20 with Washer A21. The price includes all necessary stuff or require

- Light Pole:

Supply and install Galvanized steel lights pole 10m height and 4mm thickness, pole Diameter bottom 200mm (circular or polygon); The bearing flange (ground anchored) of dimensions Column stiffening plate (4 units) thickness 10 mm, the bearing flange holes must be followed works should be according to drawing shown on **(Annex_13_)**.

Sub-total Electrical Works

Grand Total

s the contractor responsibility to obtain those documents from the mentioned						
Dibond).						
Uni	Qty	Price\$	Total \$			
LS	1.00		0.00			
M3	265.00		0.00			
M3	40.00		0.00			
M3	35.00		0.00			
M2	150.00		0.00			

NO	2.00		0.00			
M3	54.00		0.00			
M2	525.00		0.00			
ML	175.00		0.00			
M2	525.00		0.00			
M2	15.00		0.00			
M2	22.00		0.00			
NO.	3.00		0.00			

NO.	3.00		0.00			
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NO.	3.00		0.00			
NO.	1.00		0.00			
NO.	1.00		0.00			
NO.	1.00		0.00			
M.L	30.00		0.00			

M.L	25.00		0.00			
M.L	25.00		0.00			
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M.L	200.00		0.00			
L.S.	1.00		0.00			
LS	1.00		0.00			
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LS	1.00		0.00			
SET	4.00		0.00			
SET	5.00		0.00			

LS	1.00		0.00			
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M	25.00		0.00			
M	45.00		0.00			
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NO	1.00					

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M	100.00		0.00			
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Provision of water in OLD Tal Qasab via RO s

General Specification

All works and the materials supplied by the contractor must be in accordance with the relevant Iraqi specifications by visiting ministry of construction and housing web site: ministry) in addition to Iraqi technical specification for building works.

The contractor must provide samples, mockup, catalogues for testing / inspection and a

Contractor must pay the cost for samples including any laboratory tests, both inside and

Permanent signage (after implementation is completed): (60cm x 40cm), printed on v
To be placed in a prominent position at the main entry door of the site, at eye level.

Temporary signage (during implementation): (W 190cm x H 90cm) printed on mounted

The price of works includes all job requirements as per Iraq's standard specification.

The contractor must provide PPE for all laborer's, personnel, engineers and possible visi

Item Description

CIVIL WORKS

Site preparation (2000 m2):

Supply of materials, tools, machinery and manpower for site preparation. The work includ

1-Clearing, stripping and leveling of the site.

2-Removing undesired plants and other natural vegetation.

3-Dumping of all the debris and rubble to a site approved by the local authorities.

All needed work to complete the job will be included within the price.

Filling works:

Supply of materials, tools and manpower for filling (in layers not exceeding 25cm, includi
sub base (type A) where required within the area inside the fence such as open yard, aprc
work to complete the job will be included within the price.

Reinforced Concrete Mat Foundation:

Supply of materials, tools and manpower for casting reinforced concrete mat foundation i
sulphate resistance cement for foundations. The price includes adding bonding agent mat
concrete (if any). The work includes all the requirements of steel reinforcement, concret
All needed works to complete the job will be included within the price.

Reinforced Concrete slab, beam, column, lintel and staircase:

Supply of materials, tools and manpower for casting reinforced concrete slab, beam, colu
and staircase using concrete (C25MPa). The price includes adding bonding agent material
any). The work includes all the requirements of steel reinforcement, concrete covers and
complete the job will be included within the price. **See attached drawing.**

Concrete with BRC:

Supply of materials, tools and manpower for casting (15cm) concrete with BRC(150x150x
for (C25MPa) concrete. The price includes providing expansion joints every 4m both direc
the job will be included within the price.

Main gate foundation and columns:

Supply of materials, tools and manpower to cast reinforced concrete using (C30 Mpa) for columns (0.4x0.4x2.5m) for main gate. Including rebars, form works and all requirements will be included within the price. **See attached drawings**

Masonry works above DPC level:

Supply of materials, tools and manpower to rebuild walls above DPC level (20cm width) up to 1.2m high with cement sand mortar (1:3). The wall should be leveled vertically and horizontally. The price includes the removal of the damaged parts and removing of all debris and rubble to a site approved by the local authority. ~~the job will be included within the price~~

Cement Plastering For New Walls:

Supply of materials, tools and manpower for cement plastering with 20mm thickness smooth finish on masonry walls using aluminum straight edges. The price includes three layers as follows: one layer of rough (kafmal) and finally smooth finished cement plastering with cement-sand mortar. ~~the job will be included within the price~~

Chain Link Fence with Precast Concrete Pole:

Supply of materials, tools and manpower to install galvanized chain link fence (50x50x3mm) on precast concrete poles (10x10cm) and (2.40m) height spaced every (2.0m). The price includes the following:

- 1-Removing of the old and damaged chain fence.
- 2-Excavation (40x40x40cm) for the precast concrete pole footings .
- 3-Providing precast concrete pole(column) 100x100mm and 2.40m height.
- 4-Plain concrete footing (40x40x40cm) after installing the poles.
- 5-Three tie/binding strand wire 5mm at (bottom, middle and top) of the poles.
- 6-Bracing inclined poles for the corners and at every 20m of straight lines.
- 7-Providing three barbed wires at the top of the poles (for security).

All needed work to complete the job will be included within the price. **See attached annex**

Plastic painting:

Supply of materials, tools and manpower to paint the exterior walls and fence, with three coats of paint (Jotun, Betek, CAPAROL, Polisan, dyo or equivalent). The paint should be diluted (1 part paint to 10 parts water). The coverage of painting of not more than (10-12) m²/Liter/layer. The job includes cleaning and repairing all the cracks and filling all the holes before painting. All needed works to complete the job will be included within the price.

Ceramic tiles for Walls:

Supply of materials, tools and manpower to remove the damaged ceramic tiles and dump them at an approved site, then apply ceramic tiles for walls (25x50cm) or same as the existing size and color, and filling the joints with white cement paste. All needed work to complete the job will be included within the price.

Steel windows:

Supply of materials, tools and manpower to install steel windows (using T, L and Z shapes) with painting and two layers of oil painting, anti-insects wire mesh, handles, windows stopper and fixing a stopper on the floor or wall. All needed work to complete the job will be included within the price.

Steel Door with the Frame(1.0x2.10m):

Supply of materials, tools and manpower to install steel door with frame, with steel plate and using steel tube 40x40x2mm, including a layer of Styrofoam to be placed between the two tubes and fixing a stopper on the floor or wall. The price of work includes the painting of steel door and frame. All needed work to complete the job will be included within the price. **See attached annex**

Main gate (H3.0m, W3.0m):

Supply of materials , tools and manpower to install new main gate steel doors, by using p 40x40x2mm, including door handles, hinges and locks. Price of the work shall include pair two layers of oil paints. The price also includes removing of the damaged door and dump authority. All needed work to complete the job will be included within the price. **See att**

Sliding Steel Door (2.0x4.0m) One Leaf with small door (1.0x2.0m):

manpower to remove the damaged sliding steel door and removing the debris and rubble then install new slide steel door (one leaf), including plate gauge 18(1.41mm) on double 1 steel pipe (75x75x3mm) and sub divider of pipe (50x50x3mm) @ 40cm c/c, slide steel fra and making a small door within the gate (1x2m) with a frame of angle steel (75x75x3mm) painting with anti-rust and 2 layers oil paint, rollers, door handles and locks. All needed v included within the price

Steel door cover for well opening (1.2x1m):

Supply of materials, tools and manpower to install steel door cover made by using plate g dimensions 75x75x3mm. Including locks and painting by using two (2) layers of anti-rust a needed works to complete the job will be included within the price. See attached drawin

Billboard:

Supply of materials, tools and manpower to install billboard made of frame of size 3×1 m, frame shall be made of square pipe section 4x4cm. Price of the work shall include all req

Room title board:

Supply of materials and manpower to install room title name made of plastic sheet size 1 needed work to complete the job will be included within the price.

SUB TOTAL FOR CIVIL WORKS**SANITARY WORKS****Water tank:**

Supply of materials, tools and manpower for installing galvanized water tank of 1250 liter gauge 16(1.56mm), supported by steel base made with 50mm (2") angle shape, including pipes. The price of work includes all piping and fittings, valves, float valves, accessories.

Taps:

Supply of materials, tools and manpower to connect chrome water taps 1/2" or 3/4". Pric connections. All needed work to complete the job will be included within the price.

Mixer taps :

manpower to install mixer taps , locks and all accessories with complete water connectic

Ceramic wash basin:

manpower to install ceramic wash basin with stand, mixer taps , valves , mirror(60x50)cm connections . All needed work to complete the job will be included within the price.

Eastern toilet:

Supply of materials, tools and manpower to install new ceramic eastern toilet. Including : (4"), flexible hose and water connections. All needed work to complete the job will be inc

Roof Drain pipes (4"):

Supply of materials, tools and manpower to remove the damaged water roof drain pipes a 4" (100mm). Including all connections and needed accessories to fix on roof and walls. All be included within the price. **See attached drawing.**

PVC pipe 4" (Ø 100mm):

Supply, installation, testing and commissioning of PVC 4"(100mm) 6 bar for drainage and vent with all required fittings including excavation, back filling, encasing with sulphate resistant caps. All needed works to complete the job, will be included within the price.

Galvanized iron water pipes(1/2"):

Supply and install galvanized water pipes. The price includes all fittings and accessories, pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and their connections of cold and hot water pipes and concreting 10cm around the pipes. All needed works to complete the job will be included within the price.

Galvanized iron water pipes(3/4"):

Supply and install galvanized water pipes. The price includes all fittings and accessories, pipes using 3 layers of anti rust then isolate all hot water pipes by using arm flex and their connections of cold and hot water pipes and concreting 10cm around the pipes. All needed works to complete the job will be included within the price.

PPR pipes(3/4"):

Supply and install PPR pipes (3/4)" diameter. The price includes all fittings and accessories, hot water pipes by using arm flex and thermal tape and concreting 10cm around the pipes.

Masonry manholes:

Supply of materials and construction of manholes of different depths with internal dim blocks 15X20X40 cm for walls. The price includes excavation, crushed stone, plain concrete and iron covers. **See attached drawing.**

Septic Tank:

Supply of materials, tools and manpower to build septic tank of internal dimension (L=2.1m) includes:

- 1-Soil excavations in any types of soil.
- 2-Provide a layer of crushed stones 10cm under the foundation concrete.
- 3-Casting (25cm) plain concrete for the foundation using (C25Mpa) Concrete and using sulphate resistant cement.
- 4-Build the walls of 40 cm width with solid blocks (15x20x40cm) and cement mortar (1:3).
- 5-Casting reinforced concrete slab (20cm) with two layers of 12mmØ spaced @20cm both ways.
- 6-Installation of two manhole steel covers of (60 x 60)cm.
- 7-Supplying maintenance ladders.
- 8-Plastering of the interior and exterior walls with two layers of cement plastering 20mm of cement splash dash.

All needed work to complete the job will be included within the price. **See attached drawing.**

SUB TOTAL FOR SANITARY WORKS

Mechanical Works

BOREHOLE WORK:

Provide equipment, manpower, tools, any required stuff to carry out the work of drill and other details as per each item below; to drill and put in service the well at designated place. The price includes any requirements may be not listed through the details, to ensure optimum results. The work should be according to the following details and directions of the competent authority.

Drill for main borehole body(Filtering zone & reservation):

Supply materials, equipment and manpower to drill the borehole, up to 200 meters depth using hammer drill or rotary drill according to the supervision of geologist committee and site engineer.

Casing pipes:

Installing casing and slotted (holes size is 3-5 mm.) galvanized steel pipes having a diameter than 5 mm for the whole depth of (200 m). The pipes must comply with BS 1387 standard the pipes should be perforated pipes, and the rest of pipes should be unperforated pipes. sealed by steel plate with thickness not less than 10 mm, according to the instruction and the site supervisor.

The price includes pipe welding and putting them down inside the borehole besides any

Filtration:

Supply tools, equipment and manpower to lay the gravel between casing pipes and the well be used comply with the Iraqi Measurement Standard number 1555, having a size from 6.3 to 12.5 mm implemented according to the instruction and supervision of geologist committee and the site supervisor. The price includes applying the pebbles down inside the borehole to (100 m) from the wellhead according to the requirements to do a perfect job.

Grouting Concrete for Well reservation + Casting well cover:

Supply materials, special equipment, machinery and manpower to grout the space between casing pipes for the upper (100 m) by using grouting machine to inject a mixture of (Sulfates Resisting concrete) adding a binding material additives (SBR, RP9, or other approved material of well-knowledge). The price includes to cast a concrete slab around the head of the borehole and install a well cover (at least) on the top of the slab, according with the instructions of the supervisor engineer.

Cleaning and Hydraulic Test:

Provide equipment, skill staff, tools, and other requirements to perform the washing and air compressor with pressure not less than 15 bars until the water get clear; and achieving drawdown test; The test must comprise all necessary information about static and dynamic efficiency, wellbore skin factor and effective well radius. Test to be in time frame not less than 24 hours of site supervisor from (UNDP) . All works should be implement according to the instruction of geologist committee and the site supervisor

Laboratory tests:

Samples of water must be delivered to an authorized laboratory for chemical and biological analysis.

Submersible pump with electrical board:

Supply and install submersible pump (including motor) with cable (3 x 16mm²), nominal current 10 amp meter with electrical control panel (including: starter, phase failure, main and secondary ammeter, voltmeter with selector switch, frequency meter, indication lamps, and contactor Schneider or equivalent).

- The price includes steel cover for the well opening (galvanized plate, min. 10 mm thick and 90 degree bended).

- Any other needed or required to complete the job as optimum, as indicated by the committee and the site supervisor.

- The cable size may change according to the manufacturer, and as will requested by the site supervisor.

3" GI Steel Delivery pipe:

Supply, transport and install of 3" Galvanized pipe(4.5 mm) thickness to the outlet of the well according to the standards. The price includes all the necessary fittings.

STEEL TANKS:

RAW Water collecting Tanks 45 m³ (Ø3.6 m X 4.5 m Length) Horizontal Galvanized steel

General Specification and Standards:

Supply, install and test galvanized steel tank with the following description and requirements

- #- Should meet the Steel Tank Institute (STI) standards at highest standards for common iron
- #- The galvanization work should be "processed by a member of Galvanizers Association".
- #- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization requirement of BS EN ISO 1461: 2009.
- #- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.25 or ASME B16.34) to ensure excellent job. **(Details Are Shown In The Attached Drawings)**

#- The tanks are cylindrical shape, the used plate sheet thickness not less than (5) mm for

#- The tank lays horizontally on (2) fixed iron bases (H section beam 16 cm x 16 cm) welded with a width of (8 mm) plate material should be applied and welded to the tank at the area of contact

#- (6 Inch) Flanged openings for inlet, discharge, and drainage.

#- The tank should be braced with (2) cross-sectional internal partitions made of heavy galvanized

#- (6 Inch) Ventilation opening with 180° elbow ends with mesh; And (4 inch) overflow opening and discharge pipe toward the base of the tank and as directed by the supervising engineer.

#- (70 cm dia) circular main opening with tight cover with ventilator.

#- Water level scale with sight glass fixed in the front of the tank.

#- **Internal ladder** descending inside the tank from the main opening made of galvanized

#- **External ladder** : (4.7 m total height and 0.60 m width) made of U-shape iron channel on both sides using (circular section iron pipe 2" and thickness not less than 5mm).

#- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water or equivalent, (thickness not less than 250 micron). The outside tank and the bases should be painted with anti-rust paint and 3 plies H.Q. oil paint. The price includes all requirements to complete the work.

#- The tanks should be connected to other from bottom throughout the drain openings using pipes with isolating valves as will be directed by the supervising engineer.

#- The price includes providing all fittings needed to make connections between (pipes, tanks, and pipe to the pumping station next the tanks), any other requirements to complete the work.

RO water Tank 32.6 m3 (Ø3.8 m X 2.88 m Height) Elevated Vertical Galvanized steel tank

Supply, install and test galvanized steel tank with the following description and requirements

#- Should meet the Steel Tank Institute (STI) standards at highest standards for common iron

#- The galvanization work should be "processed by a member of Galvanizers Association"

#- A certificate of compliance (ISO 10474) would be available confirming that the Galvanization requirement of BS EN ISO 1461: 2009.

#- All Welding Processes Should Be Plasma Arc Welding (PAW) according to (ASME B16.25 or ASME B16.34) machines to ensure excellent job.

Tank Description:

#- Galvanized water storage tank capacity (30 m³) vertical cylindrical shape thickness of cover (mm).

#- Inside the tank should be painted with epoxy paint with PRIMER, valid for potable water or equivalent), thickness not less than (250 micron), while the outside of the tank and the quality 2 plies antirust paint and 3 plies H.Q. oil paint.

#- (70 cm dia) circular main opening with tight cover.

#- Internal ladder descending inside the tank from the main opening made of galvanized thickness.

#- External ladder : (6 m total height and 0.60 m width) made of U-shape iron channel banner on both sides using (circular section iron pipe 2" and thickness not less than 2.5mm

#- Provision of materials and Connecting the following accessories:

@- Ascending pipe (3" GI iron pipe of thickness not less than 2.5 mm) to be connected with

@- Excess water pipe (3" GI iron pipe of thickness not less than 2.5 mm) descending to

@- Connecting a Spigot pipe (Ø2.5" GI iron pipe of thickness not less than 3.5 mm with directed by the supervising Engineer and as to location demands.

@- Connecting (6) branches of 1" galvanized steel pipe heavy grade with isolating valve a from ground level (for filling water drums).

@- Drainage pipe (Ø2.5" GI iron pipe of thickness not less than 2.5 mm) with ball valve.

@- Water level scale with sight glass fixed in the front of the tank.

@- All fittings needed to complete the job and any other proposed by supervising engineer

REJECTED water (SALINE) Tank (20 m³) / Vertical POLYETHYLENE Tank

Supply, transport and install, and connect of (20 m³) Polyethylene vertical cylindrical tank to the RO Plant. The tank should be made from linear low-density polyethylene (LLDPE) in accordance with US and European recommendations and statutory regulations for drinking water tank production.

The price includes to provide materials, fittings and other requirements to connect the tank to the main pipe coming from the RO plant (to be determined later as required at position).

#- the main pipe coming from the RO plant (to be determined later as required at position)
#- Delivery pipe with SS316 ball valve (2.0" RC - HDPE - SDR 11) connected to a spigot from the RO unit and as directed by the supervising engineer.

#- Drainage pipe with UPVC ball valve (2.0" RC - HDPE - SDR 11).

##- The price includes providing (15-20 mm) rubber sheet between the concrete foundation and the tank.

Gasoline Water Pump:

Supply, transport, test, and commission gasoline water pump unit (Honda, Yamaha, Kohler, etc. outlet dia.), the entire unit to be protected by sturdy Rollover Pipe Frame.

All Requested Details of the unit are in the compliance sheet.

8 000 liter/hour Reverse Osmosis Desalination Unit:

#- All Details of the requested plant are in the compliance sheet.

GENERAL NOTES:

The price shall include but not limited to the following:

1- Complete detailed shop drawings should be delivered to the Engineer to take his approval.
Samples of all materials shall also be delivered to the Engineer to take the approval.

2-Contractor shall take into consideration that all - direct and indirect works and their implementation of the project including temporary facilities, fencing, securing utilities (including electricity systems).

The contractor will be accountable for all necessary equipment, materials and activities at the site of the project and vicinity, where an approved safety plan will be prerequisite to installing all required components and materials necessary for safety of workers, project

3- All works and installations should be carried out, tested and commissioned by specialist in coordination with supervisor Engineer, all in accordance with drawings, specifications and instruction of the Engineer. The Engineer has the right to reject any component of the work if it does not meet specifications and the terms of the contract.

4-The contractor have to submit detailed schedule for commissioning the desalination plant including electrical and mechanical component of the plant and certified by the engineer. The contract also includes biological tests for the permeate and saline waters and the price includes training of the operator for 7 hours daily and 7 days, all under the approval and monitoring of the engineer

RO Desalination Unit:

Supply, install, test, and commission a skid-mounted brackish water desalination unit for PPM, to produce (10m³/hour) water with the following facts:

- Salinity (less than 100 ppm), (PH 7-7.8),
 - Recovery rate of the system not less than (65% -75%).
 - Total hardness (TH) (60-80 mg/liter) CaCO₃.
- Max. Fe < 0.05 mg/l
- Silt Density Index (SDI) < 3

#- The plant should comprise but not limited to, raw water tank feed pump, fully controlled rubber-lined steel vessels and externally epoxy painted with automatic back-washing and vessel, (chlorination, dechlorination and antiscalant dosing system each with 500 liters PF FRP, PN25 high-pressure vessels and RO membranes 99% salt rejection(at least), VFD controlled filter, Product water booster pump, stainless steel grade 317 high-pressure piping, PN16 C pipes, valves, gauges, electro-mechanical European origin digital flow meters for raw water and soda dosing system and sodium Hypochlorite dosing system, Digital EC, PH and turbidity water monitoring, PLC controlled electrical power and control switchboard, TDS Water Break Leak Detection Alarm. The price also includes connecting with the other accessories of the plant

#- The contractor should submit a detailed process schematic diagram for the establishment of the plant supported with documentation before the commencement of the work to get approval

#- All pipes and fittings, pump components in contact with brackish water should be made of carbon steel and stainless steel 317 for the high-pressure side.

#- The price includes a control system to govern the plant operation with levels in the well and the well pump.

Sub-total Mechanical Works
Electrical Work
Solar Energy Plant:

PV-Solar Package:

#- The contractor should equip the solar package under the requirements of the RO unit perfect operation of the whole plant to produce the designated capacity of the unit through

#-The contractor will be accountable for all necessary equipment, materials, and activities within the desalination plant building and vicinity, where an approved safety plan will be along with installing all required components and materials necessary for the safety of workers at the desalination plant. All relevant costs are deemed to be included in the unit price.

#. In case of any difference between BOQ, designs, and/or drawings; the instruction of the

#- The price shall include:

- Design concept drawing , including electrical drawing for (PV,DC combine box, inverter, structural design drawings for PV modules mounting support structure. complete details to the Engineer to take his approval prior to commencement of work. Samples of all materials to the Engineer to take the approval.
- The Contractor shall submit “as built” drawings after the completion of the work.
- Any other material, accessories and/or fitting, not expressly mentioned but required for Solar plant components, shall be supplied and installed by the contractor.
- General notes and specifications in the **Annex_1_** are applicable for solar works.

Solar PV Module:

Supply and install Min (42 kW) power Solar Panels, Mono Crystalline PV Solar Modules, desalination characteristics to be at standard test conditions (STC: irradiance 1000W/m²), PID free cells internationally certified by TUV Rheinland to ISO, BS and UV standards, (10 Years product Warranty) with Certificate of origin (COO). The work includes specified cables according to all PV module and DC combiner, installation, connection, testing and commissioning with any accessories as required. All works should be according to **(GTP/Compliance sheet)**

DC combiner box:

Supply, install, erect and commission of PV panel connection box (DC Combiner) with DC IP65. Operational Environment Temperature: (-30 °C ~+70 °C). Max Input/ Output Voltage include the required cable sizes for input/out and according to approved design to connect combiner box with MC4 Links & with supply of all required touch DC fuse-holders, DC fuse induced DC surge arresters and load disconnect switches and with any other accessories to

Earthing and lightning protection:

Supply, install and connect AC and DC earthing and protection system in accordance to the modules AC and DC, inverters and monitoring systems from the effects of electromagnetic containing with a copper rod of 20 mm dia 1.5m length connect with all accessories such as bare Cu conductor and to connect with all associated frame and structure (PV panel & racking cable sizes according to approved design yellow /green color separately. Work includes supplying minimum height of 1.5m. Price includes supplying of all necessary materials /accessories etc.), installing, laying, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m for the salt and fine sand etc. to complete work as required. The resistance of earthing system shall System shall be comply with IEC 60364, BS EN 61643-11 and IEC/BS EN 62305-3.

Mounting Structure Foundation:

Provide material, equipment, skilled manpower, and any required stuff to cast reinforced of (0.40 m width X 0.25 m thickness X 4 m Length), the number of the blocks will be acc the whole system. The Preparation of the Yard of Solar panels has been included with the duly prepared as will be directed by the competent Engineer.

Solar Mounting Steel Structure :

Supply install and test 70mm fixed support with pined support 40 mm, and aluminum Z ar stand. The structure should be capable of withstanding a wind load of 120 km/hr., should panels and resists the wind forces and other affecting factors and according to ASTM A123 details below is required:

- 1- Structure: Hot dip galvanized steel with a standard of Zinc 80-120 (ASTM A526).
 - 2- Module Rail: Aluminum EN AW-6063 T66.
 - 3- Fixtures: Hot dip galvanized steel (grade 8.8) Clamps: Z and U profile aluminum EN AW
 - 4- Stand to be fixed above concrete base by using clamps of aluminum EN AW-6063 T66 to mm, with any other accessories to complete works as required. All works should be accor
-

25 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 25kW, 3 Phase hybrid driver for water pump (Subr install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

10 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 10kW, 3 Phase hybrid driver for water pump (Subr install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

5.5 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of (5.5KW), 3 Phase hybrid driver for water pump (Su and install of (Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, I Filter, Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cab with all other fittings, accessories and required works). It should be internationally certif years warranty. Circuit breakers, and cable size shall be according to approved design to protection with all other fittings and accessories. All works should be according to **(GTP/C**

3 kW Hybrid Solar Pump Controller:

Supply, install, test, and commission of 3kW, 3 Phase hybrid driver for water pump (Subm install of Maximum Power Point Tracker (MPPT), Pump Controller, Frequency Drive, Dry Ru Circuit Breakers (8 strings Min.), Surge Protection, Protection System, required cable size other fittings, accessories and required works. It should be internationally certified by TU warranty. Circuit breakers, and cable size shall be according to approved design to conne protection with all other fittings and accessories. All works should be according to **(GTP/C**

Solar Hybrid Inverter (3 kW):

Supply, install, test, and commission of (3kW), 1 Phase, hybrid Inverter (Rated DC Voltage supply and install MPPT, Filter/Sine Wave Filter, Circuit Breakers, Surge Protection & Protection connection purposes and with all other fittings, accessories and required works. It should be from Rheinland, and have Min 3 years warranty. Circuit breakers, and cable size shall be according between all PV module, surge protection with all other fittings and accessories. All works

[Compliance sheet](#)

MAIN AC Switch and control board:

Supply and install of AC switch board for connecting the inverters to the loads, and AC Control system between Solar System, National Grid and/or Generator with preset priority. The work includes all required MCCB breakers, DC And AC protection devices, contactors, electrical cables with all accessories carried out as per the design and approved by the project with National Grid and terminal electrical boxes. Connect the board with earthing system. The work includes rewiring and separating the existing installation to Emergency Load (feed by National Grid & Generator). The price includes supplying, installing, connecting (concrete wall if required) and commissioning to complete works as required.

Testing all the Solar system with end user staff training:

Testing, Commissioning of the solar system considering any requirements to complete a project (RO plant + Solar Plant + water well). The work includes site training of the end-user team on the solar system for (3 days, 7 hours a day) to the level that qualifies them to carry out routine evaluation of participants at the end of the course will be required. Training plans, schedule. Training must be done by a certified trainer and a CV must be provided.

General Electrical works

Note:- The price include removal and disposal all defective and damage items to designated area. include supply, replace, install, connect and commission lighting points and power socket fittings, laying wires/ cables, Work includes supply, install, test, connect, commission and suitable size for offices, conference hall, canteen, guest house, corridors, toilets also include lighting ,repair and maintenance for Main Distribution Board. replace (if any) damaged bulbs, holders, fans, lighting fixtures, switch boards, MCBs, Maintenance of internal Telephone wiring for new connections if required. All the necessary equipment/items (if any) must be according to cable size.

Socket Switch(13A):

Supplying & fixing of combine 13A, universal switch-socket with shuttered & indicator outlet includes wiring/connecting with 1.0 kV grade 3*2.5mm² PVC insulated copper cable/wire: pipe and if required laid through new surface PVC pipe (20 mm dia) with all accessories. installing, connecting, laying, drilling & cutting (concrete wall if required) and commissioning

Fluorescent Lighting:

Supplying ,Installation, testing and commissioning of prewired fluorescent fittings of all power rod 36W/19mm dia(4feet) includes wiring/connecting with 1.0 kV grade 2*1.5mm² PVC in existing concealed PVC pipe and if required laid through new surface PVC pipe (20 mm dia) with accessories. The price includes supplying, installing, connecting, laying, drilling & cutting and commissioning to complete works as required

Bracket waterproof wall:

Supplying & Installing of bracket waterproof wall prewired outdoor lighting luminaires suitable complete with all accessories such as base, LED drive & LED bulb, glass, reflector, louvers. kV grade 2*1.5mm² insulated copper cable/wires laid inside existing concealed PVC pipe surface PVC pipe (20 mm dia) with 6 A switches with all accessories. The price includes supplying, drilling & cutting (concrete wall if required) and commissioning to complete works as required

Projector LED fixture 200W:

Supplying , Installing , connection ,and commissioning of LED light projector fixture 230V, grade, PVC insulated copper wire (2x1.5mm²) with 5A photo cell should be connect with 1 conduit pipe (20 mm dia)/cable tray and connecting with all accessories. The price include laying and commissioning drilling, cutting to complete works as required.

SDB (6 ways):

Supplying, installing, testing and commissioning of sub distribution boards 6 ways, TPN DE single door complete set to accommodate incoming miniature circuit breaker (MCB) triple MCB, (6X16) Amps on/in prefabricated MS surface /MS cubical control panel board with n The price includes supplying, installing, connecting, drilling & cutting (concrete wall if re (cable termination with Cu lugs at end) to complete works as required.

Power Cable (4x16 mm²):

Supplying, laying and connecting 1.0kV grade, 4 core 16 mm² PVC insulated and sheathed form MDB To SDB distribution board with all accessories. Price includes supplying, installir include (cable termination with lugs at both end) to complete the work as required. All w Technical Specifications shown on (Annex 2)

Cable (3x70+35mm²):

Supply, install, test and lay 1.0 kV grade (3x70+35 mm²) PVC insulated sheath-un-armored and Distribution Board) laid through PVC pipe (4" dia) with cable termination lugs in both includes supplying, installing, connecting, laying, drilling & cutting (concrete wall if requ (cable termination with Cu lugs at both end) to complete works as required. All works shc Specifications shown on (Annex 2)

Cable (3X95+50 mm²):

Supply, install, test and lay 1.0 kV grade (3X95+50 mm²) PVC insulated sheath-un-armored the main distribution board) laid through PVC pipe (4" dia) with cable termination lugs in price includes supplying, installing, connecting, laying, drilling & cutting (concrete wall i (cable termination with Cu lugs at both end) to complete works as required. All works shc Specifications shown on (Annex 2)

Distribution Board:

Supply, install, test, commission prefabricated a distribution board for the Well room with incorporated in DIN bar with following incoming and outgoing. The price includes supplyi cutting (concrete wall if required) and commissioning include (cable termination with Cu as required. The paint finish should be suitable for installation inside the Well room with .
A- [(1 No.) 150 A, 3 pole MCCB type, breaking capacity 36 kA].
B- [4 strips= 1 set] copper bus bar 200 A phase and neutral with separate earthing bar/sti

Main Distribution Board (MDB):

Supply, install, test, commission prefabricated Main Distribution Board (MDB) (100cm x 80cm with following incoming and outgoing. The price includes supplying, installing, connecting (cable termination with Cu lugs at both end) and commissioning include (cable termination with Cu lugs at both end) to connect to the main supply.

A- [(1 No.) 400 A, 3 pole MCCB type, breaking capacity 36 kA].

B- (2No.) 150 A, 3Ph. 3P, MCB type, breaking capacity 25 kA].

C- (1 Set) Ammeter (0 -300 A), 300/5A with required CTs.

D- (1 No.) Voltmeter (0- 400 V) with selector switch (all Ph-Ph and Ph. -N), (1 No.) Hertz meter

E- (1 No.) selector switch. (ON & OFF position)

F- (3 No.) Indicator lamp 230VAC

G- Three-phase, four wires Kilowatt-hour meter with all accessories.

H- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/strip

10 meter street lighting pole:

Supply, install, test and commissioning of Lighting pole 10m height with single arm and 40x40x2.5cm metal plate. The pole consist of galvanized pipe 6"dia, 4mm starting from 2" reducer to galvanized pipe 4"dia, 4 mm finally connect through 4" to 2" reducer with size 1.5m length to hold the lighting fixture. Using 2x2.5 mm² cable from the base to the lamp. The pole will be fixed on concrete with four anchor bolts 19mm, 50cm length with 3" PVC elbow pipe to be used for cable in concrete base should be leveled on 10cm height plain concrete. The price should cover all materials (cables) required for connections and functioning the system. All works should be according to Technical Specifications shown on **(Annex_3_)**.

Earthing System:

Supply, install and connect earthing system containing (3 number of 20 mm dia, 1.5m length straight formation based on space availability), connected together with 1x50 mm² bare (SMDBs inside the building with all accessories. Price includes supplying all necessary materials, testing, commissioning, excavation pit LxW, 1.8 m x 0.5m (for each Cu rod and refill with Soft soil, etc.) to complete work as required. (Consider 3 pits = 1 set, where each pit con depicted in attached **(Annex 4)**

Transformer (250) kVA:

Supply, Install, test and commission pole mounted outdoor type distribution transformers (Poles), explosion fuse cutout, bracket channels, steel angle, transformer base, lighting arm (25mm²) sheath-armored copper conductors) from Transformer to distribution board, earthing all accessories and connect to with national utility Electrical power network, in coordination with electricity department according to supervise committee engineer to complete work as per necessary requirements for removing defective and damaged (Transformer) from the network location. All works should be according to **(GTP/Compliance sheet)** and Iraqi Technical Sp **(Annex_6_)**.

Distribution Board (Tr.250kVA):

Supplying prefabricated chamber metal out door (MDB) pole mounted (80cm x 60 cm x 2 the incoming and outgoing with all internal connection and installations accessories for b supplying, installing, testing, fixing and commissioning with all accessories to complete v

A- [(1NO) 400 A, 3Ph. MCCB type electronic release of breaking capacity 35 kA.]

B- [(1NO.) 400V, Voltmeter with selector switch (ON, OFF Position) and accessories.

C- [4 strips= 1 set] copper bus bar 500A phase and neutral with separate earthing bar/str

D-[(1NO.) 400V , Ampere meter with selector switch (RST Position) and accessories. All wo Technical Specifications shown on **(Annex_7_)** and **(GTP/Compliance sheet)**.

Supply and Installing (11m), 11kV Lattice Steel Pole:

Supply and erecting and installing of 11m, Lattice Galvanized steel poles, type ST52 for 5 supply and install cross arm 1410mm, (100*50*6)mm hot deep galvanized to mount on the and terminal pole locations with it's bracket, GS bolts, nut, flat and spring washers. Work insulator and D-bracket complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each flat and spring washers and shackle strap. Excavation of pole pit with size not less than (2 shall be filled with concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays s the concrete is hardened. The concrete filing shall be up to a height not less than 100mm face should be coated with two layers of asphaltic coat. Work includes supply and install copper wire 1x 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. Technical Specifications shown on **(Annex_8_)** and **(GTP/Compliance sheet)**.

Supply and Installing (11m), 11kV Tubular Steel Pole:

Supply and erecting and installing of 11m, Tubular Galvanized steel poles, type ST52 for 5 supply and install cross arm 1250mm, (100*50*6)mm hot deep galvanized to mount on the locations with it's bracket, GS bolts, nut, flat and spring washers. Work includes supply ar complete with LV insulator (Shackle insulator 0.4kV) 5 Qty for each poles, with suitable G and shackle strap. Excavation of pole pit with size not less than (200*70*60)cm and the po concrete with mixing ratio of (1:2:4) (grade 20) and temporary stays shall be used to supp hardened. The concrete filing shall be up to a height not less than 100mm above ground l coated with two layers of asphaltic coat. Work includes supply and install earthing system 50mm² and copper earth rod, 16mm diameter, 1.5m length for all poles. All works should Specifications shown on **(Annex_9_)** and **(GTP/Compliance sheet)**.

ACSR Conductor:

Supply and install of ACSR conductor size 120/20 mm² for 11kV Over Head Transmission Li manpower for installing, stringing and sagging the 11kV OHTL with ACSR '120/20' Single Ci cross arms with mounting insulators Sets (disc and pin insulators with its hardware).Work joints for connecting ACSR conductor. Installing insulators and hardware with all accessori supply and install aluminum binding wire to bound conductors on pin insulators at each p parallel grove clamp, bolted type, Al 25-150/25-150 sqmm shall be use for connecting Alu conductor, at section pole locations. All works should be according to **(GTP/Compliance s** shown on **(Annex_10_)**.

LV-ABC cable:

Supplying, stringing, connection of ABC overhead Al cable size (3*95+50+16)mm² with all tension, connectors) and any other requirements for work according to electricity directo supplying, stringing, installation, connection and all other requirements of work. All work **Compliance sheet)** and Iraqi Technical Specifications shown on **(Annex_11_)**.

Change Over Switch (Motorized Change Over switch) Board:

Supplying of Automatic Change Over Board (HxWxB) 120cm x 80 cm x60cm or equivalent s frame made of iron sheet 2mm thickness painted with two layers of gray color oil paint, v and exhaust fan on the top of the panel, (items below with twin internal and external do for wiring and accessories with glands, screws, insulators. The price includes supplying, ir commissioning with below items to complete works as required. (See attached GTP/Com

A- (1 No.) Automatic change over (100 A); change over switch, twin three pole or four pol by change over circuit breakers with (Manual/Auto) selector, includes automatic control u

B- (1Set= 4 strips) Copper Bus-Bar 300 A for (lines and neutral) and with separate earth st

C- (3No.) Signal lamps& control cabling terminal block and protection fuses, bottom cable

D- [(1NO.) 400V , Analog Voltmeter with selector switch (All Ph-Ph and Ph. -N Position).

Solar Energy lighting**#- Solar LED unit:**

Supply and Installation of Solar Street Lights, Remote Control (All-In-two) High Efficiency, Lumens, CRI not less than 85, Constant lighting with mode options for energy saving, Con night lighting when weather change and should be equipped with a battery charging man monitor and control the charging and discharging of rechargeable batteries.

- Solar Panel:

High efficiency Mono-Crystalline Silicon panel, Adjustable solar panel to increase the char 120 Watt, solar cell efficiency around 18.0%, lifespan ≥25 years.

- LED:

High Quality LED (1W= minimum 140 Lumen), output 60 W.

color temperature (4000-6500K), type Philips (Europe) or Cree (USA) or PMMA (JAPAN) or angle.

lighting time with 1 full charge not less than 3 Nights,

Body: Aluminum die casting body, Waterproof with at least IP65.

Replaceable lithium Iron battery (LifePO4). with not less than 2500 cycles 80%. (See attac

#- Street Light Pole:**- Pole foundation:**

Provide manpower and machinery to excavate the poles foundation with dimensions 70 X concrete, asphalt, etc. The depth of the foundation is 100 measured from the NGL (any e contractor will be responsible for casting it with concrete at his expense). Casting the fou kicker (20 cm above the ground) by ordinary concrete C20 (ready mix and job mix must b includes fixing Anchorage rods 102 cm length and diameter 18 mm 4 rods, coated totally v has three HEX nut -M20 with Washer A21. The price includes all necessary stuff or require

- Light Poles:

Supply and install Galvanized steel lights poles 10m height and 4mm thickness, pole Diam bottom 200mm (circular or polygon); The bearing flange (ground anchored) of dimensions Column stiffening plate (4 units) thickness 10 mm, the bearing flange holes must be follow works should be according to drawing shown on (Annex_13_).

Sub-total Electrical Works

Grand Total

s the contractor responsibility to obtain those documents from the mentioned					
· Dibond).					
Uni	Qty	Price\$	Total \$		
LS	1		0.00		
M3	220		0.00		
M3	40		0.00		
M3	35		0.00		
M2	150		0.00		

NO	2		0.00		
M3	54		0.00		
M2	525		0.00		
ML	175		0.00		
M2	525		0.00		
M2	15		0.00		
M2	22		0.00		
NO.	3		0.00		

NO.	3		0.00		
NO.	1		0.00		
No.	2		0.00		
NO.	1		0.00		
NO.	3		0.00		
			US\$ -		
NO.	1		0.00		
NO.	3		0.00		
NO.	1		0.00		
NO.	1		0.00		
NO.	1		0.00		
M.L	30		0.00		

M.L	25		0.00		
M.L	25		0.00		
M.L	15		0.00		
M.L	25		0.00		
NO.	1		0.00		
NO.	1		0.00		
			US\$ -		
M.L	200		0.00		

M.L.	200		0.00		
L.S.	1		0.00		
LS	1		0.00		
L.S.	1		0.00		
L.S.	1		0.00		
L.S.	1		0.00		
ML.	130		0.00		

No.	1		0.00		

No.	1		0.00		
No.	1		0.00		
NO.	1		0.00		

No.	1		0.00		
			US\$ -		

LS	1		0.00		
SET	4		0.00		
SET	5		0.00		

LS	1		0.00		
LS	1		0.00		
SET	1		0.00		
SET	2		0.00		
SET	1		0.00		
SET	1		0.00		

SET	1		0.00		
SET	1		0.00		
LS	1		0.00		
NO	14		0.00		
NO	12		0.00		
NO	10		0.00		

NO.	6		0.00		
NO	2		0.00		
M	25		0.00		
M	45		0.00		
M	50		0.00		
NO	1				

NO	1				
NO	2				
SET	1		0.00		
NO	1		0.00		

NO	1		0.00		
NO	2		0.00		
NO	2		0.00		
M	500		0.00		
M	100		0.00		

