

PAL-2019-72711
Amendment No. 1 dated 18 June 2019

Amendment No.1 to Solicitation Documents

PAL-2019-72711: Construction of Wastewater Flow Measurement Systems in Qalqilya, Beit Jala and Ramallah
Issue Date: 28 May 2019
Closing date & time: 25 June 2019 8:00AM EDT

This correspondence pertaining to the above-mentioned project shall be considered as Amendment No.1 to the Invitation to Bid reference number PAL-2019-7271, which shall be deemed to form and be read as part of the tender, following the visits to the sites on 10-11-12 June 2019.

- (I) Item No 5.5 (PV Mounting Structure) in the Bill of Quantities (Bill #3 & Bill #4) has been modified as follow:

"Supply and install Module mounting structure from hot galvanized steel foundation profile suitable to the dimension of selected PV modules and PV numbers, the mounting provides a fixed inclination of the modules from 30 degree to 32 degree with vertical supports, plates, screws and casting, unit price also include excavation in any type of soil for reinforce concrete foundations B250 (3.0x2.2x0.4) m3 for the PV panels, the structure profile includes bracing and double hot galvanized angles for dividers. The mounting structure components are bonded together to guarantee potential equalization. The price includes supply and install a complete earth system (electrodes 15mm2, manhole with iron cover, earth joints, clamps and 25 mm2 flexible copper cable from the structure to the electrode, all necessary copper wires to connect arrays and modules in one loop for earthen. All precaution to have the resistance < 2Ω. Work also include supplying erection and anchoring Galvanized fence around the PV Panels including the ceiling and painting two coats according to the instructions of the supervisor engineer and the technical specifications. Unit rate also include Supplying, erection and anchoring gate of Galvanized fence for the area of the PV Panels. Price also includes removal of the unwanted relevant materials to dump site approved by the engineer. Exact location of the PV panels will be decided on site, all according to the drawings and engineer approval." Please see attached the technical details of the galvanized fence.

The Bill of Quantities has been amended and herein replaced by a revised version, attached to this amendment. Interested bidders are therefore required to duly fill-in/ price and submit the revised version "Bill of Quantities (BoQ)- Modified 18 June 2019" along with their bid. In case any bidder uses and submits a different version of the table, this shall cause UNDP to reject its bid as non-responsive. In case both versions of the table are submitted by the bidder, then UNDP reserves the right to consider only the revised version of the table when evaluating its bid as per Amendment No 1.

The Clause related to "Offices for the Engineers Representative" page 39 of the ITB has been amended and the need for a meeting room and its furniture is NOT required. The Contractor is required to set up and furnish a site office in each location to contain a one room office in addition



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PAL-2019-72711

Amendment No. 1 dated 18 June 2019

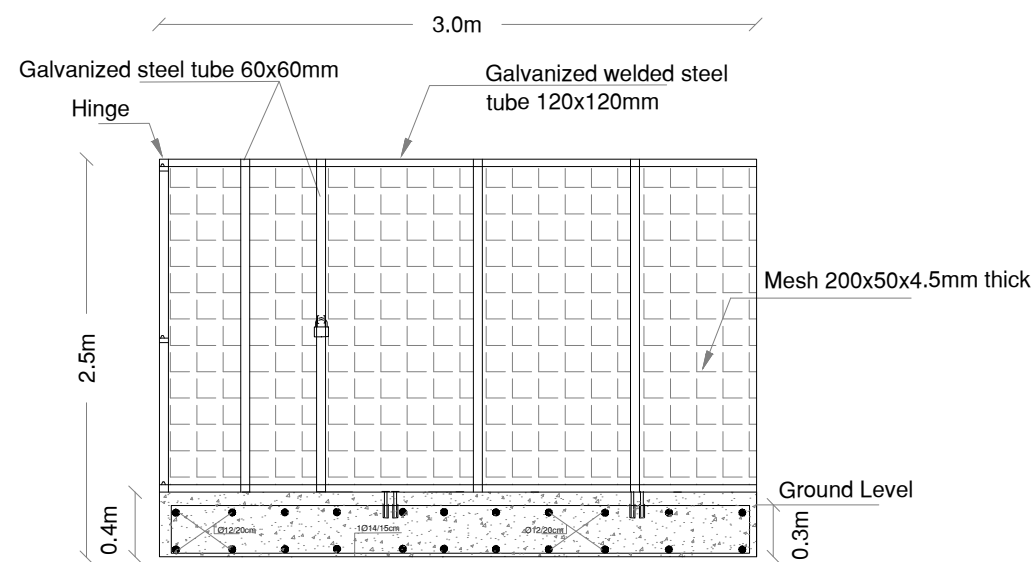
to a toilet with all supplies and a small kitchenette with all necessary tools and supplies in addition to adequate split unit A/C (hot and cold).

Contractors are required to sign and stamp this amendment and to include it in their bids.

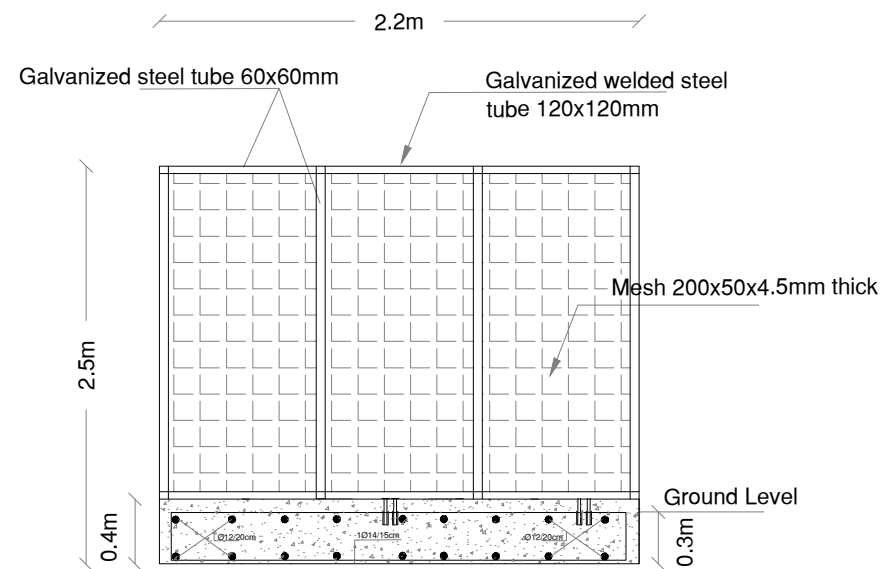
For your kind attention and reference,



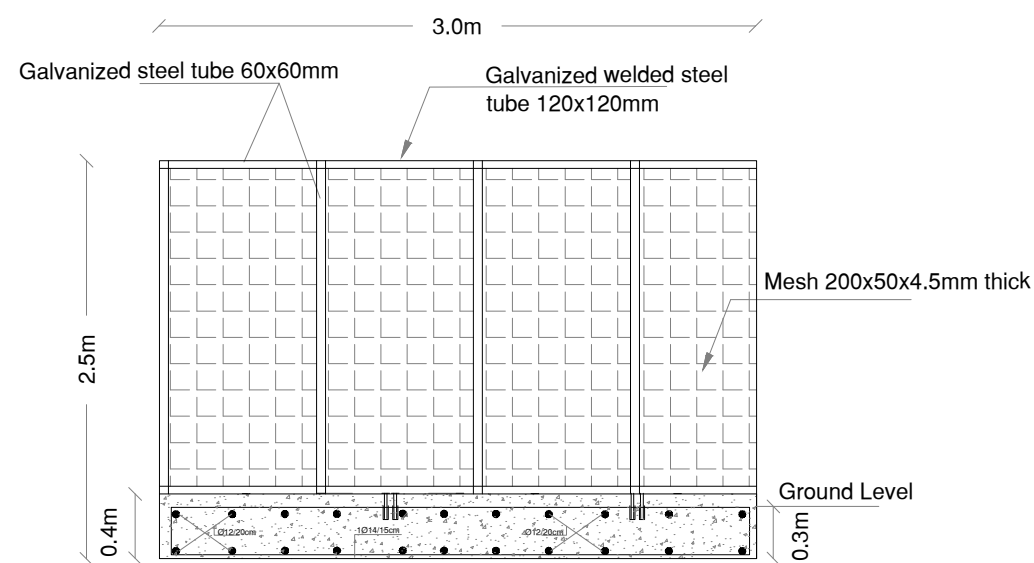
Shehaden Habash
Head of Procurement Unit
UNDP/PAPP



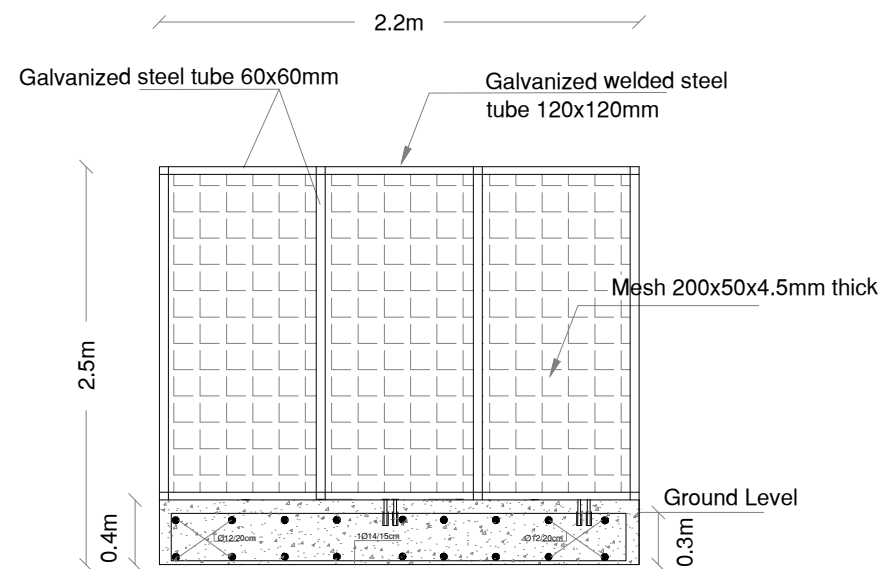
Side View 1 Galvanized fence around the PV Panels with Galvanized Gate



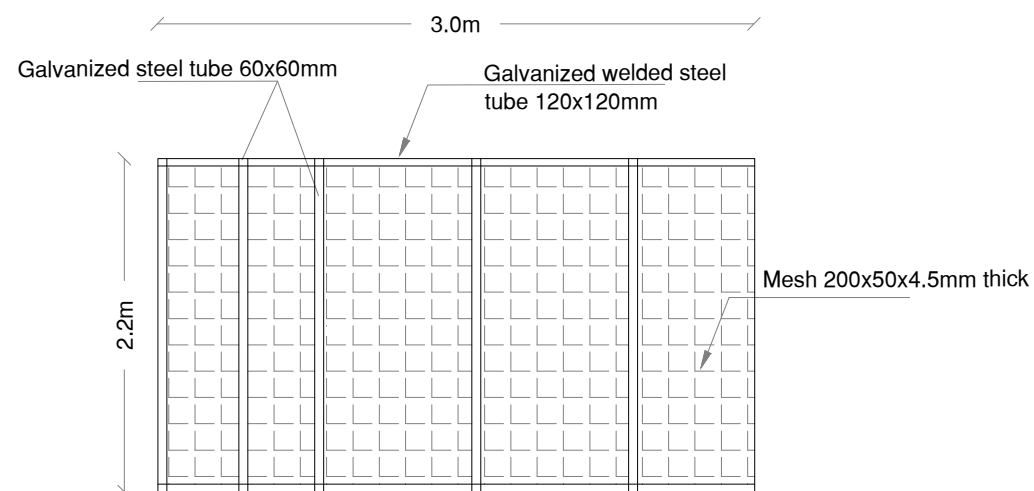
Side View 2 Galvanized fence around the PV Panels



Side View 3 Galvanized fence around the PV Panels



Side View 4 Galvanized fence around the PV Panels



Galvanized ceiling fence For the PV Panels



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Consulting Engineer



Project

Design Flow Measurement Systems for Trans-Boundary
Wastewater Streams Reference No: RFP-PAL-0000049571
Wadi Al-Zuhur Qalqilia City

Drawing name

Galvanized Fence Protection
to be Installed Surrounding the PV Panels

Date / Signature
Dec. 2018

Designed by: Ammar kukhun

Checked by: Ammar Kukhun

Drawn by : Yara Dhoon

Approved by: Ammar kukhun

Drawing No.
0010 D

Modified 18 June 2019 / ITB-PAL-2019-72711
Construction of Flow Measurement Systems for Trans-Boundary
Wastewater Streams

Description

General Notes for Supply and Installation of Sewage Works

_ All the project items to be implemented according to PWA general technical specification for sewage systems (1999)

_ All works, materials, products...etc. should be according to the references and standards specified in the project documents or should be according to the equivalent

_ Supplying, transporting and installing the following pipes, manholes and fittings, where no mix of pipes and fittings makes should be allowed, and all such supplies should have recent manufacturing dates;

_ Supplying, transporting and unloading in the specified stores of the contractor the following pipes, manholes and fittings, all to be new and not used before or renewed.

_ All pipe work items mentioned hereinafter for all project facilities and items shall include supply, delivery, installation, excavation in all types of soils, backfilling with approved materials, compaction, testing, cleaning of pipes, supporting existing utilities if any, commissioning, reinstatement of the surface to their original shape, fittings and all accessories according to Drawings, PWA specifications and to the satisfaction of the Engineer.

_ The Contractor has to submit Detailed Shop Drawings to be approved by the Employer/Engineer before commencement of the work, and all required materials should be supplied as specified and subject to the Employer/Engineer approval.

_ All the sewage works have to be coordinated with Baqa Al Sharqiya and An Nazlat Municipality and An Nazleh Al Sharqiya Village Council.

_ The Contractor should submit samples for approval by the Engineer before starting implementation.

_ The Contractor shall repair any damage or destruction of general services that may arise during the implementation phases of work, and restoration of sound as it was.

_ The concrete used on fixing manhole covers or when the ramp and reduce the manhole should be not less than B250(w/c max 45%).

_ The holes of the manholes have to be done using core machine and the manholes have to be coated by two external bitumen coating.

_ The Contractor has to visit the site for inspections.

_ The price includes all needed tests as in specification.

_ The covers of manholes are made of cast iron of internal diameter 60 cm and with 40 ton capacity engraved by the word " Sewage " in English and Arabic.

_ The Contractor has to provide all safety measures and bracing as specified, needed and requested by Employer/Engineer.

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 00: Preliminaries

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
1	Allow for each and every expense to mobilize, set up offices, stores, compound, signs,Insurance, etc..., including any taxes, rents, temporary facilities and electricity ,etc..., maintain and keep in good order for the duration of the Project. Rates include removing offices, stores, compound, temporary fence etc..., and all waste and surplus materials from the site and leave in a clean and tidy condition. Rate also includes provision and erection of signboards; rate includes all requirements related to mobilization and demobilization mentioned in the Technical Specifications GTS, and Bidding Documents. In addition to relevant fees for authorities in relation to work executions)				
1.1	Mobilization	LS	1		
1.2	Demobilization	LS	1		
	Total of Site Mobilization,Quality, H &S, Environment Plans and Implementation in USD				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 01: Wadi Al-Zuhur North and East part of Qalqilia City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
1	Earth works, Supply and Installation of Sttel and UPVC Pipes for Sewer Connection				
1.1	<p>Supply and install steel pipes Dn 10" 3.96 mm (5/32") wall thickness steel pipes according to P.S No.186 or equivalent, grade B welded end with internal colloidal concrete lining 6mm thickness (sulfate resistance cement) according to PS 325 part 1 and external polyethylene coating with minimum thickness of 1.8 mm according to P.S No.325 part 6 wrapping applied by the extrusion method. Pipe shall be for sewer use and must be medium series, length of each pipe 12.2 m, and (Stamp with Palestinian supervision or quality marked or equivalent) on each pipe for the production of the pipe itself. Unit price also include supply and install all required fittings to complete the connection of the proposed pipe Dn 10" with the existing sewer PVC pipeline/or existing</p> <p>Trench excavation in soil or rock for pipes, removing surplus excavation material from the site, providing soft backfilling, laying of pipes, proper jointing, underground supporting and hanging the existing utilities which will face the contractor during excavation and the backfilling with base course, leveling, compaction in layers, cutting asphalt if any in suitable width using machine, reinstatement to original conditions, cleaning, testing...etc and all other necessary works to be jointed complete, all above should be according to the drawings, specification, standards and under the supervision and direction of the Engineer. For uPVC pipes SN8 for the trench excavation widths and excavation variable depths as shown in drawings</p> <p>1- Excavation shall cover clearing, grubbing of top soil , trimming bottoms and sides of trench to the depths and widths shown on drawings, removal and disposal of all excess material to locations acceptable to the Engineer, Client representatives and Municipality</p> <p>2-Soft Backfilling sand (equivalent min 50%) shall cover supplying and backfilling (surrounding the pipe) by using sand . This sand (equivalent min 50%) bedding material shall be placed 150 mm below the invert level up to 200 mm over the crown of the pipe and for the full width of the trench. The work shall be completed according to the drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>3- Supplying and installing of Metallic green warning tape marked "Sewer " or ' Sewer Pipe" the warning tape shall be made of solid aluminum foil visible on unprinted side encase in portative high visibility, inert polyethylene plastic jacket or tape with integrated copper wires encased in portative high visibility, inert polyethylene plastic jacket, foil thickness min 0.14mm (5.5 mils) Width 200mm. Identifying lettering min 25mm high permanent black lettering imprinted continuously over entire length. Joining clips coated and furnished by tape manufacture.</p> <p>4-Final Backfilling and Reinstatement shall cover backfilling and reinstating of the excavated trench by supplying Base course material for the rest of the trench, all backfill materials shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes supply and installation of the reinstatement materials depending on the original existing surface depending on situation . All works should be completed according to the contract drawings, specifications and Engineer's approval.</p> <p>5- Rate price to include all necessary cleaning, washing and testing (leakage test, strength...etc) according to specification, standards and directions of Engineer.</p> <p>6-The contractor has to submit shop drawing for all works to be approved by the Engineer before starting any activity.</p> <p>7- The contractor has to fix and repair any damage to underground utilities that may be caused during work implementation</p> <p>8- Length of installed pipes will be measured between the internal two wall faces of the two adjacent manholes.</p>	L.M	30		
1.2	<p>Ditto but Supply and install 250mm diameter UPVC sewer pipes SN8 with wall thickness (7.3mm) "Palestinian supervision mark or Palestinian quality mark or equivalent" and according to PS 9-2011 or ISO 4435 (2003) or equivalent including all necessary fittings, rubber rings, adhesive material, any other accessories...etc, price includes but not limited to the followings:</p>	L.M	55		
	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Pipe(USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 01: Wadi Al-Zuhur North and East part of Qalqilia City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
2	<p>Supply & Installation of Sewer Manholes (200 cm dia. Precast Manholes)</p> <p>Supply and install of 200cm internal diameter precast concrete circular sewer manholes. The manhole should have internal tar-epoxy 2 coats 250µm each coat. benching, pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, work also include supply and installation of heavy duty cast iron cover with frame "supporting ring". The price is to include excavation works, backfilling around the manhole in layers with approved backfill materials, all required accessories and all necessary works to be jointed complete; all above shall be as per drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>Note 1: All Manhole covers should be heavy duty Cast Iron/ 40 tons and all holes of manholes have to be done using core machine.</p> <p>Note 2: All concrete materials which are in contact with sewer shall be sulfate resistance cement.</p> <p>Note 3: For Manhole depth and dimensions shall be as shown in drawings.</p> <p>Note 4: Thickness for precast manhole Base, Walls and Cone shall be min 20cm</p> <p>Note 5: Work also supply and install blinding concrete B150 and gravel (single size) under the blinding concrete</p> <p>Note 6: The pr</p>	No.	2		
	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	<p>Electromagnetic Flowmeter (Electromagnetic flow sensor Dn 10")</p> <p>Supply, install and construct Electromagnetic Flowmeter (Electromagnetic flow sensor) for partially filled pipes for wastewater flow Including flanges, gaskets & bolts, complete with Sensors, separate converter/integrator, transmitter, remote indicator, converter installed at panel door or wall next to the main DB, showing both flow rate & volume including all cabling (no joints) and accessories complete as indicated in the drawings and according to ISO 9001 : 2008 and compliance with essential and health safety requirement according to EN 60079-0 :2009, EN 60079-7 :2007, EN 6N 60079-1 :2007, EN 60079-11 :2012, EN 60079-5 :2007 and EN 60079-26 or equivalent. (Eruption Product for Flowmeter is only acceptable) , work also include supply, install, connect, testing and commission complete distribution boards, with (mdb) circuit breakers, isolators, earth leakage C.B, distribution terminal blocks according to local electrical authority and according to drawings, specifications and relevant codes. work also include supply and install of electrical Cables with all required accessories for proper installation and connection. Rate also includes connection with the main power source. Unit price also include connection the inlet steel pipe of the Electromagnetic flow meter with the nearest existing upstream manhole and the outlet of the Electromagnetic flow meter with the nearest downstream manhole. All as per attached Particular Technical Data sheet. The integrated level sensors in the liner are in no contact with the liquid and are therefore insensitive against fat and oil floating on the surface.</p> <p>Work also includes supply and construct of flowmeter reinforce concrete chamber B300. Rate includes excavation in any material, trimming, backfilling using compacted base course, reinforced concrete structure complete, blinding concrete B150 and base course under and sounding the chamber, all base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes, work also include supply & Install wall mounted sluice gate 400mm opening diameter (round), stainless steel 316 with EPDM sealant & associated operating gear, fittings, suitable for wastewater with extended arm to surface level. as indicated in the drawings, specifications and according to the manufacturer & engineer's instructions.</p> <p>Unit price also include supply and install of cast iron heavy duty with frame and covers , venting pipes, drainage pit, flanges compatible with PVC sewer pipes and all other Accessories required for the connection, steel piping inside the chamber, reinforced concrete support wall B300, laying, jointing, building, testing, structure backfilling, reinstatement and commissioning complete. The work shall be complete according to the drawings and to the technical specifications of the contract and the instruction of the supervising engineer. Chamber should have internal tar-epoxy 2 coats 250µm each coat. pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement with concrete cover not less than 50 mm, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, all as shown in the drawings and approve by the engineer</p>	L.S	1		
	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 01: Wadi Al-Zuhur North and East part of Qalqilia City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
4	Miscellaneous Works				
4.1	Concrete Encasement Allow for each and every expense for pipe encasement with concrete B250 (w/c max 45%) for any diameter where the cover above the crown of the pipe is less than 70 cm for diameter less than 150mm and 90cm for diameter ≥ 150mm including all necessary works, complete, all according to tender documents, drawings and as directed by the Engineer/or for water/sewege crossing	M3	5		
4.2	Concrete Reinstatement Allow for each and every expense for 10 cm thickness for reinforced concrete B250(w/c max 45%) including 8mm steel mesh reinforcement and all necessary works, complete and all according to directions of Engineer	M3	5		
4.3	Flow Diversion Contractor shall allow for flow diversion through the construction work, flow diversion shall be executed under the approval of supervisor engineer; contractor shall provide on his own cost all necessary requirements for the flow diversion, such as excavation, backfilling, reinstatement, pipes connection. Pipe crossing, contractor on his own cost shall repair all infrastructure utilities that might be damage through the diversion of flow.	LS	1		
	Sub Total of Miscellaneous Works (USD)				
1	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Collection Network(USD)				
2	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				
4	Sub Total of Miscellaneous Works (USD)				
	Total of Bill # 01: Wadi Al-Zuhur North and East part of Qalqilia City (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1**Bill # 02: Wadi Al-Zuhur Western part of Qalqilia City**

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
1	Earth works, Supply and Installation of Sttel and UPVC Pipes for Sewer Connection				
1.1	<p>Supply and install steel pipes Dn 12" 3.96 mm (5/32") wall thickness steel pipes according to P.S No.186 or equivalent, grade B welded end with internal colloidal concrete lining 6mm thickness (sulfate resistance cement) according to PS 325 part 1 and external polyethylene coating with minimum thickness of 1.8 mm according to P.S No.325 part 6 wrapping applied by the extrusion method. Pipe shall be for sewer use and must be medium series, length of each pipe 12.2 m, and (Stamp with Palestinian supervision or quality marked or equivalent) on each pipe for the production of the pipe itself. Unit price also include supply and install all required fittings to complete the connection of the proposed pipe Dn 10" with the existing sewer PVC pipeline/or existing</p> <p>Trench excavation in soil or rock for pipes, removing surplus excavation material from the site, providing soft backfilling, laying of pipes, proper jointing, underground supporting and hanging the existing utilities which will face the contractor during excavation and the backfilling with base course, leveling, compaction in layers, cutting asphalt if any in suitable width using machine, reinstatement to original conditions, cleaning, testing...etc and all other necessary works to be jointed complete, all above should be according to the drawings, specification, standards and under the supervision and direction of the Engineer. For uPVC pipes SN8 for the trench excavation widths and excavation variable depths as shown in drawings</p> <p>1- Excavation shall cover clearing, grubbing of top soil , trimming bottoms and sides of trench to the depths and widths shown on drawings, removal and disposal of all excess material to locations acceptable to the Engineer, Client representatives and Municipality</p> <p>2-Soft Backfilling sand (equivalent min 50%) shall cover supplying and backfilling (surrounding the pipe) by using sand . This sand (equivalent min 50%) bedding material shall be placed 150 mm below the invert level up to 200 mm over the crown of the pipe and for the full width of the trench. The work shall be completed according to the drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>3- Supplying and installing of Metallic green warning tape marked "Sewer " or ' Sewer Pipe" the warning tape shall be made of solid aluminum foil visible on unprinted side encase in portative high visibility, inert polyethylene plastic jacket or tape with integrated copper wires encased in portative high visibility, inert polyethylene plastic jacket, foil thickness min 0.14mm (5.5 mils) Width 200mm. Identifying lettering min 25mm high permanent black lettering imprinted continuously over entire length. Joining clips coated and furnished by tape manufacture.</p> <p>4-Final Backfilling and Reinstatement shall cover backfilling and reinstating of the excavated trench by supplying Base course material for the rest of the trench, all backfill materials shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes supply and installation of the reinstatement materials depending on the original existing surface depending on situation . All works should be completed according to the contract drawings, specifications and Engineer's approval.</p> <p>5- Rate price to include all necessary cleaning, washing and testing (leakage test, strength...etc) according to specification, standards and directions of Engineer.</p> <p>6-The contractor has to submit shop drawing for all works to be approved by the Engineer before starting any activity.</p> <p>7- The contractor has to fix and repair any damage to underground utilities that may be caused during work implementation</p> <p>8- Length of installed pipes will be measured between the internal two wall faces of the two adjacent manholes.</p>	L.M	30		
1.2	<p>Ditto but Supply and install 315mm diameter UPVC sewer pipes SN8 with wall thickness (9.3mm) "Palestinian supervision mark or Palestinian quality mark or equivalent" and according to PS 9-2011 or ISO 4435 (2003) or equivalent including all necessary fittings, rubber rings, adhesive material, any other accessories...etc, price includes but not limited to the followings.</p>	L.M	55		
	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Pipe(USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 02: Wadi Al-Zuhur Western part of Qalqilia City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
2	<p>Supply & Installation of Sewer Manholes (200 cm dia. Precast Manholes)</p> <p>Supply and install of 200cm internal diameter precast concrete circular sewer manholes. The manhole should have internal tar-epoxy 2 coats 250µm each coat. benching, pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, work also include supply and installation of heavy duty cast iron cover with frame "supporting ring". The price is to include excavation works, backfilling around the manhole in layers with approved backfill materials, all required accessories and all necessary works to be jointed complete; all above shall be as per drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>Note 1: All Manhole covers should be heavy duty Cast Iron/ 40 tons and all holes of manholes have to be done using core machine.</p> <p>Note 2: All concrete materials which are in contact with sewer shall be sulfate resistance cement.</p> <p>Note 3: For Manhole depth and dimensions shall be as shown in drawings.</p> <p>Note 4: Thickness for precast manhole Base, Walls and Cone shall be min 20cm</p> <p>Note 5: Work also supply and install blinding concrete B150 and base course under and sounding the Manhole, base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent</p>	No.	2		
Sub-Total of Supply & Installation of Sewer Manholes (USD)					
3	<p>Electromagnetic Flowmeter (Electromagnetic flow sensor Dn 12")</p> <p>Supply, install and construct Electromagnetic Flowmeter (Electromagnetic flow sensor) for partially filled pipes for wastewater flow Including flanges, gaskets & bolts, complete with Sensors, separate converter/integrator, transmitter, remote indicator, converter installed at panel door or wall next to the main DB, showing both flow rate & volume including all cabling (no joints) and accessories complete as indicated in the drawings and according to ISO 9001 : 2008 and compliance with essential and health safety requirement according to EN 60079-0 :2009, EN 60079-7 :2007, EN 6N 60079-1 :2007, EN 60079-11 :2012, EN 60079-5 :2007 and EN 60079-26 or equivalent. (Eruption Product for Flowmeter is only acceptable) , work also include supply, install, connect, testing and commission complete distribution boards, with (mdb) circuit breakers, isolators, earth leakage C.B, distribution terminal blocks according to local electrical authority and according to drawings, specifications and relevant codes. work also include supply and install of electrical Cables with all required accessories for proper installation and connection. Rate also includes connection with the main power source. Unit price also include connection the inlet steel pipe of the Electromagnetic flow meter with the nearest existing upstream manhole and the outlet of the Electromagnetic flow meter with the nearest downstream manhole. All as per attached Particular Technical Data sheet. The integrated level sensors in the liner are in no contact with the liquid and are therefore insensitive against fat and oil floating on the surface.</p> <p>Work also includes supply and construct of flowmeter reinforce concrete chamber B300. Rate includes excavation in any material, trimming, backfilling using compacted base course, reinforced concrete structure complete, blinding concrete B150 and base course under and sounding the chamber, all base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes, work also include supply & Install wall mounted sluice gate 400mm opening diameter (round), stainless steel 316 with EPDM sealant & associated operating gear, fittings, suitable for wastewater with extended arm to surface level. as indicated in the drawings, specifications and according to the manufacturer & engineer's instructions.</p> <p>Unit price also include supply and install of cast iron heavy duty with frame and covers , venting pipes, drainage pit, flanges compatible with PVC sewer pipes and all other Accessories required for the connection, steel piping inside the chamber, reinforced concrete support wall B300, laying, jointing, building, testing, structure backfilling, reinstatement and commissioning complete. The work shall be complete according to the drawings and to the technical specifications of the contract and the instruction of the supervising engineer. Chamber should have internal tar-epoxy 2 coats 250µm each coat. pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement with concrete cover not less than 50 mm, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, all as shown in the drawings and approve by the engineer</p>	L.S	1		
Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)					

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 02: Wadi Al-Zuhur Western part of Qalqilia City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
4	Miscellaneous Works				
4.1	Concrete Encasement Allow for each and every expense for pipe encasement with concrete B250 (w/c max 45%) for any diameter where the cover above the crown of the pipe is less than 70 cm for diameter less than 150mm and 90cm for diameter ≥ 150mm including all necessary works, complete, all according to tender documents, drawings and as directed by the Engineer/or for water/sewege crossing	M3	5		
4.2	Concrete Reinstatement Allow for each and every expense for 10 cm thickness for reinforced concrete B250(w/c max 45%) including 8mm steel mesh reinforcement and all necessary works, complete and all according to directions of Engineer	M3	5		
4.3	Flow Diversion Contractor shall allow for flow diversion through the construction work, flow diversion shall be executed under the approval of supervisor engineer; contractor shall provide on his own cost all necessary requirements for the flow diversion, such as excavation, backfilling, reinstatement, pipes connection. Pipe crossing, contractor on his own cost shall repair all infrastructure utilities that might be damage through the diversion of flow.	LS	1		
	Sub Total of Miscellaneous Works (USD)				
1	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Collection Network(USD)				
2	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				
4	Sub Total of Miscellaneous Works (USD)				
	Total of Bill # 02: Wadi Al-Zuhur North and Western part of Qalqilia City (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
1	Earth works, Supply and Installation of Sttel and UPVC Pipes for Sewer Connection				
1.1	<p>Supply and install steel pipes Dn 12" 3.96 mm (5/32") wall thickness steel pipes according to P.S No.186 or equivalent, grade B welded end with internal colloidal concrete lining 6mm thickness (sulfate resistance cement) according to PS 325 part 1 and external polyethylene coating with minimum thickness of 1.8 mm according to P.S No.325 part 6 wrapping applied by the extrusion method. Pipe shall be for sewer use and must be medium series, length of each pipe 12.2 m, and (Stamp with Palestinian supervision or quality marked or equivalent) on each pipe for the production of the pipe itself. Unit price also include supply and install all required fittings to complete the connection of the proposed pipe Dn 10" with the existing sewer PVC pipeline/or existing</p> <p>Trench excavation in soil or rock for pipes, removing surplus excavation material from the site, providing soft backfilling, laying of pipes, proper jointing, underground supporting and hanging the existing utilities which will face the contractor during excavation and the backfilling with base course, leveling, compaction in layers, cutting asphalt if any in suitable width using machine, reinstatement to original conditions, cleaning, testing...etc and all other necessary works to be jointed complete, all above should be according to the drawings, specification, standards and under the supervision and direction of the Engineer. For uPVC pipes SN8 for the trench excavation widths and excavation variable depths as shown in drawings</p> <p>1- Excavation shall cover clearing, grubbing of top soil , trimming bottoms and sides of trench to the depths and widths shown on drawings, removal and disposal of all excess material to locations acceptable to the Engineer, Client representatives and Municipality</p> <p>2-Soft Backfilling sand (equivalent min 50%) shall cover supplying and backfilling (surrounding the pipe) by using sand . This sand (equivalent min 50%) bedding material shall be placed 150 mm below the invert level up to 200 mm over the crown of the pipe and for the full width of the trench. The work shall be completed according to the drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>3- Supplying and installing of Metallic green warning tape marked "Sewer " or ' Sewer Pipe" the warning tape shall be made of solid aluminum foil visible on unprinted side encase in portative high visibility, inert polyethylene plastic jacket or tape with integrated copper wires encased in portative high visibility, inert polyethylene plastic jacket, foil thickness min 0.14mm (5.5 mils) Width 200mm. Indentifying lettering min 25mm high permanent black lettering imprinted continuously over entire length. Joining clips coated and furnished by tape manufacture.</p> <p>4-Final Backfilling and Reinstatement shall cover backfilling and reinstating of the excavated trench by supplying Base course material for the rest of the trench, all backfill materials shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes supply and installation of the reinstatement materials depending on the original existing surface depending on situation . All works should be completed according to the contract drawings, specifications and Engineer's approval.</p> <p>5- Rate price to include all necessary cleaning, washing and testing (leakage test, strength...etc) according to specification, standards and directions of Engineer.</p> <p>6-The contractor has to submit shop drawing for all works to be approved by the Engineer before starting any activity.</p> <p>7- The contractor has to fix and repair any damage to underground utilities that may be caused during work implementation</p> <p>8- Length of installed pipes will be measured between the internal two wall faces of the two adjacent manholes.</p>	L.M	30		
1.2	<p>Ditto but Supply and install 315mm diameter UPVC sewer pipes SN8 with wall thickness (9.3mm) "Palestinian supervision mark or Palestinian quality mark or equivalent" and according to PS 9-2011 or ISO 4435 (2003) or equivalent including all necessary fittings, rubber rings, adhesive material, any other accessories...etc, price includes but not limited to the followings</p>	L.M	65		
	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Pipe(USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
2	<p>Supply & Installation of Sewer Manholes (200 cm dia. Precast Manholes)</p> <p>Supply and install of 200cm internal diameter precast concrete circular sewer manholes. The manhole should have internal tar-epoxy 2 coats 250µm each coat. benching, pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, work also include supply and installation of heavy duty cast iron cover with frame "supporting ring". The price is to include excavation works, backfilling around the manhole in layers with approved backfill materials, all required accessories and all necessary works to be jointed complete; all above shall be as per drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>Note 1: All Manhole covers should be heavy duty Cast Iron/ 40 tons and all holes of manholes have to be done using core machine.</p> <p>Note 2: All concrete materials which are in contact with sewer shall be sulfate resistance cement.</p> <p>Note 3: For Manhole depth and dimensions shall be as shown in drawings.</p> <p>Note 4: Thickness for precast manhole Base, Walls and Cone shall be min 20cm</p> <p>Note 5: Work also supply and install blinding concrete B150 and base course under and sounding the Manhole, base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent</p>	No.	2		
	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	<p>Electromagnetic Flowmeter (Electromagnetic flow sensor Dn 12")</p> <p>Supply, install and construct Electromagnetic Flowmeter (Electromagnetic flow sensor) for partially filled pipes for wastewater flow Including flanges, gaskets & bolts, complete with Sensors, separate converter/integrator, transmitter, remote indicator, converter installed at panel door or wall next to the main DB, showing both flow rate & volume including all cabling (no joints) and accessories complete as indicated in the drawings and according to ISO 9001 : 2008 and compliance with essential and health safety requirement according to EN 60079-0 :2009, EN 60079-7 :2007, EN 6N 60079-1 :2007, EN 60079-11 :2012, EN 60079-5 :2007 and EN 60079-26 or equivalent. (Eruption Product for Flowmeter is only acceptable) , work also include supply, install, connect, testing and commission complete distribution boards, with (mdb) circuit breakers, isolators, earth leakage C.B, distribution terminal blocks according to local electrical authority and according to drawings, specifications and relevant codes. work also include supply and install of electrical Cables with all required accessories for proper installation and connection. Rate also includes connection with the main power source and (PV). Unit price also include connection the inlet steel pipe of the Electromagnetic flow meter with the nearest existing upstream manhole and the outlet of the Electromagnetic flow meter with the nearest downstream manhole. All as per attached Particular Technical Data sheet. The integrated level sensors in the liner are in no contact with the liquid and are therefore insensitive against fat and oil floating on the surface..</p> <p>Work also includes supply and construct of flowmeter reinforce concrete chamber B300. Rate includes excavation in any material, trimming, backfilling using compacted base course, reinforced concrete structure complete, blinding concrete B150 and base course under and sounding the chamber, all base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes, work also include supply & Install wall mounted sluice gate 400mm opening diameter (round), stainless steel 316 with EPDM sealant & associated operating gear, fittings, suitable for wastewater with extended arm to surface level. as indicated in the drawings, specifications and according to the manufacturer & engineer's instructions.</p> <p>Unit price also include supply and install of cast iron heavy duty with frame and covers , venting pipes, drainage pit, flanges compatible with PVC sewer pipes and all other Accessories required for the connection, steel piping inside the chamber, reinforced concrete support wall B300, laying, jointing, building, testing, structure backfilling, reinstatement and commissioning complete. The work shall be complete according to the drawings and to the technical specifications of the contract and the instruction of the supervising engineer. Chamber should have internal tar-epoxy 2 coats 250µm each coat. pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement with concrete cover not less than 50 mm, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, all as shown in the drawings and approve by the engineer</p>	L.S	1		
	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
4	Miscellaneous Works				
4.1	Concrete Encasement Allow for each and every expense for pipe encasement with concrete B250 (w/c max 45%) for any diameter where the cover above the crown of the pipe is less than 70 cm for diameter less than 150mm and 90cm for diameter ≥ 150mm including all necessary works, complete, all according to tender documents, drawings and as directed by the Engineer/or for water/sewege crossing	M3	5		
4.2	Concrete Reinstatement Allow for each and every expense for 10 cm thickness for reinforced concrete B250(w/c max 45%) including 8mm steel mesh reinforcement and all necessary works, complete and all according to directions of Engineer	M3	5		
4.3	Flow Diversion Contractor shall allow for flow diversion through the construction work, flow diversion shall be executed under the approval of supervisor engineer; contractor shall provide on his own cost all necessary requirements for the flow diversion, such as excavation, backfilling, reinstatement, pipes connection. Pipe crossing, contractor on his own cost shall repair all infrastructure utilities that might be damage through the diversion of flow.	LS	1		
	Sub Total of Miscellaneous Works (USD)				
5	PV Solar System works				
	The system is designed to cover the Design Flow Measurement Systems. The system will be grid interactive connected system, which will allow for many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the batteries when PV generates more than the loads, the batteries can be charged from Grid if PV output is not enough for loads and batteries. • Contractor shall submit shop drawings of all electrical ,civil and solar photovoltaic complete system works,including a single line diagram showing all the components of the PV system, DC and AC distribution boards, PV panels lay out and backup systems and wires cross section for all the system to be approved by the Engineer before executing the work. As well as the catalogs of each component showing the requested specifications stated at the bill of quantity. • As-built drawings shall be submitted after handing over the work. • All junction boxes and DBs will be lockable type. • Upon completion of the installation, the contractor shall organize an on site training program involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates. • The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer				
5.1	PV Modules – 2 KWp: Supply, install, connect and operate Mono Crystalline Photovoltaic Solar Modules with all mounting structure and other material needed to have complete job ready for installing high quality PV modules with total arrays capacity 2 KWp. (Type is European Solar or equivalent), the Item Includes supply, install & connect the following: • Water proof PV junction boxes IP65(combiner) for each array including DC Fuses, DC switch disconnectors, bus bars ,terminals, ducts, supports &labels suitable to the PV arrays loads. • Solar DC cables appropriately sized to connect the PV solar cells together and to the J.B and from J.B to the inverter to have a complete operational circuit with all conduits, clamps , trays and cable end terminations which shall be DC plug and socket connectors . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 3%. • The number of panels based on 250 Wp for each solar panel. The contractor should provide certified panel characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer), maintenance catalogues and manufacturers warrantee for each solar panel for a period not less than 20 years. The Manufacture testing certificate should be provided for the PV panels and the contractor will provide the necessary arrangements for inspecting of the supervision team. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.	LS	1		
5.2	Inverter Supply, install, connect and operate DC/Ac grid tie inverter 3-phase (Inverter power must be sized in accordance with the installation requirements applicable on site) with data communication unit with Ethernet connection. (Type is European or equivalent) with minimum 2 MPP inputs, efficiency 98% and suited to any PV module configuration, the inverter depending on the system design and installation proposed and for the future extended. The DC max power input rating should be equal to the PV modules capacity at standard test condition (STC). The inverter unit shall be suitable for indoor and outdoor installations with IP65.The rated AC output power should be compatible with the AC loads design. The inverter must include the safety concepts such as (triple protection with optiprotect, electronic string fuse, self-learning string failure detection, DC surge arrester) to ensure max availability. The price includes : * Supply ,install and connect Sunny WEBBOX for the PV system installedall compatible with the inverter,Bluetooth &Wireless Technology ,with all data cables and connection needed to complete the job. * Supply ,install and connect all DC cables appropriately sized in accordance with the installation requirements and to connect the inverter with PV system designed with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors and workmanship needed to have a complete job, the allowable voltage drop for DC cables between inverter and PV system less than 3%. The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer), maintenance catalogues and manufacturers warrantee for inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team of the panels before transporting to site. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.	No	1		

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
5.3	<p>Battery Inverter – 2 KW: Supply, install, connect and operate DC/Ac Battery Inverter compatible with on-grid, 1 & 3 phase system and connectable in parallel and modularly extendable. The Battery Inverter must include the following concepts such as (Ac and DC coupling, High efficiency, intelligent battery management for maximum battery life, charge level calculation, extreme overload capability, and battery temperature sensing and battery current measurements).The rated AC output power should be compatible with the AC loads design, and the maximum input AC power from the grid . The price includes:</p> <p>* Supply ,install and connect Remote Control Unit for the PV system installedall with all data cables and connection needed to complete the job.</p> <p>*Supply ,install and connect DC cables appropriately sized in accordance with the installation requirements to connect the Backup unit with DC battery fuses box with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors and workmanship needed to have a complete job, the allowable voltage drop for DC cables between battery inverter and batteries less than 3%.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for each inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team of the panels before transporting to the site All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction’s and approval.</p>	No	1		
5.4	<p>Battery Bank: Supply, install, connect and operate (VRLA) or (AGM) deep cycle Batteries with a 12-volt dc, the total capacity of battery bank must include 60 % DOD @ C10. The battery bank voltage is 48 Vdc. (Type is European or equivalent).The battery must provide high-quality and achieving superior performance, the manufacturing date must be new and not more than 6 months, suitable for every type of applications specially for solar renewable energy, designed Service Life 10 years with low internal resistance, designed to be deeply discharged and recharged hundreds of times. The Battery should provide benefits of being maintenance free, case flame retardant & non-hazardous. The Item Includes supply, install &connect the following:</p> <p>• All necessary DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 3%.</p> <p>• Battery mounting structure from hot galvanized steel stand with shelves and dividers for hosting the batteries and all other material needed to have a complete job ready .</p> <p>• Complete earth system for neutrals including (electrodes 15mm2, manhole with iron cover, earth joints, clamps, conduits and 50 mm2 flexible copper wire from the neutral bus bar in the battery fuse box to the electrode. All precaution to have the resistance < 2Ω.</p> <p>• The number of batteries based on 210 amp-hours of capacity for each one.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for each inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction’s and approval.</p>	No	1		
5.5	<p>PV Mounting structure: Supply and install Module mounting structure from hot galvanized steel foundation profile suitable to the dimension of selected PV modules and PV numbers, the mounting provides a fixed inclination of the modules from 30 degree to 32 degree with vertical supports, plates, screws and casting, unit price also include excavation in any type of soil for reinforce concrete foundations B250 (3.0x2.2x0.4) m3 for the PV panels, the structure profile includes bracing and double hot galvanized angles for dividers. The mounting structure components are bonded together to guarantee potential equalization. The price includes supply and install a complete earth system (electrodes 15mm2, manhole with iron cover, earth joints, clamps and 25 mm2 flexible copper cable from the structure to the electrode, all necessary copper wires to connect arrays and modules in one loop for earthen. All precaution to have the resistance < 2Ω. Work also include supplying erection and anchoring Galvanized fence around the PV Panels including the ceiling, and painting two coats according to the instructions of the supervisor engineer and the technical specifications. Unit rate also include Supplying, erection and anchoring gate of Galvanized fence for the area of the PV Panels. Price also includes removal of the unwanted relevant materials to dump site approved by the engineer. Exact location of the PV panels will be decided on site, all according to the drawings and engineer approval .</p>	L.S.	1		

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #1

Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
5.6	<p>Battery Fuse Box: Supply, install, connect and operate battery DC fuse box (500*375*225 mm) as an external DC distributor to protect the battery connections of the inverters .Type is (SMA or equivalent), the box must be water proof protection with IP65, simple wall mounting, suitable connections for three battery inverters and up to six DC connections inlet on the battery side, the item includes (2 LTL 250/400A , 6 fuses 250A , cable glands, with all necessary DC cables from the battery bank and to the fuse box and from the fuse box to the battery inverters to have a complete operational circuit with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 3%.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for battery fuse box for a period not less than 3 years. The Manufacture testing certificate should be provided also. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction’s and approval.</p>	No	1		
5.7	<p>3-Phase Digital KWH Meter: Supply, install,connect and operate 2-phase digital KWH meter, with all other material needed to have a complete job ,The kWh meter has a digital interface for monitoring by the Remote Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction’s and approval.</p>	No	1		
	Sub Total of PV System Works (USD)				
1	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Collection Network(USD)				
2	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				
4	Sub Total of Miscellaneous Works (USD)				
	Sub Total of PV System Works (USD)				
	Total of Bill # 03: Wadi Beit Jala Beit Jala and some parts of Bethlehem City (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #2

Bill # 04: Wadi Suriq Outlet of Ramallah WWTP

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
1	Earth works, Supply and Installation of Sttel and UPVC Pipes for Sewer Connection				
1.1	<p>Supply and install steel pipes Dn 12" 3.96 mm (5/32") wall thickness steel pipes according to P.S No.186 or equivalent, grade B welded end with internal colloidal concrete lining 6mm thickness (sulfate resistance cement) according to PS 325 part 1 and external polyethylene coating with minimum thickness of 1.8 mm according to P.S No.325 part 6 wrapping applied by the extrusion method. Pipe shall be for sewer use and must be medium series, length of each pipe 12.2 m, and (Stamp with Palestinian supervision or quality marked or equivalent) on each pipe for the production of the pipe itself. Unit price also include supply and install all required fittings to complete the connection of the proposed pipe Dn 10" with the existing sewer PVC pipeline/or existing</p> <p>Trench excavation in soil or rock for pipes, removing surplus excavation material from the site, providing soft backfilling, laying of pipes, proper jointing, underground supporting and hanging the existing utilities which will face the contractor during excavation and the backfilling with base course, leveling, compaction in layers, cutting asphalt if any in suitable width using machine, reinstatement to original conditions, cleaning, testing...etc and all other necessary works to be jointed complete, all above should be according to the drawings, specification, standards and under the supervision and direction of the Engineer. For uPVC pipes SN8 for the trench excavation widths and excavation variable depths as shown in drawings</p> <p>1- Excavation shall cover clearing, grubbing of top soil , trimming bottoms and sides of trench to the depths and widths shown on drawings, removal and disposal of all excess material to locations acceptable to the Engineer, Client representatives and Municipality</p> <p>2-Soft Backfilling sand (equivalent min 50%) shall cover supplying and backfilling (surrounding the pipe) by using sand . This sand (equivalent min 50%) bedding material shall be placed 150 mm below the invert level up to 200 mm over the crown of the pipe and for the full width of the trench. The work shall be completed according to the drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>3- Supplying and installing of Metallic green warning tape marked "Sewer " or ' Sewer Pipe" the warning tape shall be made of solid aluminum foil visible on unprinted side encase in portative high visibility, inert polyethylene plastic jacket or tape with integrated copper wires encased in portative high visibility, inert polyethylene plastic jacket, foil thickness min 0.14mm (5.5 mils) Width 200mm. Identifying lettering min 25mm high permanent black lettering imprinted continuously over entire length. Joining clips coated and furnished by tape manufacture.</p> <p>4-Final Backfilling and Reinstatement shall cover backfilling and reinstating of the excavated trench by supplying Base course material for the rest of the trench, all backfill materials shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes supply and installation of the reinstatement materials depending on the original existing surface depending on situation . All works should be completed according to the contract drawings, specifications and Engineer's approval.</p> <p>5- Rate price to include all necessary cleaning, washing and testing (leakage test, strength...etc) according to specification, standards and directions of Engineer.</p> <p>6-The contractor has to submit shop drawing for all works to be approved by the Engineer before starting any activity.</p> <p>7- The contractor has to fix and repair any damage to underground utilities that may be caused during work implementation</p> <p>8- Length of installed pipes will be measured between the internal two wall faces of the two adjacent manholes.</p>	L.M	30		
	Ditto but Supply and install 315mm diameter UPVC sewer pipes SN8 with wall thickness (9.3mm) "Palestinian supervision mark or Palestinian quality mark or equivalent" and according to PS 9-2011 or ISO 4435 (2003) or equivalent including all necessary fittings, rubber rings, adhesive material, any other accessories...etc, price includes but not limited to the followings	L.M	65		
	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Pipe(USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #2

Bill # 04: Wadi Suriq Outlet of Ramallah WWTP

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
2	<p>Supply & Installation of Sewer Manholes (200 cm dia. Precast Manholes)</p> <p>Supply and install of 200cm internal diameter precast concrete circular sewer manholes. The manhole should have internal tar-epoxy 2 coats 250µm each coat. benching, pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, work also include supply and installation of heavy duty cast iron cover with frame "supporting ring". The price is to include excavation works, backfilling around the manhole in layers with approved backfill materials, all required accessories and all necessary works to be jointed complete; all above shall be as per drawings, specifications and up to the satisfaction of and as directed by the Engineer.</p> <p>Note 1: All Manhole covers should be heavy duty Cast Iron/ 40 tons and all holes of manholes have to be done using core machine.</p> <p>Note 2: All concrete materials which are in contact with sewer shall be sulfate resistance cement.</p> <p>Note 3: For Manhole depth and dimensions shall be as shown in drawings.</p> <p>Note 4: Thickness for precast manhole Base, Walls and Cone shall be min 20cm</p> <p>Note 5: Work also supply and install blinding concrete B150 and base course under and sounding the Manhole, base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent</p>	No.	2		
	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	<p>Electromagnetic Flowmeter (Electromagnetic flow sensor Dn 12")</p> <p>Supply, install and construct Electromagnetic Flowmeter (Electromagnetic flow sensor) for partially filled pipes for wastewater flow Including flanges, gaskets & bolts, complete with Sensors, separate converter/integrator, transmitter, remote indicator, converter installed at panel door or wall next to the main DB, showing both flow rate & volume including all cabling (no joints) and accessories complete as indicated in the drawings and according to ISO 9001 : 2008 and compliance with essential and health safety requirement according to EN 60079-0 :2009, EN 60079-7 :2007, EN 6N 60079-1 :2007, EN 60079-11 :2012, EN 60079-5 :2007 and EN 60079-26 or equivalent. (Eruption Product for Flowmeter is only acceptable) , work also include supply, install, connect, testing and commission complete distribution boards, with (mdb) circuit breakers, isolators, earth leakage C.B, distribution terminal blocks according to local electrical authority and according to drawings, specifications and relevant codes. work also include supply and install of electrical Cables with all required accessories for proper installation and connection. Rate also includes connection with the main power source and (PV). Unit price also include connection the inlet steel pipe of the Electromagnetic flow meter with the nearest existing upstream manhole and the outlet of the Electromagnetic flow meter with the nearest downstream manhole. All as per attached Particular Technical Data sheet. The integrated level sensors in the liner are in no contact with the liquid and are therefore insensitive against fat and oil floating on the surface.</p> <p>Work also includes supply and construct of flowmeter reinforce concrete chamber B300. Rate includes excavation in any material, trimming, backfilling using compacted base course, reinforced concrete structure complete, blinding concrete B150 and base course under and sounding the chamber, all base course shall be compacted in layers not more than 20 cm thickness to reach 95% of the maximum density with optimum moisture according to modified AASHTO T-180, and AASHTO T-191 or equivalent. Compaction tests and grain size analysis must be carried out according to PWA specifications by the contractor and at his own expense also rate includes, work also include supply & Install wall mounted sluice gate 400mm opening diameter (round), stainless steel 316 with EPDM sealant & associated operating gear, fittings, suitable for wastewater with extended arm to surface level. as indicated in the drawings, specifications and according to the manufacturer & engineer's instructions.</p> <p>Unit price also include supply and install of cast iron heavy duty with frame and covers , venting pipes, drainage pit, flanges compatible with PVC sewer pipes and all other Accessories required for the connection, steel piping inside the chamber, reinforced concrete support wall B300, laying, jointing, building, testing, structure backfilling, reinstatement and commissioning complete. The work shall be complete according to the drawings and to the technical specifications of the contract and the instruction of the supervising engineer. Chamber should have internal tar-epoxy 2 coats 250µm each coat. pointing, heavy duty iron steps coated with rubber , proper pipe connections as required, and should be of sulfate resistance cement with concrete cover not less than 50 mm, damp proofing and cold bituminous external protection(min. thickness 1000µm), blinding, all as shown in the drawings and approve by the engineer</p>	L.S	1		
	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #2

Bill # 04: Wadi Suriq Outlet of Ramallah WWTP

Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
4	Miscellaneous Works				
4.1	Concrete Encasement Allow for each and every expense for pipe encasement with concrete B250 (w/c max 45%) for any diameter where the cover above the crown of the pipe is less than 70 cm for diameter less than 150mm and 90cm for diameter ≥ 150mm including all necessary works, complete, all according to tender documents, drawings and as directed by the Engineer/or for water/sewege crossing	M3	5		
4.2	Concrete Reinstatement Allow for each and every expense for 10 cm thickness for reinforced concrete B250(w/c max 45%) including 8mm steel mesh reinforcement and all necessary works, complete and all according to directions of Engineer	M3	5		
4.3	Flow Diversion Contractor shall allow for flow diversion through the construction work, flow diversion shall be executed under the approval of supervisor engineer; contractor shall provide on his own cost all necessary requirements for the flow diversion, such as excavation, backfilling, reinstatement, pipes connection. Pipe crossing, contractor on his own cost shall repair all infrastructure utilities that might be damage through the diversion of flow.	LS	1		
	Sub Total of Miscellaneous Works (USD)				
5	PV Solar System works				
	The system is designed to cover the Design Flow Measurement Systems. The system will be grid interactive connected system, which will allow for many power sources options. The system will import from the grid when loads are being more than the generated from PV and supply surplus electricity to the batteries when PV generates more than the loads, the batteries can be charged from Grid if PV output is not enough for loads and batteries. • Contractor shall submit shop drawings of all electrical ,civil and solar photovoltaic complete system works,including a single line diagram showing all the components of the PV system, DC and AC distribution boards, PV panels lay out and backup systems and wires cross section for all the system to be approved by the Engineer before executing the work. As well as the catalogs of each component showing the requested specifications stated at the bill of quantity. • As-built drawings shall be submitted after handing over the work. • All junction boxes and DBs will be lockable type. • Upon completion of the installation, the contractor shall organize an on site training program involving nominated employer's staff. Such a program shall be carried out during the commissioning phase. The cost of the training shall be deemed to have been included in the tendered rates. • The price includes all builders' works, making good and reinstatement including necessary materials and workmanship as well as removal of unwanted materials to dump sites approved by the engineer.				
5.1	PV Modules – 2 KWp: Supply, install, connect and operate Mono Crystalline Photovoltaic Solar Modules with all mounting structure and other material needed to have complete job ready for installing high quality PV modules with total arrays capacity 2 KWp. (Type is European Solar or equivalent), the Item Includes supply, install & connect the following: • Water proof PV junction boxes IP65(combiner) for each array including DC Fuses, DC switch disconnectors, bus bars ,terminals, ducts, supports &labels suitable to the PV arrays loads. • Solar DC cables appropriately sized to connect the PV solar cells together and to the J.B and from J.B to the inverter to have a complete operational circuit with all conduits, clamps , trays and cable end terminations which shall be DC plug and socket connectors . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 3%. • The number of panels based on 250 Wp for each solar panel. The contractor should provide certified panel characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer), maintenance catalogues and manufacturers warrantee for each solar panel for a period not less than 20 years. The Manufacture testing certificate should be provided for the PV panels and the contractor will provide the necessary arrangements for inspecting of the supervision team. All works and materials must be according to the drawings, specifications and supervisor engineer instruction's and approval.	LS	1		
5.2	Inverter Supply, install, connect and operate DC/Ac grid tie inverter 3-phase (Inverter power must be sized in accordance with the installation requirements applicable on site) with data communication unit with Ethernet connection. (Type is European or equivalent) with minimum 2 MPP inputs, efficiency 98% and suited to any PV module configuration, the inverter depending on the system design and installation proposed and for the future extended. The DC max power input rating should be equal to the PV modules capacity at standard test condition (STC). The inverter unit shall be suitable for indoor and outdoor installations with IP65.The rated AC output power should be compatible with the AC loads design. The inverter must include the safety concepts such as (triple protection with optiprotect, electronic string fuse, self-learning string failure detection, DC surge arrester) to ensure max availability. The price includes : * Supply ,install and connect Sunny WEBBOX for the PV system installedall compatible with the inverter,Bluetooth &Wireless Technology ,with all data cables and connection needed to complete the job.	No	1		

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Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
	<p>* Supply ,install and connect all DC cables appropriately sized in accordance with the installation requirements and to connect the inverter with PV system designed with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors and workmanship needed to have a complete job, the allowable voltage drop for DC cables between inverter and PV system less than 3%.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer), maintenance catalogues and manufacturers warrantee for inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team of the panels before transporting to site. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>				
5.3	<p>Battery Inverter – 2 KW:</p> <p>Supply, install, connect and operate DC/Ac Battery Inverter compatible with on-grid, 1 & 3 phase system and connectable in parallel and modularly extendable. (Type is European or equivalent). The Battery Inverter must include the following concepts such as (Ac and DC coupling, High efficiency, intelligent battery management for maximum battery life, charge level calculation, extreme overload capability, and battery temperature sensing and battery current measurements).The rated AC output power should be compatible with the AC loads design, and the maximum input AC power from the grid . The price includes:</p> <p>* Supply ,install and connect Remote Control Unit for the PV system installedall with all data cables and connection needed to complete the job.</p> <p>*Supply ,install and connect DC cables appropriately sized in accordance with the installation requirements to connect the Backup unit with DC battery fuses box with all conduits, clamps, trays and cable terminations end which shall be DC plug and socket connectors and workmanship needed to have a complete job, the allowable voltage drop for DC cables between battery inverter and batteries less than 3%.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for each inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team of the panels before transporting to the site All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	1		
5.4	<p>Battery Bank:</p> <p>Supply, install, connect and operate (VRLA) or (AGM) deep cycle Batteries with a 12-volt dc, the total capacity of battery bank must include 60 % DOD @ C10. The battery bank voltage is 48 Vdc. (Type is European or equivalent).The battery must provide high-quality and achieving superior performance, the manufacturing date must be new and not more than 6 months, suitable for every type of applications specially for solar renewable energy, designed Service Life 10 years with low internal resistance, designed to be deeply discharged and recharged hundreds of times. The Battery should provide benefits of being maintenance free, case flame retardant & non-hazardous. The Item Includes supply, install &connect the following:</p> <p>• All necessary DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 3%.</p> <p>• Battery mounting structure from hot galvanized steel stand with shelves and dividers for hosting the batteries and all other material needed to have a complete job ready .</p> <p>• Complete earth system for neutrals including (electrodes 15mm2, manhole with iron cover, earth joints, clamps, conduits and 50 mm2 flexible copper wire from the neutral bus bar in the battery fuse box to the electrode. All precaution to have the resistance < 2Ω.</p> <p>• The number of batteries based on 210 amp-hours of capacity for each one.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for each inverter for a period not less than 10 years. The Manufacture testing certificate should be provided for the inverter and the contractor will provide the necessary arrangements for inspecting of the supervision team. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	1		
5.5	<p>PV Mounting structure:</p> <p>Supply and install Module mounting structure from hot galvanized steel foundation profile suitable to the dimension of selected PV modules and PV numbers, the mounting provides a fixed inclination of the modules from 30 degree to 32 degree with vertical supports, plates, screws and casting, unit price also include excavation in any type of soil for reinforce concrete foundations B250 (3.0x2.2x0.4) m3 for the PV panels, the structure profile includes bracing and double hot galvanized angles for dividers. The mounting structure components are bonded together to guarantee potential equalization. The price includes supply and install a complete earth system (electrodes 15mm2, manhole with iron cover, earth joints, clamps and 25 mm2 flexible copper cable from the structure to the electrode, all necessary copper wires to connect arrays and modules in one loop for earthen. All precaution to have the resistance < 2Ω. Work also include supplying erection and anchoring Galvanized fence around the PV Panels including the ceiling, and painting two coats according to the instructions of the supervisor engineer and the technical specifications. Unit rate also include Supplying, erection and anchoring gate of Galvanized fence for the area of the PV Panels. Price also includes removal of the unwanted relevant materials to dump site approved by the engineer. Exact location of the PV panels will be decided on site, all according to the drawings and engineer approval</p>	L.s	1		

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams - Lot #2

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Item No.	Description	Unit	Qty.	Unit Rate (USD)	Amount (USD)
5.6	<p>Battery Fuse Box:</p> <p>Supply, install, connect and operate battery DC fuse box (500*375*225 mm) as an external DC distributor to protect the battery connections of the inverters . The box must be water proof protection with IP65, simple wall mounting, suitable connections for three battery inverters and up to six DC connections inlet on the battery side, the item includes (2 LTL 250/400A , 6 fuses 250A , cable glands, with all necessary DC cables from the battery bank and to the fuse box and from the fuse box to the battery inverters to have a complete operational circuit with all conduits, clamps, stainless steel bolts, washers and cable end terminations needed to fix, all DC cables must be sized in accordance with the installation requirements applicable on site ,the allowable voltage drop must be less than 3%.</p> <p>The contractor should provide certified characteristics, shop test performance curves, spare parts regular (as recommended by manufacturer , maintenance catalogues and manufacturers warrantee for battery fuse box for a period not less than 3 years. The Manufacture testing certificate should be provided also. All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	1		
5.7	<p>3-Phase Digital KWH Meter:</p> <p>Supply, install,connect and operate 2-phase digital KWH meter, with all other material needed to have a complete job ,The kWh meter has a digital interface for monitoring by the Remote Monitoring System .All works and materials must be according to the drawings, catalogues, specifications and supervisor engineer instruction's and approval.</p>	No	1		
	Sub Total of PV System Works (USD)				
1	Sub-Total of Earth works, Supply and Installation of UPVC Pipes for Sewer Collection Network(USD)				
2	Sub-Total of Supply & Installation of Sewer Manholes (USD)				
3	Sub Total of Electromagnetic Flowmeter (Electromagnetic flow sensor) (USD)				
4	Sub Total of Miscellaneous Works (USD)				
	Sub Total of PV System Works (USD)				
	Total of Bill # 04: Wadi Suriq Outlet of Ramallah WWTP (USD)				

Construction of Flow Measurement Systems for Trans-Boundary Wastewater Streams

	Final Summary of Bill of Quantity	
Lot No. 1	Description	Amount (USD)
Bill No. 0	Total of Bill No. 0:	
Bill No. 1	Total of Bill No. 1:	
Bill No. 2	Total of Bill No. 2:	
Bill No. 3	Total of Bill No. 3:	
Total of Lot No. 1		
Lot No. 2	Description	Amount (USD)
Bill No. 4	Total of Bill No.4:	
Total of Lot No. 2		
Grand Total of Lot No. 1 and Lot No. 2		

The sum of _____ USD

Contractor: _____

Signature with stamp _____

Date _____