PROJECT:

PR 4924927

MRU SEPTIC BIODIGESTER PURCHASE AND INSTALLATION

BILLS OF QUANTITIES

CLIENT: **THE CONTRACTING OFFICER**
US EMBASSY IN NAIROBI
P.O. BOX 606,00621
NAIROBI

APRIL,2016

PR 4924927 MRU SEPTIC BIODIGESTER PURCHASE AND INSTALLATION

BILLS OF QUANTITIES

1.		- INDEX	(i)
2.		- SPECIAL NOTES PAGE	(ii)
3.		- FORM OF TENDER	FT/1 - FT/2
4.		- CONDITIONS OF TENDERING	CT/1 - CT/2
5.		- PREAMBLES AND PRICING NOTES	PR/1 – PR/4
6.	BILL NO. 1	- BIODIGESTER	BD/7
13		- GRAND SUMMARY	GS/1

Index Page

SPECIAL NOTES

1. The Contractor is required to check the numbers of the pages of these Bills of Quantities against the contents stated on page (i) and should he find any missing, in duplicate or indistinct, he must inform the Contracting officer at once and have the same rectified.

2. Should the Contractor be in doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform the Contracting Officer in order that the correct meaning may be decided before the date for submission of tenders.

3. No liability will be admitted or claim allowed in respect of errors in the Contractor's tender due to mistakes in the Bills of Quantities which should have been rectified in the manner described above.

4. The accurate ordering of materials is the sole responsibility of the contractor in accordance with the final drawings and the instructions from the Project Manager. No claim for any loss or expense will be entertained for orders for materials based upon Bills of Quantities.

5. The Bills of Quantities shall be priced in US Dollars.

6. These Bills of Quantities shall be treated as an addendum to the Solicitation Document and where any of the conditions or instructions in these Bills of Quantities contradict any other conditions in the Solicitation Document, the conditions in the Solicitation Document shall override.

7. The Contractor shall clearly demonstrate how they intend to deliver the component of Civil and Builder's Works for this project.

8. Expenses incurred in preparation of this tender shall not be reimbursed.

CONDITIONS OF TENDERING

1. Tenders shall be submitted as directed in the Solicitation Documents supplied:
2. The Documents in this Bills of Quantities are as follows

   (a) Bills of Quantities
   (b) Grand Summary

3. The word "tenderer" in these conditions shall be deemed to include two or more persons. The word "his" may also mean "their" and the word "he" may also mean "they".

PREAMBLES AND PRICING NOTES

PREAMBLES AND PRICING NOTES

GENERAL SPECIFICATION

The works under this contract shall be carried out in accordance with the Ministry of works General Specification 1976 Edition.

MANUFACTURER'S NAME and references are given as a guide to quality. Alternative manufacture of equal quality will be accepted at the discretion of the Architect.

EXCAVATION

Prices are to include for excavating in all materials met with except Rock as specified. Prices are also to include for planking and strutting, and for destroying all white ants nests and keeping excavations free from water.

Insecticide Treatment

Treating surface of hardcore with approved insecticide shall include execution by any reputable supplier/manufacturer who shall give a ten year guarantee to the Employer.

CONCRETE WORK

Test Cubes

Allowance must be included in the tender for the preparation of concrete test cubes as required by the Engineer.

Precast Concrete Works

Prices are to include for handling reinforcement, and for bedding in cement mortar.

WALLING

ConcreteBlocks

All concrete walling blocks are to be in metric sizes and to the specified quantities.

Wall reinforcement shall be hoop iron, one layer per 90mm thickness, and placed in the bed joint of alternate courses.

Samples

Prices are to include for packing and sending sample blocks to the approved Testing Laboratory

PREAMBLES AND PRICING NOTES (CONTD.)

ROOFING

All roof materials shall be specified in the Bills of Quantities, and laid in accordance with the manufacturer's instructions.

CARPENTRY AND JOINERY

Cypress

The grading rules for cypress shall be the same as those for podocarpus.

Laminated Plastic Sheeting

Shall be fixed with an approved waterproof adhesive.

Prices of joinery

Shall include for pencil rounded arises; for protection against damage and for bedding frames and cills in cement mortar.

Plugged shall mean drilling walling or concrete with a drill and filling with proprietary plugs of the correct size

IRONMONGERY

Shall be as specified in the Bills of Quantities, or equal and approved.

Prices must include for removing and refixing during and after painting, for labelling all keys, and for fixing with matching screws.

METAL WORK

Generally

All steel work shall be cleaned free from rust and priced one coat or red lead primer before being delivered to the site.

Prices for Metal Windows

To include for assembling parts, bedding and pointing in mastic, building in fixing lugs, and plugging as necessary.

PREAMBLES AND PRICING NOTES (CONTD.)

PLASTERWORK AND OTHER FINISHES

Generally

All plaster work and paving to be as described in the Specifications and in the Bills of Quantities

Pavings

Prices are to include for brushing concrete clean, wetting and coating with cement and sand grout (1:1).

GLAZING

Polished Plate Glass

Shall be general Glazing Quality

Prime Rebates

Prices are to include for priming rebates before placing putty

Broken or Scratched Glass

The contractor will be responsible at his own cost, for replacing any broken or scatched glass and handing over in perfect condition.

PAINTING

Generally

Note that the General Contractor is to provide scaffolding for all trades including painting.

Paint category

Painting shall be applied in accordance with the manufacturer's instructions and to the required coats.

Prices

Prices are to include for all preparatory work, priming coats and for protecting other works and for cleaning up on completion. Prices for painting on galvanised metal are to include for mordant solution as necessary.

PREAMBLES AND PRICING NOTES (CONTD.)

PLUMBING AND ENGINEERING INSTALLATION INCLUDING SOLAR PANELS

Generally

All work shall be executed by an approved specialist and the General Contractor shall first obtain written approval from the Architect before engaging the specialist.

Description

The sizes given are internal diameter. the words 'pipe' and 'tube' are synonymous.

Prices of Sanitary Fittings

To include for assembling and jointing parts, plugging as necessary, and all joints to services and wastes or soil pipes.

ROADS AND CAR PARKS

All work must be supervised by an experienced Road Engineer of Foreman.

B I L L N O. 1

B I O D I G E S T E R

BIODIGESTER					
Item	**Description**	**Qty**	**Unit**	**Rate (USD)**	**Amount (USD)**
	Supply and install biodigester waste treatment system complete with the following items to the satisfaction of the Engineer. The system is expected to treat approximately 13,300 gallons per day(50 cubic metres per day) or 200 persons whichever is higher. The tenderer to submit the technical brochures and working calculations together with the tender for evaluation. Alternative and approved systems utilising packaged systems may be provided.				
I	**Biodigester unit** The principal items of equipment shall include interconnecting liners with leg attachments, airlifts, hoses, biosolids collection manifold, sludge pump, screens, blower assembly, and control panel among others as listed and any other neccesary equipment.				
A	**Prescreening device** Prescreening device before Aeration stage .The prescreening device is to provide for separation of non biological solids and grit	1	Item		
B	**Blower** The blower shall be capable of delivering 300 to 500 CFM [210 - 850 m3/hr]. The blower assembly shall include an inlet filter with metal filter element. The blower shall be mounted outside the tank adjacent to the Treatment Zone on a contractor supplied concrete base. The blower elevation must be higher than the water level in the tank and above any normal floodlevel. A two-piece, blower housing shall be provided with tamper-proof screws. Blower piping to the tank shall use non-corrosive material (Galvanized or Stainless Steel).	1	Item		
C	**Control Panel** The standard control panel provides power to the blower with an alarm system consisting of a visual and audible alarm capable of signaling blower circuit failure. A manual silence button should be included.	1	Item		
D	**Chlorine Dosage System** Allow for chlorine dosage sytem including the dosing controller,dosing pump and chlorine reserve tank.Allow for all the neccesary interconnections,overdosage and underdosage controls neccesary and electrical wiring and installations proprietary to.	1	Item		
Total Carried to Collection Page					

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
A	**Associated Electrical works** All wiring must conform to code and provide the specified power to the blower. Input power on 50Hzelectrical systems 220/400 VAC, three phase 60/35 FLA. All conduit and wiring required on the project shall be supplied . The standard control panel shall utilize motor starters and overloads to be housed in an approved enclosure. The control panel shall be equipped with a visual and audible alarm to indicate loss of power to the blower. A manual silence switch is to be included	1	Item		
B	**Vent** Covered area should vent to desired location.The cover opening should have a vent grate with at least 60 sq in. [390 sq. cm] open surface area. The grating shall be secured with Stainless Steel screws.Vent piping must not allow condensate build up or create back pressure. Vent must be above finished grade or higher.	1	Item		
C	**Biosolids collection assembly** A Biosolids Collection Assembly shall be located underneath the liners. The collection assembly consisting of; a collection grid, (trunk line, valves, five lateral lines with engineered orifices), biosolids manifold, and biosolids pump. The contractor shall also supply piping to connect the grid to the biosolids pump and to construct the manifold. A field adjustable event timer will control the duration and frequency of the biosolids wasting from the Treatment Zone. The biosolids collection system should be reversible to facilitate back flush operations.	1	Item		
D	**Media** The media shall be manufactured of rigid PVC, polyethylene, or polypropylene and it shall be supported by the polyethylene insert. The media shall be fixed in position and contain no moving or wearing parts and shall not corrode. The media shall be designed and installed to ensure that sloughed solids descend through the media to the bottom of the tank.	1	Item		
E	**Piping Connections** Each system should have six (6) inch gasketed effluent connections. Each effluent connection has a maximum unrestricted flow of 250 US GPM (945 LPM with a 2.0 design safety.factor. The systems should have been receive gravity and demand-based influent flow. When influent flow is controlled by pump or other means to help with highly variable flow conditions, then multiple dosing events should be used to maximize performance.	1	Item		
Total Carried to Collection Page					

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
II	**Aeration Management Systems(AMS)** The system shall provide mixing to reduce primary sludge settling prior to the Treatment Zone. The contractor shall furnish and install aeration system in the				
A	**Aerator** Aerator shall be made of rigid PVC and ABS or equivalent.The aerator shall be fixed in position anchored by non corrosive fasteners and contain no moving or wearing parts and shall not corrode.	1	Item		
B	**Blower** The system shall come equipped with a regenerative type blower capable of delivering at least 20-50 CFM [34-85 m3/hr]. The blower assembly shall include an inlet filter with metal filter element. The blower shall be secured on the walkway or perimeter of tank on a base. The blower must not set in standing water and its elevation must be higher than the normal flood level and the tank's operating level. A two-piece, blower housing shall be provided. The discharge air line from the blower to the BMZ shall be provided and installed.	1	Item		
C	**Associated Electrical works** All wiring must conform to code and provide the specified power to the blower and chlorination pumps.	1	Item		
D	**Control Panel** The standard control panel provides power to the blower with an alarm system consisting of a visual and audible alarm capable of signaling blower circuit failure. A manual silence button should be included.	1	Item		
E	**Vent** Covered BMS Zone should vent to desired location.The cover opening should have a vent grate with at least 7 sq in. [45 sq. cm] open surface area. The grating shall be secured with Stainless Steel screws.Vent piping must not allow condensate build up or create back pressure. Vent must be above finished grade or higher.	1	Item		
Total Carried to Collection Page					

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
III	**Biosolids Management Systems** The system shall provide oxygen and mixing to reduce biosolids quantity prior to final disposal. The contractor shall furnish and install the neccesary equipment including:				
A	**Aerator** Aerator shall be made of rigid PVC and ABS or equivalent.The aerator shall be fixed in position anchored by non corrosive fasteners and contain no moving or wearing parts and shall not corrode.	1	Item		
B	**Blower** The system shall come equipped with a regenerative type blower capable of delivering at least 20-50 CFM [34-85 m3/hr]. The blower assembly shall include an inlet filter with metal filter element. The blower shall be secured on the walkway or perimeter of tank on a base. The blower must not set in standing water and its elevation must be higher than the normal flood level and the tank's operating level. A two-piece, blower housing shall be provided. The discharge air line from the blower to the BMZ shall be provided and installed.	1	Item		
C	**Associated Electrical works** All wiring must conform to code and provide the specified power to the blower.	1	Item		
D	**Control Panel** The standard control panel provides power to the blower with an alarm system consisting of a visual and audible alarm capable of signaling blower circuit failure. A manual silence button should be included.	1	Item		
E	**Vent** Covered BMS Zone should vent to desired location.The cover opening should have a vent grate with at least 7 sq in. [45 sq. cm] open surface area. The grating shall be secured with Stainless Steel screws.Vent piping must not allow condensate build up or create back pressure. Vent must be above finished grade or higher.	1	Item		
F	**Power Supply** Design cable sizing and install to the satisfaction of the Project Manager, power supply in armoured cable from the Main Distribution Board to the the equipments complete including all excavations, disturbance to road and paved surfaces, conduiting in 100mm uPVC and encasing in 100mm mass concrete surround circa distance of 100 metres all to IEEE Standards.	1	Item		
Total Carried to Collection Page					

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
	Decant pump				
A	A decant pump is to provided for pumping the supernatant from the Biosolids Zone to the Treatment Zone.The standard decant pump will be controlled by a manual start/stop controller.The standard 50 Hz decant pump shall be capable of pumping 300 to 400 Lpm at 3m of total dynamic head. Input power on 50Hz electrical system is three phase.Allow for all conduiting and wiring.	1	No		
	Jib crane				
B	The jib crane is provided for adjusting the height of the decant pump.The jib crane is designed to handle a lifting capacity of 500 Lbs. and a lifting range of 160 inches [305cm].	1	Item		
C	Testing and commissioning of the system to the satisafaction of the engineer	1	Item		
D	Calculations and working drawings As-	1	Item		
E	built drawings	1	Item		
	Any other item neccesary for the functioning of the system				
	REACTOR TANK				
F	Allow for exhausting and demolition of existing septic tank including cart away debris	1	Item		
	Excavations				
G	Excavate pit exceeding 1.50m deep starting from ground level	105	cm		
H	Excavate pit exceeding 1.50m deep but not exceeding 3.0m deep starting from reduced level	105	cm		
I	Extra over excavations for excavating in hardrock	110	cm		
J	Return fill and ram approved excavated material around foundations	85	cm		
K	Load and cart away surplus excavated material	125	cm		
L	Allow for keeping the whole excavation free from all water including spring and running water		Item		
M	Allow for plunking and strutting the whole excavation		Item		
	Mass concrete class 'P' in:				
N	50mm thick blinding under foundations	45	sm		
	Total Carried to Collection Page				

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
	Reinforced insitu concrete class 25/(20mm aggregate)				
A	200mm thick floor bed	45	sm		
B	200mm thick wall	127	sm		
C	200mm thick suspended slab	45	sm		
D	Strip foundation	1	cm		
	Square twisted high tensile bars to B.S.4461				
E F	Assorted reinforcement	5000	kg		
	Fabric mesh reinforcement to B.S. 4483 ref A142 weighing 2.22kg/m² (measured net-no allowance made for laps)	45	sm		
G	**Sawn formwork to:**				
H I	Soffites of suspended slab	45	sm		
	Sides walls	254	sm		
J	Edge of bed between 150 - 225mm wide	52	lm		
K L	**Water proof cement/sand (1:3) in:**				
M	20mm thick screed to sloping floor bed cross falls	45	sm		
	20mm thick screed trowelled hard and smooth	45	sm		
N	20mm thick render to walls	254	sm		
O	20mm thick render to soffites	45	sm		
	Sundries				
P	Form or leave 100mm diameter hole in 200mm thick reinforced concrete wall and slab	20	no		
Q	Form or leave 600 x 600mm hole in 200mm thick reinforced concrete suspended slab	9	no		
R	600 x 600mm heavy duty double sel manhole cover and frame including setting cover in concrete opening and forming rebate	9	no		
	20mm diameter galvanised mild steel step iron 450mm long twice bent and with both ends built 75mm deep into concrete wall	15	no		
	200mm galvanised mild steel water bar on construction joints	52	lm		
	Total Carried to Collection Page				

Item	Description	Qty	Unit	Rate (USD)	Amount (USD)
	Approved filling				
A	Rock and gravel backfill	20	cm		
B	Blind surfaces of hardcore with 50mm thick well watered fine murram or crushed stone	4	sm		
C	Insecticide treatment on blinded surfaces with "Termidor" termicide or other equal and approved at the rate of fipromil (250gm/ litre) after dilution with water (1:100) at the rate of 5litres per square metre all in accordance with Manufacturer's Specifications	45	sm		
D	Single layer 1000 gauge polythene sheeting with minimum 300mm side and end laps	4	sm		
	Natural natural stone block walling jointed in cement/sand (1:3) mortar in				
E	200mm thick wall	7	sm		
	Machine dressed natural stone block walling jointed in cement/sand (1:3) mortar in				
F	200mm thick wall	7	sm		
	Precast concrete class 20(20mm) in				
G	200mm thick louvred vent block walling	6	sm		
	Roof covering				
H	26 gauge prepainted I.T.5 sheets or other equal and approved and fixing to including timber bearers with and including nails	10	sm		
	Louvred door :				
I	1300 x 2100mm high louvred mild steel double door comprising 50 x 50 x 4mm thick L- frame to sides and top and plugged to wall each leaf consisting of 50 x 50 x 3mm thick square hollow section frame all round divided horizontally at the middle into two equal portions with and including 50 x 50 x 3mm thick square hollow section transome with the two portions infilled with and including 20No. 1.2mm thick mild steel sheet louvres 100mm wide, twice bent and welded both sides to the frame, complete with necessary iron mongery and paint work	1	no		
	Cement/sand (1:3) in:				
J	25mm thick plaster to walls trowelled smooth	14	sm		
	Paint work				
K	Prepare and apply one undercoat and two finishing coats of permaplast paint	30	sm		
	Total Carried to Collection Page				

COLLECTION PAGE		
Item	**Description**	**Amount (USD)**
1	Total carried forward from page 1	
2	Total carried forward from page 2	
3	Total carried forward from page 3	
4	Total carried forward from page 4	
5	Total carried forward from page 5	
6	Total carried forward from page 6	
7	Total carried forward from page 7	
8	Allow a Provisional Sum for Temporary Septic Tank	
9	Allow a Contingency Sum of Two (2) Percent for Contingencies	
Total cost for biodigester installation works		

G R A N D S U M M A R Y

USD

PR 4924927 MRU SEPTIC BIODIGESTER PURCHASE AND INSTALLATION

GRAND SUMMARY

NO.		ITEM	PAGE NO.
1		- PARTICULAR PRELIMINARIES	
2		- GENERAL PRELIMINARIES	
3	BILL NO.1	-BIODIGESTER	BD/8

SUB-TOTAL

ADD 16% V.A.T

NET GRAND TOTAL CARRIED TO FORM OF TENDER

CONTRACTOR .....

Address .....

Date .....

WITNESS-Name .....

(Signature) .....

Address .....

Date .....