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Date: 03/28/2019

FRED SORORIAN, PE | Project Engineer
Thomas & Hutton
50 Park of Commerce Way
Savannah, GA 31405

REF: Travis Field Water Reclamation Facility
SUB: Cost Allowance and BOM for UV Disinfection System Procurement. Project Specifications SECTION 44 44 73 ULTRAVIOLET DISINFECTION SYSTEM (NON-CONTACT)

Dear Fred,

Per your request Enaqua is pleased to provide this detailed cost allowance for equipment, spares, services, warranty, shipping, and all other services in accordance with the above referenced project specifications, and the relevant specifications referenced in SECTION 44 44 73 ULTRAVIOLET DISINFECTION SYSTEM (NON-CONTACT).

Enaqua shall furnish the UV Disinfection System Equipment, associated equipment items and services per project specifications for the lump sum of **US \$559,170.00** for Phase I as detailed in Table 1.0 below. The lump sum quote for Phase I shall be valid for six (6) months from the date of this letter.

A requested schedule of payment is provided in Table 1.2 below. Detailed scope of supply for UV reactors, instruments, sensors, UV Control Panel, UV Power Panels, UV Pump Control Panels, Spares, Start-up training and maintenance services, performance warranty, and equipment warranty- in accordance with contract specifications SECTION 44 44 73 ULTRAVIOLET DISINFECTION SYSTEM (NON-CONTACT) are provided in Tables 1.2 – 1.10.

Please do not hesitate to contact me with any questions you may have regarding the information in this document, or the Enaqua Non-Contact UV Disinfection system operation. Thank you for the opportunity to provide you with this cost allowance and bill of materials and pricing for Phase I of this project.

Regards,

Arijit Sarkar
Applications Manager

Table 1.0 – Guaranteed Lump Sum Quote for Phase I

	Cost (\$)
UV Disinfection System, as specified in the Technical Specifications (sales taxes should be included)	\$508,000.00
Spare parts and special tools, as specified in the Technical Specifications	\$6,120.00
Freight, as specified in the Technical Specifications	\$15,300.00
Supervision of installation, testing, training, commissioning, warranty, and Follow-up support services. (Per Technical Specifications)	\$29,750.00
Total Equipment Cost (Sum of Items #1 - 4) (Including State Sales taxes)	\$559,170.00

Table 1.1: Requested Payment Schedule

Milestone	% Payment
Percentage of the bid item to be paid upon Engineer's approval of equipment submittals	30.0
Percentage of the bid item to be paid upon delivery of the equipment and the Preliminary O&M Manuals to the project site in a condition acceptable to the Contractor, Owner, and Engineer	30.0
Percentage of the bid item to be paid on successful operation and field testing of the equipment and delivery of the Final O&M Manuals	30.0
Retainage after final acceptance of project	10.0*

*Note: Assumed retainage of 10.0%. To be revised based on the requirements for retainage for UVSS as specified for this project.

Table 1.2 – Detailed Scope of Supply for Phase I- UV Reactors

UV REACTOR MODEL	C8t.10082
Reactor Type	In-Pipe Flanged
Process Connection	24" Flange (ASME/ANSI B16.5, CL 150)
ENLIGHT XUV60 UV LAMP- Enaqua Part number: 001.0617SLM	145-Watt Low Pressure High Intensity- Non-Amalgam Smart Lamps
Ballasts-Enaqua Part number: 502.5V2427M	145 Watt- Enlight high efficiency electronic ballast
Non-contact Reactor Material	C Series AFP840™ Tube
Material of Construction	316 Stainless Steel for all wetted parts
UV REACTOR(s)	
Number of Proposed UV Reactor(s)	2
Number of Banks per Reactor	2
Number of AFP tubes per bank	80 (In two bank length)
Number of Lamp Racks per Bank	9
Number of Lamps per Rack	12
Number of Lamps per Bank	108
Number of Lamps per Reactor	216
Number of Ballasts per Reactor	216
Total Number of UV Lamps (System)	432
REACTOR-THERMAL MANAGEMENT SYSTEM	
Air-Liquid Heat Exchangers installed inside reactor body.	Four per UV Bank
Cooling Pumps	2 per UV reactor (1 duty 1 standby)

UV INTENSITY SENSORS	
UV intensity Monitors- Enaqua part number: 560.601902	4 (One per UV Bank)
EFFLUENT LEVEL CONTTOL MECHANISM	
Rectangular contracted weir plate and weir frame installed in effluent tank of UV reactors. Weir plate, frame, mounting accessories 316L SS.	2 One per UV Reactor)

Table 1.3– Detailed Scope of Supply for Phase I- Third Party Sensors and Instruments

INSTRUMENTS	
EchoSpan Ultrasonic Level Transmitter, model LU81	2 (1 per UV reactor)
Bypass UV Transmittance Sensor, Transmitter, and CIP. REALTECH REAL UV Model M3000, and REAL PUMP CLEAN SYSTEM 1	1

Table 1.4– Detailed Scope of Supply for Phase I- UV Control Panel Components

ENAQUA UV Control Panel Components (FCP UV)			
ENAQUA MICROCONTROLLER BASED COMPONENTS			
Item	Part Number	QTY	
EDC GEN 2 (Ensure Dosing Controller)	062.01003700	2	
PIO (Discrete IO Module)	062.01003600	4	
AIO GEN 2 (Analog IO Module)	062.01003800	1	
Data HUB GEN 2- Enaqua part number:	602.01003900	1	
THIRD PARTY COMPONENTS			
Item	Manufacturer	Part Number	QTY
UV Control Panel Enclosure-316L SS NEMA 4X	Rittal	WM483612N6	1
19-inch color touchscreen display (HMI)	Hope Industrial	HIS-ML19 (Rev. G)	1
Windows 10 PC	AMOS	3005-1Q12A2	1
Circuit Breakers	Weidmuller	BR1C10AC	2
		BR1C20AC	1
24VDC Power Supply	IDEC	PS5R-SD24	2
Ethernet Switch, 8 port 10/100BaseT(X) (RJ45 connector)	Weidmuller	IE-SW-BL08-8TX	1
120V Receptacle	Weidmuller	6720005421	2

Pump Control Relays	Schneider	RPM22F7	6
UPS	Allen-Bradley	1609-B1000N	1
HMI ON/OFF Switch	IDEC	CW1S-2E10	1
HOA Switches	IDEC	CW1S-2E20	9

Table 1.5– Detailed Scope of Supply for Phase I- UV Bank Power Disconnect Panels

UV BANK POWER DISCONNECTS	
Panel Enclosure – Rittal Model # WM161208N46	2(One per UV Reactor)
Main Power Disconnect – ABB Model # OT63F3	4 (One per Panel)
Power Distribution/ Terminal Block – Marathon Catalog # 1321580	As needed
Circuit Breaker – Weidmuller Part # BR1C20AC & BR3C30AC	8 (Four per Panel)
TVSS – Weidmuller Part # 6720005410 & 6720005412	8 (Four per Panel)

Table 1.6– Detailed Scope of Supply for Phase I- UV Pump Control Panels

UV PUMP CONTROL PANELS	
Panel Enclosure – Rittal Model # WM201608N6	2 (One per Reactor)
Circuit Breaker – Weidmuller Part # BR1C40AC & BR3C10AC	4 (Two per Panel)
Power Distribution/ Terminal Block – Marathon Catalog # 1321580	As Needed
Pump Motor Protector – ABB Model # MS116-12	4 (Two per Panel)
Pump Contactor – ABB Model # AF65-30-11-13	4(Two per Panel)

Table 1.7 –Detailed Scope of Supply for Phase I- Spares

ITEM	QTY
Spare Lamps (10.0% additional)	44
Spare Ballasts (5.0% additional)	22
Quartz Sleeves	N/A
Lamp Sealing Rings or Holder Seals	N/A
Lamp Plugs/ Lamp End Connectors (5.0% additional)	22
Wiper or Wiper Rings	N/A
Proprietary Printed circuit boards (EDC, PIO, LRC Board, MLM, ADR, HUB)	1 of each listed
Proprietary Printed circuit boards (MLM) (5.0% additional)	2
Pump or Electric Motor. Cooling Pumps for UV Reactors	1
UV Intensity Sensor- Enaqua part number: 560.601902	1
Operator’s safety kit includes UV resistant Gloves, and Face Shields that block UV light wavelengths between 200 and 400 nm.	2
AFP Tube Cleaning Kit- Teflon Brush and extension kit with adaptable poles.	2

N/A: Not applicable for Non-Contact UV system

Table 1.8: Detailed Scope of Supply- Installation, On-Site Services, Testing, Start-UP, Training and Maintenance trips

Trip #	Trip Description	Hours/day	# Days	# of Trips
1	Installation Supervision and Inspection: Minimum 7 person-days to handle various requests by the City, including during the unloading of UV disinfection equipment system (assume one trip) and for providing installation assistance for the UV Disinfection Equipment System (assume one trip).	8	7	1
2	Start-Up and Field-Testing: Minimum 10 person-days to handle various requests by the City, for assistance during startup activities (assume two trips).	8	10	2
3	Operator Training: Training shall consist of a minimum of total of 16 hours, for multiple classes, of hands-on lectures on the UV Disinfection Equipment System operation and the maintenance requirements, including lamp chemical cleaning and replacement and repair processes for lamps, ballasts, wipers, sleeves and ancillary equipment. Training shall take place before the Initial Performance Test. The field training shall cover all shifts.	8	2	-
4	Additional Site Visit- SUPPLIER shall return for 2 additional days 1 year after final acceptance to review UV Disinfection System performance, operations, and maintenance.	8	2	1
5	Maintenance Service - Service Scheduling: a. By City request any time during warranty period as specified on the Warranty Form.	-	-	-

Table 1.9: Detailed Scope of Supply- PERFORMANCE WARRANTY

<u>1.05.A.1 - PERFORMANCE WARRANTY</u>	<p>a. Manufacturer shall guarantee the specified performance (system shall meet minimum UV doses specified in Section 1.3.C under the conditions specified in the design criteria section) for a period of five (5) calendar years following equipment startup and acceptance to allow evaluation of performance under the specified water quality conditions. The system must be maintained and operated per the manufacturer's recommendations and instructions.</p> <p>b. If the UV disinfection system fails to meet the performance guarantee criteria or fail to demonstrate performance, the manufacturer shall modify, change, or add equipment as necessary to meet performance requirements. The manufacturer shall be responsible for any additional costs due to changes (including piping, mechanical, structural or electrical changes) or additional equipment as necessary to meet performance requirements. This includes design, engineering, construction, as well as equipment.</p>
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Table 1.10: Detailed Scope of Supply- EQUIPMENT WARRANTY

<u>1.05.B.1 - GENERAL WARRANTY</u>	<p>a. The equipment furnished under this section shall be free of defects in materials and workmanship, including damages that may be incurred during shipping, storage, and installation, for a period of <u>2 years</u> which shall commence after successful completion of the Initial Performance Test (Substantial Completion of the UV system).</p>
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	<p>b. All wiring in the train exposed to UV light shall be warranted for 15 years by the SUPPLIER. If the wiring fails before <u>15 years</u> have elapsed, the SUPPLIER shall be responsible for the replacement of the wires and the labor.</p> <p>c. Enaqua shall guarantee that for components manufactured by Enaqua, replacement parts shall continue to be available to the City for a minimum of <u>20 years</u> from date of successful completion of Initial Performance Test. Enaqua shall guarantee that, if Enaqua or Enaqua's product line is sold, Enaqua shall make provisions such that all guarantees, warranties, and bonds will remain in effect and that replacement parts and operational support shall continue to be available to the City for the time period specified above.</p> <p>d. No warranties shall be pro-rated, and all warranties shall include all costs associated with required site visits, inspections, equipment removal costs, and equipment installation costs.</p> <p>e. All warranties and support shall be provided directly by the SUPPLIER and not the local manufacturer's representative.</p>
<p><u>1.05.B.2- UV LAMP WARRANTY</u></p>	<p>a. UV lamps shall be warranted for a minimum of 16,000 hours operating time under the conditions specified herein non- prorated. In the event of premature UV lamp failure, the UV system supplier shall offer the following:</p> <ol style="list-style-type: none"> 1. Lamp failure before 16,000 hours – send a replacement lamp free of charge. <p>b. This guarantee shall be limited by the guaranteed number of start/stop cycles. The guaranteed lamp start/stop cycle shall be 24 stop/start cycles per 24-hour period over the life of the lamp. The automation associated with the UV equipment shall be programmed to prevent more than 24 start/stop cycles per day. Additionally, the automation system must log the operational hours for each individual lamp.</p> <p>c. The guaranteed lamp life shall not include periods when the plant is not in operation and/or when the UV system is shut down.</p> <p>d. SUPPLIER shall ensure all returned UV lamps (old/new) are recycled upon receipt of the returned lamps at the manufacturing headquarters for the life of the UV Disinfection System (20 years after successful completion of the Initial Performance Test).</p>
<p><u>1.05.B.3 - UV BALLAST WARRANTY</u></p>	<p>a. SUPPLIER shall guarantee all ballasts against failure for a minimum period of 10 years, which shall commence after successful completion of the Initial Performance Test (Substantial Completion of the UV system).</p> <p>b. SUPPLIER shall replace any ballast that fails before the end of the designated warranty period at no cost to the City, with freight and insurance paid by SUPPLIER. Installation of the failed ballast can be performed by City.</p>
<p><u>1.05.B.4- AFP TUBE WARRANTY</u></p>	<p>AFP tubes shall be warranted for twenty years as long as the wastewater flow and quality remains in the range(s) specified in the Design Criteria, and the UV system is operated in accordance with the O&M manual</p>

<u>1.05.B.5- UV SENSOR WARRANTY</u>	UV sensors shall be guaranteed against failure for a minimum of five (5) years.
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END OF COST ALLOWANCE AND BOM -Dated 03/28/2019