

Proposal to Provide Engineering Services for WRF – Development of Process and Instrumentation Diagrams Work Order No. 20

Services to be provided by: Hazen and Sawyer (Hazen)
Services provided to (“Village”): Village of Wellington (Village)
Proposal date: November 17, 2019

Proposal Terms

PROJECT DESCRIPTION

The Village of Wellington Water Reclamation Facility (Wellington WRF) is preparing to undergo programmable logic controller (PLC) upgrades. Additionally, the Wellington WRF is currently undergoing construction in which PLC’s are being replaced and new PLCs installed. To complete the PLC upgrades and support ongoing construction activities, it will be required to reprogram the new PLCs to continue to perform the monitoring and control functions throughout the WRF upon installation/replacement. Limited process and instrumentation diagrams (P&IDs) exist to provide information to a contractor/system integrators who will perform the work. Therefore, it is necessary to create P&IDs for each process for current and future work outsourced to third party professional contractors/system integrators that adequately describe the existing instrumentation and control of the Wellington WRF.

Hazen shall prepare P&IDs for existing processes at the Wellington WRF with a written description of the control strategies. The resulting documentation shall provide an outline of process, mechanical and related control operations at the plant that can be used as a reference to support plant operations and training, and also preserve institutional knowledge for future personnel and third party contractors/system integrators who maintain the plant supervisory control and data acquisition (SCADA) system.

SCOPE OF SERVICES

Task 1 – Development of P&IDs

Hazen will organize and lead a kick-off meeting with Village staff and key members of the project team. During this meeting, the overall work plan, project goals, and schedule will be discussed, lines of communication will be established, and data needs will be assessed. Key elements will be discussed during the kick-off meeting. Kick-off meeting minutes will be prepared and distributed by the Hazen.

Hazen shall collect and review existing documentation, mechanical drawings, electrical drawings, process control system databases, SCADA Human Machine Interface (HMI) screens, I/O schedules and instrument lists. Hazen shall also perform site visits and interview operators regarding operation of each process. Based upon existing documentation and information collected during site visits, Hazen shall prepare draft P&IDs of existing process areas. Hazen will not test equipment or software to validate the P&IDs.

Review and validation of P&IDs by Village staff who are familiar with the operation of the plant is very important. Therefore, it is assumed that key Village staff will review each document and be prepared to discuss and provide comments. A DRAFT of the P&IDs will be prepared and submitted to the Village for review. Comments will be documented and incorporated as applicable in the FINAL P&IDs.

The estimated number of P&IDs required for this contract are provided in attached **Table 1** on the following pages.

P&IDs will be developed in a similar style and level of detail as the attached example provided as **Attachment B**.

Deliverable(s):

1.1 – Minutes from project kick-off meeting

1.2 – DRAFT P&IDs

1.3 –FINAL P&IDs

Table 1 – Estimated P&IDs

Area ID	Process Area	Process Component	P&ID (Amount)
1	Headworks	Bar Screens	1
		Screening Compactor	
		Grit Classifier	
		Grit Pumps	
		Pista Grit Paddle	
2	Aeration Basin No. 1/2	Aerators	1
4	Aeration Basin No. 3	Aerators	1
6	Clarifier No. 1 - 4	Mechanisms	1
		RAS Pumps	1
		Scum Pumps	
		WAS Pumps	1
		Gates	
5	Mixed Liquor Splitter Box	Gates	
10	Filter Dosing Pump Station	Filter Dosing Pump No. 1 - Equip	1
11	Basic-Level CCT No. 1	Gates	
12	Process Water Pumps	Process Water Pumps	
13	Basic-Level CCT No. 2	Gates	
14a	High-Level CCT North	Gates	1
14b	High-Level CCTs South	Gates	
15	Reuse Wetwell No. 1	Reuse Pumps	1
		Levels	
16	Reuse Wetwell No. 2	Reuse Pumps	1
		Levels	
17	Effluent Filters	Various Equipment	2
18	Filter Backwash Waste Basin	Mudwell Pumps	1
		Levels	
19	Aerobic Digesters 1-5	PD Blowers	1
		BFP Feed Pumps	1
		Levels	
21	Sludge Dewatering Facility	Belt Filter Presses	1
		Polymer Makeup Units	
		Cake Conveyors	
		Cake Pumps	
22	Truck Loading Building	Truck Load Conveyor - Equip	1
23	Sludge Drying Building	Dryer	2
		Dryer Condensate - Pumps	
24	MCC & Generator Building	Generator (2 MW)	1
		2 MW Gen Fuel Storage Tank	
25	Odor Control - Headworks	Various Equipment	1
26	Odor Control - Aeration	Various Equipment	1

Table 1 – Estimated P&IDs (continued)

Area ID	Process Area	Process Component	P&ID (Amount)
27	Odor Control - Digesters	Various Equipment	1
28	Odor Control - Biosolids	Various Equipment	1
		Biofilters	
33	Diesel Fuel Tank - Parks	Parks Fuel Storage Tank	
34	NaOH Bulk Storage Containment	Tanks	1
		NaOH pumps	
35	NaOCl Bulk Storage Containment	Tanks	1
		NaOCl Pumps	
36	Lift Station - Main	Main - Pumps	1
38	Lift Station - Filtrate	Press/Filtrate - Pumps	
39	Lift Station - Wetlands	Wetland - Pumps	1
		Wetlands - Valves	
40	Septage Receiving Station	Structure	
41	Injection Well	injection Well	1
		Hydropneumatic Tank	
		Dual Zone Monitor Well	
		Sample Pump	
42	Drum storage area		
43	Building - Operator's	Generator (0.75 MW)	1
		.75 MW Gen Fuel Storage Tank	
		.75 mW Gen Day Tank	
44	Building - Maintenance		
45	Building - Sludge Stabilization		
46	Building - Truck Canopy		
47	Lime Silo	To be demolished	
48	Building - Covered Storage	To be demolished	
49	Building - Reuse	To be demolished	
50	Building - Old Chemical/Storage	To be demolished	
Future	(New) Aerobic Digester 6-7		1
	(New) Lift Station - Headworks		1
Future	(New) Building - Blower		
Future	(New) Building - Filter Control		
	Reuse Distribution Sites		1
	Misc Instrumentation		2
			P&ID (Amount)
Plantwide Total			35

ASSUMPTIONS

1. It is assumed that key Village staff will review each document and provide comments.
2. P&IDs will be developed in a similar style and level of detail as the attached examples provided as **Attachment B**.
3. P&IDs will be developed based on documentation and input from Village staff. Hazen will not test equipment or software to validate the P&IDs.
4. It is anticipated that the Village will provide Hazen with required data within the first four weeks following receipt of a Project Notice-to-Proceed. Data that are expected to be required include, but are not limited to, the following:
 - PLC input/output (I/O) lists and other relevant information
 - Record drawings
 - Interviews with key Village staff and outside consultants knowledgeable about operation and maintenance of instrumentation and controls at the Wellington WRF

SCHEDULE

Task	Description	Time of Completion from NTP
1	DRAFT Deliverables	30 weeks
1	FINAL Deliverables	36 weeks

COMPENSATION

Compensation for all tasks, unless specifically noted below, will be billed on a lump sum basis based on percent of work complete and total project fees presented in **Attachment A**.

AUTHORIZATION

Work described in this proposal will commence upon authorization to proceed and receipt of a signed agreement.

Hazen and Sawyer

Signed: Albert Muniz

Name: Albert Muniz, PE

Title: Vice President

Date: November 7, 2019

Village of Wellington

Signed: _____

Name: _____

Title: _____

Date: _____

(Please return one original to Hazen)

ATTACHMENT A

BUDGET SUMMARY - Lump Sum

Task No.	Description	BUDGET SUMMARY for Work Order No. 20							
		Vice President	Senior Associate	Associate	Engineer/ Asst Engr	Principal Designer	Office	Total Labor	Sub-Consultant
1	Project Initiation	1	6	6	6	0	4	23	\$0
2	Development of P&IDs								
	Review of existing information	0	10	20	20	0	0	50	\$0
	Site Visits	0	20	60	60	0	0	140	\$0
	Development of P&IDs	4	80	90	440	280	0	894	\$0
	SUB-TOTAL	5	116	176	526	280	4	1107	0
	Labor Raw Costs	\$218	\$196	\$165	\$105	\$114	\$73		
	Labor Sub-Total	\$1,090	\$22,736	\$29,040	\$55,230	\$31,920	\$292		
	Labor Total							\$140,308	
	Subconsultant Labor Total								\$0
	Subconsultant Multiplier								1.0
	Subconsultant Total								\$0
	Reimbursable Expenses								\$0
	Project Total								\$140,308

Appendix B

Example P&ID

INSTRUMENT AND FUNCTION SYMBOLS					VALVE, GATE, AND ACTUATOR SYMBOLS					PUMP AND EQUIPMENT SYMBOLS					IDENTIFICATION LETTERS					
LOCATION AND ACCESSIBILITY	SHARED DISPLAY/SHARED CONTROL		COMPUTER SYSTEMS AND SOFTWARE	DISCRETE										FIRST LETTERS		SUCCEEDING LETTERS				
	PRIMARY CHOICE OR BASIC PROCESS CONTROL SYSTEM	ALTERNATE CHOICE OR SAFETY INSTRUMENTED SYSTEM													MEASURED OR INITIATING VARIABLE	VARIABLE MODIFIER	READOUT/PASSIVE FUNCTION	OUTPUT/ ACTIVE FUNCTION	FUNCTION MODIFIER	
- LOCATED IN FIELD - NOT PANEL, CABINET, OR CONSOLE MOUNTED - VISIBLE AT FIELD LOCATION - NORMALLY OPERATOR ACCESSIBLE														A	ANALYSIS		ALARM			
- LOCATED IN OR ON FRONT OF CENTRAL OR MAIN PANEL OR CONSOLE - VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY - NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE														B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE	
- LOCATED IN REAR OF CENTRAL OR MAIN PANEL - LOCATED IN CABINET BEHIND PANEL - NOT VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY - NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE														C	CONDUCTIVITY			CONTROL	CLOSE	
- LOCATED IN OR ON FRONT OF SECONDARY OR LOCAL PANEL OR CONSOLE - VISIBLE ON FRONT OF PANEL OR ON VIDEO DISPLAY - NORMALLY OPERATOR ACCESSIBLE AT PANEL FRONT OR CONSOLE														D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENCE, DIFFERENTIAL			DEVIATION	
- LOCATED IN REAR OF SECONDARY OR LOCAL PANEL - LOCATED IN FIELD CABINET - NOT NORMALLY OPERATOR ACCESSIBLE AT PANEL OR CONSOLE														E	VOLTAGE (EMF)		SENSOR, PRIMARY ELEMENT			
<div><div> SUFFIX (X) TO DIFFERENTIATE BETWEEN INSTRUMENTS AND FUNCTIONS THAT WOULD OTHERWISE HAVE THE SAME IDENTIFICATION.</div><div> SINGLE INSTRUMENT OR OTHER COMPONENT HAVING MULTIPLE FUNCTIONS OR SHARING A COMMON HOUSING</div><div> DESIGNATIONS OF CONTROL FUNCTIONS (ZZZ) ASSOCIATED WITH INSTRUMENT OR OTHER COMPONENTS.</div><div><div><div>AHC - AUTO/HOLD/CLOSE AM - AUTO/MANUAL CALC - CALCULATION DEV - DEVIATION MOA - MANUAL/OFF/AUTO HOR - HAND/OFF/REMOTE LOS - LOCKOUT STOP LR - LOCAL/REMOTE LSR - LOCAL/STOP/REMOTE OO - ON / OFF OC - OPEN/CLOSE</div><div><div>OSC - OPEN/STOP/CLOSED POT - POTENTIOMETER RL - RAISE/LOWER RS - RUN/STOP RSL - RAISE/STOP/LOWER SD - SHUTDOWN SEL - SELECT SP - SET POINT SR - START/RESET SS - STOP/START</div></div><div> INSTRUMENT WITH COMPUTING OR CONVERTING FUNCTION</div><div> CONTROL SYSTEM COMPUTING FUNCTION</div><div><div><div>CONVERTE - VOLTAGE I - CURRENT P - PNEUMATIC A - ANALOG B - BINARY</div><div><div>H - HYDRAULIC O - ELECTROMAGNETIC, SONIC R - RESISTANCE (ELECT.) D - DIGITAL</div></div><div><div>COMPUTEΣ SUMMING PROPORTIONAL DIFFERENCE - SUBTRACTOR DERIVATIVE HIGH SELECTING X MULTIPLYING AVERAGING LOW SELECTING ÷ DIVIDING RATIO INTEGRAL √ ROOT EXTRACTION PID COMPLEX FUNCTION # = 1, 2, 3, etc. REFER TO NOTE ON SAME SHEET FOR BRIEF DESCRIPTION</div></div><div> ELECTRICAL CONTROL INTERLOCK</div><div><div> COMPLEX INTERLOCK # = 1, 2, 3, etc. REFER TO NOTE ON SAME SHEET FOR BRIEF DESCRIPTION</div><div> AND LOGIC OR LOGIC</div></div><div> PILOT LIGHT</div></div></div></div></div></div>					GATE VALVE PLUG VALVE GLOBE VALVE BALL VALVE BUTTERFLY VALVE CHECK VALVE 3-WAY VALVE 3-WAY BALL VALVE DIAPHRAGM VALVE PINCH VALVE NEEDLE VALVE SLUICE GATE STOP/SLIDE GATE SOLENOID ACTUATOR PNEUMATIC ACTUATOR				BACKFLOW PREVENTER PRESSURE RELIEF VALVE VACUUM RELIEF VALVE COMBINATION VACUUM AND PRESSURE RELIEF VALVE PRESSURE-REDUCING REGULATOR BACKPRESSURE REGULATOR AIR RELEASE VALVE ROTARY MOTOR ELECTROHYDRAULIC ACTUATOR MANUAL ACTUATOR				CENTRIFUGAL WET PIT PUMP (OR DRY-PIT SUBMERSIBLE) SCREW PUMP ROTARY LOBE PUMP OR BLOWER (POSITIVE DISPLACEMENT) PROGRESSIVE CAVITY PUMP CENTRIFUGAL PUMP BLOWER (CENTRIFUGAL) PISTON PUMP METERING PUMP VERTICAL PUMP GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT) DIAPHRAGM PUMP COMPRESSOR INLINE GRINDER MIXER							
					MISCELLANEOUS SYMBOLS															
					QUICK CONNECT BLIND FLANGE FLEXIBLE HOSE CALIBRATION CYLINDER					PULSATION DAMPENER EXPANSION TANK HORN					HORN/STROBE RUPTURE DISK VENT DRAIN FILTER INJECTOR					
					PRIMARY ELEMENT SYMBOLS															
					MAGNETIC FLOW METER SONIC FLOW METER THERMAL MASS FLOW METER					TURBINE OR PROPELLER FLOW METER VENTURI FLOW METER AVERAGING PITOT TUBE					PADDLE WHEEL FLOW METER VORTEX FLOW METER POSITIVE DISPLACEMENT FLOW METER					
					PARSHALL FLUME WEIR ORIFICE PLATE					ROTAMETER WITH INTEGRAL VALVE SUBMERSIBLE LEVEL SENSOR NON-CONTACT RADAR LEVEL SENSOR GUIDED WAVE RADAR LEVEL SENSOR					FLOAT LEVEL SWITCH CAPACITANCE LEVEL SENSOR					
					ANALYTICAL ABBREVIATIONS					GENERAL NOTES					LINE SYMBOLS AND LEGEND					
					<div><div> ANALYSIS INSTRUMENT</div><div><div><div>(ZZZ) = ALK - ALKALINITY CH4 - METHANE CL2 - CHLORINE COMB - COMBUSTIBLE GAS CON - CONDUCTIVITY DO - DISSOLVED OXYGEN IR - INFRARED H2S - HYDROGEN SULFIDE LEL - LOWER EXPLOSIVE LIMIT METH - METHANOL VAPOR NH3 - AMMONIA NO3 - NITRATE O2 - OXYGEN O3 - OZONE ORP - OXIDATION/REDUCTION POTENTIAL PETRO - PETROLEUM VAPOR</div><div><div>PH - HYDROGEN ION CONCENTRATION P04 - PHOSPHATE SO2 - SULFUR DIOXIDE TH - TOTAL HARDNESS TSS - TOTAL SUSPENDED SOLIDS TURB - TURBIDITY UV - ULTRAVIOLET</div></div></div></div></div>					<div><div>1. SYMBOLS AND NOMENCLATURE ARE BASED ON ANSI/ISA-5.1-2009.</div><div>2. REFER TO LEGEND SHEETS OF OTHER DISCIPLINES FOR ADDITIONAL SYMBOLS AND ABBREVIATIONS.</div><div>3. REFER TO SPECIFICATIONS FOR ADDITIONAL DETAIL ON CONTROL SYSTEM FUNCTIONAL REQUIREMENTS.</div><div>4. INSTRUMENTS AND PANELS DENOTED WITH AN ASTERISK (*) ARE PROVIDED BY OTHER DISCIPLINES. REFER TO THE DRAWINGS AND SPECIFICATIONS OF OTHER DISCIPLINES FOR ADDITIONAL DETAIL.</div><div>5. POWER SUPPLIES FOR LOOPS OR SYSTEMS SHALL BE FURNISHED BY THE INSTRUMENTATION SUPPLIER TO MEET THE PARTICULAR CHARACTERISTICS (E.G., VOLTAGE AND CURRENT REQUIREMENTS) OF COMPONENTS IN EACH LOOP OR SYSTEM.</div></div>					<div><div> MAJOR PROCESS PIPES OR CHANNELS</div><div> SECONDARY PROCESS OR MECHANICAL CONNECTION</div><div> AIR SUPPLY OR SIGNAL</div><div> ELECTRICAL SIGNAL/ COPPER CABLE</div><div> DATA LINK OR INTERNAL SOFTWARE LINK</div><div> FIBER OPTIC CABLE</div><div> TAG DRAWING OFF-SHEET CONNECTOR</div><div><div> DISCRETE ELECTRICAL SIGNALS</div><div> DISCRETE DIGITAL SIGNALS</div><div> ANALOG ELECTRICAL SIGNALS</div><div> ANALOG DIGITAL SIGNALS</div></div><div>PROCESS/SIGNALS NOT CONNECTED (CROSSING)</div><div>PROCESS/SIGNALS CONNECTED</div></div>					
DESIGNED - DRAWN - CHECKED - PROJ.ENGR. -					THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.					PROCESS AND INSTRUMENTATION SYMBOLS AND LEGENDS					DATE DECEMBER 2015					
2 03/2016 CONFORMED F.A.M.					HAZEN					PROJECT NUMBERS 45527-006					DRAWING NUMBER 101					
1 12/2015 BID SET F.A.M.					HAZEN AND SAWYER 2101 CORPORATE BOULEVARD, SUITE 301 BOCA RATON, FLORIDA 33431 CERTIFICATE OF AUTHORIZATION NO. : 2771															
NO. DATE ISSUED FOR BY					EVAN P. CURTIS, PE NO. 69657															

