



CITY OF CLEARWATER

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TELEPHONE (727) 562-4750 FAX (727) 562-4755

ENGINEERING DEPARTMENT

December 14, 2018

McKim & Creed Engineers
1365 Hamlet Avenue
Clearwater, FL 33756

Attn: Mr. Michael Tweedel, PE. – Senior Project Manager

Dear Mr. Tweedel,

Please find attached Work Order initiation form which, with this letter, will authorize your firm to provide services for WTP 1 Scada System PLC Upgrade.

Project #	17-0041-UT
Contract Amount	\$ 69,647.00
P.O. # :	19000503

The scope of services, method of compensation, applicable City finance codes(s) and other pertinent data appear where applicable on the standard form.

We look forward to a successful project.

Sincerely,

Tara Kivett, P.E.
Assistant Engineering Director

cc: Duy Nguyen. – Project Manager
Jeremy Brown, PE. – Utility Engineering Manager

Attachment



"Equal Employment and Affirmative Action Employer"



1365 Hamlet Ave. Clearwater, Fl. 33756 (727) 442-7196

WORK ORDER INITIATION FORM for the CITY OF CLEARWATER

Date:	November 1, 2018
Consultant Project Number:	160358
City Project Number:	17-0041-UT
City Plan Set Number:	2017020

1. PROJECT TITLE:
WTP No. 1 SCADA System PLC Upgrades

2. SCOPE OF SERVICES:

The City of Clearwater's Water Treatment Plant (WTP) No. 1 control system includes programmable logic controller equipment (PLC) that is being phased out of standard production by the manufacturer (Allen Bradley/Rockwell Automation SLC 500). The City has recognized the obsolescence of this PLC equipment and the importance it serves for the monitoring and control of City facilities. The City therefore desires to perform upgrades to Water Treatment Plant No. 1, including PLC equipment, remote I/O devices and network communications for the plant control system.

The City has requested that McKim & Creed provide equipment selection assistance as well as software implementation and conversion services for upgrading the existing controller-related systems from the older Allen Bradley platforms to current technology CompactLogix/ControlLogix series units with similar input/output components. All upgrades, including related communications equipment, will support the upgraded PLCs with all communications over Ethernet.

McKim & Creed will assist the City in selecting components and provide drawing documentation indicating the communication connections, an upgraded network diagram, the PLC component layout and the I/O module signal termination points. The City will procure all equipment and perform all equipment installation, communications cabling and field wiring/terminations. On completion of the City's installation work, McKim & Creed will test the PLC software programs and confirm the interface to the plant SCADA computer systems.

Upgrades will include the following locations and activities:

- Electrical Room PLC system
 - Convert CP-100 PLC from SLC 5/05 to a CompactLogix L33ER
 - Include a third-party Modbus serial module to maintain communications to the switchgear and MCC power monitors

- Upgrade RACO Autodialer to direct PLC communications and configure for the existing alarm list
- Upgrade (3) Well Booster Pumps VFD (Loop 102) communications from DeviceNet to Ethernet
- Convert Well No. 31 from SLC 5/05 to CompactLogix L2 PLC with Ethernet fiber optic communications
- RO Process Room system
 - Convert CP-200 PLC from SLC 5/05 to a CompactLogix L33ER
 - Decommission CP-200 door-mounted operator interface
 - Convert (10) PLC DeviceNet remote I/O links to Ethernet remote I/O over fiber optic cable including RO Skid No. 1, RO Skid No. 2, Antiscalant, Sodium Bisulfite, Sodium Hydroxide, Pre-Treatment Sodium Hypochlorite and (4) Dual Media Filters No. 1 thru 4
- Off-Site Wellfield
 - Off-site wells will not be upgraded as part of this project
 - The existing CP-100 SLC-5/05 PLC will be relocated to the site wellfield master radio panel and reconnected to the plant SCADA network over Ethernet fiber optic cable
 - The existing CP-100 PLC application will be revised to handle well communications only, over existing serial radios

For each of the control panels modified as part of the project, McKim & Creed will review the arc flash status of the panel. For any control panels without an evident arc flash label, McKim & Creed will notify the City to receive authorization to perform a study to determine the panel rating and provide a label.

The scope of work to be provided will include the following:

Task 1 – Water Treatment Plant (WTP) No. 1 SCADA System PLC Upgrades

- 1.1 Project administration, monthly status reports and invoicing.
- 1.2 Perform an onsite field investigation to inventory the physical components of the existing configurations including remote input/output modules, field signal connections, communication links, available fiber optic cable and arc flash label status. Review any components from the existing system which are no longer required in the replacement implementation, such as Devicenet communication devices, remote I/O locations, operator interfaces or communication gateways. A health and safety plan will be submitted for approval by the City Project Manager prior to conducting any fieldwork/site visits.
- 1.3 Develop and provide a Bill of Materials of upgrade components for direct purchase by the City. Bill of Materials will be provided in Excel electronic file format.
- 1.4 Prepare and provide a set of drawings for the PLC layout, communication connections, input/output signals and system network diagram to document the new PLC configuration for the City's use in installation of the replacement components. Drawings will follow typical industry standards for PLC documentation and will be provided in electronic PDF format.

- 1.5 Perform a conversion of the existing PLC logic program and database documentation from SLC 500 format to CompactLogix format. This conversion will make use of manufacturer-provided tools for initial conversion, estimated at 60% completion, with the balance of the program conversion completed through manual software coding. Modify the existing PLC logic programs for the new components and communications format, only. No functional changes to the plant operation are planned or included.
- 1.6 Configure the software communications driver on the two (2) SCADA computers for the new CompactLogix PLCs.
- 1.7 Prior to the field conversion process, the PLC hardware will be staged in office and the converted software tested with a backup of the SCADA system software, updated for the PLC hardware changes. After confirmation of the office testing, the PLC hardware will be temporarily staged at the site and all communication paths tested, including PLC to SCADA and PLC to PLC. On completion of testing, the PLC hardware will be turned over to City technicians for installation.

Note: This project will upgrade the communication links for the PLC I/O systems from DeviceNet to Ethernet over network components using City-provided network and fiber optic cable.

- 1.8 Following completion of equipment and network installations by the City, download updated PLC application software, assist the City technicians in confirming the field signal terminations and verify PLC and SCADA network communications to confirm PLC operations.
- 1.9 Perform on-site configuration and testing of a new RACO Catalyst autodialer, capable of communicating directly to the CompactLogix PLC. No changes will be made to the alarm call out numbers or schedule configurations but all monitored alarms will originate from CP-100. Monitored alarms will be simulated to verify the operation.
- 1.10 Provide final electronic files reflecting as built conditions for the project. Drawing files will include a Record Drawings label with Engineer's stamp. Files will be provided on a removable storage drive using a directory structure to be developed as part of the project. Files will include the network diagram, control panel PLC layout and I/O module drawings, SCADA network address spreadsheet, PLC application programs and SCADA software backup files. Drawings will include any modifications that occur during the start-up process and will be provided in electronic PDF and AutoCAD file formats.

Task 2 – WTP No. 1 Control Panel Arc Flash Assessment

- 2.0 For any control panels modified as part of this without an arc flash label, perform an assessment and provide new arc flash rating label. For previously labeled panels, note and confirm the existing arc flash rating. Provide documentation noting the rating for all control panels.

Task 3 – Northeast WRF PLC Upgrade Documentation

- 3.0 Provide electronic files reflecting as built conditions for the Northeast WRF PLC Upgrade project. Drawing files will include a Record Drawings label with Engineer's stamp. Files will be provided on removable storage device using a directory structure to be developed as part of the project. Files will include the network diagram, control panel PLC layout and I/O module drawings, SCADA network address spreadsheet, PLC applications programs and current SCADA software backup files. Drawings will be provided in electronic PDF and AutoCAD file formats

3. PROJECT GOALS:

- PLC Equipment Bill of Materials (electronic)
- PLC layout, I/O module wiring and network design drawings (electronic)
- PLC and HMI Application Software Development/Conversion
- System Startup and Testing
- Project final documentation and record drawings (electronic)
- Electronic copy of PLC and HMI application programs
- Application software installation and communication testing
- Arc flash assessment and control panel rating labels

4. BUDGET:

This price includes all labor and expenses anticipated to be incurred by McKim & Creed, Inc. for the completion of these tasks, in accordance with Professional Services Method "A" – Cost Times Multiplier Basis, for a fee not to exceed Sixty-nine Thousand, Six Hundred and Forty-seven Dollars (\$69,647.00)

5. SCHEDULE:

Equipment selection and initial drawing documentation work will be completed within 60 days of issuance of notice-to-proceed.

Software implementation and testing/startup will be completed within 30 days of notification of the City's successful hardware installation and testing for each PLC location.

6. STAFF ASSIGNMENT:

McKim & Creed Staff: Michael Tweedel, PE, Flavio Velecela, Eric Brown, Aubrey Haudricourt

City of Clearwater Staff:

Duy Nguyen	Project Manager
Michael Gilliam	Public Utilities Manager
Kervin St. Amie	Public Utilities Liaison
Charles "Mac" McAbee	Public Utilities Site Representative
Jeremy J. Brown, PE	Utilities Engineering Manager
Richard G. Gardner, PE	Public Utilities Assistant Director

7. CORRESPONDENCE/REPORTING PROCEDURES:

ENGINEER's project correspondence shall be directed to:
Michael Tweedel, PE

All City project correspondence shall be directed to the Project Manager, with copies to the Utilities Engineering Manager and Public Utilities Assistant Director.

ENGINEER shall provide a minimum of forty-eight (48) hours' notice prior to conducting any field work/site visits. ENGINEER shall provide a minimum of seven (7) days notification for site visits requiring the assistance of City Operations and Maintenance personnel.

ENGINEER acknowledges that all City directives shall be provided by the City Project Manager.

8. INVOICING/FUNDING PROCEDURES:

For work performed, invoices shall be submitted monthly to the:

**City of Clearwater, Engineering Department
Attn. Veronica Josef, Senior Staff Assistant
PO Box 4748
Clearwater, Florida 33758-4748.**

City Invoicing Code: 3217321-561300-96764

9. INVOICING PROCEEDURES

At a minimum, in addition to the invoice amount(s) the following information shall be provided on all invoices submitted on the Work Order:

- A. Project Number, Purchase Order Number and Contract Amount.
- B. The time period (begin and end date) covered by the invoice.
- C. A short narrative summary of activities completed in the time period
- D. Contract billing method – Lump Sum or Cost Times Multiplier
- E. If Lump Sum, the percent completion, amount due, previous amount earned and total earned to date for all tasks (direct costs, if any, shall be included in lump sum amount).
- F. If Cost Times Multiplier, hours, hourly rates, names of individuals being billed, amount due, previous amount earned, total earned to date for each task and other direct costs (receipts will be required for any single item with a cost of \$50 or greater or cumulative monthly expenses greater than \$100).
- G. If the Work Order is funded by multiple funding codes, an itemization of tasks and invoice amounts by funding code.

10. SPECIAL CONSIDERATIONS:

The consultant named above is required to comply with Section 119.0701, Florida Statutes (2013) where applicable.

The record drawings provided will include PLC layout, I/O module wiring and facility SCADA network diagrams. These drawings will reflect the changes implemented as part of the project but are only a partial indication of the panel circuitry and layout information. These drawings should be used in conjunction with existing panel drawings for full panel circuitry and layout.

Exclusions

This scope has been developed to address the anticipated project requirements. Task items not specifically identified in this scope of services are not included. If during the course of the work, it is determined that additional work or assistance is necessary to complete the project, the activities can be added via additional services. Some specific items not included in this scope of services are as follows:

- The project will not require any changes to the monitoring and control operations of the facility and is similar to previous upgrades at this and other City facilities. Therefore, no training is included as part of this scope of work.
- No permitting is anticipated or included as part of these scope of services
- No functional changes to the control software or plant operation are anticipated.
- No purchase or provision of PLC components, networking equipment and/or software licenses is included.
- No installation of equipment, communication cables or signal wiring is included.

PREPARED BY:



Michael Tweedel, PE
Senior Project Manager
McKim & Creed, Inc.

11-7-2018

Date

APPROVED BY:



D. Scott Rice, PE
City Engineer
City of Clearwater

11/6/18

Date



CITY OF CLEARWATER ENGINEERING DEPARTMENT

WORK ORDER INITIATION FORM CITY DELIVERABLES

1. **FORMAT**

The design plans shall be compiled utilizing the following methods:

1. City of Clearwater CAD standards.
2. Datum: Horizontal and Vertical datum shall be referenced to North American Vertical Datum of 1988 (vertical) and North American Datum of 1983/90 (horizontal). The unit of measurement shall be the United States Foot. Any deviation from this datum will not be accepted unless reviewed by City of Clearwater Engineering/Geographic Technology Division.

2. **DELIVERABLES**

The design plans shall be produced on bond material, 24" x 36" at a scale of 1" = 20' unless approved otherwise. Upon completion, the consultant shall deliver all drawing files in digital format with all project data in Autodesk Civil 3D file format. If not available, Land Desktop files are still acceptable; however the City or Clearwater is currently phasing out Land Desktop.

NOTE: If approved deviation from Clearwater CAD standards are used, the Consultant shall include all necessary information to aid in manipulating the drawings including either PCP, CTB file or pen schedule for plotting. The drawing file shall include only authorized fonts, shapes, line types or other attributes contained in the standard release of Autodesk, Inc. software. All block references and references contained within the drawing file shall be included. Please address any questions regarding format to Mr. Tom Mahony, at (727) 562 4762 or email address Tom.Mahony@myClearwater.com.

All electronic files must be delivered upon completion of project or with 100% plan submittal to City of Clearwater.



WORK ORDER INITIATION FORM

PROJECT BUDGET

Task	Description	Subconsultant Services	Labor	Total
1.0	WTP No. 1 SCADA System PLC Upgrades			
1.1	Project Administration		\$3,642	
1.2	Field Investigations		\$6,434	
1.3	Bill of Material Preparation		\$3,850	
1.4	PLC Drawing Preparation		\$5,768	
1.5	PLC Software Conversions		\$17,242	
1.6	SCADA Driver Configurations		\$2,010	
1.7	System Pre-Testing		\$2,832	
1.8	Program Install and System Testing		\$6,261	
1.9	Autodialer Configuration		\$3,426	
1.10	Final Document Preparation		\$4,091	
				\$55,556
2.0	WTP No. 1 Control Panel Arc Flash Assessment			
2.1	Arc Flash Assessments		\$10,000	
				\$10,000
3.0	Northwest WRF As Built Documents			
3.1	Final Document Preparation		\$4,091	
				\$4,091
Grand Total				\$69,647