City of Oak Ridge
Wastewater Treatment Plant
Programmable Logic Controller (PLC) System Replacement
Request for Proposal

The City of Oak Ridge is seeking sealed proposals to replace the current Allen Bradley 1771 Series PLC with a Square D M-340 based PLC system to monitor and control the Wastewater Treatment Plant and associated remote locations.

The following information is intended to give an outline of the scope of the project and the requirements of this project.

A **mandatory Pre-Proposal conference** for all potential proposers will be held on June 9, 2016 at 10 a.m. (local time) at the City of Oak Ridge Wastewater Treatment Plant, 200 Monterey Road, Oak Ridge, TN.

All potential proposers are encouraged to review the accompanying PDF file of the current system As-Built drawings.

Sealed proposals are due by **2 p.m. (local time) on Thursday June 16, 2016** to the following:

Delivery:	US Mail:
City of Oak Ridge	City of Oak Ridge
Attention: Lyn Majeski	Attention: Lyn Majeski
200 Monterey Road	P.O. Box 1
Oak Ridge, TN 37830	Oak Ridge, TN 37831-0001

1.0 Current PLC Configuration:

The current configuration of the PLC/SCADA system is configured in the following manner.

1.1 Located in the Control Room of the Wastewater Treatment Plant (WWTP) is the main Allen Bradley 1771 series PLC where the logic processor resides with a Hot Stand-By Processor.

- All of the Input/Output (I/O) for all the equipment located in the Operations Building are directly wired to this PLC rack.
- All valve monitoring and control throughout the WWTP are connected to the redundant Rotork Pak-Scan controllers via Ethernet communications. The Pak-Scan unit controls all the valves via dedicated valve loop which will not be replaced in this upgrade.
- The Allen Bradley 1771 Series PLCs located in the Blower Building, Screening Building and Digester Building are all connected via dedicated fiber optic communications cable that will also remain.

- The Allen Bradley PLC located in the UV building is connected via Blue Hose utilizing Modbus communications protocol as well.
- The PLC in the UV building will not be upgraded in this project and is a stand-alone system with view only functions in the WWTP Control Room.
- The remote sites are all connected to the M-340 via the City's Fiber Optic Network and include the following:
    - East Plant Pump Station
    - Emory Valley Pump Station
    - Emory Valley EQ Basin
    - Scarboro EQ Basin
    - Three permanent flow meters located in the center of the City

1.2 There are two desk top PCs in the Control Room at The WWTP and one Desk Top PC at the Water Plant that provide monitoring and control of all the equipment connected to the Allen Bradley 1771 PLC, utilizing RS View for the Graphics and operational control interface. All users have their own login name and password and there are several different access levels granted depending on operator's needs.

1.3 The Allen Bradley 1771 PLC located in the Blower Building is connected to the PLC in the Operations Building via a point to point fiber optic cable. All of the I/O for all of the equipment located in and around the Blower Building are connected to this PLC rack. There is a desk top PC at this location configured exactly like the other in the Control Room of the Operations Building.

1.4 The Allen Bradley 1771 PLC located in the Screening Building is connected to the PLC in the Operations Building via point to point fiber optic cable. All of the I/O located in this building are connected to this PLC Rack.

1.5 The Allen Bradley 1771 PLC located in the Digester Building is connected to the PLC in the Operations Building via a point to point fiber optic cable. All of the I/O located in this building are connected to this PLC rack.

1.6 The Allen Bradley 1771 PLC located at the Turtle Park Pump Station is connected to the PLC located in the Operations Building via a Blue Hose cable. All of the I/O located in this building are connected to this PLC rack.

1.7 The PLC located in the UV Building is a stand-alone PLC that operates and controls the UV disinfection system located in this building. The UV PLC is connected to the PLC in the Operations Building via Blue Hose which has view only capabilities.

1.8 The M-340 that is described and located in the Operations Building will not be found on the as-built drawings. This is a new piece of equipment that will be in service by the time this contract is issued.

2.0 Proposed PLC Requirements

The City of Oak Ridge is requiring that the following items be incorporated into the design, build and programming of the new PLC/SCADA system at the WWTP.

2.1 PLC Requirements:

1. All PLCs shall be the M-340 manufactured by the Square D Corporation.
2. All M-340 shall utilize the P 342020 CPU manufactured by Square D.
3. All Digital Input cards shall be Square D part number DAI 1604.
4. All Digital Output cards shall be Square D part number DRA 1605.
5. All Analog Input Cards shall be Square D part number AMI 0810.
6. All Analog Output cards shall be Square D part number AMO 0410.
7. All Ethernet to Fiber Cards shall be Square D part number NRP 0200.
8. All Standard Ethernet Cards shall be Square D part number NOE 0110.
9. All RS485 Modbus cards shall be Square D part number NOM 0200.
10. All unmanaged Ethernet switches shall be a Square D Conexium Unmanaged TCSESU053FN0 switch.

3.0 Human Machine Interface (HMI) Requirements:

1. All HMIs shall be a Magelis HMI GTU with a 15.4" screen manufactured by Square D.
2. A total of seven (7) HMIs will be required for proper system viewing and control. The locations of these six HMIs are as follows:
    - Three (3) located in control panel in the Control Room in the Operations Building.
    - One (1) located on the door of the existing enclosure at the Blower Building.
    - One (1) located on the door of the new control panel for the Screening Building.
    - One (1) located on the door of the new control panel for Turtle Park.
    - One (1) located in the existing control panel at Y-12 Water Plant.
3. All HMIs shall have four (4) levels of operation based on sign in level. These levels are:
    - View Only Mode: Allows operator to view screens only and no operational changes permitted except to acknowledge an alarm.
    - Basic Operator: Allows operator to turn pumps on/off and acknowledge alarms.
    - Advanced Operator: Allows operator to change set-points as well as pump on/off and acknowledge alarms.
    - Super User: Allows operator to make control all functions of Advanced Operator as well as make changes to HMI settings.

4. All HMIs shall have the ability to have up to 50 different users with individual passwords to access their assigned access level.

4.0 Data Requirements:

1. Pump Run Time, Start/Stop per Hour/Day for all connected equipment as well as flow and level trending shall be viewable on all HMIs.
2. Pump Run Time, Start/Stop per Hour/Day as well as flow and level trending shall be transmitted to an external server (City of Oak Ridge to Provide) in a CSV format.
3. Alarm Logs shall be recorded and log shall be transmitted to the server in a CSV format.

5.0 Wiring:

The currently installed Allen Bradley 1771 Series PLC utilizes both 2-wire and 4-wire control circuits (*as indicated on the As-Built Drawings*) for the Start/Stop of pumps and motors. The proposed system shall incorporate dedicated 2-wire control only for all pumps and motors with dedicated outputs for all variable outputs. In order to clarify definitions of specifications the following definitions shall be true.

- Plant Wiring: Shall be defined as all wiring from the final terminal strip located on the PLC back plain. This includes all conductors from the PLC back plain to the motor control device. This shall also include all wiring inside the motor control enclosure. All communications wiring and fiber optic cables from the last termination point on the PLC back to the last termination point on the remote PLC back plain.
- PLC Wiring: Shall be defined as all wiring connected directly to the I/O of the PLCs to the last terminal strip on the PLC back plain. This includes all interconnecting wiring as well as all communications wiring from any device used or required by the PLC to communicate to the remote device.

5.1 The City of Oak Ridge will be responsible for all plant wiring changes required in the field to convert any 4-wire motor control circuit to a 2-wire motor circuit.

5.2 The City of Oak Ridge will be responsible for the integrity of all plant wiring.

5.3 The City of Oak Ridge will be responsible for the reliability and performance of any communications networks that leave any site.

5.4 The awarded proposer shall be responsible for all PLC wiring located within the back plain of the PLC or the control panel up until the point of the last terminal strip

5.5 The awarded proposer shall be responsible for all communication cable located within the PLC back plain or control cabinet.

5.6 The use of manufactured pig tails to adapt from the Allen Bradley 1771 card sockets to the socket of the Square D M-340 is acceptable and are in fact encouraged to facilitate a smooth and quick cutover.

6.0 Installation:

6.1 The installation of the PLC and associated equipment in the Operations Building shall be installed on the existing PLC rack. The awarded proposer shall make all necessary precautions to have as minimal interruption of plant operation as possible during the installation.

6.2 The installation of the PLC and associated equipment in the Blower Building shall be installed in the existing PLC enclosure. The awarded proposer shall make all necessary precautions to have as minimal interruption of plant operation as possible during the installation.

6.3 The installation of the PLC and associated equipment in the Digester Building shall be installed in the existing PLC enclosure. The awarded proposer shall make all necessary precautions to have as minimal interruption of plant operation as possible during the installation.

6.4 The PLC for the Screening building shall be in a new enclosure supplied by the awarded proposer. See specifications for requirements on the control enclosure.

6.5 The PLC for Turtle Park Pump Station shall be in a new enclosure supplied by the awarded proposer. See specifications for requirements on the control enclosure.

6.7 It shall be the responsibility of the awarded proposer to supply all the required parts and material required and install all parts and material as needed.

6.8 The City shall supply necessary personnel for the start-up and commissioning of the new SCADA system.

6.9 The start-up and commissioning of the SCADA System shall be coordinated with the City to keep interruptions of the WWTP operations to an absolute minimal.

7.0 New PLC Enclosures:

7.1 The new enclosures located in the Screening Building and at Turtle Park Pump Station shall be as follows:

- The enclosures shall be a Rated NEMA 4X with a minimum size of 24 X 30 X 10.5 and be painted steel.
- The door opening shall have a continuous gasket.
- The locking mechanism shall be a 3-point single point handle.
- The required HMI for each of these enclosures shall be mounted in the panel door.
- All digital I/O connections shall be isolated via Square D 8501Series relays with LED indication.
- Terminal strips shall be utilized for all connection from equipment located outside enclosure.
- An uninterruptable power supply manufactured by APC shall be located within the enclosure and must be capable of maintaining power to all devices located within the panel for a 1 hour minimum.

8.0 Qualifications:

8.1 All potential proposers must have a minimum of ten (10) years of business experience in the municipal and/or industrial market place performing the same type of work as outlined in this document. Upon request by the City of Oak Ridge, prior to award, the proposer must be able to provide documentation showing proof of meeting this criteria.

8.2 All submitted proposals shall include a minimum of ten (10) screen shots of past projects of similar nature that proposal provider has completed with job name and contact information.

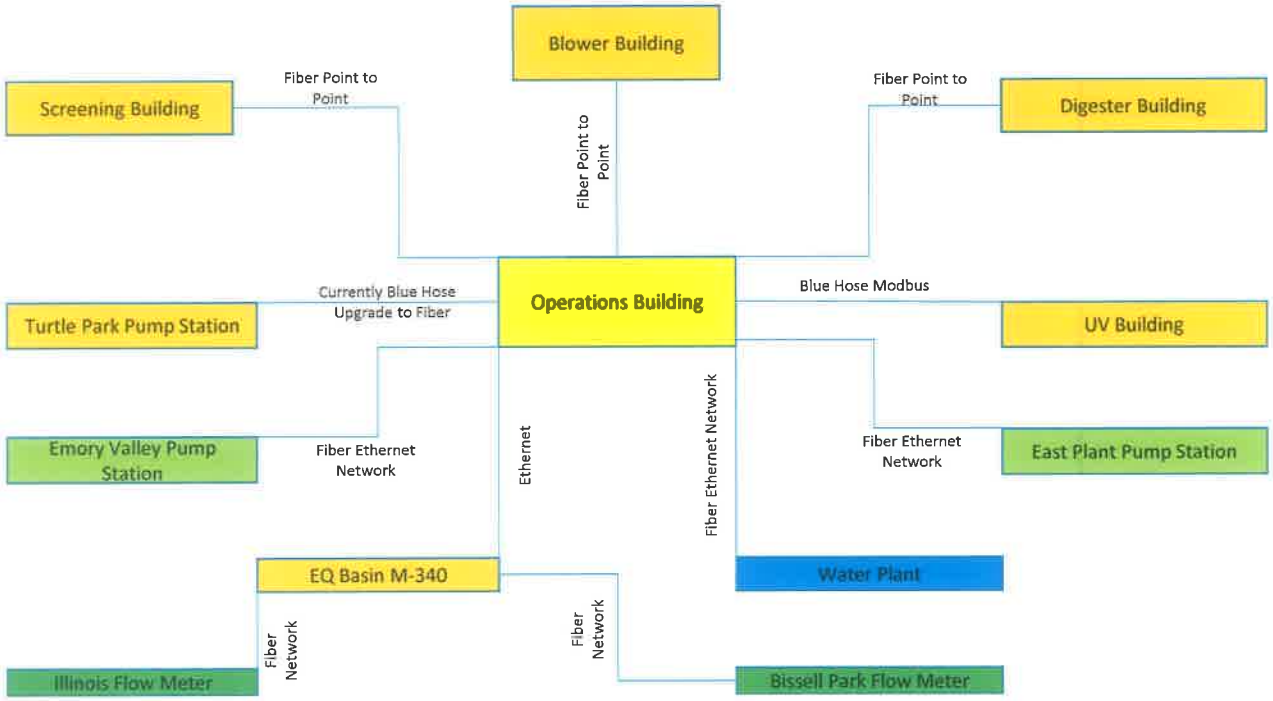
8.3 All proposals shall include documentation showing proficiency in programming and knowledge base in the Square D M-340 hardware and programming. A list of previous completed work utilizing this equipment shall be provided with proposal.

9.0 Pricing and Warranty

9.1 Please provide pricing for the proposed system including applicable hardware, software, programming and installation.

9.2 Please provide warranty information with your submitted proposal.

City of Oak Ridge WWTP PLC Overview



Operations Building at WWTP

PLC's Located on same property as Operations Building

Remote Locations connected via City Fiber Network

Remote Locations Connected to M-340

Remote Screen for Monitoring and Control Connected Via City Fiber Network