CITY OF ELGIN, TEXAS

REQUEST FOR PROPOSALS FOR

Acquisition of Replacement SCADA and Telemetry Systems for the City's Water System

RFP #2019-01

Due Date: Friday October 4, 2019 at 2:00 p.m. (local time)

Issued By: City of Elgin -Procurement Section
310 N. Main Street
Elgin, Texas 78621

SCADA and Telemetry Systems RFP,
Contact Information:

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1135 Swenson
Elgin, TX 78621

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CITY OF ELGIN, TEXAS
REQUEST FOR PROPOSALS
SCADA SYSTEM HARDWARE/SOFTWARE SYSTEMS AND SERVICES FOR UTILITIES

The City of Elgin, Texas is seeking proposals from controls firms for installation of new SCADA equipment, software, programming and on-call support services for the City's water and wastewater utilities Supervisory Control and Data Acquisition (SCADA) system. Services shall be provided by a company with a proven track-record of successful SCADA integration and are anticipated to include on-call technical support, system troubleshooting, periodic on-site programming and miscellaneous support. The SCADA Integrator shall be responsible for installation of hardware/software control systems including a Main Terminal Unit (MTU) and Remote Terminal Units (RTUs) to replace existing systems and upgrade existing facilities to expand functionality; however, where feasible and appropriate the proposal should include use of existing equipment such as relay boards, wiring, control boxes, etc. where possible.

Not only to ensure a timely changeover, but also to avoid having to replace perfectly serviceable items that can be salvaged going forward, a premium will be placed on utilization of existing equipment wherever possible and must be specifically identified in the proposal. The City of Elgin reserves the right to accept or deny use of equipment that is currently installed and functioning, that is proposed to be used during the changeover and/or to be a permanent and integral part of the new system. The City intends to contract with one or more SCADA Integrators to provide these services and equipment. Contracts will be for an initial five-year period with the option to extend annually for up to an additional three years.

System Overview

The current City of Elgin SCADA system includes a remote terminal unit at the existing Water Treatment Plant as well as remote terminal units at (1) Plant site, (3) storage tanks, (4) well pumps, (2) booster stations, and (3) water tower sites. A master control terminal will be located at the office of the Utility Director. The system provides control of booster stations and control valves as well as monitoring, data logging, and trending of tank and meter sites. It is anticipated that the system will continue to be expanded over the next five years to include all major potable water facilities. The existing system primarily includes proprietary PLC's, firmware, platform and software programming at the master site and remote facilities. Refer to Attachment B – "Typical SCADA System Specifications" for additional details.

Scope of Services

Services will be requested and performed on an as needed basis including, but not limited, to the following:

- SCADA Equipment including PLC's, enclosures and all peripheral equipment to provide a functioning SCADA system for the City of Elgin water treatment, storage and distribution system.
- PLC Programming & Troubleshooting
- Control Panel Troubleshooting & Modifications
- Radio Telemetry Troubleshooting
- Master & Remote Terminal Unit Troubleshooting & Upgrades
- Remote Terminal Unit Installation & Master System Integration

On-Call field service and support services will be performed at standard contract hourly rates plus material expenses. Installation of new control sites or major upgrades of existing facilities will be performed at fees negotiated prior to work.

Proposal Format and Content

Each interested firm must submit three (3) copies of sealed proposals at the location and time specified in this Request for Proposals.

Proposals shall be attached to the "SCADA Services Proposal Form" (Attachment A) and may include a cover letter or additional information not to exceed five (5) additional pages.

Proposal Evaluation & Selection Procedure:

Proposals will be evaluated under the following criteria:

1. Qualifications and experience of firm;
2. References from previous clients including satisfaction with system performance, reliability, and quality of service;
3. Service responsiveness.

The City's selection committee will review all proposals. The committee may conduct follow-up discussions/interviews with qualified firms and reserves the right to select the firms it feels are most qualified based on the proposals. The City reserves the right to reject any and all proposals or waive any informality. The procurement of these services will comply with the Texas Administrative Code. The City is an equal opportunity employer. Female and minority firms are encouraged to submit proposals.

Inquiries:

All inquiries regarding this Request for Proposals shall be addressed to Doug Prinz, Director of Utilities.

Doug Prinz, Utilities Director
1135 Swenson
Elgin, TX 78621
(512) 229-3257
dprinz@ci.elgin.tx.us

Proposal Submittal

Proposal shall include completed Attachment A – "SCADA Services Proposal Form" and may include a cover letter or additional information not to exceed five (5) additional pages. Three (3) copies of the proposals described herein must be received in a sealed envelope clearly marked "City of Elgin SCADA System Services" no later than 2:00 p.m. on Friday October 4, 2019. Proposals shall be addressed to:

City of Elgin -Procurement Section
310 N. Main Street
Elgin, Texas 78621

Attachment A - SCADA System Acquisition and Services Proposal Form

The following information shall be completed by firms submitting proposals for City of Elgin SCADA Services. Firms may provide a cover letter or additional information not to exceed five (5) additional pages. The Owner reserves the right to request additional information following proposal submission deemed as assistance for proposal evaluation.

1. Year firm was established
   (or year firm began providing control/SCADA services, if later). _____
2. Total number of employees. _____
3. Number of field service staff. _____
4. Typical response time for troubleshooting/repair field service requests (days).
   _____
5. Guaranteed response time for troubleshooting/repair field service requests.
   _____
6. References:
   A. Reference #1 Customer:

      Location (Town or City):

      Number of System Sites (RTU/MTU):

      PLC Hardware Type:

      Add in: Windows Software

      Platform (All references)

      PC Software System (if applicable):

      Contact:

      Title: Telephone Number:

   B. Reference #2 Customer:

      Location (Town or City):

      Number of System Sites

      (RTU/MTU):

      PLC Hardware Type:

      Add in: Windows Software

      PC Software System (if applicable):

      Contact:

      Title: Telephone Number:

C. Reference #3 Customer:

Location (Town or City):

Number of System Sites

(RTU/MTU):

PLC Hardware Type:

Add in: Windows Software

PC Software System (if applicable):

Contact:

Title: Telephone Number:

7. Proposed Standard Rates (Rates may be revised at time of annual contract renewals)

Hourly Field Service (Not including Travel)	$_____/ hour
Minimum Field Service Charge (Including Travel)	$_____/ daily trip
Telephone Support (if applicable)	$_____/ hour

8. Non-Binding Site Installation Estimates. (Refer to "Typical SCADA System Specifications" for scope of typical site installations. Exact scope of any proposed future installations will be defined, and Quotes/Proposals requested at that time. Exclude cost of computer hardware software that will be quoted in item 9.)

Master Terminal Unit	$_____
Ground Storage Tank RTU	$_____
Water Tower RTU	$_____
Meter/ Control Valve RTU	$_____
Booster Station RTU	$_____
Well Pump RTU	$_____

9. Proposed Hardware/Software purchase, installation and annual License and Maintenance Fees:

One-time purchase and installation cost	$_____
Annual License and Maintenance Fee	$_____

The undersigned hereby authorizes and requests any person, firm or Corporation to furnish any information requested by the Owner or TRC in evaluation of the submitted proposal:

Company: _____

By: Title: _____

Date:

ATTACHMENT B - SCADA SYSTEM SPECIFICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

This document provides information on the existing City of Elgin potable water utility SCADA system and typical requirements for such facilities. Work for this installation includes design, documentation, assembly, installation, field testing, startup, training, and final documentation for project controls to replace the City's existing system. Major components generally include enclosures, hardware, firmware programming, PC hardware, software platform, software programming, materials, equipment, and installation required to provide a fully operational SCADA system.

1.2 GENERAL REQUIREMENTS

Electrical: All wiring shall be in complete conformance with the National Electric Code, state, local and NEMA electrical standards. All incoming and outgoing wires shall be connected to numbered terminal blocks and all wiring neatly tied and fastened to chassis as required. For ease of servicing and maintenance, all wiring shall be color coded and uniquely numbered. The wire color code and number shall be clearly shown on the drawings, with each wire's color and number indicated. SCADA MTU and RTU panels shall be UL certified by the SCADA integrator.

1.3 QUALITY ASSURANCE

A. General: The controls provider shall be responsible for and shall provide for the design, supply, delivery, installation, certification, calibration and adjustment, software configuration, testing and startup, owner training, warranty and routine future field services for new installations.

B. Standard Products: In order to achieve standardization in appearance, operation, maintenance, spare parts and manufacturer's service, to the greatest extent practicable, like items of equipment provided hereunder shall be the end products of the same manufacturer.

1.4 SUBMITTALS

Hardware Submittals: Before any components are fabricated, and/or integrated into assemblies or shipped to the job site, bidder shall furnish to the Owner for their review, copies of submittal documents. Submittals shall include descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these specifications. Specifically, submittals shall include the following materials:

1. Block diagram and operational description of the system showing all major components and their interconnections and interrelationships. Label each diagram and specify all external power and communications interfaces. Final documentation sets shall be furnished in bound hardcopy and documentation shall also be provided in electronic format on CD.

2. Drawings of equipment to be supplied shall include, as a minimum: overall dimension details for each panel, console, etc., including internal and external arrangements and door mounted operator. Devices with nameplate designations. Wiring diagrams of equipment including field device connections shall be included and specific installation/wiring requirements identified.
3. Operational Description shall include the principal functions/capabilities of each personal computer (PC) and PLC as provided and configured/programmed. Included shall be a description of system communications.

1.5 OPERATION AND MAINTENANCE MANUALS AND SOFTWARE

General: Provide complete hard-covered, ring bound, loose-leaf O&M manuals as well as one digital copy for all new facilities. Manuals shall include operating and maintenance literature for all components provided.

The submitted literature shall be in enough detail to facilitate the operation, calibration, testing, and maintenance of each component and/or instrument.

All software and tools required for configuring and programming the MTU, RTU's, PLC's, and SCADA software shall be provided and licensed to Owner under an annual maintenance and license Agreement.

Contents of the O&M manuals shall include the following sections:

1. System Hardware/Installation
2. System Software
3. Operation
4. Maintenance and Troubleshooting

PART 2 - PRODUCTS

2.1 GENERAL

A. General: The functions and features specified herewith are typical requirements of standard control site installations. Specific requirements of individual sites may vary and would be determined for any proposed future installation prior to a Request for Quote. In some cases, the specifications may allow the accomplishing of certain functions by means of more than one hardware/firmware/software approach. Any approach that is proposed shall equal or exceed all functional, operational, convenience and maintenance aspects of the one described. Major equipment, component and software items may be specified in advance; however, the controls provider shall include all appurtenant items necessary to achieve the required operation.

B. Existing System Overview: The existing City of Elgin SCADA system includes a remote terminal control station (MTU) at the existing Water Treatment Plant (**Plant 1A, Plant 1B, Plant 2A and Plant 2B)**as well as remote terminal units at the **Base Station, Pistol Hill Booster Station, Ground Storage Booster Station, Water Towers 1 & 2, Elgin Oaks Water Tower and Wells 10, 14, 15, and 16**. The

system provides control of the Water Treatment Plant in addition to the booster stations, wells and towers as well as monitoring, data logging, and trending of all sites.

2.2 CENTRAL MONITORING AND CONTROL STATION (MTU)

A. Proposed System Overview: A PLC panel and SCADA PC computer will be installed at the Office of the Utility Director, to serve as a central monitoring and control station (MTU). The SCADA PC graphics platform will be Wonderware System Platform with 5,000 tag capacity. The MTU station receives and transmits all inputs and outputs described at all sites. PC Software provides remote monitoring, data logging, and trending of meter flows, tower and tank levels, and pump run times. SCADA software will include reporting and trending within software as well as ability to export standard reports to Excel worksheets. The system will be accessible via password protected internet access and provides automated alarm notification and acknowledgement via telephone and email communication. System provides automated backup of recorded data.

B. SCADA PC Screens: The SCADA PC software and graphics includes the following screens:

1. Map Overview Screen
    a. Area wide overview with GIS or dynamic Google Maps (or similar) base mapping showing major roads and corporate boundaries. Base mapping shall include water system linework from City provided shape files which shall be updatable by Owner
    b. Tank Levels depicted graphically and numerically as water depth and/or percent full.
    c. Booster pump station status including Run, Fail, Idle condition
    d. Control valve status as Open or Closed Condition
    e. Selectable navigation to screen for any site providing full site details.
    f. Indication of signal failure to any site
2. Plants
    a. Plant Enable
    b. Plant Status
    c. Blower Run Status (Each Blower)
    d. Blower Enabled Status (Each Blower)
    e. Blower Alarm Status (Each Blower)
    f. Discharge Pressure Setpoint
    g. Discharge Pressure
    h. Pump Run Status (Each Pump)
    i. Pump Enabled Status (Each Pump)
    j. Pump Alarm Status (Each Pump)
    k. Discharge Pressure Setpoint
    l. Discharge Pressure
    m. Suction Pressure
    n. Valve Open/Close

o. Valve Open/Close Status
p. System Operation Mode (Auto/Manual)
q. System Reset Required
r. System Reset Request
s. General Alarm
t. Discharge Flow Rate
u. Master Meter
    1. Total daily Flow
    2. Current Flow Rate
    3. 24 hour historical flow rate
    4. Previous seven day flow

3. Booster Stations
    a. Pump Run Status (Each Pump)
    b. Pump Enabled Status (Each Pump)
    c. Pump Alarm Status (Each Pump)
    d. Discharge Pressure Setpoint
    e. Discharge Pressure
    f. Suction Pressure
    g. System Operation Mode (Auto/Manual)
    h. System Reset Required
    i. System Reset Request
    j. General Alarm
    k. Discharge Flow Rate
4. Water Towers
    a. High- and low-level alarm setpoints
    b. Pump on/off or control valve open and close level setpoints for applicable sites
5. Tank Sites
    a. Numerical display of current level
    b. Graphical indicator of current level
    c. Graphical display of 24-hour historical tank levels.
    d. High- and low-level alarm setpoints
    e. Pump on and off or control valve open and close level setpoints for applicable sites
6. Historical Data Screen
    a. Configurable graphical display of any individual or multiple selected monitored or calculated values
    b. Report Generation
7. Alarm Configuration Screen (may be provided in add-on software package)
    a. Configuration of alarms which initiate notification
    b. Configuration of notification email addresses and telephone numbers

2.3 BOOSTER STATION CONTROL PANELS

A. Control panels shall be installed at the booster station to monitor the booster pump system and provide alarm acknowledgement and setpoint interface control. For the purpose of control provider budgetary pricing, power electric service and suitable power circuit shall be assumed to already be available at the booster station. Control Panel shall be assumed to be wall mounted within the station. Telemetry shall be assumed to be via RF transmission, cellular data modem or better.

B. The proposed equipment shall be housed in a corrosion resistant welded NEMA Type 4X enclosure. Units shall include a single gasketed front door. Full height hinges and door clamping hardware shall be included.

C. Inputs and Outputs: The RTU shall be capable of accepting a minimum of two local analog inputs (AI), ten digital inputs (DI), and six digital outputs (DO), with expansion capability for additional inputs and outputs. Initial inputs and outputs shall be as follows:

Description	Type	Source/ Output Location
Booster System Common	DI-1	Booster Station Control
Mag Meter Pulse Flow	DI-2	Mag Meter Transmitter
Booster System Discharge Flow	AI-1	Mag Meter Transmitter

D. Booster System Monitoring: The RTU shall communicate to the Booster System Control Panel via Ethernet to provide monitoring or pump and system status, allow adjustment of system setpoints and allow remote system to reset.

The SCADA system shall provide monitoring only of the following booster system status items:

1. Pump Run Status (Each of Three Pumps)
2. Pump Enabled Status (Each of Three Pumps)
3. Pump Alarm Status (Each of Three Pumps)
4. Discharge Pressure
5. Suction Pressure
6. System Reset Required
7. General Alarm

The SCADA system shall also provide monitoring and adjustment of the following:

1. Discharge Pressure Setpoint
2. System Operation Mode (Auto/Manual)
3. System Reset Request

Totalized and instantaneous flow measurements shall also be provided through the SCADA system.

2.4 WATER TOWER CONTROL PANELS

A. Remote terminals at each water tower will be installed to monitor tower level and provide control of applicable control valves or transfer pump stations for tank fill control, based on adjustable low and high level setpoints in the tank. For the purpose of control provider budgetary pricing, Water Tower Control Panel telemetry work shall be assumed to also include material furnishing and installation of galvanized steel electrical mounting rack, meter base, and 100 amp minimum 12 space panelboard. Telemetry shall be assumed to be via RF transmission, cellular data modem or better.

B. The proposed tower equipment shall be housed in a corrosion resistant welded NEMA Type 4X enclosure. Enclosures shall be fabricated from stainless steel. Units shall include a single gasketed front door. Full height hinges and door clamping hardware shall be included.

C. Inputs and Outputs: The RTU shall be capable of accepting a minimum of two local analog inputs (AI), ten digital inputs (DI), and six digital outputs (DO), with expansion capability for additional inputs and outputs. Initial inputs and outputs shall be as follows:

Description	Type	Source/ Output
Tank Level	AI-1	Level Sensor

D. Equipment shall operate from a source of 120 volts, 1 phase, and 60 Hz. Circuit breakers shall be quick- make, quick-break, thermal-magnetic, trip indicating. Single pole circuit breakers shall be UL listed as "Switching Breakers" at 120 Volts and shall carry the SWD marking.

E. Surge protection shall be installed to protect electrical components in accordance with minimum International Society of Automation (ISA) standards. All analog signals coming from instrumentation to the control panel shall be protected with surge suppression. All digital input/output signals and instrumentation shall be protected by inline fuses. Transient voltage surge suppression (TVSS) shall be installed in the control panel. Insulation and grounding of suppressors shall be in conformance with manufacturers recommendations.

2.5 TANK CONTROL PANELS

A. Control panels shall be installed at new storage tanks to monitor tank level. Master SCADA controls shall also provide control of applicable control valves or transfer pump stations for tank fill control based on adjustable low and high level setpoints in the tank. For the purpose of control provider budgetary pricing, Tank Control Panel telemetry work shall be assumed to also include material furnishing and installation of galvanized steel electrical mounting rack, meter base, and 100 amp minimum 12 space panelboard. Telemetry shall be assumed to be via RF transmission, cellular data modem or better.

B. The proposed tank equipment shall be housed in a corrosion resistant welded NEMA Type 4X enclosure. Enclosures shall be fabricated from stainless steel. Units shall include a single gasketed front door. Full height hinges and door clamping hardware shall be included.

C. Inputs and Outputs: The RTU shall be capable of accepting a minimum of two local analog inputs (AI), ten digital inputs (DI), and six digital outputs (DO), with expansion capability for additional inputs and outputs. Initial inputs and outputs shall be as follows:

Description	Type	Source/ Output
Tank Level	AI-1	Level Sensor

D. Equipment at the Control Panels currently operate from a source of 120 volts, 1 phase, and 60 Hz. If needed to be replaced, they will be replaced with Circuit breakers and shall be quick- make, quick-break, thermal-magnetic, trip indicating. Single pole circuit breakers shall be UL listed as "Switching Breakers" at 120 Volts and shall carry the SWD marking.

E. Surge protection shall be installed to protect electrical components in accordance with minimum International Society of Automation (ISA) standards. All analog signals coming from instrumentation to the control panel shall be protected with surge suppression. All digital input/output signals and instrumentation shall be protected by inline fuses. Transient voltage surge suppression (TVSS) shall be installed in the control panel. Insulation and grounding of suppressors shall be in conformance with manufacturers recommendations.

2.6 COMPONENT SPECIFICATIONS

A. MTU and RTU Panels: Existing control panel enclosures should be used if possible, but if not shall be NEMA Type 4. Units shall include a single gasketed front door. Full height hinges, locking hasp and door clamping hardware shall be included. All panels shall be UL certified.

Controls shall operate from a source of 120 volts, 1 phase, 60 Hz. All controls shall be protected from lightning or other transient voltages by a surge protection device (SPD). All power supplies required for operation shall be provided. Power supplies shall be sized to have a minimum of 40% spare capacity providing increased reliability and allowing for the addition of future equipment. Optical isolators shall be provided on all analog inputs for surge suppression. Enclosure shall have a heater for condensation protection.

All wiring shall be in complete conformance with the National Electric Code, state, local and NEMA electrical standards. All incoming and outgoing wires shall be connected to numbered terminal blocks and all wiring neatly tied and fastened to chassis as required. For ease of servicing and maintenance, all wiring shall be color coded and uniquely numbered. The wire color code and number shall be clearly shown on the drawings, with each wire's color and number indicated.

Relays shall be plug-in relays with contacts rated 5 amperes at 120 volts AC and clear polycarbonate covers. Relays shall be like square D RS14, Class 8501 general purpose relays with screw terminal sockets mounted in a NEMA 1 enclosure. All digital input/output signals and instrumentation shall be protected by inline fuses.

B. PLC Control/Telemetry System: Each PLC panel shall have adequate memory and instruction sets required to make the unit perform all functions required by this specification. Units shall communicate with each other and with remote I/O panels via Modbus protocol.

All control signals, status signals, alarms, and process variable data shall be transmitted and received between the sites via the telemetry system. The system shall convert commands, alarms and variable analog data to digital blocks and transmit this information. The PLCs shall be capable of stand-alone control to maintain programmed logic.

Units shall be furnished completely configured and tested providing the specified communication, monitoring, display, input/output, annunciation, computational and other requirements for operation of the system. Any additional components required for operation, whether specifically referenced herein or not, shall be provided.

The PLC system shall be based on a scalable modular multi-use open architecture platform that can be efficiently applied to perform the necessary functions at each location. Each controller/telemetry unit shall be a modular hardware style PLC consisting of a CPU with adequate memory and instructions, power supply, local and remote input/output modules, communications ports, and all other components required to make the unit perform all the functions required in this specification.

The PLC system shall support true system open architecture allowing full integration of other third-party generic hardware/software devices. The architecture shall meet the requirements as herein defined and allow economical expansion of function and features based on new and evolving technologies.

1. Programmable Logic Controller (PLC): The PLC system shall be based on a robust, field proven, current technology hardware platform allowing utilization of the latest advances in technology and permitting the most open programming and communication architectures. The PLC system shall be modular and scalable to be efficiently applied at each of the specified sites within the system.

   The PLC system shall include a real time of day-time clock w/battery backup for time stamping of data log records and scheduling of periodic time of day-based events. Clock shall not require reset after a site power failure has occurred.

   The PLC shall store system parameters including, logic configuration, setpoints, time delays, alarm and event data, counters and totalizers, etc. in field programmable (FLASH) non-volatile memory. Enough non-volatile memory must be provided to protect at least 8,000 variables. The PLC shall also provide enough protected memory for time stamped data logging of up to 200,000 process values. This data shall be unaffected by power interruptions.

   The PLC shall have enough processing power and working (DRAM) memory to enable high level programs such as Internet Web Servers to operate efficiently without affecting other simultaneous multitasking operations.

The PLC shall be furnished with a minimum of 6 communication ports with true multitasking and allow simultaneous support of all ports. Ports can be configured for local I/O, Operator Interface/display support, LAN/WAN, etc..

The PLC processor shall meet the following as a minimum:

a. CPU - True 32 Bit running at 50 MHz
b. 16 MB - 32 bit Dynamic RAM
c. 8 MB FLASH
d. 512 KB Static RAM
e. 1 (One) Ethernet 10/100 BaseT port (RJ45)
f. 1 (One) RS-232 Serial Communications (115 KB PS)
g. 1 (One) Local I/O port
h. 1 (One) Display Serial Communications Port

The PLC shall not require any specialized tools for removal of the unit. System components including PLC, power supplies, etc. shall be DIN rail mounted. Terminations shall be via plug in connectors facilitating quick field replacement.

PLC's and associated I/O modules shall meet national and international safety standards including UL, CSA, CE, DNV and Zone 2 Rated. In addition to the safety standards PLC system components shall also meet IEEE-472 (ANSI C37.90) surge withstand and IEC68-2-6 Vibration standards.

The PLC shall operate from a 10-30 VDC power source. A battery and charger as previously specified shall be supplied to power the master & remote unit during 120 Volt service power outage conditions.

The PLC's shall have an operational temperature range of -40ºC to 70ºC (-40ºF to 158ºF) under relative humidity conditions of 5 to 95% non-condensing. Storage temperature range up to 85ºC (185ºF)

2. Software: The PLC shall have a high-performance open source software architecture that utilizes a true multitasking operating system running a combination of standard and specially designed for water and wastewater application software modules. The system provided shall utilize an integra-ted system approach providing a comprehensive common configuration tool for all components within the system including I/O, Processor, Communications, and Operator Interface Display. The architecture shall permit all system components to be configured, simulated, tested and downloaded from one terminal to all system components. The operating system shall be multitasking and allow a minimum of two separate programs to run simultaneously without affecting each other.

To provide for and ensure multiple source support, the PLC system shall utilize industry standard programming language certified by the PLC open committee for all five languages supported by the IEC 61131-3 standard including; Sequential Function Chart, Ladder Diagram, Structured Text, Instruction List, and Function Block Diagram. All five languages must be included. Any one or a combination of the programming languages can be used to implement the system strategy. The programming software must be Windows™ based and be able to operate on Windows 10 - 64 Bit operating systems.

PLC's provided under this specification shall be capable of performing the necessary logic to control the system as previously defined. These capabilities shall include, but not be limited to the following:

a. Discrete input/output
b. Analog input
c. Analog output
d. Timers
e. Pump Controller
f. Pump Alternation
g. Mathematical Function Blocks
h. Stage Blocks
i. Trending
j. Latch/unlatch relays
k. Counters
l. Comparators
m. Ladder logic
n. Flow Totalization/Integration
o. Intrusion Detection
p. Time of Day Control w/Lockout
q. Ramp Blocks
r. Data Logging

Communications between a PLC and any computer shall be accomplished using standard off-the- shelf drivers allowing use of standard Windows DDE and/or OPC software drivers. The PLC system configuration software shall allow the MTU tag name data base to be exported to the computer HMI software providing continuity between PLC and HMI tag names and making future changes/upgrades more efficient and less prone to database tag name error. Communications between the PLC any link computer shall be via high speed communications port (RS-232 up to 115 Kbps) or Ethernet 10/100 Base T (10/100 Mbps) in conjunction with a modem over the previously specified telemetry medium.

Each unit shall be furnished with built in O & M data associated with its specific site including; as a minimum, basic system information, panel layouts, wiring diagrams, material lists w/part numbers, and operational summary. This information shall be accessible locally or remotely.

3. I/O Systems: The PLC system shall have I/O resources to support a wide variety of applications without needing to depend upon alternate technologies to meet various system data requirements. Each PLC shall be supplied with the required I/O to meet the specified requirements and allow for a minimum of 100% spare capacity for future expansion. The PLC system shall be easily scaled from a standalone unit capable of supporting a minimum of 64 local, 64 remote I/O, and 64 Ethernet networked I/O points or one of 1284 RTU's with a total system data handling capability of 10,000 points.

The PLC system shall support a wide variety of modular I/O with various configurations to permit the most efficient use of I/O hardware and panel space. I/O modules shall be available for local I/O (within control panel), remote I/O (RS-485 based distributed outside of the control panel) and Ethernet based I/O (Distributed I/O on high speed in plant network or wireless Ethernet). Each I/O module shall be DIN rail mounted, have compression wire type terminals capable of accepting 14 AWG wire, have wire identification markers and I/O wiring diagram. Each module shall include diagnostic LEDS indicating module operational and I/O status. Each I/O module shall be electrically isolated, meet IEEE-472 (ANSI C37.90) surge withstand certification, shall be removable under power and easily field replaced with a spare module requiring no software/hardware reconfiguration adjustments. Each module shall be safety keyed to insure proper installation. I/O modules shall permit installation and operation in hazardous locations as classified under UL, CSA Class 1, Div. 2, Groups A, B, C & D.

a. Local I/O modules shall be connected to the PLC by a dedicated high-speed serial communications port and shall allow local networking of I/O modules. Local I/O to PLC update time shall not exceed 150 mS.

b. Ethernet I/O modules shall be connected to the PLC by on board Ethernet 10/100 BaseT connection port. Ethernet I/O modules shall support multiple communications including TCP/IP and Modbus ASCII and RTU allowing connection to any device supporting these protocols over standard Ethernet backplane.

C. Battery Back Up System: Included with each PLC and I/O station and working in conjunction with the unit's DC power supply, shall be an intelligent battery backup system including battery health logic module, charger and sufficiently sized battery. Battery system shall provide full on-line protection, power conditioning, and a seamless switchover to battery upon detection of main DC power supply failure. Once main DC power is restored, the unit shall provide seamless switchback to normal DC power source and recharge the battery. Battery health logic module shall individually monitor main DC power supply, battery and converter voltages for low voltage conditions, and provide low voltage cutoff to protect battery from an unrecoverable depletion. An on-board LED, or local Operator Interface (OI) if provided shall locally indicate detection of an alarm condition. In addition to local indication, all battery health and voltage information shall be transmitted to the Master PLC for centralized monitoring and alarm detection. The unit shall be capable of providing one-half hour of battery backed operation for all Master Station equipment.

Battery system shall be of enough capacity to provide a minimum of two (2) hours of backup in the event of a failure of the main power source. To avoid battery damage and erroneous data transmissions when operating on battery, should the battery voltage drop below 10.8 V, the PLC shall be inhibited from operation. Recovery shall be automatic upon restoration of normal power. The intelligent battery backup system shall be able to source 5 Amps allowing operation of mission critical components including; sensors, local alarm, and communication equipment during a power failure condition.

2.7 INSTRUMENTATION
Not applicable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Equipment specified in this section shall be installed in accordance with the manufacturer's recommendations at the locations as shown on the plans.

B. Field Service: Provide experienced personnel to supervise, perform, and coordinate the installation, adjustment, testing, and startup of the system. The personnel shall be present on-site as required to affect a complete and operating system. All elements of the system shall be tested to demonstrate that the total system satisfies all of performance requirements. The controls provider shall provide all special testing materials and equipment required and shall coordinate and schedule all testing and startup work with the Owner. As a minimum, the testing shall include both a factory test and a field test.

C. Training: The training program shall educate operators, maintenance, and management personnel with the required levels of system familiarity to provide a common working knowledge concerning all significant aspects of the system being supplied.

NOTE: SPECIFICATIONS CONTAINED HEREIN ARE CONSIDERED OPTIMAL FOR THE PROPOSED SCADA SYSTEM DESIRED BY THE CITY. IT IS UNDERSTOOD THAT SIMILAR OR ALTERNATE EQUIPMENT, DESIGNS OR SOFTWARE MAY BE SUITABLE FOR THE CITY'S NEEDS. ALTERNATIVES TO SOLUTIONS OR METHODS SPECIFIED IN THIS DOCUMENT ARE ENCOURAGED. BIDDERS THAT PROPOSE USE OF EXISTING EQUIPMENT WILL BE CONSDERED VERY FAVORABLY. THE CITY WILL DETERMINE WHETHER THE FINAL SCOPE OF THE PROJECT TO BE NEGOTIATED WILL BE ENTIRELY AS DESCRIBED IN THIS RFP , A PORTION OF THE SCOPE , OR A REVISED SCOPE.

END