

2. xx CELLULAR AND INTERNET BASED SCADA SOLUTION

- A. The water and wastewater facilities SCADA system shall be comprised of a hosted, Internet based human machine interface portal (Link2Site™ system) which communicates to remote sites utilizing a readily available commercial cellular network. The system shall be:
1. Totally integrated, fully automated control and monitoring solution suitable for stand alone local functionality and have simultaneous Internet based remote access.
 2. The solution shall include the required Internet based interface software, Internet wireless terminal (Link2Site cellular modem) and dedicated pump controller unit for each of the required water and wastewater facility sites.
- B. Optional redundant communication capability shall include conventional, dedicated radio or telephone and cellular connection capability operating in a fully automatic redundant mode. This communication option shall include the required controller physical connection and software as a standard product offering to support the redundancy capability.
- C. The cellular connection capability shall allow any authorized user to securely connect to the system from anywhere with an Internet connection. The Link2Site system shall be accessed utilizing a standard web browser software package, which shall function as a traditional SCADA system software interface including the following functions:
1. Interface functionality such as pump start/stop setpoint adjustments, remote on/off control, and alarm setpoint adjustment shall be included as a minimum.
 2. Remote site access security and controller configuration security shall be implemented via user entered passwords or with electronic key reader iAccess technology. Configuration changes and facility site access shall be recorded as time-and date-stamped events. These events shall then be reported and recorded over the wireless cellular connection.
 3. Alarm acknowledgement and alarm silencing capability shall be incorporated in the Link2Site system interface package.
 4. An “Update Now” function shall allow an authorized user to update the entire system automatically on demand from the Link2Site system.
- D. The Link2Site system shall provide immediate notification of facility operational and security alarms utilizing the following Owner furnished communication methods:
1. E-mail account notification.
 2. Standard Owner pager systems.
 3. Designated phone call.
 4. Text Messages
 5. All four methods at once.

- E. Advanced callout scheduling functionality shall ensure the appropriate person and/or persons are called in the event of a specific alarm type. Acknowledging alarms shall be handled by the authorized Owner personnel using either the telephone or Internet interface.
- F. The Link2Site system shall be user-friendly, configurable, and flexible. Access to the Link2Site system shall be through a secure Login Home page. Once logged into the system, the authorized operator will be able to select from the following Menu selections and associated display pages:
1. Enterprise Status Menu shall provide a facility wide overview map with facility site statuses, site list display, site detail displays.
 2. Logs Menu shall provide user access to Alarms and User/Site Event. The software shall include time- and date-stamped records for all alarms, Alarm “Acknowledgements” and Alarm “Clear” status. The software shall include time- and date-stamped records of all system Events.
 3. Reports Menu shall provide both system and Site Report displays. The system Report display shall confirm site communication connection to the Link2Site system as well as Flow and Pump Summary displays. The Site report shall provide a Communication Connection History report, Site Access report, Monthly (Site) Station report, Yearly (Site) Station report, Station (Site) Rainfall Report, and Station (Site) Flow history report. The system shall include time- and date-stamped records of Site Access including who, when and how long an individual was at the site.
 4. Graphic Menu shall provide Station (Site) Graphic displays, Detailed Station (Site) performance displays including pump cycle details and runtime and an Analog Values Report display. The system shall support equipment maintenance alerts for calculated unbalanced runtimes, runtimes exceeding setpoints, runtimes exceeding thirty- (30) averages and number of starts exceeding setpoint.
 5. Setpoint Menu shall provide setpoint definition displays and facility detail displays.
 6. Logout Menu shall allow the user to exit the Link2Site system web site.
- G. Advanced pump station performance algorithms shall be provided allowing for pump station performance optimization and offering the following capabilities:
1. Optimization shall offer reduction in facility energy requirements and help prolong equipment life.
 2. Configurable multiple, multi-point trend displays shall be a standard offering and shall be used to illustrate how different pieces of equipment and system components work together.
 3. The trending package shall allow users to track the operation and performance of different system equipment and assets over time.
 4. Users shall have the ability to determine and select variables in the system to track together and to save the custom trends for future use.
 5. Advanced pump station operation and maintenance functionality shall allow the user the ability to monitor pump performance over time, which will be used to predict pump station and/or other facility asset failures before they occur.

6. The system shall provide multiple methods of volumetric flow including pump run times, wetwell drawdown, wetwell drawdown with compensation for inflow rate. The volumetric flow calculation will be available for the entire pumping station or individual pumps to assist with overall performance analysis.
- H. The Link2Site system shall constantly monitor its own health and provide immediate notification of any system wide signal losses, alarms, or events while maintaining reasonable and responsible cellular long term costs.
- I. An Internet wireless terminal modem shall provide the communication interface between the local site dedicated pump controller unit and the cellular network provider. This wireless terminal modem shall transmit pump controller collected data to the Link2Site system via the cellular network.
- J. The provider of the Link2Site system shall be responsible for confirmation of cellular coverage for the sites to be monitored, establishment and setup of the cellular plan, procurement of the appropriate SIM modules, testing of the cellular modems, and end user billing of the cellular air time. The cellular coverage contract shall be between the end user and Siemens Water Technologies.
- K. The Link2Site cellular modem shall incorporate the following general functional design requirements:
 1. Power for the Link2Site modem shall originate from the local pump controller or via a separate 12 or 24 VDC power supply, as required. An integral power ON/OFF switch and operational status light shall be included
 2. An RS232 serial interface 9-pin connector cable between the Link2Site modem and IntraLink LC150 pump controller shall be installed in accordance with industry standards. The required pump controller RJ45 connector to the Link2Site modem DB9F modular adapter with the correct communication protocol pin-out shall be furnished.
 3. The supported standard protocols shall include as a minimum Modbus, IntraLink and DF1.
 4. Include the required antenna and appropriate cable for secure and reliable operation over the cellular communication network.
 5. Support an extended temperature range of -22°F (-30°C) to +158°F (+70°C) for the Link2Site cellular modem normal operation.
 6. The Link2Site modem shall support Circuit Switched Data (CSD) transmission rate of up to 14.4 kbps required to support mobile cellular phone systems.
 7. The Link2Site cellular modem shall support a Quad-Band Global system for mobile communication (GSM) of 850, 900, 1800 and 1900 MHz.
 8. Link2Site modem support of a standard Java software development platform, which supports Information Module Profile - Next Generation (IMP-NG). The software platform shall allow the modem to update its application over the air (OTA) in a simple and reliable manner as well as transfer and receive confidential data in a secure environment using industry standard data encryption methods.

- L. The IntraLink LC150 pump controller shall be furnished for local, dedicated monitoring and automatic control of the required water and wastewater facilities and shall communicate over the specified wireless cellular network to the Link2Site system.
1. It shall be a standard, catalogued product of a water and wastewater pumping automation equipment manufacturer regularly engaged in the design and manufacture of such equipment.
 2. The pump controller shall be specifically designed for water and wastewater pumping automation utilizing built-in preconfigured control and telemetry strategies allowing pump up or down mode pump control of 1 to 3 pumps. "One of a kind" system hardware using custom software with a generic programmable controller will not be acceptable.
 3. The pump controller operating program shall be resident in non-volatile FLASH memory and include full-scale ranging and pump-up/down determination.
 4. The pump controller shall be arranged to operate up to three (3) pumps plus high and low (analog) alarms. The ON and OFF adjustments of each pump and alarm setpoint shall be full-range adjustable through use of a software configuration package or an optional operator interface keypad with appropriate security clearance. The controller operator display shall show the operation of each control stage.
 5. The pump controller shall include adjustable on-delay timing logic to provide staggered pump starting following a power failure condition. Adjustable off delay timing for each pump control stage shall provide smooth transition between control stages.
 6. The pump controller operating voltage shall support either a 120 Volts AC or 10–30 Volts DC power sources.
 7. A power on LED shall be built on board providing local indication that power is available to the unit.
 8. The unit shall be battery backed to provide continued system monitoring and alarm annunciation in the event of primary power failure. It also shall have built in battery charging circuitry to maintain and charge battery. Battery shall be sized to provide a minimum of four- (4) hours of back up power. Back up battery power will extend to necessary process sensors, local alarm lights, horns and telemetry equipment.
- M. The pump controller shall be (furnished with) (available) with an optional user friendly "View-At-A-Glance™" operator interface allowing adjustment and viewing of all system parameters and status per the following. The operator interface shall be suitable for front door mounting including locations requiring wash-down and moisture protection.
1. The process variable signal, Pump 1, 2, & 3 On/Off and High & Low Setpoints, shall be displayed simultaneously via front panel mounted long lasting Ultra Bright LED bar graphs. These bar graphs shall be vertically mounted in parallel fashion to provide relational viewing of all setpoints vs. the measured process. Each display column shall have a minimum of 40 segments of resolution.

2. Each setpoint column shall have a status LED mounted on top of the associated setpoint providing indication of setpoint activation status. Units that require operator action to view the above parameters are not acceptable.
 3. To assure the highest resolution and accuracy, the process display shall be configured to display the full range of the actual measured process. Range can also be offset allowing display of a pressure or level range that does not start at zero. The display ranges shall be field configurable.
 4. System pumps on/off and alarm setpoint parameters shall be easily adjustable via individual up and down pushbutton arrows located next to the associated setpoint display column(s).
 5. The unit shall have a built in process simulation capability allowing the operator to verify system operation by forcing the process variable up or down via pushbutton arrows located next to the process display. To prevent accidentally leaving the unit in simulation mode, the pump controller shall be configured to automatically restore monitored process display within 2 minutes after last keypad usage or immediately upon operator initiated restore.
 6. The display unit shall incorporate a high contrast LCD panel allowing for viewing of higher level functions including the following:
 - a. Process display to XX.X of the full scale process range.
 - b. Time and Date Stamped Alarms & Events
 - c. Pump Statistics (Including Run Time, Number Of Starts, Daily Average Number Of Starts)
 - d. system diagnostics
 - e. Controller Security
 - f. Cellular communication diagnostics

The LCD shall operate in a manual scrolling menu mode with the various displays shown in sequence as selected by the keypad's up/down arrow keys.
 7. Unauthorized Station Entry Detection
- N. The pump controller shall be able to monitor two- (2) user selectable 4-20 mADC or 0-10 VDC or 5 VDC analog inputs representing the process variable to be control The pump controller shall provide on board 24 VDC loop power output for external loop powered field mounted sensor. A built-in analog supply voltage status LED shall indicate availability of loop power. The analog input circuitry shall provide optical group isolation from the main board to the field device. The analog process signals shall be displayed locally via 40 segment vertical LED display and the LCD digital display as specified above.
- O. The pump controller shall have the ability to monitor up to sixteen- (16) digital inputs, which shall provide monitoring of local facility discrete status. Each digital input shall provide optical isolation from the main board to the field device. A minimum of 1500 volts electrical isolation shall be required. An on board LED shall be provided indicating that digital input isolation is not compromised. The following inputs shall be monitored:

1. Pump 1, 2, 3 Run – This signal shall be used to provide local display of pump run status, pump total run time, pump average daily starts. For each pump.
 2. Pump 1, 2, 3 In Auto – This signal shall be used by the controller to determine pump availability. A pump in this mode cannot be called into operation.
 3. Pump 1, 2, 3 High Temperature/Seal Failure – This signal shall be used by the controller to disable the pump required when a High Temperature is the cause of the failure, and provide local alarm display. Controller shall be able to differentiate alarm. A Seal Failure shall not disable pump operation.
 4. High & Low Float/Pressure – This signal shall be used by the controller to provide back up control of the pumps in the event of primary (analog) sensor failure.
 5. Pump Inhibit – This signal shall be used by the controller to inhibit pumps from operating.
 6. Power Quality – This signal shall be used by the controller to disable pumps in the event incoming station power is unsuitable for use as determined by an optional external power monitoring device.
 7. Door Switch & Door Acknowledge– These signals shall be used by the controller to monitor station access as detected by an optional external door/limit switch an optional external alarm disabling switch.
 8. Alarm Silence – This signal shall be used by the controller to monitor an optional external silence push button and will temporarily disable the alarm horn output.
- P. The pump controller shall provide a total of seven- (7) digital outputs for interface to local pumps and alarm annunciation discrete equipment.
1. Provide five- (5) relay isolated contact outputs for activation of Pump 1, Pump 2, Pump 3, Common Alarm and Alarm Horn shall be provided. Each contact shall be rated for a minimum of 10 amps at 120 VAC or 5 Amps at 240 VAC.
 2. Provide two- (2) open collector outputs for Low and High Level Alarm shall be provided for interface to off board monitoring equipment. Open collector outputs shall have a minimum operating range of 5-30 VDC @ 100 mADC.
- Q. The pump controller shall provide one- (1) 4-20 mADC (1-5 VDC) analog output for interface to external equipment including VFDs, Chart Recorders or other analog monitoring devices.
- R. The pump controller shall have built-in standard operator adjustable alternation functions allowing for sequencing and equalizing wear of the pumps. The following alternation sequences shall be supported:
1. Fixed
 2. Rotary
 3. First On First Off (FOFO)
 4. Utilize One Favor Others (UOFO)
 5. Emergency Mode

- S. Provide built-in Pump Failure detection logic integral to the pump controller unit. In the event the pump has been called into operation and the pump run signal is not received within a pre-adjustable time period. A motor failure shall be produced. The failed motor shall be disabled, an alarm shall be displayed and the next available pump based on the selected alternation sequence shall be requested to start.
- T. The pump controller shall include a volumetric lift station flow and pump performance monitoring capability allowing station flow measurement without the use of an in line flow meter. In addition to flow measurement, the pump controller shall provide pump performance related information. Pump station flow and pump performance data shall be viewable locally through built in LCD or available for telemetry transmission to master station. The following information is to be provided:
- 1 Average Station Influent Flow Rate
 - 2 Maximum Station Influent Rate (K Gal) w/Date & Time
 - 3 Current Day Total Effluent Flow (K Gal)
 - 4 Previous Days Total Effluent Flow (K Gal)
 - 5 Average Daily Effluent Flow (K Gal)
 - 6 Maximum Daily Effluent Flow (K Gal) w/Date & Time
 - 7 Total Station Effluent Flow (K Gal)
 - 8 Average Flow Rate Pump 1, 2, 3 Over All Cycles (GPM) – Each Pump
 - 9 Average Flow Rate Pump 1, 2, 3 Over Last Three Cycles (GPM) – Each Pump
 - 10 Total Flow Pump 1, 2, 3 (K Gal) – Each Pump
 - 11 Flow Rate Pumps 1, 2 (K Gal)
 - 12 Flow Rate Pumps 1, 3 (K Gal)
 - 13 Flow Rate Pumps 2, 3 (K Gal)
 - 14 Flow Rate Pumps 1, 2, 3 (K Gal)
 - 15 Pump 1, 2, 3 Low Flow Rate Alarm (Setpoint) – Each Pump
 - 16 Pump 1, 2, 3 Run Time – Each Pump
 - 17 Pump 1, 2, 3 Number Of Starts – Each Pump
 - 18 Pump 1, 2, 3 Average Number Of Starts – Each Pump
- U. In addition to the pump and alarm control capability, the controller shall provide alarm annunciation. The controller upon the occurrence shall initiate a local alarm audible device and flash the alpha-numeric display providing the following functionality:
1. The display shall indicate the alarm description, complete with the time and date of the alarm occurrence.
 2. An acknowledge pushbutton shall be provided to allow silencing of the audible device while the digital display will continue to show the alarm function, complete with time and date information, until the condition has cleared.
 3. A built-in alarm and status historian shall retain the last 100 time and date stamped events providing a historical record of recent activity.

- V. The Pump Controller shall be furnished with an optional iAccess button . The iAccess button will support the ability to track manpower. iAccess technology shall be standard and integral to the pump controller and shall function as follows:
1. The iAccess button function shall include a small metal disk usually packaged in a key fob. This iAccess disk shall contain a unique serial number. The pump station controller shall contain an iAccess reader. This reader shall sense the presence of the iAccess button and transfers a unique serial number to the pump controller data base. Each person in the Owners workforce shall be in the system and given an iAccess key fob. Utilizing the key fob security pass, Owner designated person shall “login” on arrival and “logout” upon leaving each water and wastewater facility. These entry and exit events are recorded at the Internet Web-based central server, providing a history of who was at what sites, and when.
 2. This iAccess security pass shall also be used to provide protection from unauthorized changes to the pump control configuration. This access protection shall support different levels of security and authority in a hierarchical structure allowing access to the pump controller providing limited to maximum capabilities.
 3. Facility intrusion acknowledgment shall utilize the iAccess button providing a local time base record of securing the water and wastewater facility.
- W. The pump controller shall have two- (2) RS-232C serial communications ports that shall be available for the required system wide telemetry communication.
1. These serial communication ports shall support both a traditional SCADA system telemetry link and a cellular Internet communications link.
 2. Optional redundant communication capability shall be available supporting the radio or telephone communication as the main and the cellular Internet communication as the backup.
 3. Each of the serial communication ports shall support open communication standards including as a minimum, MODBUS, IntraLink Open and DF1.
 4. Pump controller communication ports shall support communication data rates of 1,200 to 38,800 baud rates configurable and as required by the selected communication networks.
 5. On board communication diagnostic LED indicators shall be available to provide indication of communications activity for verification and troubleshooting.
- X. The Cellular Internet Web-based Pump Telemetry Controller shall be the Link2Site system complete with the required hardware, equipment and software as manufactured by Siemens Water Technologies.

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