LITTLETON ELECTRIC LIGHT AND WATER DEPARTMENTS

39 AYER ROAD LITTLETON, MA 01460 978-540-2222

Electric and Water Supervisory Control & Data Acquisition (SCADA) Specification

1.0 Introduction

1.1 General Overview- LELWD is accepting proposals for a new Electric and Water SCADA system. Proposals will be will be received at the office of Mr. Nick Lawler, General Manager, Littleton Electric Light Department (LELD), 39 Ayer Road, P.O. Box 2406, Littleton, MA 01460 until **2:00 p.m. on October 1st, 2019** at which place and time said proposals will be opened publicly and read aloud. Bids must be received in triplicate in a sealed envelope marked "**RFP-Electric and Water Supervisory Control and Data Acquisition (SCADA) Systems"** Inquiries should be directed to Pat Laverty, Engineering and Operations Manager via email (plaverty@lelwd.com)

This document describes the minimum requirements for a new LELWD SCADA system. The system is to be installed at 39 Ayer Rd, Littleton, MA 01460.

1.2 Exceptions- All exceptions/clarifications shall be indicated on a separate page and shall be referenced to the specific paragraph of this specification.

1.3 Standards- The following standards should be met:

- **A.** IEEE Std C37.1-1994, IEEE Standard Definition, Specification, and Analysis of Systems Used for Supervisory Control, Data Acquisition, and Automatic Control
- **B.** North American Electric Reliability Corporation (NERC), Critical Infrastructure Protection (CIP)
- **C.** MultiSpeak compatible (indicate all versions that are compatible)

1.4 Vendor's Requirements

- **A.** The vendor shall be ISO 9001:2000 certified, and a copy of certification shall be provided with proposal.
- **B.** The vendor shall provide a list of 10 customer reference projects with a similar configuration and functionality to the system proposed by LELWD. This list shall include customer name, contact name, phone number, and duration of service.
- **C.** The vendor shall provide support services with a 24/7 availability.
- **D.** The vendor shall describe in detail any additional services they offer and any costs associated with additional services.

1.5 Vendor's Responsibilities

- **A.** The vendor shall design, assemble, and manufacture, factory test, deliver, install and commission a complete, new SCADA system according to the present specifications.

B. The vendor is responsible to familiarize itself with LELWD's existing SCADA set up and recommend/determine any hardware or devices that may be re-used.
C. The vendor shall provide training courses at the Vendor's or Purchaser's facilities.
D. The vendor shall provide on-site supervision of installation and commissioning of the system.
E. The vendor should provide a project schedule with anticipated milestone and go-live dates.
F. The vendor should minimize the disruption to the existing SCADA system while new implementation is in progress.

1.6 Purchaser's Responsibilities

A. The purchaser shall provide an air conditioned environment in the control room.
B. The purchaser shall provide power sources and communication wiring to the equipment locations.
C. The purchaser shall provide a project person for the coordination of all project activities with the Vendor's project manager.

2.0 Project Overview

2.1 The scope of this project is to upgrade LELWD's existing SCADA systems. At this time, the Electric Department currently uses an existing Survalent system and the Water Department currently uses an existing GE Proficy iFIX system. LELWD's intent is to implement new systems for both the Electric and Water that are provided by the same vendor. The new SCADA system is to be a dual station redundant SCADA system that allows for secure remote access and communicates via DNP 3.0 protocol.

3.0 System Configuration

3.1 System Architecture- Provide a high level architecture diagram of the SCADA system describing how different modules and 3rd party software can be integrated.

3.2 Master Station- The master station shall consist of a redundant configuration with dual host servers, with separate operator work stations, and terminal servers, all connected by a high-speed LAN. The network shall support the TCP/IP protocol which will be used by the SCADA system for all network communications. The active host computer shall maintain the standby computer in a fully synchronized state via the network. In the event of a failure of the active machine, the standby computer shall automatically assume control of all peripherals and communication lines with no action required from the system operator. When legacy devices not supporting TCP-IP network are present on the system, Media converters or terminal servers shall be used to convert Ethernet TCP-IP networks to serial interfaces such as RS-232, 422, 485, Monomodal fiber or radio systems. Terminal servers shall be able to interface to the Gigabit network.

3.3 Configuration- The host servers and all workstations shall consist of standard PC architecture machines utilizing the latest generation Intel or equivalent processors.

3.4 Communications-

A. The system must support DNP3.0 and in addition, the system shall also be able to support the following protocols:

• DNP3.0 (serial and TCP/IP)	• IEC 61850 (Ed1 and 2)
• IEC 870-5-101/103/104	• Allen Bradley Protocol
• ASW	• L&G 8979
• MDO-11	• Modbus (RTU and TCP)
• QUIN/QUICS IV	• RTCS Protocol
• SNMP Protocol	• Tejas Series V
• Goose	• Harris 5000/6000

B. The above protocols shall be run in native mode, i.e. there shall be no need for an external protocol converter (hardware unit) or internal converter (third party software driver), nor shall there be any need for any kind of front-end processor.

C. The master station database editor shall allow the user to define key parameters for each communication line: baud rate, time allowed for a device to respond, the number of retries, accumulator poll interval, interval between scans, and protocol-specific configuration parameters. The communication software shall maintain communication statistics for each device. These statistics shall be available as database points so that they can be incorporated in user-defined displays, reports, and alarms.

3.5 Security-

A. The SCADA system shall be implemented using industry standard “best practices” and meet all NERC CIP requirements in accordance with the CIP standards. Bidders must detail how they intend to meet each relevant NERC CIP requirement in their proposals.

B. The vendor shall provide all cybersecurity features.

C. The vendor shall clearly identify the cyber security features and provide the methodology for maintaining the features.

D. The vendor shall verify that the addition of security features does not significantly adversely affect connectivity, latency, bandwidth, response time and throughput.

E. The vendor shall verify and provide documentation that all services are patched to current status.

F. The vendor shall configure hosts with least privilege file and account access and provide documentation of the configuration.

G. The vendor shall have a formal patch management and update process for all vendor-supplied software.

H. The vendor shall provide firewalls and firewall rule sets between network zones.

I. The vendor shall provide a system whereby account activity is logged and is auditable both from a management (policy) and operational (account use activity) perspective. The vendor shall time stamp and control access to audit trails and log files. The vendor shall ensure audit logging does not adversely impact system performance requirements.

3.6 System Sizing-

A. The system software shall be capable of accommodating in its database an unlimited quantity of status and control points, analog input points, text points, communication lines, RTUs, IEDs, reports, graphic symbols.

3.7 Hardware Platform-

A. The hardware platform encompasses all of the physical hardware devices utilized by the SCADA system including host servers, operator workstations (local and remote), storage devices, communication interfaces, printers, GUI devices (LCD Flat Panels) and LANs to which all the hardware devices shall connect.

B. All materials and equipment furnished for permanent installation in the work shall conform to applicable standard specifications and shall be new, unused, and undamaged.

3.8 Host Servers-

A. The system supplier shall use LELWD's existing equipment or provide the Master Station server hardware and peripherals built by a leading computer industry manufacturer. The servers shall be wholly designed, manufactured, warranted, and assembled by the computer manufacturer.

B. The host servers shall run the latest Microsoft Windows Server 64-bit operating system (OS).

C. The Vendor shall provide OS patch management in accordance with NERC CIP standards. All OS patches shall be evaluated by the Vendor and the results provided to the end user within 30 days of patch release.

4.0 SCADA System Functional Requirements

4.1 Data Acquisition-

A. The SCADA data acquisition engine can retrieve variables and status information from remote sources such as RTU, PLC, data concentrators, other supervisory systems and protective equipment, among other sources, by the means of standard communication protocols.

B. The system shall be able to Monitor analog values such as Volts, Amps, Watts, energy and VARs, Pressure, volume, flow, levels, line pack, among others, at each substation. Convert these values to a digital format.

Transmit changed values back to the Master Station. Convert these values into engineering units. Display these values on single line diagrams or schematics and provide alarm limit checking. Provide historical storage at user definable interval and retention periods.

C. The SCADA system have the capability of providing health monitoring of the host server, Ethernet switch, and terminal servers by means of SNMP, and the health monitoring points integrated into the SCADA database and accessible by the GUI.

D. The system can accumulate kilowatt-hour pulses from pulse initiators at each substation. Provide a freeze of counts by RTU on a user definable interval. Transmit the counts back to the Master Station. Convert the counts into interval and hourly deltas.

4.2 Supervisory Control-

A. The system enforces the utilization of "Select Before Operate" (SBO) procedure that is fully compliant with IEEE Std C37-.1-2007.
The system requires secure handshaking with the RTU before any controls are executed. In such cases, control of a point requires the following exchange of messages:

- Master to RTU - control point selection
- RTU to Master - point address checkback
- Master to RTU - control execution
- RTU to Master - execute acknowledge

B. If the scan task does not receive proper acknowledgement of either the select request or the execute command, a checkback failure alarm should be raised

4.3 Communications-

A. The software subsystem for the proposed protocols shall implement all features of the RTUs and IEDs that are required by the end user. As a minimum, the following functions shall be included:

- Rapid polling of RTUs for exceptions
- Select Before Operate (SBO) control execution
- Variable control durations for momentary controls
- Detect and report multiple changes of state between poll cycles, if the RTU does not buffer changes but instead reports a "multiple change detects"
- Automatic interleaving of multiple priority messages, e.g. automatic "fast scan" after a control and "error scan" after a communication error
- Scheduled accumulator freezes and polls

- Scheduled integrity (general interrogation) polls
- Report by exceptions and continuous polling.
- Multiple alternate channel switch on primary error or fail detection.
- Automatic polling starts after server failover.
- Time synchronization of the RTUs
- Data exchange server and client capabilities without external modules.
- Close loop communication simulator
- Native communication protocol analyzer.
- Sequence of events data uploading and processing
- Monitor and display communications between Master Station and field devices
- Proportional integral derivative controller

B. When a user-definable error retry count expires for an RTU, the system will declare the RTU failed by means of a status point and an accompanying alarm.

C. For each RTU, the system will maintain communication statistics in the form of analog points that may be viewed on displays, printed in reports, or stored in historical data files. Such statistics shall include percentage of successful communication, number of timeouts and number of security errors.

4.4 Data Processing-

A. The system provides support for multiple status changes that result from control commands.

B. The system scans every analog input in the RTUs at predefined scanning intervals. Any failure to complete a scan shall be marked with a data quality flag. Also, the system shall scan each analog input every second and compare that input to the previously reported input. When the difference between these values exceeds its reporting band, the analog value shall be reported (report-by-exception).

C. The system can check the analog values for at least three sets of limits: warning, emergency and reasonability. Each of these three sets of limits shall be provided with an upper limit, a lower limit and a deadband.

D. To allow the removal of noise readings around the zero mark of the engineering scale, a range of engineering values inside the point value range will be specified which shall clamp the input value to zero.

E. The system is be able to process accumulators received from the RTUs. The system shall send a command to freeze the accumulators either to all RTUs or to the selected RTUs.

F. The system should be able to handle in emergency or massive disturbances at least 4,000 alarms per second peak for at least 15 minutes combining digital and analog alarms, during this period the system should handle the inbound alarms without data loss.

4.5 Authentication and Access Control-

A. The system will use username and password to be authenticated over LDAP (Active Directory) and Two factor Authentication.

B. A system administrator will be able to create and maintain accounts containing Username, password, Zone groups, mode of operation and the user rights for each system user. The system can temporarily disable a user account without deleting it. The system can deny remote access for a user account.

C. User account passwords shall be a minimum 128-bit encrypted and neither stored nor transmitted in plaintext. The system shall allow for selection of password length greater than twelve (12) characters, and have password complexity settings for inclusion of alpha, numeric, and mixed case character requirements in the password. The system shall allow the password frequency of change to be set to 1, 30, 90, 180, or 365 days. It shall also allow setting the password to never expire.

D. The system allows a settable number of failed logins attempts by an account, and a blocked timeout period to block the user login if the number of failed login attempts is exceeded.

E. The system will allow for an inactivity timeout setting to be enabled, whereas after a settable amount of time of inactivity the account is logged out.

F. Each controllable point in the system supports a configuration switch to require a secondary password be entered before a control is allowed.

4.6 User Rights-

A. Each user account can be assigned a set of user rights that determines the actions that the user may take. This shall provide individual control over various operating and editing functions. These user rights shall include the ability to: acknowledge, block, unblock, and silence alarms; edit database, maps, reports, analog limits, and notes; manual set, control, and tag/un-tag points.

B. The proposed system can handle an unlimited number of user accounts with their corresponding user rights and privileges.

4.7 Area of Responsibility-

A. The SCADA software can be partitioned into 128 areas (or zones) of responsibility. The user shall have the ability to assign any combination of the 128 zones to each database point (telemetered or calculated) and/or to each login account.

B. The user can create any number of zone groups containing various combinations of the 128 zones and to give each zone group a name.

C. An operator only can manipulate those points whose zones overlap those of his login account.

4.8 Tag Management-

A. The system can inhibit control of devices by means of a secure, multi-level tagging feature. This feature allows operators to apply up to eight tags to each point, each tag being stored with a date/time stamp and optional operator-entered description.

B. Each point displays a visual attribute showing that the point has one or more tags on each display where that point is shown. If a point is tagged, the display shall show the symbol that corresponds to the highest-level tag on the point.

C. It shall be possible to specify that the tag dialog remembers the last choice of action, tag type, tag number, and tag description.

D. The system includes the capability to configure a custom set of tag types that are mapped to the following four basic types of tags: Inhibit ON and OFF controls, Inhibit ON control only, Inhibit OFF control only, Information only (no control inhibit).

E. The system prevents bypassing the control inhibit caused by a tag. This applies to any and every application supplied by the vendor or written by the end user using the vendor's API. A group tag function is provided that allows an operator to define a tag, select multiple points and apply the same tag to all selected points.

4.9 Database Editor-

A. The database editor shall provide a graphical tree-like representation of the complete database and shall support easy navigation throughout the database to the desired items to be edited. Database items to be edited in this way shall include Stations, Communication Lines, Communication Channels, RTUs, IEDs, as well as all the individual database points (analog values, status indications, accumulators, etc.).

B. The database editor shall operate as a "client" program which communicates with a "server" program running on the host computer. However, the database editor shall be able to run on any computer that is connected to the host server via the network. With this arrangement, it

shall be possible to manage the database maintenance from any suitably configured PC on the network without being necessary to go to the control room to do it.

C. The database editor shall include features which will make it easy to create and modify the database such as:

- Using the Station Cloning feature to create an entirely new station and all its points, based on an existing station
- Copying, cutting and pasting in the Windows environment
- Using a model feature to create points and other database items that are based on previously created ones
- Using a Station Rename feature to copy a portion of an existing display, and to reassign all those dynamic points to points in a different station, all in one operation
- Editing or modifying the database on an MS Excel spreadsheet and importing it into the system real-time database
- Deleting existing database points
- Deleting an entire station with all associated points

D. All changes and updates of the database shall be completed and validated while the system is in online operation. Under no circumstances shall the real-time system operation be interrupted or disturbed by the database editing and maintenance process.

4.10 Database Editor-

A. Alarms and operational events are continuously synchronized in real-time to the standby host server, in the case of a dual-redundant system configuration.

B. The proposed system shall be able to handle a minimum of 1000 alarms or events per second per operator consoles regardless of the other workload.

C. The system includes ten (10 +1) alarm priority levels. Alarms with priority zero (the lowest) are pre-acknowledged. Such alarms are configured to neither sound any audio alarm signals nor cause points to flash on the display.

D. For each analog point, the user can define three sets of nested upper and lower alarm limits, with a separate deadband for each limit. In addition, analog points shall be able to generate an alarm when a rate of change is exceeded, either in the increasing or decreasing direction or both. Each alarm limit shall support a separate alarm priority.

E. The system should be able to block both digital and analog type alarms.

F. The system shall provide the operator with a visible "telemetry failure" indication when the value of any displayed point is not currently being updated by the system because of an RTU or communication line failure.

G. The system provides a summary lists for all unacknowledged, acknowledged, blocked, suppressed and for all alarms. The user shall be able to perform alarm filtering based on certain parameters or filters.

4.11 Reports-

A. The system includes a report generation capability that will allow the user a high level of flexibility in the definition, formatting, and scheduling of on-demand and periodic reports. The reports shall include data from both the real-time database and historical database.

B. A report editor is available to allow the user to define reports by specifying a database table, a set of desired data fields and the selection criteria for retrieving records from the database table.

C. The system packages a scheduling facility that will allow the operator to define the schedules and destinations for all reports.

D. Reports can be exported in common formats such as PDF, XML, Excel.

4.12 Data Collection and Storage-

A. The system will provide a historical data collection facility that allows the user to define the points that are to be sampled.

B. The historical data software shall be capable of sampling at intervals as low as 1 second. There should be no upper bound on the duration of samples within each dataset, and thus no upper bound on the amount of historical data that can be stored other than the limitation imposed by available disk space.

C. The historical data software shall allow the user to specify the recording of statistics in the sample records. The statistics shall include time averages, summations, maximums and minimums, and times of maximums and minimums and shall be based on user-definable observation intervals.

D. The system shall also allow the user to create "secondary" datasets that extract information from primary datasets. For example, a primary dataset could contain 15-second samples for several days. A secondary dataset could extract daily maximums and minimums, as well as the times of the maximums and minimums and record these for ten years.

4.13 Data Trending-

A. The proposed system shall provide the ability to store and view any data value from the database in a trend graphical format. The system shall bring up pixel-resolution trend graphs of historical data. Sample rates as low as 1 second must be supported.

B. Trend graphs shall be displayed in separate windows that can be moved, re-sized and minimized to an icon. The trend graph window shall include tools that allow the user to configure and customize the graph display.

C. A trend graph window shall have the ability to plot at least ten (10) points from the historical database.

D. In cases where there are more samples in the dataset that can be displayed in the graph window, it shall be possible to scroll back in time

E. The user shall be able to display trend comparison graphs from left to right, for at least ten (10) comparison trends. In trend comparison graphs, the time origin at the extreme left of the graph is a fixed time of the day; however, it may be a different day for each trend. The purpose of this is to allow the user to observe the build-up of the current day's trace, e.g. a load curve, against that of other days in the past, typically the days that contained the last week peak or the current month peak, etc.

F. The trend comparison graph shall have an option to set a start time and day of the week so that the trend graph is automatically launched.

5.0 Graphical User Interface (GUI) Functional Requirements

5.1 Graphical User Interface (GUI)-

A. GUI for operators shall support modern graphics hardware to accomplish high-quality graphics, providing a platform for the operator to view and edit SCADA applications.

B. GUI shall support running OS environment of Windows 7 or higher and offer a tabbed interface, allowing quick access to multiple views (map, alarms, operations logs, and graphs) within a single screen.

C. GUI shall support:

- The ability to control/monitor any telemetered device in the field
- Touchscreen display
- User access controls based on privileges
- Support various GPS projection schemes.
- The capability for operators to save workspace configurations
- Importing of CAD files directly into an existing map.
- Importing GIS network topology (Requires additional software)
- Line sections to display the current state of electric or water lines (SCS license required)
- Tagging or adding notes to any device in the map
- Trace multiple and simultaneously line sections on the network topology (requires licensing)

- The ability to view Reservations when editing the map
- Embedded control panels within maps to model field IEDs
- The capability to turn on/off the secondary network in the map
- Separate views for Maps, Alarms & Event Logs
- The capability to view Alarms & Event Logs in the map tab
- The capability to create and view ad-hoc or historical graphs
- Provide a tabular view on trend graphics.
- Editing capabilities - create/modify/delete objects on a map
- Built-in interactive help videos
- Diagnostic logs for fast, efficient troubleshooting
- DB points shall be able to be created from GUI when necessary privileges are enabled to the user.
- Support interfaced to AVL applications
- Represent Distributed Energy Resources (DER) generators, these shall be able to be imported or manually edited.

5.2 Drawing Tools-

A. The system shall provide the capability to:
Access libraries with the following elements that can be added to a map:

• Fonts	• Symbols
• Symbol Tables	• Colors
• Color Tables	• Widgets
• Control Panels	• Templates

- Group Views and Layers in a tree hierarchy.
- Declutter the map using layers.
- Define the topology of a network using line sections.
- Support multi-user editing and job partial or total reservation with a log of changes and users.

5.3 Operator Display-

A. GUI shall be capable of displaying a geographic map that shows all the distribution circuits.

B. GUI shall have the capability to open a separate magnification window to display details while the main view remains open.

C. Switchable devices shall have the ability to change their symbol and color based on their current state. The operator can manually change the device to any state.

D. All switchable devices will have the ability to be operated by the user for any or all phases of the devices and record actual operation time (not current time).

E. The map view can be configured to automatically declutter detail when zooming in and out (i.e., text annotation, secondary roads, etc.).

6.0 SCADA Systems Applications

6.1 Control Panel Templates-

A. The system shall support control panel templates that graphically represent IED's within the database. The template will allow dynamic elements and database values to be superimposed over a graphic representation of the IED faceplate. The template shall support multiple pages of IED information.

B. The user shall be able to copy and paste a template instance on the world map, and reassign the template to a new IED, with all database values automatically updated to the new IED. When edit changes are made to the template, all instances of the template on the world map will be updated.

C. The user shall be able to create custom templates using the same editing tools available for editing the world map. The user shall be able to import and export templates for sharing with other system users.

D. The system should provide a mechanism to build custom templates or import from spreadsheets, CSV, CID or SCL files.

E. If an existing template is updated, the system should provide a mechanism to update all templates across the system at once.

F. The vendor shall provide in their proposal a complete list of all templates that are currently available for the system. Any associated costs for adding templates to the system will be detailed and listed as options in the price proposal.

6.2 Command Sequencing-

A. Command Sequencing is an easy-to-use high-level programming language. It shall allow the user to define and execute programs which use database points as variables. Command Sequence programs can be used for calculations, open-loop control or switching sequences and for closed-loop control.

B. The command sequence program shall be started and stopped from the command sequencing editor, or via a pushbutton menu in GUI map, or it may be triggered automatically by a status change.

C. The command sequence program shall provide:

- Arithmetic and Boolean operators and expressions
- Circular, exponential and logarithmic functions

- Minimum, maximum, absolute value and modulus functions
- Delay, get time, get date functions
- Comparison and test with branch forward or backward to labels
- Issue controls and setpoints, raise alarms and trigger reports
- More than 52 temporary variables per program
- Arrays of constants or database points
- Comments fields
- Call other command sequences as subroutines
- Two-dimensional table lookup with planar interpolation
- CPU utilization calculations per host.

6.3 Disturbance Capture-

A. Disturbance Capture shall allow the user to analyze the entire state of the system leading up to, and after a disturbance. All changes in analog and status points system-wide are recorded when a user-defined disturbance is detected.

B. Users shall be able to define the pre- and post-disturbance duration and sampling rates.

C. Status can trigger a disturbance capture for a change of state.

D. Analog points can trigger a disturbance capture for any limit violation.

E. Disturbance Capture shall keep a log of all disturbances.

F. Disturbance Capture shall include a Point Capture Viewer, which will allow users to analyze points from anywhere in the system, for a given disturbance. The Point Capture Viewer will also allow the user to select any disturbance file and export it to Microsoft Excel for further analysis.

6.4 Event Data Recording-

A. Event Data Recording application shall provide a facility to record the following events:

- All status changes
- All changes for selected analog points (can be calculated points)
- All control actions
- All sequence of events (SOE) data
- All radio load shed commands

B. The system shall record all logs from operators regardless if points are enabled as EDR. It shall be able to request reports of event data filtered by a variety of parameters.

6.5 External Clock Interface-

A. External Clock Interface shall allow the SCADA master to synchronize its computer time to that of the external (GPS) clock every minute.
B. An alarm will be raised if the SCADA system cannot read the clock.
C. The system shall support dual redundant GPS clock configuration, in case of the primary clock or communications failure.

6.6 Fault Data Recorder-

A. Fault Data Recorder will allow users to upload and record fault data from relays.
B. The editor shall allow users to identify fault data points as well as other points and parameters that are involved in the process of retrieving the fault data.
C. In a relay, fault information (such as fault current, fault type etc.) is queued and stored in a buffer inside the relay. When commanded, the relay de-queues and transfers fault data to a group of data points called Relay Summary Event Data.
D. A relay fault indicator point indicates the readiness of the fault event queue. The value of this status point becomes 1 if there is at least one set of unread fault data in the queue.
E. To read the fault data, the master station sends a control command to a specific binary output point of the relay. This causes the relay to de-queue the oldest fault event and load the fault data into a set of analog points. These analog points are reported to the master station in the usual way (by exception, for example, if the communication protocol is DNP). After processing the received fault data values, the master station then checks the fault indicator point again, which will still be "on" if the queue contains more unread fault event data. The master station continues this process until all the fault event data is read, whereupon the fault indicator point goes to the "off" state.
F. The executive program of the Fault Data Recorder can be configured to operate in either Automatic Upload mode or in Manual Upload mode.
G. Additional to fault data, the system should include a COMTRADE viewer (license feature).

6.7 IED Wizard Templates-

A. The system shall support Intelligent Electronic Device (IED) wizard templates for automating the creation of points for IEDs on the system.
B. The user shall be able to select from a list of available templates, define the IED name, communication line, IED address, communication statistics for total message count, good message count, and bad message count received from the IED.

C. The template shall contain all available points for the given IED and allow the user to select the points to be included in the database. All the telemetry and control addresses and RTU-to-IED mapping shall be automatically generated.

D. The Vendor shall provide an application that allows the user to create new IED templates and edit existing templates.

E. The vendor shall provide in their proposal a complete list of all templates that are currently available for the system. Any associated costs for adding templates to the system will be detailed and listed as options in the price proposal.

6.8 Virtual RTU-

A. Virtual RTU application allows for quick and easy setup of a virtual device that can be polled by another master station via DNP3.0, Modbus RTU, QUIN RTU, IEC 101, IEC 104, or Harris protocols. This is an alternative to ICCP for sharing data between two SCADA master stations.

B. The system shall support virtual RTU connection for sending data to other master stations. The virtual RTU shall support the following:

- Status
- Analog
- Accumulator
- Control
- Setpoint

C. The Virtual RTU editor is used to create one or more Virtual RTUs for each server. Each Virtual RTU references a Dataset of SCADA points whose values are to be reported to the client.

D. The Datasets editor is used to create sets of points that are referenced by the Virtual RTUs. Each dataset contains blocks of status, analog, control, setpoint, and accumulator entries to which SCADA points can be mapped.

E. Outbound Scaling factor should be supported.

F. Points are easily added to the Virtual RTU with the Drag-n-Drop Point Browser.

G. Virtual RTU includes all the editors for setting up the communication connection and how the data is formatted when polled by the other system.

H. Complete Datasets can be created and assigned to multiple Virtual RTUs. This means that the same data can easily be sent to more than one master system without having to maintain duplicate dataset definitions for each Virtual RTU.

6.9 Interface to Microsoft Excel and Access-

A. The system shall support current and historical database access from clients running MS Excel. It shall be possible to directly connect to the SCADA host from within MS Excel by defining the Hostname and valid user account with username and password. The client application shall support redundant Host and automatically reconnect to the active Host upon failover. All current and historical tables and fields shall be accessible through this interface.

B. For current data, the user shall be able to select a database table, data fields within the table, and logic criteria (<, >, =, AND, OR) for point selection.

C. For Historical data, the user shall be able to select points contained within a historical dataset. The user shall be able to define a time type by defining the start and finish date and time, or the number of previous days, hours, and minutes. The user shall be able to select data condition codes to be included with the samples. The user shall be able to select the MS Excel worksheet, start row, and start column for where the data will be populated, and to include the column headings from the database table.

D. It shall be possible to save current and historical queries as defined above as reports available in the world map operator interface.

6.10 Master/Slave Alarm Suppression-

A. Master/Slave Alarm Suppression allows alarms to be filtered so only the real cause of the problem is presented on the alarm display

B. If the alarm suppression function is enabled for a particular master/slave relationship, then as long as the master point is in the alarm state, alarms on its slave points are suppressed (i.e. the alarm severity is reduced to zero). The suppression may be specified to be either time-limited or indefinite.

C. If the group acknowledgment function is enabled for a particular master/slave relationship, then whenever an alarm is acknowledged on the master point, its slaves are acknowledged as well.

D. Each master can have any number of slaves, each slave can have any number of masters, and a slave can also be a master and have slaves of its own.

6.11 MultiSpeak-

A. The Servers Editor shall define links to other systems. The links shall specify the type of interface, the communications ports or IP addresses used to access the other system, and other communication parameters.

B. All versions of MultiSpeak that are supported should be clearly identified.

C. Connectivity Import interface shall import network connectivity data from GIS or Engineering Analysis into SCADA**.**

D. System should be able to incorporate MultiSpeak Network Model Import, Dynamic GIS viewer, Engineering Analysis, Load Management, and Outage Analysis. Vendors should also include other Multispeak connections that can be created (i.e., customer service/billing systems)

6.12 Network Topology Processor-

A. The Network Topology Processor application shall automatically and constantly monitor equipment status changes and determine the current network connectivity (the "as operated" connectivity) based on the open/closed status of all system elements.

B. The Network Topology Processor shall detect, analyze, and graphically highlight the following network conditions:

- The energized, de-energized and/or grounded state of every element in the Distribution network
- The line segments, nodes, and devices electrically connected to each feeder in the current state
- Network loops: alternative power-flow paths to devices from a single power source
- Network parallels: multiple power sources to the same portion of the network
- The current status (normal or abnormal) of all devices
- All devices in an abnormal state (e.g., a normally-open switch currently in a closed state)
- Ability to show adjacent feeders (circuits with open breakers or tie switches)
- Differences in the frequency/phase at the feeder head.
- Highlight line sections that are experiencing overvoltage, undervoltage or overcurrent (Distribution Power Flow is required).

6.13 Remote Alarm Annunciation-

A. Remote Alarm Annunciation is designed to forward the selected alarm messages to key personnel.

B. The Remote Alarm Annunciation system can use any combination of the following messaging mechanisms:

- Call a central paging computer and submit a digital alphanumeric page request
- Send e-mail, via your e-mail server

- Send a SNMP "trap" message to a compatible network management station
- Make a voice announcement using a voice synthesizer and the telephone network
- Send a SMS text message to your cellular telephone

7.0 System Implementation

7.1 Project Schedule-

A. The vendor shall submit a schedule with the proposal indicating high level milestone dates, including a "go-live" date.

B. Within one month after contract execution, the Vendor will submit a detailed schedule showing each major and minor project task, including critical dates and tasks for the Purchaser. This schedule shall be consistent to the schedule made part of the Bid Proposal, only with added detail.

C. The schedule shall be subject to review and approval by the Purchaser.

7.2 System Testing-

A. The vendor shall prepare test documentation and test logs necessary for factory acceptance tests. The purpose of these tests is to demonstrate that the functional performance, availability and other requirements in this specification are met.

B. The procedure document shall be prepared by the Vendor and shall follow a consistent format and be submitted to the Purchaser for review.

7.3 Shipping and Installation-

A. All equipment deliveries shall be F.O.B. destination prepaid and allowed to the Purchaser's facilities.

B. The vendor shall provide all plans and procedures necessary for the system installation and integration. This includes all Vendor's supplied equipment, including third party or subcontractor equipment the Vendor is providing or has made part of its system.

C. The Purchaser will prepare all sites for the installation of equipment.

D. The Vendor shall be responsible for starting up the system. The purpose of system startup shall be for the Vendor to verify that all system functions that were demonstrated during factory testing now operate properly under actual field conditions. This shall include all application programs.

7.4 Support Plan

A. The system shall be covered by warranty for the first year of operation. The first year shall start after LELD has tested, commissioned and approved the system.

B. The Vendor shall provide 24x7 technical support. The Vendor shall also provide samples of all their offered Support Plans with pricing for these support plans are to be projected for the next 3 years. The Purchaser will have the option on what type of support package they shall require after the proposal has been accepted.

C. The Vendor shall provide software patch management in accordance with NERC CIP standards. All vendor software patches shall be tested against all software applications provided in this proposal, on a comparable hardware platform, and the results of those tests made available to the Purchaser within 30 days of patch release.

D. The Vendor shall provide remote diagnostics support from Vendor facilities via a VPN connection at Purchaser's facility.

E. The Vendor shall provide online access to software updates, manuals, and knowledge base.

F. The Purchaser shall have the option to accept or decline the support plan prior to the warranty period ending. The Vendor shall properly inform the Purchaser 90 days before expiration of the warranty period that there is a need to address continuation of a support plan.

7.5 Training

A. The Vendor shall make available to the Purchaser, training on the operation, maintenance, failover/startup, recovery, application software, and database and display maintenance.

B. Training course outlines shall be included in the bid submittal.

C. A suggested training plan and schedule suitable to the needs of the Purchaser shall be provided as part of the proposal. The plan and schedule shall include a description of the training classes.

7.6 Documentation

A. The documentation requirement shall apply to all items described in this specification. This includes all items provided by subcontractors or suppliers of the Vendor.

B. The software documentation shall provide, through a set of logically coordinated documents, a comprehensive and detailed description of all software necessary for the operation and maintenance of the proposed system. It shall describe the system's overall functions, subsystems, databases, macros, libraries and procedures.

C. A complete printed set of all documentation shall be provided to the Purchaser.

LITTLETON ELECTRIC LIGHT AND WATER DEPARTMENTS

39 AYER ROAD LITTLETON, MA 01460 978-540-2222

EXHIBIT 1- Pricing Schedule

ITEM NO.	Description	Price	Lead-Time
1	Complete Electric SCADA System with vendor supplied hardware		
2	Complete Water SCADA System with vendor supplied hardware		
3	Complete Electric SCADA System with purchaser supplied hardware		
4	Complete Water SCADA System with purchaser supplied hardware		
5	Additional Training ($/Day)		
6	Annual Support ($/year) – 3 year projection		
7			
8			
9			
10			
11			
12			
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14			
15			
16			
17			

LITTLETON ELECTRIC LIGHT AND WATER DEPARTMENTS

39 AYER ROAD LITTLETON, MA 01460 978-540-2222

EXHIBIT 2- References

	Utility Name	Address (City, State)	Number of Devices	Point of Contact Name	Email Address	Phone Number
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						