CITY OF TUSCALOOSA)
STATE OF ALABAMA)

REQUEST FOR PROPOSALS

(A17-0525)

TO: **Qualified Firms**

FROM: **The City of Tuscaloosa, Alabama**

RE: **Request for Proposals for SCADA SOFTWARE for City of Tuscaloosa Infrastructure and Public Services Department (Includes Water and Waste Water Treatment Plants, Booster Stations, Distribution and Collection Systems)**

DATE: **April 21, 2017**

Section 1. Introduction.

This is a Request for Proposals ("RFP") containing information concerning the above-referenced matter, an abbreviated scope of work, and evaluation items. Firms expressing interest should be fully capable of providing the end results requested.

This is a procurement of professional services as more particularly described herein. This procurement will be conducted in a manner providing full and open competition consistent with the standards of 24 CFR § 85.36. To wit:

a. Each firm's experience and qualifications will be evaluated primarily as they relate to the firm's ability to provide: (1) Assess the City of Tuscaloosa Infrastructure and Public Services Department SCADA system.(2) Provide design engineering, application engineering programming and technical services to smoothly integrate VT SCADA (or approved equal) into the existing SCADA infrastructure at the Ed Love Water Treatment plant, Jerry Plott Water Treatment Plant and Hilliard Fletcher Waste Water Treatment Plant. .(3) Provide design services for SCADA system architecture, HMIs and communications networks, motor control systems, and process and instrumentation diagrams. (4) Develop logical and technically sound phasing and scheduling of individual treatment plants and remote sites (5). Provide planning and integration of multiple independent SCADA sites into a unified utility-wide system. (6).Design and implement network security rules, system routing, and network configurations for high availability and secure

network communications in accordance with industry standards. (7). Design and implement server systems in support of the SCADA system for SCADA specific applications and general server back up and redundancy. (8) Properly document all system changes, revisions, modifications, and improvements such that a chronological list of activities is maintained throughout the duration of the project. Provide as-built documentation and Operation and Maintenance manuals for all work performed. (9) Provide training for the new system and interfaces. (10) Provide as-need services to quickly resolve problems, restore connections, and maintain network connectivity of all city SCADA systems on a 24/7/365 biases.

b. The City will make awards only to responsible firms possessing the ability to perform successfully under the terms and conditions of the procurement. Consideration will be given to such matters as firm integrity, compliance with public policy, record of past performance, and financial and technical resources. The City will require firms to execute a "Disbarment and Suspension Statement" certifying / verifying that the firm is not suspended or disbarred or otherwise excluded under 2 CFR Section 408.220 of the government-wide non-procurement, disbursement and suspension list. This is a qualifications-based procurement of professional services whereby competitors' qualifications will be evaluated and the most qualified firm will be selected, subject to negotiation of fair and reasonable compensation.

c. Written proposals will be reviewed and rated by a panel of qualified City employees. The rating system will consist of a numerical grading system and a pass/fail grading system, as set forth in Section 3. The City may or may not elect to interview any of the responding firms.

d. The City has exclusive and sole discretion to determine the firm whose services will be most advantageous to the City, and reserves the right to reject all firms.

e. The successful firm shall have personnel resources that can respond to critical technical issues within 100 miles of the treatment plants. The response time must be two (2) hours or less on a 24/7/365 basis.

f. The successful firm shall have the following credentials

UL 508 and 698 certified.
ISO9001:2015 certified.
VTSCADA advanced certified installer.

Be listed on the VT SCADA website.
Verizon Preferred Partner.

The purpose of this inquiry is to determine the interest or non-interest and the qualifications of firms in providing the professional services required. A number of firms may be asked to express their interest in regard to these services in the form of a Proposal. Following the receipt of Proposals, a certain firm or firms may be selected for further consideration.

Section 2. General Scope of Services

The City of Tuscaloosa seeks the services of a professional firm which has the knowledge, experience and expertise to perform the services as requested.

The project of interest is as follows:

The City of Tuscaloosa Infrastructure and Public Services Department (hereinafter "IPS") has two water treatment plants, one waste water treatment plant thirteen water tanks, eight water booster stations and sixty-three (63) lift stations.

The IPS desires to migrate from GE PROFICY/I FIX platform to a fully integrated SCADA platform that provides the option to obtain an unlimited number of thin clients, a fully integrated historian, and alarm notifications system that does not require an additional license. We need to increase the number or remote and mobile users that have access to operational data collected by the SCADA system. To reduce complexity, we are seeking a fully integrated alarm system to allow seamless alarm functions without additional licenses. Additionally, we want to improve the historian function by having it accessible to the thin (remote) clients without requiring additional licenses or seats. To reduce engineering and programing requirements the software shall accommodate historian, alarm and reporting functions without additional programing or configuration, a dedicated server and licenses for each function.

Scope of Work:

The selected firm shall deliver SCADA assessment information in order to carry out the smooth conversion from GE PROVICY/I FIX to VTSCADA. The selected firm shall deliver the final product within 4 months of contract award. During the integration process the firm shall insure GE PROFICY/IFIX and VT SCADA will run in parallel to provide for an adequate proving and acceptance period. The vendor must provide testing of each site to assure that communication is working properly.

The objective of the SCADA conversion is to have a fully integrated system to reduce software maintenance, version capability issues, simplified version control for the system, eliminate the need for multiple licenses, increase mobile and remote access, and reduce annual support and maintenance fees. IPS also desires to simplify data analysis, reporting, printing trends and alarm notifications.

A. The integrator shall provide software, integration and programming for changing from existing SCADA monitoring software.

B. Integrator is responsible for identifying/verifying programming challenges with existing SCADA software and for verifying tag count.

C. Integrator shall work with Water/Waste Water Treatment Plant staff in order to coordinate system programming in order to minimize plant downtime.

D. Integrator shall provide all completed programs and notes in a recoverable format to the City of Tuscaloosa upon completion of project.

E. Integrator shall provide a way for remote connection for both tech support with integrator and for monitoring purposes for water plant staff.

Generally, the SCADA Platform will include the following:

A. Run and operate:
   Internet Client
   Historian
   Security
   Trending
   Reporting
   SLIPPY Maps Integration
   Electronic Operator Logbooks
   Widgets and Graphics Library
   Network and Computer Resource Monitoring

B. Include all necessary I/O DRIVERS as indicated by the initial assessment.

C. Include SUPPORT PLUS:
   1 Year: Seamless Version Compatibility and Value Protection
   1st Year: Unlimited Support and Upgrades

D. Include ALARMS at no additional cost.

Alarms and Events Logging
Email, SMS, Pager, Voice (text to speech) Dial–out/Dial-in

E. Configuration shall include:
Automatic Version Control
Idea Studio Development Environment
Change Deployment
Scripting and Debugging Tools
ODBC Server, OPC Server, Web Services
Multiple plant Support

F. Provide Redundancy and Historian at no additional cost:
Back-up Historian
Back-Up Alarms and Events Logging
Back-Up Alarm notification & acknowledgement
Back-up ODBC, Server, OPC Server, Web Services
Back-Up Automatic Version Control
Secondary Idea Studio Development Environment
Back-Up Change Deployment
Multi-user Scripting and Debugging Tools

G. Dual Server Redundant, Runtime and Development software for approximately 25,000 tags

H. Tag development:
TAG EXPORT: Create and edit tags outside of VTSCADA via Access, Excel, SQL Server
MULTI-WRITE TAG: Writes up to 50 outputs with one action.
HISTORY STATISTICS TAG: Displays calculated values.
TRIGGER TAG: Initiates actions based on time or changes.
MANUAL TAG VALUES: Test systems without live I/O
RATE OF CHANGE TAGS: Detects rapid value changes (e.g., leaks) or lack of changes (e.g. failed pumps or valves).

I. Integrated alarms and logging: Built into certain analog and digital tag types.

J. ADVANCED PUMP STATUS TAGS: Built in High/Low Alarms. Delays reduce alarms for minor changes.
LOG ON CHANGE: Only save meaningful data to the DB.
QUESTIONABLE FLAGS: Flag new I/O white commissioning

K. HIERARACHICAL TAG STRUCTURES.

L. VTSCADA TAG BROWSER: Create and edit tags in this intuitive interface. Configure reusable tag structures that model how real-world elements relate. For example, a pump tag can be an assembly of I/O and communication drivers or a lift station can have multiple pumps.

M. CLONE WHOLE SUBSYSTEMS: Simply copy the parent tag. Copied tags automatically reference their new scope.

N. MULTI-TAG SELECTION: Saves time when copying, enabling, disabling, or deleting tags. Rename and reorganize tags without losing their history, page references, or alarms.

O. REUSABLE TEMPLATES-TAGS & GRAPHICS

REUSABLE PAGE TAG TEMPLATES: Combinations of tag structures and graphics that simplify configuration of applications with similar assets.

BUILT-IN TEMPLATES: Use pre-defined Page templates for these two Remote Telemetry Units (RTU) which have consistent configurations from device to device:

P. TEMPLATES INCLUDE: Alarms, analog and digital inputs. Digital controls, analog set points, counters and runtime totalizers, data age, communication link status, latitude/longitude with slippery maps support, summary starts/stops.

Any manufacturers' names, trade names, brand names, or catalog numbers used in the specifications are for the purpose of describing and establishing general quality levels. Such references are not intended to be restrictive. Since the "City" does not wish to rule out other competition and equal brands or makes, please remember "ANY APPROVED EQUAL". HOWEVER, IF A PRODUCT OTHER THAN SPECIFIED IS BID, IT IS THE VENDORS RESPONSIBILITY TO PROVE TO THE "CITY" THAT SAID PRODUCT IS EQUAL TO OR EXCEEDS THE QUALITY OF THE SPECIFICATIONS LISTED FOR ANY ITEM.

Detailed software specifications are provided in Appendix 1

The firm must comply with all applicable state, local, and federal regulations related to the services provided to the City. The City reserves the right, subject to negotiation and agreement in writing with the selected firm, to either expand or limit the scope of services as needed.

The selected firm will be required to have sufficient personnel to complete the tasks required by this scope of services. The selected firm will complete the required tasks in a timely and efficient manner. The selected firm would be expected to enter into a contract for services based upon the firm's hourly rates and an agreed upon not to exceed amount.

Section 3. Firm Qualification and Proposal Requirements

Firms interested in performing the work will be considered on the basis of a proposal containing information submitted in response to this request in a form limited to twenty (20) pages in 12-point font or larger of either Times New Roman or Arial. Front and back shall be considered 2 pages.

Proposals are due by close of business (5:00 pm CST) on May 4, 2017.

All proposals should be submitted in 8 ½" x 11" paper size, with directions as follows: Each proposal shall be prepared simply and economically, providing straightforward, concise delineation of the firm's capabilities to satisfy the requirements of this RFP. **Fancy binding and color displays other than those necessary are highly discouraged.**

Provide three (3) bound copies to:

Kristen Miller, Associate City Attorney
Office of the City Attorney
City of Tuscaloosa
Post Office Box 2089
Tuscaloosa, Alabama 35403-2089
(205) 248-5140

Courier address:
Office of the City Attorney
2201 University Blvd.
Tuscaloosa, Alabama 35401

The selected firm or firms must be experienced and qualified to provide the required scope of services. The firm or firms selected must have expertise related to the general Scope of Services set forth in Section 2. The following information must be submitted with the proposal on the date indicated above and in the order indicated below:

a. Recently Completed Projects. Include three recent (within last 4 years) SCADA changes from one platform to another platform (migration and integration projects). Municipality and/or public water utility references preferred, include at least two public water and two public waste water utilities as references. Elements of recently completed projects are as follows:

    1. Name of project.
    2. Contact person for Owner/Municipality/Government Agency.
    3. Detailed Project Description. (15 points possible)

b. Experience and Qualifications. A statement of the firm's qualifications to perform the work. The statement should include the following:

1. The general experience of the firm. Description of Company* and firm experience. (*Description of Company The following data is to be included: Name of company; Address of corporate headquarters; Telephone, Email, website and fax number; Form of company; i.e. corporation, partnership, sole proprietor; Provide the Federal Employer Identification Number (FEIN); Date company was formed; date incorporated if a corporation; Company principals including President, Chairman, VPs, COO, CFO, general manager(s); Licenses (provide a list of all licenses and/or permits the firms holds that are required to do business in the State of Alabama); Number of Employees; and Number of Accounts. (10 points possible)
2. The specific experience of the proposed personnel in the fields that the proposed services are requested, their qualifications, years of experience, professional certifications and availability to perform the work and services to be provided. If applicable, please list any work of similar nature that the proposed personnel have performed. Please include a statement as to the firm's proximity to Tuscaloosa and whether or not it maintains an office in Tuscaloosa. (10 points possible)
3. A statement as to whether the firm or any subcontractors are a minority or woman owned business enterprise. (5 points possible)
4. A statement as to professional standing including any pending controversies outstanding. (Including, but limited to, mediation, arbitration, litigation- present, pending and/or in the last five (5) years that your firm was a party to.) If none exists, such a statement should be made. (Pass/Fail)
5. A list of qualified persons in other disciplines required for the proposed services to be acquired from outside sources, if applicable. (Pass/Fail)

c. Please include a very specific statement providing examples of similar projects to past utility industry clients in relation to customer service and after sales support. (20 points possible)

d. Discuss the proposed approach to completing the needed services and provide a sample project plan which outlines the implementation, training and continued responsive service and support for the SCADA system. (25 points possible)

e. Discuss your firm's approach/method of designing to budget and on time. (10 points possible)

f. Please provide complete cost information which includes all research, design and implementation costs to deliver a fully functional integrated SCADA platform migration, meeting each requirement stated in the RFP and included in the solution proposal. While price is a major consideration, the City of Tuscaloosa will consider all aspects of each proposal. (15 points possible)

g. Please include a statement as to potential general conflicts of interest that would prevent the City of Tuscaloosa from entering into an agreement with your firm pursuant to this RFP. If none exists, such a statement should be made. (Pass/Fail)

h. Firm must be licensed and approved for work in the State of Alabama; please include a statement to this effect. (Pass/Fail)

The City reserves the right to interview a firm or multiple firms as it sees fit. There is no guarantee that a contract award will be made pursuant to this RFP. This RFP may be modified or amended at any time and for any reason, in the discretion of the City.

Any questions by the firm related to this RFP should be submitted in writing along with the firm's proposal. In the interest of fairness and in order to maintain impartiality, the City may not respond to questions from individual firms during the RFP process.

END RFP.

Appendix 1

Supervisory Control and Data Acquisition (SCADA) Software

General Requirements

1. SCADA software shall be commercially available off-the shelf and shall be non-proprietary, such that independent systems integrators are able to provide configuration and maintenance services as required.
2. Software shall be a Client/Server architecture. No Microsoft Client Access Licenses (CAL) or Terminal Services shall be required for full installation (thick) or browser-based (thin) clients.
3. Software shall offer options for unlimited, concurrent Thin Client connections for connectivity of common mobile device operating systems.
4. Software shall support running as a Microsoft Windows® service.
5. Software shall support running in a virtualized server environment.
6. Software shall support installation on a Storage Area Network (SAN) or Network-Attached Storage (NAS).
7. Software licenses shall be upgradable for an annual fee such that the client is able to download and install the current version of the product.
8. Software shall be tag-based and have an integrated development environment for creation of all aspects of the application.
9. Software shall be compatible with commercially available, off-the shelf PC hardware running Microsoft Windows client and server operating systems currently available at the time of installation.
10. Software shall not require dedicated server-level PC hardware for any individual system components.
11. Software shall support any computer running a thick copy of the software performing as both an application server and a user interface. Software shall support automatic server failover to an unlimited number of servers.
12. Software shall include the following integrated components available as standard components or for an optional add-on price. These components shall not require 3rd party software. However, the system shall allow 3rd party components to be used if required.
    I. Online application development environment with version control.
    II. I/O drivers for a wide selection of communication protocols.
    III. Alarms management and alarms/events history.
    IV. Fully-integrated historian.

V. Real-time and historical data trending and tabular views.

VI. Report generation.

VII. Security management.

VIII. Operator logbook.

IX. Support for networked applications.

X. Support for server redundancy.

XI. An object oriented scripting language with debugging tools.

XII. Browser-based thin clients for PCs and Mobile devices.

XIII. Alarm notification to off-site operators (email, text message and voice.)

XIV. Interfaces for 3rd party software programs to access data (real-time and historical) and alarms via ODBC,OPC, or SNMP.

13. Software shall automatically compensate for deploying the same application simultaneously on a variety of monitor resolutions, while maintaining the aspect ratios of all displays.

14. Software shall protect against file corruption in the event of an unexpected loss of power or hardware failure. Software shall support an automatic, orderly shutdown when power levels drop to a user defined set point.

15. Software shall support automatically startup, upon computer restart, to full operation without user intervention.

16. Software shall provide a mechanism to backup and restore the entire application configuration.

17. Software shall include an integrated security system supporting an unlimited number of user accounts, roles and privileges. System users with appropriate account privileges shall be capable of changing the application configuration without requiring the software supplier's assistance. No lockout mechanisms or passwords shall be withheld from the final customer.

18. Integrated software help manuals shall be provided to assist operators and maintenance personnel with operational and configuration tasks.

Server Redundancy and Load Balancing

1. Redundancy

I. A minimum of three levels of redundancy for all application services shall be supported. Software shall support automatic failover from primary server to backup server(s). No manual intervention shall be required. This functionality shall be supported in both standard and virtual server environments.

II. Software must not require each redundant server to use a second network card to monitor the availability status of the primary server.

III. All servers shall be aware of which server is in control of each software process. No two servers shall perform the same function at the same time (e.g. I/O communications to a specific device, incrementing a totalizer.)

2. Load balancing

I. Software shall support the assignment of specific services (e.g. alarms management, alarm notification) to specific computers.

II. Software shall support distribution of historical data storage to an unlimited number of computers.

III. Software shall automatically redirect incoming thin client connections to the server with the lowest number of active thin client connections.

IV. Software shall support redundant networks and shall be able to use these for load distribution when both are available.

Thick (full-installation) Client User Interface

1. Software licensing shall not limit the number of application display pages allowed.

2. Software shall support the following navigation methods:

I. A menu for navigating from one display to another. Menu shall be configurable to allow logical grouping of displays.

II. Tiled view of any number of displays concurrently, all tiles showing real-time data or pictures of displays (user-selectable). Selecting one of the tiles will switch to the full-screen view of that display.

III. Mouse-over selectable hot box for navigating to a specific display.

IV. Button for navigating to a specific display.

V. Browser-like forward and reverse buttons to scroll through previously viewed displays.

VI. A list of previously viewed displays with the option to navigate to a selection from the list.

VII. A mapped view of assets with the option to navigate to an application display by selecting any asset from the map.

3. Application displays shall be event-driven, in that data will be delivered to client computers by the server immediately upon receipt. Client computers will not poll the server for new data.

4. Means shall be provided to allow the operator to print graphical displays.

5. Software shall support flagging tags as ‘questionable data’ (i.e. not commissioned or value is in question.) These values will continue to display the incoming values. These flags shall be removable by users with sufficient privileges.

Thin (browser-based) Clients

1. Software shall offer an optional zero-footprint thin client for use with HTML5-compatible browsers running on operating system variants, including
   I. Windows
   II. Linux
   III. Apple
   IV. Android
2. Server for thin clients shall be an integral feature of the SCADA software. Use of the thin client shall not require a 3rd party Internet server software (e.g. Microsoft IIS, Apache).
3. System shall support three levels of server redundancy for thin client connectivity, with automatic failover and client load sharing.
4. System shall support cyber security measures including Firewalls, Virtual Private Networks (VPN) and Secure Socket Layer (SSL.)
5. Thin client connections shall be concurrent. Tools shall be provided to monitor client connectivity and to disconnect users or switch them to alternate servers on demand.
6. The thin client shall share the same security accounts as the rest of the SCADA Software. A separate privilege shall be required for browser client access. Revocation of this privilege will immediately terminate the user's client connection.
7. Thin Client displays shall be generated automatically, requiring no additional configuration.
8. On-line configuration changes shall be deployed immediately to all thin client interfaces without requiring the client interface to be restarted or refreshed.
9. The Thin Client user interface shall be offered in two variants, the choice of which to use being user-selectable.
   I. Graphical (preferred for large user interfaces) – A user experience mirroring (graphically and operationally) that of the Thick Client.
   II. Text-based (preferred for mobile phone interfaces) – Simplified lists of monitored values, with support for control actions, alarms management, trending and mapped asset view.

Historian

1. Historian shall support logging of all the SCADA system data, including real-time, historical, transactions, alarms and events, regardless of the number of tags in the system. For example, a 25,000 tag system shall support historical data storage for 25,000 tags, plus alarms and events.
2. Software shall include an integrated Historian and historical data storage at no additional cost, but may optionally use Oracle, MySQL, Microsoft SQL Server, SQL Lite as the database.
3. The Historian and its historical data storage shall not require dedicated server computers, however, dedicated servers may be used if preferred by the customer.
4. Historian shall be capable of logging up to 4,000 values per second.
5. A synchronization scheme shall be included such that a copy of all historical data storage resides on all designated computers. Data shall be synchronized in real-time.
6. Any historical database that has been offline must be automatically resynchronized with the historian holding the most recent data. Software shall be capable of synchronizing 100,000+ values per second between databases. This process shall occur in parallel with runtime SCADA processes and shall be designed to minimize interference.
7. Distributed Historian architecture shall be supported. For example, two plants (A and B) may be responsible for historical storage for locally collected data, while a central facility (C) may be responsible for redundant historical storage for both A's and B's data. This architecture shall be scalable to support the addition of future plants.
8. Historian shall support SQL queries of logged historical data. Queries of historical data may be for raw data or summary (value at beginning, average, max, min, and delta) over a period.

Transaction Data

1. System shall provide a means to reliably collect and log (to historical data storage) transaction data from a field device. Transaction data is defined as a data set of related values stored with the same timestamp.
2. The transaction data capture process must include error checking.

Historical Data Display (trend plots and tabular)

1. Software shall display historical and real-time data in both plot and tabular format.
2. Software shall allow users to generate ad-hoc plots of historical data by clicking on each of the values to be trended. Selected groups shall be recordable for future recall.

3. Software shall support ad-hoc and preconfigured trend plots of real-time and historical data as integrated elements of graphical process displays. Historical and real-time plotted values shall be shown in a continuous, uninterrupted, scrolling fashion. The display shall support:

    I. An unlimited number of pens (i.e. tag values), including both analog and digital values. Name and description of each tag shall be provided.

    II. Analog pens as either layered or as stacked individual plots.

    III. Time frame selectable from one second to five years.

    IV. Scaling for each pen as high/low values or graduated divisions.

    V. Value of each tag at the date/time of the mouse location.

    VI. Statistical data, including average, minimum and maximum values, for each plot.

    VII. Annotating trends.

    VIII. Stop/pause scrolling.

    IX. Zoom in/out on the time (x) and value (y) axis'

    X. Pan/Scroll along the time axis or select a particular date to display.

    XI. Move analog tag plots vertically (in the value (y) axis), either individually or as a group.

    XII. Print displayed plot data.

    XIII. Annotate a particular point in time on the plot.

    XIV. Display alarm set points that are associated with the tag(s) as continuous marker lines across the plot.

    XV. Export plotted data to comma separated value (.csv) file or directly to a database, for use by 3rd party data analysis software.

4. For tabular data, means shall be provided for the following;

    I. An unlimited number of pens (i.e. tag values), including both analog and digital values. Name and description of each tag shall be provided.

    II. Time frame selectable from one second to five years.

    III. Stop/pause scrolling.

    IV. Show raw data.

    V. Show summary data for a duration sampled at consistent periods (e.g. average value every 15 min for past 8 hrs.).

    VI. Export plotted data to comma separated value (.csv) file or directly to a database, for use by 3rd party data analysis software.

Alarms and Events Management

1. Software shall include alarms and events management tools consist with implementation of the ANSI/ISA 18.2-2009 Management of Alarm Systems for the Process Industries standard.
2. Software shall include a predefined alarms and events management interface. The interface shall provide the following operational tools.
    I. Lists of Current, Unacknowledged, Disabled, Active, Configured Historical and Shelved alarms and events.
    II. Tools for searching and filtering lists.
    III. Add a blog-style note to any alarm.
    IV. Day and night view toggle.
    V. Acknowledgement of individual alarms or all visible alarms.
    VI. Font size adjustment for visually impaired users.
    VII. Representation of alarm priorities using shape, color and numeric priority level for enhanced operational awareness.
    VIII. Option to plot data associated with an alarm.
    IX. Option to open a process display where the alarm is currently shown.
    X. Alarm mute and silence.
    XI. Alarm shelving options for a defined period or indefinitely. Shelved alarms shall still be recorded to the alarms history but shall not annunciate or require acknowledgement.
    XII. Alarm disable option.
3. Alarm acknowledgement shall immediately be propagated to all networked stations.
4. Software shall allow alarms to be associated with functional areas, such that a user only has to deal with alarms in his/her functional area(s).
5. Alarm occurrence, acknowledgement, clear, disable and shelve actions shall be recorded.
6. Software shall provide user-configurable settings for dead band on analog alarms and delay on analog and digital alarms.
7. Alarms and events records shall include;
    I. Time/Date stamp.
    II. The name and description of the alarm tag.
    III. Priority.

IV. Status of Alarm (i.e. Active, Acknowledged, Cleared). Alarm Acknowledgement records shall include the name of the user who acknowledged the alarm.

V. The value of the associated tag at the time of alarm occurrence.

8. Software shall support an unlimited number of alarm priorities and shall allow unique annunciation sounds and colors for each.

9. Alarm annunciation shall be configurable to use alarm tones, text to speech descriptions, sound files or popup displays.

10. Users must be notified, both visibly and audibly, of the occurrence of an alarm, regardless which display is presently being viewed.

Alarm System Auditing and Reporting

1. Software shall support printing of alarms/events created over a range of dates/times.

2. Software shall provide a means to identify frequently occurring alarms (e.g. nuisance alarms.

3. Software shall provide a means to identify and analyze alarm flood conditions.

4. Software shall provide a summary of alarm percentages by priority, for comparison with generally accepted percentages as defined in the ANSI/ISA 18.2-2009 Management of Alarm Systems for the Process Industries standard.

Alarm Notification System (for remote users)

1. The Alarm Notification System shall support alarm notification via dial-out over voice modem (using text-to-speech), VoIP (either direct or via POTS to VoIP converter) SMS text message, email and alphanumeric pager. Alarm acknowledgement shall be supported during voice calls and via email and text message.

2. The Alarm Notification System shall allow status retrieval and alarm acknowledgement via dial-in over voice modem (using text-to-speech.)

3. The Alarm Notification System shall be an integrated feature of the SCADA systems and shall not require a separate tag database and security system.

4. Email messages shall support outgoing mail with transport layer security (e.g. Gmail, Yahoo Mail.)

5. The Alarm Notification System shall be capable of annunciating alarms to rosters of users with up to 30 contacts per roster. An unlimited number of rosters shall be supported. The system shall support associating rosters with functional areas, such that alarms in these functional areas will activate notification to the appropriate contacts.

Mapping

1. Software shall support common online mapping services (e.g. MapQuest, OSM, Google Maps) with zoom and pan features such that remote assets can be automatically mapped based on latitude and longitude coordinates.
2. Software shall allow for the creation of "sites" which are collections of I/O tags with a location that can be represented using Latitude and longitude coordinates.
3. Sites shall be user-definable to store and provide a configuration interface for any user-specified data.
4. Software shall include an integrated map display, wherein sites can be displayed at their latitude and longitude coordinates.
5. Software shall allow for user creation and selection of the icons used to represent sites on the map.
6. Software shall allow users to navigate the map including zoom and pan features.
7. Icons used to represent sites on the map shall be capable of displaying information about the site including current connection status and presence or absence of active alarms within the site.
8. Icons used to represent sites on the map shall include a built-in navigational link to either an automatically-generated page displaying all I/O tags within the site, or to a user-selected page.
9. Software shall provide a means to define and display pipes or other connections between sites.
10. Pipes or other connections between sites shall be user-configurable to include any relevant information about the connection.

Security Management

1. Software shall include a security system with privilege and role based user accounts. Level-based access shall not be acceptable.
2. Security system shall support an unlimited number of user accounts and roles. System shall allow creation of an unlimited number of additional security privileges where necessary.
3. User passwords must be configurable to require a minimum length, contain a combination of letters, numbers and special characters, and expire after a pre-set period. User passwords shall be stored in an encrypted format.
4. System shall allow changes to user accounts, roles and privileges while the application is running. Changes shall become effective immediately.
5. User logon and logout activity shall be recorded in the application event log. Disabling accounts after X failed attempts shall be supported.
6. System shall provide a mechanism to limit client access to specific IP addresses.

7. System shall support authentication of user accounts via a Windows domain and authorizing SCADA user roles from domain security groups.
8. System shall support the use of proximity cards/readers.
9. The integrated version control system shall allow the option of including or excluding security-related changes if returning the application to an earlier configuration state.

Report Generation

1. Authenticated operators shall, in the runtime environment, be able to produce simple reports including any analog, digital or calculated tag data from the historical database.
2. Data format options shall be as follows:
    I. To screen.
    II. To a comma separated value (.csv) file.
    III. To a text file.
    IV. To an ODBC-compliant database.
    V. To any direct-connected or networked printer.
    VI. To a 3rd party software (e.g. Microsoft Excel) template for advanced data analysis and formatting.
    VII. To e-mail, if an external email server is provided.
3. Reports may be created for one-time use or saved for reuse.
4. The following reports should be included:
    I. Analog Summary Report.
    II. Daily Snapshot Report.
    III. Daily Total Report.
    IV. Derived Flow Report.
    V. Detail Report.
    VI. Driver Communication Error Detail Report.
    VII. Driver Communication Summary Report.
    VIII. Hourly Snapshot Report.
    IX. Hourly Total Report.
    X. Rainfall Report.
    XI. Pump Activity Report.
    XII. Pump Discrepancy Report.

XIII. Standard (raw data) Report.

5. Report generation shall be invoked either on demand, by a monitored event, or on a scheduled basis.

6. For reports that are created on a scheduled basis, a mechanism shall be provided to allow operators to re-create the last scheduled report.

Electronic Operator Notebooks

1. System shall support operator logbooks for recording ad-hoc notes or predefined notes as threads, in that notes can have associated comments.

2. Notebooks shall be searchable by keyword, user account and time/date.

3. Notebooks shall be color-coded for easy identification.

4. System shall support creation of an unlimited number of notebooks for association with system elements, such as equipment and trended pen groups.

5. All notes shall be encrypted and include the name of the user's account and the time/date of creation. All notes entered into the notebook shall be immediately viewable from all clients and servers.

6. System shall support the option of requiring operator authentication as part of the note creation process.

7. System shall support printing of notes by range of dates/times.

8. System shall support the export of notes for a selected range of dates, to a format that can be easily viewed / printed from any workstation without the need for a (HTML).

Integrated Development Environment

1. An intuitive graphical development environment with drag and drop tools shall be used for configuration of application displays. A ribbon bar along the top of the display, as common to Microsoft office tools, is preferred.

2. Displays shall support zoom and pan actions.

3. A large library of static and animated graphics shall be provided with the software. Software shall support dragging and dropping additional graphics into the library.

4. Standard features shall be included for the following;

   I. Analog and digital inputs and outputs.

   II. Retentive counters. Values will persist if power is lost and subsequently restored or if failing over to a backup server.

   III. Retentive totalizers. Values will persist if power is lost and subsequently restored or if failing over to a backup server.

   IV. Historical calculations (e.g. average flow over last hour.)

5. Software shall include pre-built displays for standard user interfaces. The following pre-built displays shall be provided as a minimum;

    I. Alarm display that can be filtered by name and includes current, unacknowledged, disabled, shelved and history.

    II. Trending and tabular viewing of historical data.

    III. Report creator.

    IV. Operator notebook.

    V. Site map.

    VI. Site list.

6. Software shall allow calculations to be associated with each graphic object to facilitate movement, visibility, sizing and rotation.

7. Software shall allow multiple objects to be saved as a template graphic. The following template capabilities shall be supported;

    I. A template may be associated with a tag structure.

    II. Each new instance of the template will inherit the properties of the template, such that changes to the template will automatically update all instances created from it.

    III. The template may have any number of parameters, including tags and text values, which can be used to animate objects within the template. Each new object created from the template may include different parameters.

    IV. Templates may be imported from other projects.

    V. Copy/paste/rename/delete for any template.

    VI. Ungrouping of any instance of the template.

8. Software shall support the creation of template displays. The following capabilities shall be supported;

    I. A template display may be associated with a tag structure.

    II. Each new instance of the template will inherit the properties of the template, such that changes to the template will automatically update all instances created from it.

    III. The template may have any number of parameters, including tags and text values, which can be used to animate objects within the template. Each new object created from the template may include different parameters.

    IV. Templates may be imported from other projects.

    V. Copy/paste/rename/delete for any template.

9. There shall be no limit to the number of animated graphics that can be used to represent the same tag value.

10. Software shall support background bitmaps on graphical pages.

11. Users shall be able to select all or a subset of the graphics on any display and see a list of the associated tags. The list of tags shall be modifiable individually or using search and replace tools.

I/O Drivers (Field Device Communications)

1. Software shall support an unlimited number of field devices and different I/O drivers in the same application.

2. Software shall include support for communications over Serial port TCP/IP UDP/IP.

3. Software shall include, at no additional cost, I/O drivers for:

   I. Protocols Aquatrol BACNet Bristol BSAP Ethernet/IP (CIP) Allen Bradley DF1 Koyo/Automation Direct DirectNet DNP3 Omron FINS Foxboro Omron Hostlink Internet Bristol Protocol IDEC IEC 60870-5-101 Mitsubishi Modbus ACSII, Embedded, TCP, RTU Enron Modbus Landis & Gyr ODBC Dexter Fortson Associates OpenLink Siemens OP/PG Opto22 Optomux Campbell Scientific Pakbus, Loggernet and RTU QNet Fisher ROC, ROC Plus Serial SNMP Client GE SNP, SNPX Square D SRTP Stevens Water Serial Surfline Toshiba.

   II. Manufacturers - Acromag Rockwell/Allen Bradley Aquatrol BACNet Bailey Campbell Scientific Control Microsystems CSE Semaphore DAQ Data Flow Systems Dexter Fortson Enron Emerson Fisher Foxboro General Electric Granville Phillips Hewlett-Packard IDEC IEC Landis & Gyr Lantronix Mitsubishi Motorola NMEA OSI Soft Omron OPC Opto 22 PLC Direct (Koyo) Power Measurements Ltd. Quindar Schneider (Bristol Babcock, Control Microsystems) Schlumberger Siemens Sixnet Square D Stevens Water Surfline Texas Instruments Toshiba Woodward Zetron

   III. Other - DDE Client, API, OPC Client to support OPC Servers from 3rd party software providers.

4. Software shall support the development of additional I/O drivers where necessary.

5. Software shall support multiple communications protocols over a single communications port.

6. I/O drivers shall support redundant failover to one of more server computers. Software shall support redundant physical links to any field device, such as primary connectivity via Ethernet and redundant connectivity via serial port. Redundant links shall support similar or different protocols.

7. Software shall provide tools for polling telemetry devices (e.g. RTUs) directly. Software shall allow real-time tuning of each device's polling frequency without interrupting the polling cycle or restarting the application. To optimize I/O communications for telemetry applications, the polling order shall be configurable and polling shall be asynchronous (if permitted by the remote telemetry unit.)
8. Software shall be capable of pooling modems connected to one or more servers, for use in I/O communications.
9. Tools shall include methods for monitoring communication statistics and reporting errors for each I/O driver. Software shall support radio diagnostics monitoring for radio modems (e.g. Dataradio/Calamp, MDS.)
10. Software shall support writing to multiple output tags via a single write request. This shall allow writing a set of default values to a set group of field device registers.
11. Software shall support rewriting the last written value to an output.

Tag Database

1. A browser shall be provided for tag creation, modification and deletion. The tag browser shall include a summary of all tags' current values.
2. A tag export/import utility shall be provided to allow bulk tag changes using Microsoft Office tools.
3. Software shall support the creation of template tag structures to represent a typical piece of equipment (e.g. a pump, an engine.)
4. Tag configuration shall support the use of expressions that can set configuration parameters based on developer-defined rules.
5. Template tag structures shall be copied and pasted to create any number of equipment instances having similar structures, but differing configuration.

Configuration Management

1. Software shall be capable of on-line configuration. That is, changes to most aspects of the application (e.g. tags, displays, calculations, reports, trends, server lists) can be deployed in real-time without recompiling or restarting the application or restarting computers.
2. Software shall be capable of offline configuration, such that changes to most aspects of the application can be imported and deployed without recompiling or restarting the application or restarting computers.
3. Software shall be capable of testing configuration changes to tags and displays in the runtime environment before changes are deployed.
4. Users shall be able to deploy a set of changes either automatically or manually, with the option to select and deploy specific changes.

5. Software shall allow multiple users to configure an application simultaneously.
6. Any shut down client shall automatically download newly deployed changes from the server when the client is restarted.
7. All application servers and clients shall automatically synchronize with the primary application server. No manual file duplication shall be required.

Application Version Control

8. The software shall have an integrated version control system that automatically logs application configuration changes to an encrypted repository. Versions shall be auto-numbered. No manual changes to the repository shall be permitted.
9. A chronologically ordered summary of versions shall display the time and date when the version was created, the user who created the version and any comments entered by the user when deploying the version.
10. It shall be possible to determine which version is currently deployed on each client and server station.
11. The version history shall allow review of all changes applied within each version.
12. The version control system shall allow the following version management methods.
    I. Switch (aka rollback) to a previous version of the application.
    II. Reverse changes applied during a specific version.
    III. Merge changes made local to a specific workstation.
    IV. Option to include or exclude security changes made between the current revision and the target revision when switching.

Multi-Plant Application Support

1. Software shall allow centralized configuration, security management and monitoring of multiple sub-applications within one large application. The sub-applications may be connected via either LAN or WAN.
2. Each of the sub-applications must be capable of running autonomously in the event of network unavailability.
3. Software shall allow users to be authorized for access to information from one or more sub-applications, or all sub-applications, of the large application.
4. Software shall support limiting the sub-applications that can be accessed from a specific SCADA node.

Information Technology (IT) Tools

1. Software shall include server-to-server and server-to-client IP link monitoring for the SCADA network. Link failure shall generate an alarm.
2. Software shall include tools for monitoring of historical data storage.

3. Software shall include tools for monitoring of any modems and SMS appliances used for sending alarm notifications to remote operators.
4. Software shall include an SNMP Agent option for integrating with Network Monitoring Software.
5. Software shall include tools to monitor computer resources (e.g. CPU, virtual memory, drive space) with the ability to generate an alarm on an out of range condition.

Product Upgrades, Support and Training

1. Software must have a history of allowing applications that have been deployed on current technology (operating systems and PC hardware) to be upgradable to new technology with minimal change to the application.
2. Software must have a history of allowing applications that have been deployed on one version of the product to be upgradable to a new version with minimal change to the application.
3. Software manufacturer shall offer product support via phone, email, user forum and remote access methods (e.g. Remote Desktop.)
4. Software training shall be available from the manufacturer via classroom courses and self-directed study (e.g. workbooks and tutorials online.)

SCADA Software License Requirements per Computer

Computer #1 ED Love

Tag Limit: 25K

License Type

Dual Server Premium

Additional Components

Alarm Notification (SMS, Email and phone notifications)

Concurrent Thin Client Connections, quantity: Unlimited.

Connectivity Pack (ODBC, OPC Server, SOAP connections to Historian server for Alarms Management

[Primary][Backup] server for Alarms Notification.

[Primary][Backup] server for Configuration Management

[Primary][Backup] server for Modem Management

[Primary][Backup] server for Historian.

[Primary][Backup] server for All [other] Application Services

Computer #2 Fletcher WTP

Tag Limit: 25K

License Type

Dual Server Premium

Additional Components

Alarm Notification (SMS, Email and phone notifications)

Concurrent Thin Client Connections, quantity: Unlimited

Connectivity Pack (ODBC, OPC Server, SOAP connections to Historian)

Server Configuration

Primary][Backup][Additional backup] server for I/O Drivers

[Backup][Additional backup] server for Alarms Management

[Backup][Additional backup] server for Alarms Notification

[Backup][Additional backup] server for Configuration Management

[Backup][Additional backup] server for Modem Management

[Backup][Additional backup] server for Historian

[Backup][Additional backup] server for All [other] Application Services

Computer #1 Jerry Plott

Tag Limit: 25K

License Type

Run Time

Additional Components

Alarm Notification (SMS, Email and phone notifications)

Concurrent Thin Client Connections, quantity: Unlimited

Connectivity Pack (ODBC, OPC Server, SOAP connections to Historian)

Server Configuration

[Additional backup] server for I/O Drivers

[Additional backup] server for Alarms Management

[Additional backup] server for Alarms Notification [Additional backup] server for Configuration Management

[Additional backup] server for Modem Management

[Additional backup] server for Historian

[Additional backup] server for All [other] Application Services

END Appendix 1