TASK ORDER FOR
SPOTSYLVANIA COUNTY CONTRACT AGREEMENT
FOR GOODS AND SERVICES
RFP #11-04-20

In accordance with the Spotsylvania County Contract Agreement For Goods and Services, Task Order #23 Proposal for SCADA Upgrade Services at Ni River Plant for the Spotsylvania County Utilities Department is made as of _____ ____, 2013 by and between Spotsylvania County, a political subdivision of the Commonwealth of Virginia, hereinafter referred to as the "COUNTY"; and EMERGE SYSTEMS, INCORPORATED, a Virginia Corporation, hereinafter referred to as "CONTRACTOR".

WITNESSETH:

WHEREAS the COUNTY and the CONTRACTOR entered into an Agreement made as of January 25, 2012, which was subsequently renewed by the "Modification #1 to Contract Agreement for Goods and Services RFP 11-04-20" dated January 23, 2013 to provide Supervisory Control and Data Acquisition (SCADA) services as necessary to support certain Spotsylvania County Utilities Department projects (hereinafter the "AGREEMENT"), and

NOW, THEREFORE, the COUNTY and the CONTRACTOR, pursuant to the Agreement, and in consideration of the mutual promises herein contained, and intending to be legally bound, do hereby agree to accept Task Order #23 and the "Proposal For Task Order #23 – SCADA Upgrade At Ni River Plant", dated December 19, 2012, and prepared by E-Merge Systems, Inc., attached hereto, and made a part hereof, which sets for the Scope of Services to be provided pursuant to this Task Order. Encompassing services to provide a proposal for upgrading the SCADA system that shall allow for system expansion to meet County growth and provide better visibility to plant personnel to efficiently operate the plant and assist with better diagnostics for the Ni River Water Treatment Plant. The SCADA system is also designed with a vision to provide common hardware/software platform across the County. Task Order #23 Proposal for SCADA Upgrade Services at Ni River Plant shall not exceed TWO HUNDRED FIFTY EIGHT THOUSAND DOLLARS ($258,000.00).

Except as provided herein, the AGREEMENT remains unchanged and in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this Task Order #23 Proposal for SCADA Upgrade Services at Ni River Plant to be duly executed by their duly authorized officials as of the date first written above.

SPOTSYLVANIA COUNTY, VIRGINIA

By: _____
C. Douglas Barnes Dated
County Administrator

EMERGE SYSTEMS INCORPORATED

By: _____ 1/31/2013
Inderdeep Huja Dated
President

Approved as to form:

_____
COUNTY ATTORNEY Dated

PROPOSAL FOR TASK ORDER #23 – SCADA UPGRADE SERVICES AT NI PLANT

Prepared for

County of Spotsylvania DPU
600 Hudgins Road
Fredericksburg, VA 22408-4147
Attn: Chris Edwards

December 19, 2012, Rev 1.0

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Contents

1. OVERVIEW

E-Merge Systems is pleased to provide a proposal to Spotsylvania County for upgrading the SCADA system at Ni plant. E-Merge is providing a scalable "open" architecture SCADA system that shall allow for system expansion to meet County growth. The new SCADA system shall provide better visibility to plant personnel to efficiently operate their plant and assist with better diagnostics. This SCADA system is also designed with a vision to provide common hardware/software platform across the County.

E-Merge shall provide the necessary engineering services including conducting workshops with plant personnel and engineers to understand their requirements, SCADA/PLC system design and development, implementation, programming, on-site checkout, startup and training support.

County currently operates a GE XL/SCADA system with Opto 22 I/O's that is totally obsolete and is not supported by any company. If the current SCADA system fails then it will be very difficult for the County to operate the plant and provide quality water. E-Merge believes if a planned migration is undertaken then a better system can be designed in more cost effective way. Additionally, the migration will be undertaken during the low water demand months and thus the migration can be carried out relatively easy.

2. SYSTEM DESCRIPTION

2.1 Integrated Architecture

The proposed SCADA/control system is based on Rockwell Automation's Integrated Architecture. In the past, plants were forced to use multiple, dedicated proprietary control systems to solve different application requirements. Each control system required different software, language types, spare parts and training and integrating these disparate control systems proved time-consuming and costly.

Rockwell's Integrated Architecture unleashes the intelligence to optimize plantwide performance. The Integrated Architecture system employs a technology that delivers live and historical data which manages information in an unprecedented way. Live data is served directly from the control architecture, using common services embedded in the control system. Other systems manage information through software connectors that sit on top of the control system, sharing the information through multiple databases and gateways.

The Integrated Architecture comprises of following components:

- Controllogix PLC's.

  ControlLogix PLC's provide discrete, drives, motion, process, and safety control together with communication and state-of-the-art I/O in a small, cost-competitive package. The systems are modular, so you can design, build, and modify them efficiently - with significant savings in training and engineering.

- FactoryTalk View SE - Supervisory HMI.

  FactoryTalk View Site Edition (SE) is a supervisory HMI software package for enterprise solutions. It has a distributed and scalable architecture that supports distributed-server/multi-user applications, giving maximum control over information where you want it.

- Panelview Plus - Local HMI.

  PanelView Plus 6 Graphic Terminals lets you monitor, control and display application status information graphically. These terminals offer the open-platform flexibility of the Windows® CE operating system.

- Ethernet /IP – Networking based on Ethernet.

  The EtherNet/IP™ Network provides plant-wide network systems using open, industry-standard networking technologies. It enables real-time control and information in discrete, continuous process, batch, safety, drive, motion, and high availability applications. The EtherNet/IP network connects devices such as motor starters and sensors to controllers and HMI devices and on into the enterprise. It supports non-industrial and industrial communications on a common network infrastructure.

The Logix technology helps to achieve:

Architecture Simplification - Using one control platform across any discipline helps eliminate the need for separate controllers and systems.

Greater Information Access - Converging multiple manufacturing disciplines into a single platform gives greater access to real-time information on the plant floor, remotely, or throughout the enterprise.

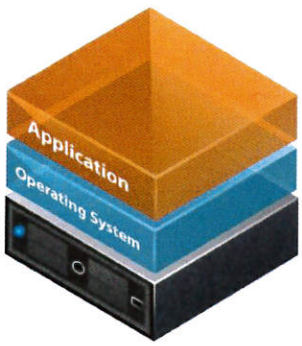
Faster Startups - The commonality between disciplines provides faster startups due to ease of integration between them. Reuse engineering designs as well as a common, tag-based system database to reduce development and commissioning time.

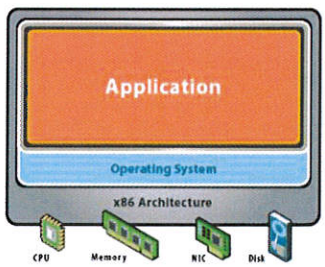
Lower Maintenance - A common Logix control engine and development environment help reduce maintenance, spare parts and training costs.

Optimized Productivity - Reuse program segments or tags for new applications to help you react quickly to business changes.

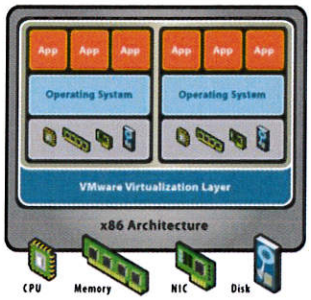
2.2 Virtualization

E-Merge intends to adopt the virtualization technology to remove reliance of SCADA software on specific hardware and other benefits of virtualization listed below. E-Merge is proposing to use VMware's vSphere virtualization platform for hosting SCADA applications. Traditional Servers are based on one operating system (OS) per physical server with multiple applications running on the same OS and often fighting for the resources.





Hardware virtualized servers remove the dependency of the hardware from the operating system, and allow multiple separate operating systems to share common hardware.



Interfacing between operating systems and the physical server hardware is handled through the Hypervisor, in this case, VMware ESXi.

Benefits of Virtualization

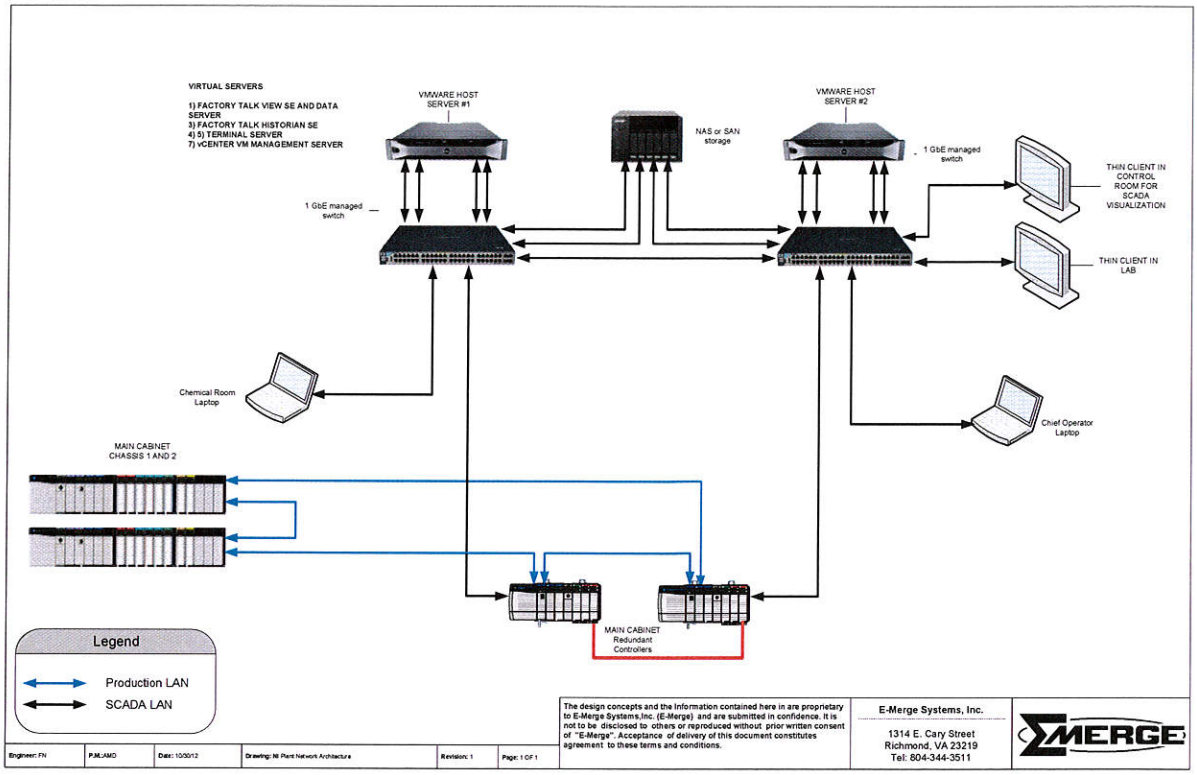
- Traditional servers running a single operating system never fully utilize the available resources (both CPU and RAM).
- Costs are reduced by requiring less hardware and reducing overall energy requirements.
- Remove reliance of a system backup on specific hardware.
- Allows for easy hardware upgrades without the need for re-installation of the operating system and application files.
- Decrease the downtime incurred during a hardware failure
    - Virtual system image is stored as a file. New hardware only requires installation of the hypervisor and copying system images.

E-Merge intends to use the VMware vSphere Essential Plus Kit for 3 hosts (Max 2 processors per host). VMware vSphere Essentials Plus Kit includes following features:

- VMFS (Virtual Machine File System)
- VMware Hypervisor
- VMware vStorage Thin Provisioning
- VMware Update Manager
- VMware vStorage APIs
- VMware vCenter Server for Essentials
- VMware vSphere Storage Appliance for Essentials Plus
- VMware Data Protection
- VMware High Availability (HA)
- VMware vMotion
- VMware vStorage APIs
- VMware Hot Add
- VMware vShield Zones
- VMware vShield Endpoint
- VMware Replication

2.3 System Architecture

Following is the proposed System Architecture:



3. Proposed Services

3.1 Project Management

The objective of this task is to provide technical direction and maintain overall project communications with County personnel. E-Merge will assign a project manager to coordinate and schedule SCADA activities. E-Merge Project Manager will be single point of contact for County personnel for any clarifications/issues/system modifications. Following activities will be carried out under this task:

1. Maintain overall communication with County's Project Manager on the project.
2. Develop project schedule and track project progress against the schedule. Take appropriate actions to keep the project on schedule.
3. Conduct workshops with County personnel to discuss migration strategy.
4. Manage internal communication within the E-Merge project team so that all the team members are synced with each other.

3.2 Submittal Engineering

E-Merge will discuss the proposed system design with County personnel. E-Merge will incorporate reasonable changes in the system design based on County's input. This process will include the following subtasks:

1. System architecture drawings showing hardware configuration and identifying model numbers of system components.
2. Datasheets submittal of major components. These datasheets will include information such as manufacturer name, model number, instrument tag nos. from specifications, dimensions, operation data, installation and mounting details, etc.
3. SCADA screens shall be submitted to County and Engineer for approval.
4. Panelview screens shall be submitted to County and Engineer for approval.

3.3 SCADA Application Development

E-Merge shall design, program, install and test the SCADA application which will provide control and monitoring of the plant equipment and instrumentation. Screens shall provide the operators a vehicle to exercise monitor/control and diagnostic functions. Up to 200 screens will be provided. This task shall include:

1. Discuss operation and GUI requirements with County.
2. Define contents of the screens and navigation structure.
3. Identify alarm management, trending and historical logging requirements.
4. System security and login/logout requirements.
5. Install and configure SCADA and Historian software.
6. Implement HMI screens as per above requirements. Test communication with the PLC's.
7. Implement alarming, trending and historical logging of identified tags.
8. Setup up to three (3) SCADA thin clients.
9. Network the SCADA servers with the PLC's and storage devices.
10. Setup the two laptop computers for SCADA access.
11. Load the Panelview application in Panelview and test communication with the PLC's.

3.4 Virtualization Setup

E-Merge is proposing to run the SCADA and other associated SCADA services in virtualized environment. VMware's vSphere shall be used as the virtualization platform for hosting SCADA applications. This task shall comprise following sub-tasks:

1. Setup the host servers for virtual environment.
2. Configure, program and test the hypervisor.
3. Create virtual Machines (VM's), install OS on VM's and test their operation.
4. Configure and test the storage (SAN/NAS) setup.
5.

3.5 Historian Configuration

E-Merge is proposing to use FactoryTalk Historian SE. The Historian provides historical data for SCADA application as well as for reports. This task shall include following activities:

1. Configure and install the Historian software in the virtual environment.
2. Develop Historian tag database.
3. Configure and test access of historical data from SCADA applications.
4. Configure and test historical data access for trend objects.
5. Setup the security in Historian.

3.6 System Test

E-Merge will prepare Factory Acceptance Test (FAT) procedure. The FAT will verify the panel wiring and panel layout is in accordance with the approved drawings. The FAT will consist of testing HMI application and its interface with PLCs at the E-Merge facility. The objective will be to verify I/O mapping between the HMI application and E-Merge furnished PLCs. At the end of the FAT, E-Merge will prepare a FAT report for each control panel indicating the results of the factory witness test.

Once the internal E-Merge testing is complete then E-Merge will conduct final FAT with County personnel. The final FAT will simulate plant operation and County personnel will get a feel for the SCADA. Any reasonable comments from County personnel during the FAT will be incorporated in the final package.

3.7 Installation Coordination and Startup

We will coordinate with County for appropriate startup time. E-Merge is tentatively planning the startup in early February. The startup will last for 4-6 weeks. E-Merge will completely debug the system; incorporate reasonable operator requests for changes, and build operator/plant personnel confidence in the new system.

This will consist of the following tasks:

1. PLC Panels – Install DCU1 and DCU2 control panels.
2. Install SCADA Server rack.
3. Migrate the field I/O signals from old DCU cabinets to new PLC control panels.
4. Test out all the I/O signals.
5. Startup HMI application.
6. Test HMI application with real world I/O.
7. Test out logic for process controls.
8. Test alarming, trending and historical logging.

3.8 Final Witness Testing

As and when the control system has been installed and started up, E-Merge will schedule an acceptance test. Following will be tested:

1. Verify that all the servers have been installed properly.
2. Verify HMI Screens.
3. Verify PLC functions by control loop.
4. Verify alarming, trending, and historical logging.
5. Verify the reports are in correct format.

3.9 SCADA Training

E-Merge will submit a training plan to County for review. All E-Merge training will be conducted at the plant. E-Merge will be providing training for E-Merge furnished equipment. E-Merge will provide following training courses:

1. Two day training for operators covering the structure and the functions of the SCADA system.

2. One day training for maintenance personnel covering preventive and troubleshooting maintenance for the SCADA components. This training will cover diagnostics capabilities of the system, software and hardware as well as routine maintenance procedures.
3. One day PLC training to train maintenance personnel in configuration, operation and programming processors. This training shall primarily focus on training in set point changes, minor programming changes, range changes, diagnostics and upkeep of documentation.
4. Two day follow up training and answer any operations/maintenance questions two months after the plant has been in operation. This training will basically cover any plant personnel questions that they may have based upon their experience with plant operation.

3.10 Documentation

E-Merge will furnish 2 printed set of As-Built drawings in 11" X 17" format for E-Merge furnished control panels. E-Merge will also generate a detailed system architecture and network drawing for plant personnel to better understand various components in SCADA system. E-Merge will also provide one set of all drawings in AutoCAD format, PLC programs and SCADA programs on a CD in electronic format.

3.11 Installation Services

E-Merge will provide installation services to install the E-Merge furnished control panel. Existing field wiring will be moved from DCU control panels to new PLC control panels. No new field wiring will be provided.

4. Assumptions/Others Responsibilities

1. **Only above listed services are included in E-Merge scope. Any services beyond this proposal will be provided at extra cost.**
2. The existing enclosure shall be utilized to install the new PLC's. E-Merge will replace the existing backpanel with new back panel. The existing doors will stay as it is. All the existing field wiring will be used as it is. No new conduits/field wiring is included in this proposal.
3. County to provide room for SCADA server rack. The room housing the server rack shall be suitable for server hardware with AC ducts.
4. During the migration there may be instances where certain equipment may be needed to run in manual/hand mode. County to provide personnel to run the equipment in manual/hand mode. E-Merge will co-ordinate with County before migrating any equipment to new control panel and will try to minimize the downtime.
5. County to provide E-Merge access to the plant.
6. The migration to new control system will be a team work between E-Merge and County. E-Merge will prepare control strategies and present it to County for review. We request that County thoroughly review the control strategies and bring to notice any missing interlocks/permissive as may be necessary.
7. E-Merge has included 1 year of VMware support in our proposal. If a future support is required then County will procure the support agreement separately.

5. Cost Proposal

E-Merge has a contractual agreement with Spotsylvania County as per Spotsylvania County RFP #11-04-20.

Above described services shall be provided for not to exceed value of $258,000.

This price is based on assumption that the project will be tax exempt and hence sales tax is not included.

5.1 Terms and Conditions

- Payment Terms: Monthly invoicing as per mutually agreed SOV.
- For items not included in the scope of this proposal, additional services and support shall be provided at additional cost. Any additional hardware and services will be approved by Spotsylvania County.
- Supplied equipment warranted free from defective materials and workmanship for a period of one year from date of installation.
- Invoices to be paid within 30 days of receipt.