



Josiah Hodge
Water System Technologies Administrator
Department of Public Works & Mobility
Utility Operations and Maintenance Division | Missoula Water

December 5, 2022

Dear Josiah,

Subject: SCADA/HMI Hardware and Software Upgrades

References:

- (a) MWSCADA.xls – received 2/23/2022
- (b) Scope Email from Josiah Hodge – received 2/23/2022
- (c) Site Visit 10/13/2022
- (d) Current HMI application

Scope Overview: The City of Missoula Department of Public Works & Mobility, Utility Operations and Maintenance, Water Division (City) is planning a multi-phase Supervisory Control and Data Acquisition (SCADA) upgrade with the first phase being to upgrade the Human Machine Interface (HMI) and Historian software and hardware.

Approach: HDR proposes to execute the project in four phases: Data Gathering & Desktop Reviews, Hardware/Software Procurement Design, HMI Screen Upgrades, and Installation & Deployment.

HDR will begin the design process by requesting additional documents to supplement the currently received information in references (a) and (b) and conduct a site visit in coordination with the project kick-off meeting. We received your current version of the HMI application, and will be requesting the current backup of the Win911, Proficy Historian, AE Collector, and RS Logix 500 logic, but believe there may be other information required to facilitate the upgrade. During the site visit and kick-off meeting, HDR will assess the available space for the upgraded equipment and discuss the City's vision of the locations and arrangements desired.

As stated in reference (b), we understand the City may wish to consider hardware other than tower chassis and is also interested in exploring virtual machines. Alarm management options will be explored with the City at this time. HDR will present the advantages and disadvantages of these options and offer solutions that maximize the current physical space available and leverage the best mature technologies for implementation, maintenance, and flexibility. Cloud based solutions are not desired and will not be considered.

As part of the Hardware/Software Procurement Design, HDR will coordinate with the City to implement hardware that meets the City standards and is known to the personnel assigned for maintenance and support. We will prepare bills of materials with part numbers and vendor information as well as coordinate with the suppliers to source, answer questions, and assist the City in procurement. Additionally, if rack mounted equipment is selected, HDR is prepared to develop a

detailed network diagram and equipment layouts for installation. HDR is requesting that the City as build the existing closet wiring in order to streamline the design process.

Once the hardware and software is in procurement, we propose to conduct workshops with the City to discuss the existing HMI screen configurations. The workshops will be tailored to discuss the screen graphics, present options for high-performance HMI graphics and new templates featured by iFIX, and dialog on future functions that might be leveraged with the new systems. Some templates or faceplates include built in features that may not currently be in use, but are desired at a future time. The upgraded application will be closely based on the structure and flow of the existing screens and developed collaboratively with the City. We will present development options at 50%, 90% and 100% complete for reviews, discussion, and adjustment.

HDR recommends the new hardware be received by the City, operating systems and IT software installed, and then brought to our offices for initial configuration, preliminary testing, and mockup validation. Any new or modified screens will require careful testing to ensure the I/O continues to match the existing programs. When the system is ready for full installation, hardware and software will be brought to the City offices and HDR will assist the City in deployment.

During deployment, we recommend beginning with upgraded software and hardware running the existing screens and configurations to establish a baseline of operation and prove updated versions of software are operating trouble-free. Then we systematically update HMI graphics running in parallel and validate operation of each graphic. A detailed checklist of each point and function will be maintained as HDR commissions the new system and places it into operation.

Migration of historian data will occur after a period of parallel operation with the existing historian to prevent any lost data. Collector operation will be similarly verified prior to decommissioning the existing server.

Task 100 – Project Management and Administration

Objective: HDR will manage and control its professional services contract to provide efficient completion of the project. Under this task, HDR will prepare and implement a project management plan; provide scope, schedule, and cost control services; and initiate and attend project working meetings.

Subtask 101 – Project Coordination and Reports

The HDR project manager will conduct conference calls or in-person meetings with City staff, upon request, to review project progress, schedule and budget, identify information needs, and make decisions regarding any changes in the scope of the services. It is assumed for this project, the meetings will be conducted online using MS Teams or Webex.

The HDR project manager will submit project invoices monthly. A brief progress memorandum, in bullet item format, will be prepared with each monthly invoice. The progress memo will summarize the work progress being invoiced, the budget expenditures to date, the percent of engineering fees invoiced to date, the percent of the work accomplished to date under the contract and identify any information requirements or decisions that need to be made by the City. These reports will help maintain frequent communications with the City and the team, and will be presented in a simple informative format, which can be used for distribution to the project team.

Subtask 102 – Post Award Kickoff Meeting (PAK)

The Post Award Kickoff (PAK) meeting is intended to bring the team together and discuss the scope, schedule and deliverables. This meeting will also include a site visit to examine the existing systems and begin discussions regarding potential new arrangements and City vision.

Within 14 calendar-days after Notice to Proceed, and prior to commencing work, meet with the City for the PAK meeting.

The meeting outcomes are expected to include:

- Integration of HDR with the City staff and conduct partnering. To most effectively accomplish this contract, the City requires the formation of a cohesive partnership within the Project Team whose members are from the City and HDR. Key personnel from the City and HDR will be invited to participate in the partnering process. The partnership will draw on the strength of each organization in an effort to achieve a project conforming to the Contract, within budget and on schedule. Through partnering we will set clear expectations for a commitment to timely and honest communications, treating each other with respect, and developing useful business partnerships.
- Establish and explain policies and procedures for completion of a successful project.
- Establish clear lines of communication and points of contact for the City and HDR team members.

Subtask 103 – Workshop #1

The first workshop will be to discuss options for SCADA equipment and software configurations and will be after HDR reviews the backup of existing systems.

The HDR team shall complete the following prior to the on-site workshop:

- Review available information and prepare answers to any City questions from the PAK that need analysis.
- Prepare sketches for alternatives such as rack mount servers, virtual machines, different alarm management options, and equipment layouts as requested.
- Prepare analysis of RSLogix 500 version upgrade and compatibility with existing SLCs
- Prepare relevant list of iFIX (current version) development templates and objects along with screen shots of templates proposed for use in screen development.

Accomplish the following items on-site:

- Present sketches for alternatives listed above.
- Present findings of RSLogix 500 analysis and recommended actions.

- Introduce and discuss current version of iFIX along with development templates and objects.

Subtask 104 – Workshop #2

Frequent communications should take place between HDR and the City as we develop the bills of materials and software purchases with licensing information. Once complete, and procurement has begun, HDR will shift focus on screen development. The primary purpose of Workshop #2 is begin planning the HMI screen upgrades and collaborating with the City on division of work. Workshop #2 may be accomplished virtually as a cost savings measure.

The HDR design team shall complete the following prior to Workshop #2:

- Review all the existing HMI screens and prepare a list of tags and objects associated with each screen. Develop a screen navigation block diagram if required that includes popups.
- Prepare an alarm management list (export).
- Prepare a configuration document with any existing scripts, configuration details, and customized items.

Accomplish the following items during the workshop:

- Achieve consensus on existing screen updates on a per screen basis.
- Establish division of work between HDR and the City.
- Discuss existing configurations and City's desire for enhancements or new features.
- Discuss features of the new software versions that are desired for future or current enhancement.

Deliverables

- Progress memoranda and invoices (digital .pdf file).
- Work Meeting agendas and notes in bullet item format (digital .pdf copy of each agenda and meeting notes).

City Responsibilities:

- Timely review (Assumed to be five working days) of submittals and coordination of all City review comments.
- Participation in Project meetings and workshop sessions.

Task 200 – Data Gathering and Desktop Reviews

Objective

Requesting and reviewing available information and examining site conditions at the City Offices in preparation of defining hardware and software for the SCADA HMI upgrade. Obtain as-built drawings/sketches of the existing system at the City offices.

Deliverables:

- List of HMI screens, objects, and tags
- Existing hardware and software list
- OT Level inventory list with assigned IP Addresses
- List of all connected network assets, radio and Ethernet

Task 300 – Hardware & Software Procurement Design

Objective:

Prepare a bill of materials that includes new hardware/software, supplier information, costs, and quantities.

Deliverables:

- Bill of Materials Spreadsheet (electronic)
- Network diagram and rack layouts (optional)
- Software licensing details including support agreements

City Responsibilities:

- Review BOM and issue purchase orders to procure equipment and software
- Receiving hardware and software at City Offices

Task 400 – HMI Screen Upgrades

Objective:

The collaborative upgrades to the HMI screens will take place through a minimum of three Workshops and additional coordination meetings. Leveraging the deliverables from Task 200 as discussion points for Workshop #2, HDR will present the most up-to-date templates, faceplates, and objects for high-performance HMI development and work closely with the City to arrive at screen designs that remain based in the structure and flow of the existing screens as much as practical, while still embracing the newer development tools.

Each screen will be reviewed for content, context, and purpose to customize the new screens and create a user-friendly, intuitive operator experience with maximum flexibility for engineering technicians and supervisors. The iterative process of reviewing and developing SCADA screens happens through commitment to detail and being prepared to walk through the screens at 50%

(Workshop #3), 90% (Workshop #4) and 100% to achieve buy-in from all the stakeholders. Agendas and goals for each workshop will be collaboratively developed during the project.

Once the screens are established, HDR will prepare lists of objects and tags for each screen that will be used during commissioning to verify all points are connected announced properly and linked to the field devices. Similar lists will be used to verify the Historian and Alarm Management software are receiving data and performing as designed.

Under this task, the new hardware will be loaded and configured with the new versions of software and initially loaded with the existing HMI applications for testing of software stability and operation. All the recommend patches will be installed on the software in accordance with the Cybersecurity and Infrastructure Security Agency (CISA). Once the software is deemed stable with the existing HMI, HDR will systematically apply the new screens and configurations to the software.

Deliverables:

- HMI Screens at 50%, 90% and 100%
- Testing checklists
- Software lists with patches

City Responsibilities:

- Collaborate on screen reviews

Task 500 – Installation and Deployment

Objective:

HDR assistance with hardware installation and software deployment of the upgraded SCADA HMI, iFIX, Proficy Historian, AE Collector (if required), Alarm Management (currently Win911), RSLinx, and RSLogix 500 (if required).

We propose the initial installation be an instance of the existing HMI operating on new upgraded servers. After a period of one week of error free operation proving upgraded system stability, we will add new screens and modify other software with pre-programmed configurations. Generally, each screen will be tested realtime using the commissioning checklists, and once complete HDR will provide the checklists to the City.

When the full software upgrade is online and operating in parallel with the existing for a period approved by the City, HDR recommends taking the existing system offline and decommissioning. Best practice is to keep this hardware and software for a month or so just in case an unforeseen issue arises and the system needs to be placed back into service.

Once the system is fully upgraded, the new City Disaster Laptop will be configured for use and tested using the offsite Esteem and Viper radios.

Often after a few weeks of using the new system, issues arise or changes are desired. HDR will retain 16 support hours for the system to include operator training if desired, and make changes as directed by the City.

Deliverables:

- Updated software, setup and configuration
- Completed screen checklists
- Training materials as needed
- Software licensing details including support agreements

City Responsibilities:

- Installation and construction of networks
- Installation of power supplies and servers
- Assistance during commissioning period that includes switching of systems for complete screen I/O testing

Project Assumptions:

- City will purchase all specified hardware and software based on HDR Bill of Materials.
- City will provide HDR with supplier and license information of current software, and HDR will do development using new City licenses on city hardware.
- City will furnish PLC programming from the collectors (aggregators) for coordination with the new software.
- Cybersecurity analysis is not included in this statement of services. It is assumed that the City has established guidelines and practices and HDR will follow these guidelines as applicable to this scope of work.
- The effectiveness of operational technology systems (“OT Systems”) and features designed, recommended or assessed by HDR are dependent upon City of Missoula continued operation and maintenance of the OT Systems in accordance with all standards, best practices, laws, and regulations that govern the operation and maintenance of the OT Systems. City of Missoula shall be solely responsible for operating and maintaining the OT System in accordance with applicable industry standards (i.e. ISA, NIST, etc.) and best practices, which generally include but are not limited to, cybersecurity policies and procedures, documentation and training requirements, continuous monitoring of assets for tampering and intrusion, periodic evaluation for asset vulnerabilities, implementation and update of appropriate technical, physical, and operational standards, and offline testing of all software/firmware patches/updates prior to placing updates into production. Additionally, City of Missoula recognizes and agrees that OT Systems are subject to internal and external breach, compromise, and similar incidents. Security features designed, recommended or assessed by HDR are intended to reduce the likelihood that OT Systems will be compromised by such incidents. However, HDR does not guarantee that the City of Missoula’s OT Systems are impenetrable and the City agrees to waive any claims against HDR resulting from any such incidents that relate to or affect the City’s OT Systems.
- PLC programming is not included in this scope of services.

Project Schedule:

We believe the project can be completed in four to six months depending on availability of hardware. As COVID-19 has caused supply chain disruptions worldwide, we are noticing delays in materials and electronic hardware and are unable to predict availability of computer platforms or network switches.

Fee Discussion and Breakdown – The scope of services will be tracked by task and billed on a Time and Expense basis. The total fee is \$80,500.

Contract Breakdown

Task 100	Project Management	\$8,800
Task 200	Data Gathering & Desktop Reviews	\$7,500
Task 300	BOM and Procurement Sppt	\$10,800
Task 400	HMI Screen Development	\$39,650
Task 500	Installation & Deployment	\$13,750

Thank you for the opportunity to propose on this exciting SCADA project.

Sincerely,
HDR Engineering



Trey Morris, PE
MT Control Systems Section Manager