

EXHIBIT A

Scope of Work

City of Longview

SCADA Redesign and Recovery

April 2018

Background

The City of Longview's (City) supervisory control and data acquisition (SCADA) system consists of the instrumentation, controllers, computers, software, and communication components required to monitor and control the City's water, wastewater and stormwater infrastructure. The existing system is relatively new but wireless cellular frequencies have caused SCADA communications to become unreliable.

The City has requested the services of RH2 Engineering, Inc., (RH2) to redesign the existing communications system and review the existing SCADA infrastructure. The tasks for this project are as follows:

1. Review Existing Infrastructure Inventory of City Facilities
2. Communication Method and Path Study
3. Hardware and Software Assessment
4. 90-Percent and Final Design
5. Bid-Ready Conversion Plan
6. FCC Licensing
7. Project Management Services

The goals of this project are to recover the existing SCADA system in the most cost-effective method possible while maintaining a high level of reliability and redundancy.

Task 1 – Review Existing Infrastructure

Objective: Review the City's existing SCADA design, planning, and O&M documentation to understand the original implementation. Meet with the existing City staff to review the existing SCADA system components and architecture, existing communication methods, hardware and software, and future SCADA system goals identified by City staff.

Approach:

- 1.1 Obtain and review relevant design, planning, and O&M documents relating to the existing SCADA system. Create an agenda and list of questions for meeting with City staff.
- 1.2 Attend one (1) meeting with City staff to review the existing system and identify the City's goals for the existing and future SCADA system. Prepare a memorandum identifying information collected during the meeting for review by City staff.

Assumptions: RH2 is entitled to rely on the accuracy and completeness of any information, data, or materials generated or produced by the City or others in relation to this Scope of Work.

Provided by City:

- Existing SCADA system design, planning, and O&M documentation.

- Existing PLC, operator interface, and radio configuration software.
- City stakeholder's ability to attend review meeting with RH2.

RH2 Deliverables:

- Meeting agenda and preliminary list of questions for review meeting in electronic format.
- Attendance at meeting with City staff.
- Meeting memorandum in electronic format.

Task 2 – Inventory City Facilities

Objective: Visit City facilities and gather/confirm site information regarding control operations, locations, power availability, communications options, instrumentation, local control equipment, and City identified upgrades. In addition, existing equipment will be assessed, and equipment will be identified that can be re-used or re-purposed as part of the redesign process. The sites to be visited include the existing 31 remote facilities that communicate back to the SCADA computer system and the 2 master polling locations.

Approach:

- 2.1 Attend site visit with City staff at each of the existing facilities.
- 2.2 Create preliminary inventory report section to be reviewed by City staff for completeness and errors.

Provided by City:

- Access to City facilities and SCADA related staff.

RH2 Deliverables:

- Facility inventory report section in electronic format.

Task 3 – Communication Method and Path Study

Objective:

Approach:

- 3.1 With the assistance of RH2's subconsultant, Accu-Comm, review the earlier radio path study (RF) study report that was completed for the City by Harris Group Inc.
- 3.2 Identify possible alternate wireless technology that can increase the speed redundancy and reliability of system with the assistance of Accu-Comm. Alternate communications for hard to reach facilities will also be evaluated as part of this subtask.
- 3.3 Attend visits at each of the intended sites involved to ascertain existing infrastructure, cabling, etc. and to determine what can be used in a new system and suitability for re-use. This subtask will be performed by Accu-Comm and will also include ascertaining potential antenna height above ground levels for each site, as well as transmission line run distances to be involved.
- 3.4 Using the sites and locations specified and the results from the site visits, perform a computer-based Terrain Analysis from a master or masters to each remote site, as specified, using as fine a gradient vertical database available that is compatible with Softwright's TAP program. This subtask will be performed by Accu-Comm.

- 3.5 Based upon the outcome of the Terrain Analysis, develop a system topology that provides for paths that have clear Line of Site (LOS) with regard to terrain infringement, based upon use of Ethernet capable RF routing equipment. This subtask will be performed by Accu-Comm.
- 3.6 With the assistance of Accu-Comm, recommend a frequency band that considers the results of the Terrain Analysis/system topology outcomes.
- 3.7 Revisit the sites to perform detailed RF measurements and path availability tests based upon actual data transfers and log the test results. *This will involve temporarily placing RF equipment, antennas, masts, and possibly other infrastructure, as necessary, to perform these tests at each site. Path availability outcomes will fail if they do not meet manufacturer specified minimums.* This subtask will be performed by Accu-Comm.
- 3.8 Pending outcome of these tests, finalize a system topology to be employed for approval with the assistance of Accu-Comm. This topology will include cost estimates for a 460 megahertz (MHz) upgrade, along with options for using other communications technologies. These options will also be based on the priority of each location to identify issues such as communications speed, redundancy, and reliability.
- 3.9 Pending approval of the recommended system topology, provide a preliminary report to the City.
- 3.10 Meet with City staff to discuss the preliminary report options for final selection by City.

Provided by City:

- Access to facility wireless communications systems.

RH2 Deliverables:

- Preliminary and final path study report in electronic format.
- Attendance at site visits for testing.
- Attendance at meeting with City to discuss preliminary report.

Task 4 – Hardware and Software Assessment

Objective: Review existing SCADA computer system hardware, software, and network components and provide recommendations for system optimization or upgrades.

Approach:

- 4.1 Evaluate computer hardware.
- 4.2 Evaluate computer software, including capacity upgrades, deploying updates, licensing, software configuration, hot back-ups, security, historian functions, alarm functions, and any additional issues identified by City staff.
- 4.3 Evaluate the existing redundant network configuration to identify any design or implementation issues.
- 4.4 Evaluate Wonderware Systems Platform Application including, but not limited to, reviewing data and graphic objects, HMI screen designs, historian configuration, redundancy implementation, and overall system design.
- 4.5 Prepare hardware and software evaluation report.

Provided by City:

- List of known SCADA computer system issues to be included in this evaluation.
- Back up of existing Wonderware Systems Platform Application.
- Access to City IT staff.
- Access to City SCADA network information.

RH2 Deliverables:

- SCADA Computer System Hardware and Software Evaluation Report in electronic format.

Task 5 – SCADA Design Report

Objective: Prepare standardized template plans, specifications, and construction cost estimates for the SCADA facility upgrades. Prepare SCADA design report.

Approach:

- 5.1 Prepare SCADA implementation schedule and finalize preliminary report
- 5.2 Prepare Standardized Template Plans and Bill of Materials – Prepare electrical and control plans to be used as a standardized template by the City to upgrade existing facilities that are not currently equipped with a SCADA system. Electrical plans will include telemetry panel details, electrical installation plans, bill of materials, and antenna mounting and radio installation details. *It is assumed that several of the City's facilities will be similar to each other and that a standardized template may be used at multiple facilities. A maximum of five (5) standardized templates will be prepared as part of this subtask that the City can use for generating bid documents. Should more than five (5) standardized templates be required, a Scope of Work and Fee Estimate amendment shall be required.*
- 5.3 Prepare Technical Specifications – Prepare technical specifications, in RH2's modified CSI format, that the City can use to generate bid documents for upgrading the telemetry and SCADA systems at existing facilities that are not equipped with SCADA. *City standard specifications and general conditions to be prepared by the City.*
- 5.4 Submit 90-percent Documents for City Review and Edit Plans – Design progress submittals shall be made at the 90-percent design stage and will include technical specifications and template plans. The 90-percent documents will be submitted to the City, and after a review period, RH2 will attend one (1) review meeting with the City. Upon completion of addressing the 90-percent comments, RH2 will submit a set of documents to the City for final comments.
- 5.5 Perform QA/QC and Internal Review – Provide a formal internal QA/QC review, which provides review of RH2's design and final deliverables.
- 5.6 Prepare Construction Cost Estimates – Prepare 90-percent and final construction cost estimates.
- 5.7 Meet with City to present and discuss preliminary SCADA design report.
- 5.8 Finalize SCADA design report after review and comment period based on feedback from City SCADA system staff.

Assumptions: Refer to the attached Exhibit B – Fee Estimate for an estimate of time required for design tasks. Revisions due to changes in design criteria after those elements have been designed will require a Scope of Work and Fee Estimate amendment.

Provided by City:

- Standard specifications and general conditions.
- Review and comments on 90-percent technical specifications, plans, and construction cost estimate.
- Review and comments for preliminary SCADA design report.

RH2 Deliverables:

- SCADA implementation schedule in electronic format (PDF).
- Standardized template plans in electronic format (PDF).
- 90-percent design plans and technical specifications in electronic format (PDF).
- 90-percent and final construction cost estimates in electronic format (PDF).
- Preliminary SCADA design report in electronic format (PDF).
- Final SCADA design report in electronic format (PDF).

Task 6 – Bid-Ready Conversion Design

Objective: Prepare bid-ready design plans and specifications for the proposed electrical and control system work to convert and migrate existing SCADA system to the proposed platforms. This task only applies to the existing facilities that have been designed to integrate with the City SCADA system.

Approach:

- 6.1 Prepare Conversion Electrical Plans – Prepare electrical plans for the telemetry panel and communication upgrades at the water, wastewater and stormwater system facilities for converting communications from 900 MHz to 460 MHz or other selected frequencies identified for each facility in Task 3. Electrical plans will include telemetry panel upgrade details, electrical installation plans, and antenna mounting and radio installation details.
- 6.2 Prepare Technical Specifications – Prepare technical specifications, in RH2's modified CSI format, for the telemetry panel and communication upgrades. *City standard specifications and general conditions to be prepared by the City.*
- 6.3 Submit 90-percent Documents for City Review and Edit Plans – Design progress submittals shall be made at the 90-percent design stage and will include technical specifications and electrical plans. The 90-percent documents will be submitted to the City, and after a review period, RH2 will attend one (1) review meeting with the City. Upon completion of addressing the 90-percent comments, RH2 will submit a set of documents to the City for final comments.
- 6.4 Perform QA/QC and Internal Review – Provide a formal internal QA/QC process, which provides review of RH2's design and final deliverables.
- 6.5 Prepare Construction Cost Estimates – Prepare 90-percent and final construction cost estimates.
- 6.6 Prepare Final Bid Documents – Coordinate with the City for providing final bid documents. *It is assumed that all bid documents will be provided to the City in electronic PDF format.*

Assumptions: Refer to the attached Exhibit B – Fee Estimate for an estimate of time required for design tasks. Revisions due to changes in design criteria after those elements have been designed will require a Scope of Work and Fee Estimate amendment.

Provided by City:

- Standard specifications and general conditions.
- Review and comments on 90-percent and bid-ready plans and technical specifications.

RH2 Deliverables:

- 90-percent design plans and technical specifications in electronic format (PDF).
- 90-percent and final construction cost estimates in electronic format (PDF).
- Bid-ready plans and technical specifications in electronic format (PDF) for the City's use in producing bid sets for electronic distribution.

Task 7 – FCC Licensing

Objective: Provide wireless licensing services to obtain new or change existing Federal Communications Commission (FCC) wireless licenses.

Approach:

- 7.1 Based upon design recommendations, make a final recommendation as to FCC application steps and assist as desired in making the formal application for submission to the proper coordinating body in pursuit of an FCC license for operation. This subtask will be performed by Accu-Comm.
- 7.2 Once coordination efforts are complete, test any frequencies offered for consideration employing Spectrum Analyzation equipment to verify recommended frequency/frequencies usability, measure noise floor levels, and select the best channel offered. This subtask will be performed by Accu-Comm.

Provided by City:

- Access to facilities to test FCC offered frequencies.

RH2 Deliverables:

- New or updated FCC license applications.

Task 8 – Project Management Services

Objective: Provide ongoing project management services during the fulfillment of the contract.

Approach:

- 7.1 Track RH2's work elements accomplished, work items planned for the next period, manpower, scope changes, and time and budget needed to perform the work. Prepare monthly progress reports to summarize work accomplished, anticipated work for the following month, and potential issues or changes. Submit monthly invoices summarizing costs and remaining budget by task.
- 7.2 Communicate issues with the City's project manager by phone or email on an as-needed basis.
- 7.3 Develop and submit meeting minutes within three (3) days of a meeting, site visit, or conference call.

RH2 Deliverables:

- Monthly invoices and budget status in electronic format (PDF).
- Monthly progress reports, including task completion status and future work items for next period in electronic format (PDF).

- Meeting minutes in electronic format (PDF).

PRELIMINARY