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BARR

February 21, 2017

Mr. Bob Therres
Public Services Manager
City of Blaine
10801 Town Square Drive NE
Blaine, MN 55449

Re: Proposal for SCADA assistance

Dear Mr. Therres:

Pursuant to our meeting on February 14, 2017, this is a proposal for assistance with your utility SCADA system.

Background Information and Project Overview:

The City of Blaine (City) has experienced two failures of its SCADA system that led to low system pressure events in 2017. The SCADA system was originally constructed by Total Control Systems, Inc., and later supported by Superior Control Systems. In 2015, the City developed contract documents for upgrades to the SCADA master panel, computers and software. The City awarded the work to In Control, Inc. The current In Control contact is underway, but not complete. The new SCADA master panel has been delivered to the site, but not installed.

The City has requested Barr's review of the overall SCADA system for the water and sewer utilities for reliability and redundancy, especially with regard to failure modes and alarm reporting. Barr will provide an overall review of hardware, system configuration, communication methods, reliability and redundancy. Since the existing system includes PLC programs that were original to the system, and may have been modified by multiple vendors over the years, it is important to conduct a thorough review of the PLC code. Since In Control is currently under contract, and the City intends to continue forward with the In Control contract, Barr recommends retaining In Control for the PLC code review. The intent of the PLC code review is to determine if there are portions of the code that are not inherently reliable, and to make recommendations for PLC code revisions.

The SCADA system review will also consider the system's capability for handling alternative communication mediums (radio, cellular, fiber optic, etc.), and expandability for handling future additional sites, including the northeast wellfield and water treatment facility.

The result of the SCADA system hardware and software review will be a series of recommendations for system improvements.

As an interim step, the City is soliciting proposals for backup alarm systems to be installed at each of four (4) water towers. The backup alarm systems will consist of a pressure switch and automatic telephone dialer at each location. The systems will simply call a list of City personnel if a low pressure condition is detected. The pressure settings will be selected to provide the City with enough time to respond, assess

the alarm, and take corrective action. The City will undertake installation of the backup alarm systems ASAP.

Objectives

The following objectives will guide our work on the evaluation:

- Develop a comprehensive understanding of the city's existing water and sewer system components including SCADA equipment, software, hardware, and communications, and how they function together during daily operation.
- Provide recommendations on improvements to system controls and operations based on operations staff preferences, industry standards, and risk assessments.
- Provide comprehensive documentation of the system so all stakeholders can be aware of operational parameters.
- Reduce risk of system failures based on third party reviews and added redundancies.

Proposed scope of work

Details of the scope of work we will perform to meet the objectives listed above are included below.

Task 1: tower level alarms

Review emergency pressure alarm proposals that were solicited by the City, recommend changes if needed. Recommend proposal award.

Task 1 meetings

- none

Task 1 deliverables

- email with recommendations

Task 1 work by City

- provide quote packages for review
- provide installation of selected tower alarm systems

Task 2: high-priority assessment

We will perform a critical short term review of the current system set up and operation to assess exposure to immediate risk of failure (e.g. move temporary panel inside, modify UPS circuitry, etc.). We will also determine the need to initiate temporary 24 hour staff monitoring of critical water system information until the full evaluation or implementation is completed. At a minimum, we will recommend protocols or changes to prevent a repeat of either of the events that triggered the two recent water outages.

Task 2 meetings

- phone call to review recommendations

Task 2 deliverables

- electronic memo describing any high-priority improvements and operational recommendations until full review is complete.

Task 2 work by City

- Provide record drawings of all equipment installations and SCADA

Task 3: review existing and proposed system

The objective of this task is to obtain a full understanding of what the existing system is comprised of, how it functions, and the proposed SCADA system work.

1. Review the existing and proposed system record drawings.
    a. Review existing and proposed hardware from record drawings and proposed drawings.
    b. Review existing and proposed software with In Control
2. Work with In Control to ensure that changeover to the new system has appropriate safe guards for uninterrupted service. In Control is currently fulfilling a contract with the City. The contract documents were prepared by others. Barr may have recommendations that will result in changes to the current contract.
3. Review the proposed SCADA drawings with an eye towards future expansion and the future NE well field and treatment plant.
4. Work with staff and In Control to draft a functional description. In Control is currently under contract with the City, but the contract does not appear to include review and/or modifications of existing system functionality at sites other than the SCADA master. The development of functional descriptions will require assessment of the existing PLC programs by In Control.
5. Field verify installations of equipment, as necessary, based on status of record drawings.

Task 3 meetings

- One two-hour meeting with utility staff to discuss current operations and to outline a functional description.
- Two two-hour meetings with In Control to review existing and proposed SCADA.

Task 3 deliverables

- Functional description
- Existing system schematics
- Redlined existing system record drawings to reflect installed components
- Memo or drawings to summarizing current proposal for new system

Task 3 work by City

- Provide record drawings of all equipment installations and SCADA
- Provide In Control scope form to outline the new system requirements
- Work with Barr to create a functional description, provide a narrative of how you operate the water and sanitary sewer systems.
- Provide access to infrastructure that needs field reviews to verify installations.

Task 4: recommend improvements

Following the existing and proposed system evaluations, Barr will recommend improvements to the system to improve reliability. These improvements will be developed based on Barr's experience with many systems of similar size and scope. As discussed in our meeting, the recommendations will be made impartially, regardless of current contracts or vendors working with the city.

1. Identify areas for hardware, software and communications improvement or redundancy based on drawings and risk assessments.

2. Work with In Control to identify areas for improvement in SCADA controls, communications and collection of historic data.

Task 4 meetings

- One meeting with utility staff to discuss proposed improvements
- One two-hour meeting with In Control to review existing and proposed SCADA changes.
- One two-hour city council workshop to discuss draft project recommendations

Task 4 deliverables

- Draft technical memo and redlined drawings outlining recommended improvements and how they were prioritized, first for city review, then for city council workshop.
- Final technical memo of recommendations

Task 4 work by City

- Assistance with prioritization of improvements

Task 5: implementation

Work with city to help implement improvements based on the recommendations in the proceeding task. The scope of this task will be developed at a later date.

Task 5 meetings

- to be determined

Task 5 deliverables

- to be determined

Task 5 work by City

- to be determined

Project management

Project management will involve project updates and correspondence with City staff and the project team, at frequency requested by City staff.

Personnel availability

The Barr team committed to this project consists of staff with whom you are familiar, including:

- **Sheldon Sorensen**—principal in charge and QA/QC
- **Brian LeMon**—QA/QC
- **Michelle Stockness**—project manager
- **Dan Nesler**—senior process/civil engineer
- **Stuart Stephens**—electrical engineer
- **Zach Nesler**- electrical engineer
- **Katie Duncan**- process engineer

Project schedule

The proposed project schedule is provided in the following table.

Work task	Duration	Deliverable date
Kickoff meeting	1 day	February 14, 2017
Task 1- tower level alarm proposal review	2 days from kickoff	February 16, 2017
Task 2: Data request to In Control and City	3 days after kickoff	February 17, 2017
Task 2: Receipt of all record drawings	1 week after request	February 24, 2017
Task 2: High priority assessment	1 week after data received	March 3, 2017
Task 3: Review existing and proposed hardware	2 weeks after data received	March 10, 2017
Task 3: Review existing and proposed software	4 weeks after data received	March 24, 2017
Task 4: Draft recommendations	2 weeks after reviews	April 7, 2017
Task 4: City Council workshop	After draft recommendations	To be determined
Task 4: Final recommendations	2 weeks after council workshop	To be determined
Task 5: Implementation		To be determined

Fee estimate

Barr Engineering Company proposes to provide the described services on an hourly basis at standard rates, plus outside expenses. The fee estimate for the Barr work tasks described above are provided in the table below. Given the emergency response schedule and discovery nature of the project, we are estimating a range of the fee estimate. If we think our work may exceed this amount, we will discuss before continuing further.

Work task	Fee estimate
Barr Engineering	$ 25,000 - $ 30,000

As noted above, Barr is recommending a role for In Control, Inc. with regard to detailed review of the existing system software. In Control, Inc. will incur costs to perform the software review, provide recommendations, attend meetings, and the like. It is our understanding that In Control, Inc. will provide the software review services directly for the City of Blaine as an extension of their existing SCADA contract. *We have not included In Control, Inc.'s costs in this proposal.*

In conclusion

Thank you for the opportunity to work on this project. If you have questions, feel free contact Sheldon Sorensen (952-832-2970 or ssorensen@barr.com) or Michelle Stockness (952-832-2754 or mstockness@barr.com).

If the terms of this agreement are acceptable to the City of Blaine, please date and sign in the space provided below. Keep one copy for your records and return the other to Barr Engineering Co.

Sincerely,

By: Sheldon Sorensen, PE
Its: Vice President, Principal in Charge

Michelle Stockness, PE
Project Manager

Accepted this ___ day of _____, 2017

CITY OF BLAINE

By_____

Its_____