



Donohue & Associates, Inc.  
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December 13, 2018

Mr. Jon Haukaas, PE  
Director of Public Works  
City of Blaine  
1801 101<sup>st</sup> Avenue NE  
Blaine, MN 55449

Re: Investigation of Corrosion Issues at Wells 3 and 4, Tower 1 and WTP 1

Dear Mr. Haukaas:

Thank you for this opportunity to assist the City of Blaine with investigation and mitigation of corrosion problems that are occurring in Wells 3 and 4 and the assessment of potential corrosion issues in nearby facilities: Tower 1 and WTP 1.

We understand that in late 2017, Well 3 failed. Upon removal of the pump from the well, the drop pipe was found to have deteriorated to the point that the electrical supply cable was holding the pump and motor assembly.

Subsequently, the City contracted removal of the Well 4 pump and evaluation of its components. Column pipe removed from Well 4 shows distinct differences in appearance below and above the water level and in areas of the pipe protected by taped electrical wire. Bergerson Caswell also reported that there is corrosion evident in the pitless spool of Well 4.

A cathodic protection system was installed at Tower 1 when it was constructed in 1961 but the system was taken out of service in 1996 and subsequently removed. There is no cathodic protection system in WTP 1.

### **Scope of Services**

We developed our Scope of Services based on information you and your staff provided during your meeting on November 29, 2018 and experience with similar projects at other cities.

Our general approach to this project is to provide services to investigate the issue with Wells 3 and 4 corrosion as a first phase of work. Then, depending on the outcome of the investigation, design of mitigation may be necessary or a simple resolution to the problem might be identified.

Due to the unusual nature of this situation, Donohue has elected to bring in a national corrosion engineer to conduct field work including electrical testing. He will also lead preparation of assessment documentation and be responsible for development of recommendations for mitigation as appropriate.

### *Kickoff Meeting*

Donohue team members will meet with the City to conduct a Project Kick-off Meeting to review project scope and existing facility information. The following elements will be discussed during this meeting:

- Requirements and goals for this Project
- Project Schedule
- City concerns
- Previous studies and available data including facility plans and tower inspections, well video logs and inspections
- Local utility mapping
- Tour of WTP 1 and Tower 1

We will provide an agenda prior to the meeting that includes a request for information. Meeting minutes will be provided to the City by Donohue staff.

### *Assessment*

The project team will complete an assessment of the existing facilities' corrosion potential consisting of:

- Review of existing data and facility plans
- Assessment of well pump installation and water quality data
- Evaluation of underground facilities with potential to induce corrosion to Wells 3 or 4, WTP 1 or Tower 1
- Conduct electrical tests to eliminated possible causes such as:
  - Interference corrosion
  - Dissimilar metals
  - Differential pH corrosion cells.
  - Electrical grounding issues
  - Other possible corrosion cells.

### *Technical Memorandum #1*

This assessment will be documented in Technical Memorandum #1 that will include:

- Executive summary
- Table of contents
- Introduction consisting of project background, purpose and scope
- Summary of the existing facilities and condition assessment that includes photographs and descriptions of equipment and facilities.
- Recommendation for additional testing
- Recommendation for mitigation, if appropriate

### **Proposed Fee**

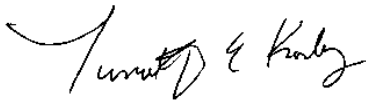
Compensation for completion of items as described in the Scope of Services will be on an hourly basis and will not exceed \$22,000 without your authorization.

**Proposed Schedule**

Donohue staff will schedule the project kickoff meeting at a mutually agreed to time with City staff, anticipated to be within three weeks of our receipt of a signed contract. It will likely be necessary to schedule a second site visit for electrical testing.

Services will be performed in accordance with the enclosed Standard Terms and Conditions.

Sincerely,

A handwritten signature in black ink, appearing to read "Timothy E. Korby". The signature is fluid and cursive, with the first name "Timothy" being the most prominent part.

Timothy E. Korby, PE

Enclosures: As noted