

Technical Memorandum

To: Jon Haukaas, City of Blaine
From: Brian LeMon, Barr Engineering Co.
Subject: **Draft** Blaine WTP 1-3 Evaluation
Date: November 11, 2020
Project: WTP 1-3 Upgrades

1.0 Purpose

The City of Blaine (City) requested that Barr Engineering (Barr) and CBS Squared conduct an evaluation of existing water treatment plants 1-3 (WTP 1-3). The purpose of the inspection was twofold. The first objective was to provide data for input into the City's asset management program (PubWorks) and in so doing, create a baseline condition assessment of the existing plants for future comparison. The second objective was to define the limits of the proposed WTP 1-3 upgrade project. Inspections were conducted at each WTP to achieve both the creation of the baseline condition assessment and define the limits and scope for the proposed WTP 1-3 upgrade project. This memorandum provides documentation of the inspections and summarizes the design scopes for each treatment plant, distinguishes improvements that will be included in the bid, items the City may want to correct independent of the project, suggests a schedule, and provides a scope of work and cost estimate for Barr's and CBS Squared's services related to preparation of bidding documents for the project. The outcome will be two separately bid projects, one for WTP 1 and 3 and a second for WTP 2.

The remainder of this document is broken down into the following sections:

- Introduction
- WTP 1-3 Condition Assessment and Scope of Upgrade
 - Assessment and Project Development Methodology
 - WTP 1
 - WTP 2
 - WTP 3
- Schedule and Sequencing
- Scope and Fee for Preparation of Bidding Documents

2.0 Introduction

Barr inspected the building interior process piping, equipment, chemical addition systems, and electrical components. CBS Squared inspected the interior and exterior architectural components extending to slabs adjacent to the building. The majority of the inspections were visual, and the functionality of the equipment was not tested with the exception of lighting circuits. Lighting circuits were tested using a

megger unit to measure the resistance of the wiring. An Excel file titled, *Blaine_WTP 1-3 Inspection Form*, was used to record inspection observations and testing completed during the site visit. Three separate spreadsheets within the Excel file were used to separately document the condition of each WTP.

The City is undertaking the plant upgrade projects largely to address the physical appearance of the plants. Separate projects will address plant functionality and process upgrades. In addition to this, filter upgrades are being contemplated at each of the plants to address problems occurring with the filter underdrains. This filter upgrade work is being performed by another consultant and is not part of this effort. However, it will affect the schedule of the projects contemplated and defined in this memo. Work on an upgrade project at any of the plants should not occur until after the filter modifications have been completed. Coordination between this and other work being performed in the city will be important to ensure consistent and uninterrupted supply of compliant drinking water to residents and businesses.

3.0 WTP 1-3 Condition Assessment and Scope of Upgrade

The following paragraphs identify the scope for the WTP 1-3 Upgrade project. Detailed inspection results are included in the *Blaine WTP 1-3 Inspection Form*.

3.1 Assessment and Project Development Methodology

During the site visit, equipment was given a grade based on the observed condition using the following 1-5 grading scale:

- 1 = poor condition
- 2 =below average
- 3 =average
- 4 =above average
- 5 =excellent

It was also indicated if the item should be included or excluded from the project. A code was added to help explain why the item may or may not be included. The following codes were used:

- Include – NC (Not Compliant)
- Include – NF (Not Functional/<5yrs remaining useful life)
- Include – AH (Aesthetic/High Impact)
- Include – CR (Consistent Repair)
- Include - RP (Recommended Practice) e.g., chemical feed line replacement
- Include - FI (Functional Improvement) e.g., sample tap/pressure gauge replacement
- Exclude – FS (Feasibility Study scope item) e.g., valve actuator study, flow meter replacement
- Exclude – AL (Aesthetic/Low Impact)
- Exclude – FR (Functional Replace/5-10 years remaining useful life)

All items that were identified as noncompliant, non functional (with less than five years of useful life remaining), aesthetic high-impact, consistent repair, recommended practice, and functional improvements will be included in the project. Also, the flow meter and control valve feasibility studies will be completed prior to completion of the design so we can identify how replacement or repair of the flow meters and control valves should be incorporated into the project.

3.2 WTP 1 Condition Assessment

Within WTP 1, all the process piping, including gate valves and check valves will be coated. The replacement of automated butterfly valves and flow meters will be investigated in separate feasibility studies, which will be completed prior to completion of the design package for the plant upgrade so they can be incorporated in the project, whether they will be painted or replaced and painted. The vessels, reaction tanks, and air stripper appear to be in good shape, only cleaning and touch-up paint will be required. Any damage to coatings or messes created during the media change out or underdrain repair/replacement work will be addressed in this project. The large flow control valves will be sent off site to be rebuilt and re-certified and then coated after they are re-installed. Sample taps and pressure gauges will also be replaced along with the sulfur dioxide injection tap. Concrete bases for pumps, vessels, reaction tanks, and the air stripper will be coated. The eyewash and shower located in the fluoride room is also in need of coating. The three high service pumps, backwash recycle pump, chemical booster pumps, air stripper blower, and air stripper chemical recirculation pumps will also all need to be coated. Motor testing for all major motors and feeder circuits should be conducted at the beginning of the work to identify if the motor windings are in good condition, and if not, motor replacement or re-winding should be performed.

We recommend to replace vent lines for the polyphosphate and fluorosilicic acid and all chemical tubing for polyphosphate, fluorosilicic acid, and sulfur dioxide. Common practice is to replace chemical tubing on a regular basis, some cities do this annually. This is a task we assume can be completed by Blaine staff, and therefore not currently included in the project. The chlorine gas system will be evaluated in a separate feasibility study. Additionally, it is recommended to dispose of chemicals currently stored in the WTP that are no longer used.

The lighting within the building is generally in poor condition and also utilizes legacy lamping technology. It will be replaced along with associated wiring and switching with LED lighting products. The exterior lighting is in acceptable condition, but also utilizes legacy lamping technology. Therefore, it will also be replaced. Ceiling paddle fans are also in poor condition and will be replaced.

Exterior architecture work to be incorporated into the project includes re-tuck pointing mortar joints and mud jacking to raise concrete slabs adjacent to the building followed by replacing caulk joints. Several exterior doors require a new frame and/or door. Others with panic hardware that do not require a new frame or door need new weather stripping. We have assumed remaining exterior improvements can be addressed by City staff, including washing exterior walls to remove mold/mildew and vinegar stains from

near the scrubber tower; cleaning gutters of debris and vegetation; moving mulch away from the building face so it does not block weeps; oiling garage and service door coils, tracks, and springs; and application of epoxy coating to bollards.

Interior architecture work to be included in the project is characterized by application of new epoxy coating (and scarifying prior as applicable) to many surfaces/appurtenances including floors, walls, concrete pads beneath reaction tanks, roof trusses, steel lintels, pipe supports, and sprinkler pipes. In addition, hollow metal frame windows need to be replaced with fiberglass while all window glass requires fire-rated glazing, all penetrations through the walls and roof are to be caulked and sealed, and safety rails need to be installed at the roof access hatch. In the office, the sink and faucet need replacement as do the upper cabinets unless City forces elect to replace existing upper cabinet hardware along with the lower cabinet hardware. Other interior architectural improvements we have assumed will be accomplished by City staff include scrubbing and resealing glazed blocks and joints; replacing failing door hardware; replacing bathroom faucet and flush valves and toilet accessories (with plastic); and providing two fire extinguishers to meet code compliance. A blower door test to detect leaks is pending and may result in additional improvements to the project scope of work.

It will be our intention that the plant will have a relatively continuous appearance. In other words, sections to be painted/coated will not be situated immediately next to sections that are not to be, unless they will blend well together. Table 3-1 summarizes tasks we assume will be included in the bid for WTP 1 and Table 3-2 summarizes maintenance tasks we assume the City can complete at WTP 1.

Table 3-1 WTP 1 Proposed Tasks Included in Bid

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR LIGHTS	Lights are old technology HID, should be replaced w/LED.
EXTERNAL ELECTRICAL OUTLETS	Replace if applicable.
EXTERIOR WALLS	Re-tuck point mortar joints.
EXTERIOR SERVICE DOORS	Doors with panic hardware are failing to release when depressed; install new weather stripping. Several other doors need a new frame and/or door.
SIDEWALKS ADJACENT TO BUILDING	Mud jack to raise exterior slabs adjacent to building.
JOINT BETWEEN BUILDING AND SIDEWALKS	Replace caulk joint following mud jacking of slabs.
Building Interior – Main Filter Room	
LIGHTING AND SWITCHES/CONTROLS	Significant corrosion on many fixtures, replace lighting w/LED.
FANS	Only one of three working.
GENERAL ELECTRICAL RACEWAYS (conduit and enclosures secured, no visible wiring)	Superficial corrosion, clean and paint.
CONDITION OF WIRING (spot meggering to verify insulation resistance)	Spot checked insulation resistance on one lighting circuit, failed test (did not display significant resistance).

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EQUIPMENT	DESCRIPTION
LEAKS	Blower door test pending; will update with proposed scope of work when complete.
WINDOWS	Apply fire-rated glazing. Replace hollow metal frames with fiberglass for some.
ROOF ACCESS	Add safety rail on roof at roof hatch/access.
EPOXY FLOORS	Scarify and apply new epoxy paint.
EPOXY COVERED WALLS	Scarify and apply new epoxy paint.
ROOF TRUSSES/ROOF DECK	Remove rust, scarify surface, and galvanize in place.
SPRINKLER PIPES	Scarify and apply new epoxy paint or replace with galvanized pipe.
PENETRATIONS THROUGH WALL AND CEILINGS	Caulk and seal all penetrations through wall and roof.
STEEL LINTELS	Scarify and apply new epoxy.
PIPE SUPPORTS	Scarify and apply new epoxy.
WELL #3 CHECK VALVE	New coating needed.
WELL #4 CHECK VALVE	New coating needed.
PROCESS PIPING	New coating needed.
GATE VAVLES	New coating needed.
FLOW CONTROL VALVES	Rebuild off site and certify functionality; then coat.
PRESSURE GAUGES	Replace.
SAMPLE TAPS	Replace.
SO2 INJECTION TAP	Replace.
CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
SO2/CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #1 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #2 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
AIR STRIPPER VESSEL/CONCRETE PAD	Touch up coat on vessel inside the building and coat concrete base.
HIGH SERVICE PUMP 1	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
HIGH SERVICE PUMP 2	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
HIGH SERVICE PUMP 3	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.

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EQUIPMENT	DESCRIPTION
BACKWASH RECYCLE PUMP	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
SLUDGE PUMP	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
CHEMICAL BOOSTER PUMPS	Needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
AIR STRIPPER BLOWER	Needs new coating
CHEMICAL RECIRCULATION PUMP	Needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
Electrical Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Main sections w/ corroded fasteners. ATS was tested/maintained in 2018. MCC interiors in good condition, do IR test.
ELECTRICAL EQUIPMENT (enclosures close properly, 3.5' clear in front of each panel)	Main sections w/ corroded fasteners. ATS was tested/maintained in 2018. MCC interiors in good condition, do IR test.
Fluoride/Polyphosphate/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Replace w/LED.
EYEWASH AND SHOWER	Needs coating.
EPOXY FLOORS	Scarify and paint with new epoxy.
Chlorine/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
EPOXY FLOORS	Scarify and paint with new epoxy.
Scrubber Enclosure	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
Bathroom	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
Office	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
CABINETS	Replace upper cabinets (should City staff elect not to replace hardware themselves).
SINK/FAUCET	Replace.

Table 3-2 WTP 1 Proposed Tasks Completed by City

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR WALLS	Wash to remove mold/mildew and graffiti.
SERVICE/GARAGE DOORS	Oil coils/tracks/springs.
EXTERIOR SEPARATE SPACE – GENERATOR ENCLOSURE	Wash block walls to remove mildew, mold, and vinegar stains from cleaning scrubber tower.
BOLLARDS	Paint bollards with epoxy coating to prevent oxidation and rust.
GUTTERS	Remove debris and vegetation to prevent ice dams.
LANDSCAPING	Mulch to be moved away from building face so it does not block weeps.
Building Interior – Main Filter Room	
FIRE EXTINGUISHER	Provide two (2) fire extinguishers.
INTERIOR DOORS	Replace failing door hardware.
CHEMICAL STORAGE TANKS	Remove chemicals and storage tanks that are no longer used.
Fluoride/Polyphosphate/SO2 Room	
TUBING AND VALVES	
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.
Chlorine/SO2 Room	
TUBING AND VALVES	Replace SO2, fluoride, and poly tubing and valves
TANK VENTS	Replace vent lines for fluoride and poly tanks
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.
Bathroom	
TOILET ACCESSORIES	Replace with plastic.
FAUCET AND FLUSH VALVES	Replace corroded fixture/valves.
CLEAN GLAZED BLOCK AND JOINTS	Scrub and reseal.
Office	
CABINETS	Replace upper and lower cabinet hardware. It may be most cost-effective to replace all upper cabinets.
GLAZED BLOCK AND JOINTS	Scrub and reseal glazed block and joints.

3.3 WTP 2 Condition Assessment

Within WTP 2, all the process piping, including gate valves, check valves, and air/vacuum valves will be coated. The replacement of automated butterfly valves and flow meters will be investigated in separate feasibility studies, which will be completed prior to the completion of the design package for the plant upgrade so they can be incorporated in the project, whether they are to be painted or replaced and painted. The vessels and reaction tanks appear to be in good shape, only cleaning and touch up paint will

be required. Any damage to coatings or messes created during the media change out or underdrain repair/replacement work will be addressed in this project. The large flow control valves will be sent off site to be rebuilt, re-certified, and coated after they are re-installed. Several of the sample taps and pressure gauges will also be replaced. Concrete bases for wells, vessels, and reaction tanks will be coated. Well 12, Well 13, backwash recycle pump, and chemical booster pumps will also all need to be coated. Motor testing for all major motors and feeder circuits should be conducted at the beginning of the work to identify if the motor windings are in good condition, and if not, motor replacement or re-winding should be performed.

We recommend replacement of vent lines for the polyphosphate and fluorosilicic acid and chemical tubing for polyphosphate, fluorosilicic acid, and sulfur dioxide. Common practice is to replace chemical tubing on a regular basis, some cities perform this annually. This is a task we are assuming can be completed by Blaine staff, and therefor is not currently included in the project. The chlorine gas system will be evaluated in a separate feasibility study.

The lighting within the building is generally in poor condition and also utilizes legacy lamping technology. It will be replaced along with associated wiring and switching with LED lighting products. The exterior lighting is in acceptable condition, but also utilizes legacy lamping technology. Therefore, it will also be replaced. Ceiling paddle fans are also in poor condition and will be replaced.

Architectural upgrades recommended at WTP 2 are generally the same as those for WTP 1.

It will be our intention that the plant will have a relatively continuous appearance. In other words, sections to be painted/coated will not be situated immediately next to sections that are not to be, unless they will blend well together. Table 3-3 summarizes tasks we assume will be included in the bid for WTP 2 and Table 3-4 summarizes maintenance tasks we assume the City can complete at WTP 2.

Table 3-3 WTP 2 Proposed Tasks Included in Bid

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR LIGHTS	Lights are old technology HID, should be replaced w/LED.
EXTERNAL ELECTRICAL OUTLETS	Replace if applicable.
EXTERIOR WALLS	Re-tuck point mortar joints.
EXTERIOR SERVICE DOORS	Doors with panic hardware are failing to release when depressed; install new weather stripping. Several other doors need a new frame and/or door.
SIDEWALKS ADJACENT TO BUILDING	Mud jack to raise exterior slabs adjacent to building.
JOINT BETWEEN BUILDING AND SIDEWALKS	Replace caulk joint following mud jacking of slabs.
Building Interior – Main Filter Room	
LIGHTING AND SWITCHES/CONTROLS	Some fixtures not working, replace w/LED.
FANS	Fans not working.

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EQUIPMENT	DESCRIPTION
GENERAL ELECTRICAL RACEWAYS (conduit and enclosures secured, no visible wiring)	Superficial corrosion, clean and paint.
CONDITION OF WIRING (spot meggering to verify insulation resistance)	Spot checked insulation resistance on one lighting circuit, failed test (did not display significant resistance).
LEAKS	Blower door test pending; will update with proposed scope of work when complete.
WINDOWS	Apply fire-rated glazing. Replace hollow metal frames with fiberglass for some.
WELLS	Re-epoxy coat all house-keeping pads and pipe supports.
EPOXY FLOORS	Scarify and apply new epoxy paint.
EPOXY COVERED WALLS	Scarify and apply new epoxy paint.
ROOF TRUSSES/ROOF DECK	Remove rust, scarify surface, and galvanize in place.
SPRINKLER PIPES	Scarify and apply new epoxy paint or replace with galvanized pipe.
PENETRATIONS THROUGH WALL AND CEILINGS	Caulk and seal all penetrations through wall and roof.
STEEL LINTELS	Scarify and apply new epoxy.
PIPE SUPPORTS	Scarify and apply new epoxy.
WELL #12 – MOTOR, CONDUIT, WIRE, LOCAL DISCONNECT	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
WELL #12 AIR/VACUUM VALVE AND CHECK VALVE	New coating needed.
WELL #12 CONCRETE PAD	New coating needed.
WELL #13 – MOTOR, CONDUIT, WIRE, LOCAL DISCONNECT	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
WELL #13 AIR/VACUUM VALVE AND CHECK VALVE	New coating needed.
WELL #13 CONCRETE PAD	New coating needed.
WELL #17 CHECK VALVE	New coating needed.
WELL #9 CHECK VALVE	New coating needed.
PROCESS PIPING	New coating needed.
GATE VALVES	New coating needed.
FLOW CONTROL VALVES	Rebuild off site and then coat.
PRESSURE GAUGES	Replace.
SAMPLE TAPS	Replace.
CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
SO ₂ /CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #1 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.

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EQUIPMENT	DESCRIPTION
FILTER TANK #2 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #3 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #4 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
BACKWASH RECYCLE PUMP	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
SLUDGE PUMP	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
CHEMICAL BOOSTER PUMPS	Needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
Electrical Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Main sections w/ corroded fasteners. ATS was tested/maintained in 2018. MCC interiors in good condition, do IR test.
Fluoride/Polyphosphate/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Replace w/LED.
EPOXY FLOORS	Scarify and paint with new epoxy.
Chlorine/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
EPOXY FLOORS	Scarify and paint with new epoxy.
Scrubber Enclosure	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
Bathroom	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
Office	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
CABINETS	Replace upper cabinets (should City staff elect not to replace hardware themselves).
SINK/FAUCET	Replace.

Table 3-4 WTP 2 Proposed Tasks Completed by City

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR WALLS	Wash to remove mold/mildew and graffiti.
SERVICE/GARAGE DOORS	Oil coils/tracks/springs.
EXTERIOR SEPARATE SPACE – GENERATOR ENCLOSURE	Wash block walls to remove mildew/mold.

EQUIPMENT	DESCRIPTION
BOLLARDS	Paint bollards with epoxy coating to prevent oxidation and rust.
GUTTERS	Remove debris and vegetation to prevent ice dams.
Building Interior – Main Filter Room	
FIRE EXTINGUISHER	Provide one (1) fire extinguisher.
INTERIOR DOORS	Replace failing door hardware.
Fluoride/Polyphosphate/SO2 Room	
TUBING AND VALVES	
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.
Chlorine/SO2 Room	
TUBING AND VALVES	Replace SO2, fluoride, and poly tubing and valves.
TANK VENTS	Replace vent lines for fluoride and poly tanks.
GUIDERAILS	Clean of debris.
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.
Bathroom	
TOILET ACCESSORIES	Replace with plastic.
FAUCET AND FLUSH VALVES	Replace corroded fixture/valves.
CLEAN GLAZED BLOCK AND JOINTS	Scrub and reseal.
Office	
CABINETS	Replace upper and lower cabinet hardware. It may be most cost-effective to replace all upper cabinets.
GLAZED BLOCK AND JOINTS	Scrub and reseal glazed block and joints.

3.4 WTP 3 Condition Assessment

Within WTP 3, all the process piping, including gate valves, check valves, and air/vacuum valves will be coated. The replacement of automated butterfly valves and flow meters will be investigated in separate feasibility studies, which will be completed prior to the completion of the design package for the plant upgrade so they can be incorporated in the project, whether they need to be painted or replaced and painted. The vessels and reaction tanks appear to be in good shape; only touch up paint will be required. Any damage to coatings or messes created during the media change out or underdrain repair/replacement work will be addressed in this project. Sample taps and pressure gauges will also be replaced. Concrete bases for wells, vessels, and reaction tanks will be coated. Well 6, the backwash recycle pump, and chemical booster pumps will also need new coating. Motor testing for all major motors and feeder circuits should be conducted at the beginning of the work to identify if the motor windings are in good condition, and if not, motor replacement or re-winding should be performed.

We recommend replacement of vent lines for the polyphosphate and fluorosilicic acid and chemical tubing for polyphosphate, fluorosilicic acid, and sulfur dioxide. Common practice is to replace chemical

tubing on a regular basis, some cities perform this annually. This is a task we are assuming can be completed by Blaine staff, and therefore is not currently included in the project. The chlorine gas system will be evaluated in a separate feasibility study.

The lighting within the building is generally in poor condition and also utilizes legacy lamping technology. It will be replaced along with associated wiring and switching with LED lighting products. The exterior lighting is in acceptable condition, but also utilizes legacy lamping technology. Therefore, it will also be replaced. Ceiling paddle fans are also in poor condition and will be replaced.

Architectural upgrades recommended at WTP 3 are generally the same as those for WTP 1 and 2, however a roof inspection is pending and may result in additional recommended improvements being added to the project. Items to be added to the scope for WTP 3 include replacement of the bathroom sink, which is not ADA compliant, and removing vegetation and cleaning the chlorine scrubber enclosure, which we have assumed can be accomplished by City staff.

It will be our intention that the plant will have a relatively continuous appearance. In other words, sections to be painted/coated will not be situated immediately next to sections that are not to be, unless they will blend well together. Table 3-5 summarizes tasks we assume will be included in the bid for WTP 3 and Table 3-6 summarizes maintenance tasks we assume the City can complete at WTP 3.

Table 3-5 WTP 3 Proposed Tasks Included in Bid

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR LIGHTS	Lights are old technology HID, should be replaced w/LED.
EXTERNAL ELECTRICAL OUTLETS	Replace if applicable.
EXTERIOR WALLS	Re-tuck point mortar joints.
ROOF	Inspection pending; will update with proposed scope of work when complete.
EXTERIOR SERVICE DOORS	Doors with panic hardware are failing to release when depressed; install new weather stripping. Several other doors need a new frame and/or door.
SIDEWALKS ADJACENT TO BUILDING	Mud jack to raise exterior slabs adjacent to building.
JOINT BETWEEN BUILDING AND SIDEWALKS	Replace caulk joint following mud jacking of slabs.
Building Interior – Main Filter Room	
LIGHTING AND SWITCHES/CONTROLS	Significant corrosion on many fixtures, replace w/LED.
FANS	Fans not working.
GENERAL ELECTRICAL RACEWAYS (conduit and enclosures secured, no visible wiring)	
CONDITION OF WIRING (spot meggering to verify insulation resistance)	

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EQUIPMENT	DESCRIPTION
LEAKS	Blower door test pending; will update with proposed scope of work when complete.
WINDOWS	Apply fire-rated glazing. Replace hollow metal frames with fiberglass for some.
WELLS	Re-epoxy coat all house-keeping pads and pipe supports.
EPOXY FLOORS	Scarify and apply new epoxy paint.
EPOXY COVERED WALLS	Scarify and apply new epoxy paint.
ROOF TRUSSES/ROOF DECK	Remove rust, scarify surface, and galvanize in place.
SPRINKLER PIPES	Scarify and apply new epoxy paint or replace with galvanized pipe.
PENETRATIONS THROUGH WALL AND CEILINGS	Caulk and seal all penetrations through wall and roof.
STEEL LINTELS	Scarify and apply new epoxy.
PIPE SUPPORTS	Scarify and apply new epoxy.
WELL #6 – MOTOR, CONDUIT, WIRE, LOCAL DISCONNECT	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
WELL #6 AIR/VACUUM VALVE AND CHECK VALVE	New coating needed.
WELL #6 CONCRETE PAD	New coating needed.
PROCESS PIPING	New coating needed.
GATE VAVLES	New coating needed.
FLOW CONTROL VALVES	Rebuild off site and then coat
PRESSURE GAUGES	Replace.
SAMPLE TAPS	Replace.
CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
SO ₂ /CHLORINE REACTION TANK VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #1 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
FILTER TANK #2 VESSEL/CONCRETE PAD	Touch up coat on vessel and coat concrete base.
BACKWASH RECYCLE PUMP	Volute needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
SLUDGE PUMP	Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
CHEMICAL BOOSTER PUMPS	Needs coating. Motor looks good but should be tested when plant is down, local disc. has corrosion - replace, wire should be tested.
Electrical Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Main sections w/ corroded fasteners. ATS was tested/maintained in 2018. MCC interiors in good condition, do IR test.

EQUIPMENT	DESCRIPTION
ELECTRICAL EQUIPMENT (enclosures close properly, 3.5' clear in front of each panel)	Main sections w/ corroded fasteners. ATS was tested/maintained in 2018. MCC interiors in good condition, do IR test.
Fluoride/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS (clean, non-corroded and working)	Replace w/LED.
EPOXY FLOORS	Scarify and paint with new epoxy.
Chlorine/SO2 Room	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
EPOXY FLOORS	Scarify and paint with new epoxy.
Scrubber Enclosure	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
Bathroom	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
SINK	Not ADA compliant; replace.
Office	
LIGHTING AND SWITCHES/CONTROLS	Replace w/LED.
CABINETS	Replace upper cabinets (should City staff elect not to replace hardware themselves).
SINK/FAUCET	Replace.

Table 3-6 WTP 3 Proposed Tasks Completed by City

EQUIPMENT	DESCRIPTION
Building Exterior Shell & Sidewalk	
EXTERIOR WALLS	Wash to remove mold/mildew and graffiti.
SERVICE/GARAGE DOORS	Oil coils/tracks/springs.
EXTERIOR SEPARATE SPACE – GENERATOR ENCLOSURE	Wash block walls to remove mildew/mold.
CHLORINE SCRUBBER ENCLOSURE	Clear of moss/vegetation and clean.
BOLLARDS	Paint bollards with epoxy coating to prevent oxidation and rust.
GUTTERS	Remove debris and vegetation to prevent ice dams.
LANDSCAPING	Mulch to be moved away from building face so it does not block weeps.
Building Interior – Main Filter Room	
FIRE EXTINGUISHER	Provide two (2) fire extinguishers.
INTERIOR DOORS	Replace failing door hardware.
Fluoride/Polyphosphate/SO2 Room	
TUBING AND VALVES	
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.

EQUIPMENT	DESCRIPTION
Chlorine/SO2 Room	
TUBING AND VALVES	Replace SO2, fluoride, and poly tubing and valves.
TANK VENTS	Replace vent lines for fluoride and poly tanks.
GUIDERAILS	Clean of debris.
GLAZED BLOCK AND JOINTS	Scrub and reseal block and joints.
Bathroom	
TOILET ACCESSORIES	Replace with plastic.
FAUCET AND FLUSH VALVES	Replace corroded fixture/valves.
CLEAN GLAZED BLOCK AND JOINTS	Scrub and reseal.
Office	
CABINETS	Replace upper and lower cabinet hardware. It may be most cost-effective to replace all upper cabinets.
GLAZED BLOCK AND JOINTS	Scrub and reseal glazed block and joints.

4.0 Schedule and Sequencing

The proposed project schedule for the WTP 1 and WTP 3 upgrades is provided in the following table. WTP 1 and WTP 3 will be bid together, however construction will only take place at one plant at a time so that the other WTP can remain online in addition to WTP 2 to help ensure the City water demands are met. Construction will not begin until the media and underdrain replacement is complete, which is assumed to take place prior to February 28th. This assumption is based on the underdrains having an eight to twelve week lead time with install and media change out at each plant taking an additional two weeks per plant. The City has stated they will need to have both WTP 1 and WTP 3 both operational by April 15th. The schedule below assumes WTP 1 will be online by April 15th, and work at WTP 3 will take place after WTP 4 is online. Additionally, several tasks will require the temperatures outside to be above 50 degrees Fahrenheit, however these tasks can be completed while the WTPs are in operation.

Table 4-1 Proposed Project Schedule for WTP 1 and WTP 3 (Tentative)

Work Task	Deliverable Date	Task Duration
Project Kickoff	November 18, 2020	
90% draft design package	January 6, 2021	7 Weeks
Final design package	January 15, 2021	1.5 Week
Bidding	January 18, 2021 – February 8, 2021	3 Weeks
Bid Opening	February 8, 2021	
Bid Award	February 15, 2021	1 Week
Installation of underdrains and media change out complete	February 22 nd	Assumes underdrains arrive in 12 weeks and it takes 2 weeks to install at each plant (4 weeks total)
WTP 1 Construction	February 23, 2021 – April 15, 2021	7 weeks
Start-up of WTP 1	April 15, 2021	1 day

Work Task	Deliverable Date	Task Duration
WTP 3 Construction	Following startup of WTP 4 ¹	7 weeks
Start-up of WTP 3	TBD, 7 Weeks following start of construction	1 day
Final completion	6 Weeks following Start-up of WTP 3	

¹WTP 4 startup scheduled for spring 2021

The proposed project schedule for the WTP 2 is provided in the following table. WTP 2 will be bid separate from WTP 1 and WTP 3 and take place the following winter. The City has stated they will need to have WTP 2 operational by April 15th. Several tasks will require the temperatures outside to be above 50 degrees Fahrenheit, however these tasks can be completed with WTP 2 in operation.

Table 4-2 Proposed Project Schedule for WTP 2 (Tentative)

Work Task	Deliverable Date	Task Duration
Project Kickoff	September 17, 2021	
90% draft design package	November 5, 2021	7 Weeks
Final design package	November 19, 2021	2 Week
Bidding	November 22, 2020 – December 13 2021	3 Weeks
Bid Opening	December 13, 2020	
Bid Award	December 20, 2021	1 Week
WTP 1 Construction	January 3, 2022 – February 21, 2022	7 weeks
Start-up of WTP 2	February 22, 2022	1 day
Final completion	April 5, 2022	6 weeks

5.0 Scope and Fee for Preparation of Bidding Documents

Barr will prepare construction plans and specifications for the projects. One initial and one final design meeting with the city are planned for each bid package. It is assumed that all other matters will be resolved via telephone calls and emails.

Bid-phase services will include preparing addendums as required, answering telephone calls and emails from bidders, etc. No additional meetings are planned during this phase.

Construction-phase services will include reviewing submittals, preparing change orders as required, answering telephone calls and emails from the contractor, construction observation, etc. This will be provided on a time and materials basis, and **NOT** included in the fee below

5.1 WTP 1 and WTP 3 Scope

WTP 1 and WTP 3 Tasks

- A. Design and Bidding
 - 1. Attend one preliminary design meeting with City staff.
 - 2. Prepare plans and specifications for plant upgrades.
 - 3. Attend one final design meeting with City staff.
 - 4. Advertise project for bids.
 - 5. Answer questions from contractors during bidding
 - 6. Evaluate the bids
 - 7. Provide a recommendation to the City regarding award of the construction contract

- B. Construction Assistance (Provided on a time and materials basis, fee **NOT** included below).
 - 1. Prepare and distribute construction contracts
 - 2. Organize and conduct preconstruction meeting with contractor and City staff.
 - 3. Review shop drawings and submittals from contractor
 - 4. Act as the City's on-site representative providing construction observation and follow-up as necessary including drafting punch lists.
 - 5. Check for substantial and final completion with appropriate follow-up.
 - 6. Review and make recommendation for contractor payment applications.
 - 7. Prepare and administer contract modifications as necessary

WTP 1 and WTP 3 Meetings

- A. Preliminary design kickoff meeting
- B. 90% design meeting
- C. Pre-construction meeting (**NOT** included in the fee shown below)

WTP 1 and WTP 3 Deliverables

- A. Meeting minutes
- B. 90% and Final bid packages
- C. Addenda, as needed
- D. Reviewed pay applications (**NOT** included in the fee shown below)
- E. Punch list (**NOT** included in the fee shown below)

5.2 WTP 2 Scope

WTP 2 Tasks

- A. Design and Bidding
 - 1. Attend one preliminary design meeting with City staff.
 - 2. Prepare plans and specifications for plant upgrades.
 - 3. Attend one final design meeting with City staff.
 - 4. Advertise project for bids.

5. Answer questions from contractors during bidding
 6. Evaluate the bids
 7. Provide a recommendation to the City regarding award of the construction contract
- B. Construction Assistance (Provided on a time and materials basis, fee **NOT** included below).
1. Prepare and distribute construction contracts
 2. Organize and conduct preconstruction meeting with contractor and City staff.
 3. Review shop drawings and submittals from contractor
 4. Act as the City's on-site representative providing construction observation and follow-up as necessary including drafting punch lists.
 5. Check for substantial and final completion with appropriate follow-up.
 6. Review and make recommendation for contractor payment applications.
 7. Prepare and administer contract modifications as necessary

WTP 2 Meetings

- A. Preliminary design kickoff meeting
- B. 90% design meeting
- C. Pre-construction meeting (**NOT** included in the fee shown below)

WTP 2 Deliverables

- A. Meeting minutes
- B. 90% and Final bid packages
- C. Addenda, as needed
- D. Reviewed pay applications (**NOT** included in the fee shown below)
- E. Punch list (**NOT** included in the fee shown below)

5.3 Fee

We propose to perform this work on a time and materials basis. The estimated fees are provided in the table below. If during the execution of the work it appears that more effort or materials are needed we will notify you in advance before exceeding the amount shown below. The fee for each task can also be negotiated based on the final work scope.

Note: fee estimate does not include the fees associated with the roof inspection or blower door tests.

To: Jon Haukaas, City of Blaine
From: Brian LeMon, Barr Engineering Co.
Subject: **Draft** WTP 1-3 Upgrades
Date: November 11, 2020
Page: 19

Work Task	Fee Estimate
Design and Bidding WTP 1 and WTP 3	\$65,200
Design and Bidding WTP 2	\$29,400
Total	\$94,600
Construction services	Time and materials ¹

¹All construction services will be offered on a time and materials basis and are not included in the fee above.