



August 16, 2016

Mr. Bryan Bertacchi, Electric Utility Director (907) 747-1870
Mr. Andy Eggen, Electric Gen. System Mgr. (907) 747-1886
City and Borough of Sitka
Electric Department
131 Jarvis Street
Sitka, Alaska 99835

Subject: **City and Borough of Sitka, AK
Blue Lake Project**

Amendment to Proposal for Design Engineering Services for

Blue Lake – Bulk Water Supply System Piping Modifications – Phase II
(Safety Modifications to Existing 36” Isolation Butterfly Valve Actuators -
and Delivery of new Maximum 7 cfs flow to NSRAA Facility)

Dear Mr. Bertacchi and Mr. Eggen:

McMillen Jacobs Associates is pleased to have completed the development of all of the system Record Drawing piping system schematics as well as preparation of the new Contract Documents for valve and actuator upgrades to the existing Blue Lake water distribution system, as discussed in our original proposal to the City and Borough of Sitka (CBS), dated October 23, 2015. We have submitted a final 90% complete check set on those drawings to your staff in late June for final review comments and corrections as needed.

Background on CBS Meeting with NSRAA in May / June 2016. From discussions with CBS electric department staff, it is our understanding that CBS and NSRAA hatchery staff conducted a meeting in early June in which a decision was made to implement a new primary back-up water supply option to supply water to the NSRAA hatchery. The final design work that McMillen Jacobs has implemented to date for CBS, prior to that meeting, effectively had the new Powerhouse Tailrace Pumps functioning as the first and most energy efficient option for supplying water to the NSRAA facility.

However, we understand that from this recent meeting that NSRAA staff expressed some concerns (including salt water intrusion during high-high ocean tides back into the tailrace and possible fish disease transmission concerns) as to why use of these tailrace pumps and the tailrace water supply may cause issues for raising fish at the NSRAA Hatchery. NSRAA staff have thus expressed desire to not have these tailrace pumps serve as either the first or second option for supplying water to the hatchery. We understand that the current preferences for supplying water (~10 cfs at maximum flow needs) to the NSRAA hatchery are as follows:

- **#1 Preference, Primary Supply from Raw Water Valve House:** Continue feeding up to 10cfs water to NSRAA thru the existing 16” diameter NSRAA pipe from the Raw Water Valve House.
- **#2 Preference, New Secondary Supply:** Feed up to 10 cfs thru the existing 16” Fire Suppression line by designing and installing a new PRV valve upstream of the Raw Water Valve House, to limit pressure in the fire supply line to about 76 psig at the Raw Water Valve House which corresponds to about 100 psig down in the lower industrial and NSRAA Hatchery complex area. Downstream of the Raw Water Valve House, a new cross-over piping connection would connect the existing 16” fire suppression pipeline to the existing 16” NSRAA supply pipeline. The new cross connect pipeline would likely be of / near 10” diameter and have the following components:
 - A new electric actuator on a new cross-over isolation valve (BFV-153) to open automatically in case of loss of the #1 Preference supply.
 - A new orifice plate or fixed sleeve valve downstream of the isolation valve to reduce the water supply pressure from the 76 psig estimated value at the Raw Water Valve House down to the minimum pressure needed (likely around 10 psig) to supply water into the existing 36-inch HDPE pipeline.
 - The new electric actuator could be easily programmed to open upon loss of flow (i.e. < 2 cfs or 900 gpm, Operator settable) as measured at the existing NSRAA inlet flow meter (M-401).
- **#3 Preference (Tailrace Pumps):** Feed up to 10 cfs of water thru use of the existing Powerhouse Tailrace pumps thru the existing 20” diameter new hatchery supply line that connects to the 42” / 36” HDPE pipeline. This option was fully designed and defined in new P&ID Drawing **I-01** presented back in June (as the #1 Preference Primary Supply). BFV-144 was designed to have a new electric actuator as part of the emergency back-up supply to NSRAA hatchery. (Since this option has now moved to #3 Preference, the electric actuator and control work on BFV-144 could be omitted from the new work, realizing a \$10K+ construction savings). **CBS to confirm their desire on this new actuator?)**

This option is by far the most energy efficient, as the Tailrace pumps can be run at variable speed to produce only the volumetric flow of water needed, and up to only the minimum head needed to push the water to the NSRAA Hatchery head tank (i.e no wasted head pressure in this system at all, and no spilled / overflow water).

- **#4 Preference (Use of 36” Bulk Delivery Line & New 6” Water Supply Piping / Valving to Forebay):** Feed from 4 to 7 cfs of water thru use of the existing 36” steel bulk delivery line and the designed new modifications made to the 6” steel water supply line that feeds the top of the Filter Forebay Bulk Delivery Tank. This option has been fully designed and is defined in new Contract Drawings GM-01 and M-01 as previously submitted for CBS review. Given that this alternative has recently fallen to a lower level

on the hierarchy of water supply options for NSRAA hatchery, CBS may wish to simply hold this design work for future construction implementation, if needed.

The new design work and CAD drawing production work for **Preferences #1, #3, and #4** above have all been essentially completed. This letter proposes a contract Amendment to request additional project coordination and design budget to cover the following additional work items:

- **#2 Preference, New Secondary Supply:** New cross-over piping and valving system, as defined above.
- The water supply piping system schematics developed as part of this original Phase II project ended up requiring 9 sheets of design drawing effort (3 of which were valve and instrument schedules) to document the existing system. We wanted to make sure that we developed a detailed and thorough drawing system that would be of real service to all related CBS department staff in future operations. Our original proposal had estimated that this record drawing development work would cover about 4 to 5 sheets maximum (including the schedules).
- Coordination with existing valve manufacturer's (M&H in particular on the existing 36" AWWA BFV to be reused) to get proper recommendations for refurbishment of the BFV-300 valve as well as gathering all existing pertinent information on valves to receive new actuators, proved more time consuming than anticipated.

New Design Assumptions and Criteria. Design of the new **#2 Preference Secondary Supply** option will be based on the existing piping and valve systems, information provided by CBS (1991 design drawings), and the following assumptions:

- The existing 16" fire suppression pipeline will require freeze protection at least up to the point of the new cross-over connection, just uphill from the Raw Water Valve House. Heat tracing and pipe insulation up to the location of the new cross-over connection shall be provided. (CBS to confirm if existing 16" Fire Service Water line leaving the Raw Water Valve House is normally live (i.e full of water) or not?)
- The new isolation valve BFV-153 will be of 10" or 12" diameter and will be designed around AWWA C504 Class 150B valve ratings. The valve will have a new 120 / 240 VAC, 1-phase electric actuator that is powered from the existing 1-phase AC power distribution panel inside of the Raw Water Valve House.
- New valve BFV-153 will be a normally closed valve that will be designed to open automatically (via it's new electric actuator) upon loss of flow (< 2 cfs or 900 gpm), as measured by existing meter M-401.
- The new electric actuator designed for BFV-144, which is now the #1 Preference Primary Supply, that was designed in as part of our previous design work could be removed from the construction requirements. Given that this line should always be in operation supplying

water to NSRAA Hatchery, there are essentially three different existing isolation valves (GV-140, BFV-141, or BFV-144), any one of which could be manually closed should this existing 16" line need to be taken off of service for some reason. **CBS to decide if they want an electric actuator on BFV-144 or not? Drawing could be saved for future construction.**

- With the new elevated dams crest water surface elevation of 425 ft, the hydrostatic pressures to be experienced at the various valves or interest for this work are approximately:
 - At the Raw Water Valve House and Lower Portal Area, use elevation 79-ft msl
 - At the Lower Industrial Area and around the NSRAA Hatchery complex, assume average elevation of 25-ft msl
- It is assumed that a fire suppression hydrostatic pressure of 100 psig is desired in the existing fire suppression system's lower industrial complex area. CBS to confirm prior to initiation of design if this assumed hydrostatic pressure at the lower complex area is acceptable.

DESIGN CRITERIA AND PROJECT APPROACH

We have assumed that the design criteria for this new pipe delivery system will be as follows:

- Modifications to the existing 16" industrial raw water supply pipeline to connect to the main NSRAA supply pipe will be designed for outside of the Raw Water Valve House, in the yard. The new interconnect pipe will happen above grade near the top of the hill where the parallel pipelines split and head off in their own directions.
- All new pipeline segments and valves will be designed for a nominal design pressure of 150 psig, although actual working pressures are anticipated to be less than 75 psig downstream of any new PRV valves installed. New valves will generally be in accordance with AWWA valve standards.
- The new interconnect valve system will be of all manual operation and will not be equipped with electric actuators, nor require electrical service of any type.

ENGINEERING SERVICES SCOPE OF WORK

In preparation for this proposal, Matt Moughamian, PE (McMillen) has discussed the project needs in depth with Andy Eggen of CBS. We have both conducted a previous site visit and reviewed a number of photographs of the existing piping and valve system related to the Raw Water Valve House, Penstock Lower Portal area, PMFU and Filter Forebay facilities. Based on this work and these discussions, we propose the engineering design scope of work be divided into the following three work tasks:

- Task 1.0 Project Coordination & Management
- Task 2.0 New Cross-Over Piping and Valve System Design
- Task 3.0 Engineering Support during Construction

The deliverable products and assumptions are included in each task description below.

Task 1.0 Project Coordination and Management

McMillen will coordinate with CBS staff to provide full design documents (Construction Drawings and Specifications) as discussed above. Engineer may request that some new photos of all relevant piping systems be provided by CBS Operations staff, and use such to develop Construction drawings of the existing water piping delivery system(s).

Work task also includes coordination phone calls as required with CBS project staff regarding project coordination and design issues, as well as phone calls and design discussion with the valve manufacturers. General accounting and other project management costs are also included in this task.

Task 2.0 New Cross-Over Piping and Valve System Design – for #2 Preference Secondary Supply.

This task includes performing all required hydraulic calculations and consultation with appropriate valve / actuator manufacturers of the existing relevant butterfly valve systems to withstand anticipated static and surge pressures from the new Blue Lake reservoir project water surface elevations. It is estimated that updates to one (1) of the new process flow schematic drawings will be prepared in AutoCAD drawing format, along with preparation of a new mechanical piping plan and sections / details sheet. Also, a new P&ID drawing will be prepared to define both manual and automatic control of the new isolation valve, BFV-153.

Contract Bid and/or Record Drawings. This task includes preparing the following new Construction Drawings assumed required for the #2 Preference Secondary Supply option:

PROPOSED DRAWING LIST	
Dwg No.	Title
G-01 thru G-03	Existing Drawings as already Provided on Original Design (NIC)
G-05	Update to Raw Water Valve House Piping & Flow Schematic (for #2 Preference System)
M-03	New Crossover Mechanical Piping (for #2 Preference System), Plan and Sections.
I-02	New P&ID for Control of new Actuator on Valve BFV-153

Assumptions: This task and the associated proposed budget assumes the following during the design process:

- Existing survey files and piping record drawing information is adequate and no additional field survey work will be required.
- No new geotechnical investigations will be required.
- Coordination with existing CBS water staff to determine the needed water pressures in the fire suppression system at the lower industrial area (~ ground elevation of +25-ft) will be as determined by CBS project staff.
- No added site visit will be required by lead Engineer to produce the new baseline design and Contract Drawings. It is assumed that all information relative to the new piping systems will be communicated by photos gathered by CBS staff and email communications.
- New PLC I/O terminations and programming for automation of new 10” butterfly electric actuator on new cross-over pipeline will be provided by CBS programmer or others?
- All comments and required design changes of substance shall be identified by CBS and McMillen team at the 60% review level, and such changes shall be made as part of this design process. Any substantive changes required by the Owner at the final 100% final design submittal may require additional budget compensation to this proposed contract.
- This proposal assumes McMillen Jacobs will not be providing any assistance on any required permitting services for the project, if any. All project permitting requirements, including any city, county, state or federal permitting requirements shall be resolved and obtained by the Owner (CBS).
- At the end of the design phase for the new piping and valving modifications work, McMillen Jacobs construction team can, if desired by CBS, provide a cost proposal to self-execute those new features of the Contract Construction documents requested by CBS.

Task 3.0 Engineering Support during Construction

Whether the project is completed as a design-bid-build or a design-build project, our engineering staff would be pleased to provide the office engineering support services related to project construction. All RFI's and submittals from the Contractor would be reviewed by McMillen's

design engineer and submitted to the CBS or McMillen construction manager / RPR for approval and implementation.

Assumptions: Additional CMS services are budgeted based upon the following assumptions for the new construction work to be completed:

- A maximum of two (2) added RFIs will be submitted and reviewed.
- A maximum of three (3) added submittals will be submitted and reviewed. Each submittal will require no more than one resubmittal.
- After completion of construction services, McMillen Construction Superintendent or hydraulic engineer will provide the on-site construction assistance as previously outlined in the original work proposal. An added 6 hours of on-site time plus one added nights lodging is added to the budget to cover review and dynamic testing of the new interconnection system valves, including the new PRV and new isolation electric actuated BFV.

ENGINEERING DESIGN & CMS BUDGET

McMillen Jacob's proposed budget for the additional project coordination, engineering design and construction management services are outlined in the table below.

PROPOSED ENGINEERING & CMS BUDGET		
Task	Work Description	Budget
1.0	Project Design Coordination & Management / Invoicing	\$2,270
2.0	Preparation of Design Documents (Contract Drawings and Specs for new interconnection from Fire Suppress / Industrial RW Pipeline.)	\$9,450
3.0	Added Construction Management Services (Engineering Submittal & RFI reviews)	\$3,925
Amendment Total:		\$15,645

Amendment Proposal for SOW. McMillen Jacobs requests an amendment to our current time and materials labor-hour budget to perform the required SOW for all of Tasks 1 thru 3 as stated above, for CBS's *Blue Lake Water Supply System Piping Modifications – Phase II* project, under all assumptions stated above, for an additional cost not-to-exceed value of **\$15,645**, be added to our original contract value of \$47,757 (Oct. 23, 2015), for a new total not-to-exceed value of \$63,402.

If you have any questions or need any additional information on this amendment proposal, please contact me at (208) 342-4214, x306. Thank you for your consideration, and we look forward to continuing to serve CBS on this project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Matt Moughamian'.

Matt Moughamian, PE
Project Manager / Lead Engineer

A handwritten signature in blue ink, appearing to read 'Mara McMillen'.

Mara McMillen
Chief Operating Officer

cc: Morton D. McMillen, Chief Engineer
Andrew Pharis, RPR Blue Lake Project
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