Quarter 4 Update: October – December, 2022

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From: Joshua Schimmel, Executive Director, Springfield Water and Sewer Commission

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The Springfield Water and Sewer Commission (Commission) is embarking on large-scale upgrades to replace 50- to 100-year-old drinking water infrastructure and to achieve compliance with regulatory limits for disinfection by-products (DBPs). This is a quarterly update on projects related to DBP compliance and water supply capacity.

The following projects to reduce Disinfection By-Products in the Commission's drinking water and maintain a consistent supply of safe drinking water have progressed over the last quarter:

- **Clearwell & Backwash Pump Station project** - CH Nickerson began construction of the backwash pump station directly over the completed clearwell structure, completing the precast concrete panel envelope and plank roof. The rapid sand filters and existing clearwell were shut down for a two-day period in November to allow for the contractor to tie into the existing 48-inch rapid sand filter effluent line. The shutdown and tie-in were completed successfully, and CH Nickerson is continuing to install site piping to connect the new facility to the existing infrastructure.
- **New Water Treatment Plant Design** – Hazen is working to finalize the 30% design documents for the new water treatment plant and are scheduled to provide this deliverable in January 2023. The new treatment plant will be constructed using two different contracts: a site preparation contract for slow sand filter (SSF) demolition and related site work will be bid in the summer of 2023, followed by a bid for the construction of the new plant.
- **42-inch Raw Water Transmission Main** – AECOM has completed the 90% plans and specifications for the repair of the existing pipeline, which the Commission is currently reviewing. In addition, the Commission recently provided comments on the 30% design plans for a new energy dissipating valve and structure at the outlet to the Sedimentation Basin.
- **Aluminum Chlorohydrate (ACH) Bulk Chemical Storage/Chlorination System Improvements - *COMPLETE*** RH White completed the replacement of components of the gaseous chlorine system in August and completed the new ACH bulk storage tank system in September.
- **Cobble Mountain Hydroelectric Station Improvements for Primary Raw Water Conveyance** - Stantec and Kleinfelder completed an assessment of the Cobble Mountain Hydrostation and provided a draft alternatives analysis for turbine upgrades. We are currently evaluating their proposed alternatives for refurbishing this facility.

We have included additional information for each project on the following project update pages.

Please contact us if you would like more information about these projects. More information is also available at https://waterandsewer.org/projects/.

DBP Compliance

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Clearwell & Backwash Pump Station

Project Purpose: This facility will replace the existing clearwell and backwash, domestic, and process water pumps.

The existing clearwell is a 1920's slow sand filter that was retrofitted for use as a clearwell and backwash water storage tank for the direct filtration plant in the 1970's. The structural integrity of the clearwell is uncertain and the roof is leaky, allowing rainwater to infiltrate into the filtered water. The roof leaks have been temporarily mitigated by the installation of a geomembrane cover over the clearwell. The clearwell cannot be taken offline for maintenance, presenting a single point of failure for the direct filtration plant. The existing backwash, domestic, and process water pumps are original to the plant and are regularly breaking down and in need of repair.

This project will provide the reliability and redundancy needed to maintain existing operations and will also function as the first component of the new water treatment plant.

Delivery Approach: Design-Build with AECOM (OPM), Tighe & Bond (Engineer), and CH Nickerson (GC). Financed by SRF.

Design Progress: Tighe & Bond finalized the design and submitted the final design documents in November.

Const. Progress: CH Nickerson began construction of the backwash pump station directly over the completed clearwell structure and completed the precast panel envelope and concrete plank roof in September and October.

In November CH Nickerson began installing site piping to connect the new facility to the existing infrastructure. The rapid sand filters and existing clearwell were shut down for a two-day period to allow the contractor to tie into the existing 48-inch steel rapid sand filter effluent line with a 48-inch ductile iron cross pipe and four butterfly valves. The shutdown and tie-in were completed successfully.

Supply Chain: Delivery times for piping and appurtenances continue to be long. Delivery times for ductile iron pipe (both small diameter and large) ordered for this project are upwards of 12 months. The slow delivery dates initially caused a slight delay in the substantial completion date. The arrival of electrical system components also continues to be a concern and may impact schedule.

Project Delays: Changes in design scope as requested by the Commission and AECOM during the 60% design review, along with pipe delivery delays, resulted in a four-month delay in project completion.

Operational Issues: Construction activity had a significant impact on operations in Quarter 4. The process water (carrying water for gaseous chlorine) line and chemical feed lines were disrupted by excavation activities on several occasions and required staff to respond to minimize the impact to water treatment and repair broken and leaking feed lines. We are working closely with Nickerson to anticipate periods of high risk activity and run on auxiliary systems, when possible, as a precaution to minimize the potential adverse impact to our chemical feed systems.

The shutdown of the rapid sand filters and existing clearwell in November required careful planning and coordination by our Operations staff to successfully shut down the rapid sand filters, operate the slow sand filters, maintain temporary chemical feed systems, and run a temporary domestic water system.

Schedule: The contractual substantial completion date is currently set for June 2023 (delayed from February 2023), but the project is currently projected to be delayed to August 2023 due to pipe and equipment lead times.

Erecting pump station precast concrete panels

Installing 48-inch ductile iron cross into existing 48-inch steel rapid sand filter effluent pipe

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New Water Treatment Plant Design

Project Purpose: This project is for design and construction of a new water treatment plant (WTP) to meet the system demand while providing a higher level of treatment to achieve long-term, consistent compliance with the Disinfection By-Product (DBP) Rule. The new WTP will replace the existing direct filtration and slow sand filtration plants, which were not designed to remove adequate dissolved natural organic matter (NOM) to meet current regulatory limits for HAA5s and THMs.

The Commission has frequently been in non-compliance for HAA5s since 2018. To address this issue, after completing several studies, the Commission identified that modifications to the existing plant processes would not be sufficient to achieve compliance, and that the addition of clarification was needed to reliably remove NOM and maintain compliance. Based on the results of a three-season pilot plant operation, Dissolved Air Flotation (DAF) with a polyaluminum chloride coagulant was selected as the clarification process for the new conventional plant.

Delivery Approach: Design-Bid-Build with Hazen (Engineer). Planned financing by WIFIA and SRF.

Progress: Hazen completed an alternatives analysis and draft Basis of Design Report in Quarter 3 and is scheduled to deliver 30% design documents in January 2023. The preliminary design incorporates the results of the alternatives analysis and includes the major components of the new water treatment plant, including layout, capacity, residuals handling options, process design criteria, raw water conveyance, permitting, and design parameters for the electrical, HVAC, structural, and civil components of the project.

Supply Chain: Supply chain impacts on this project are currently unknown but are a concern.

Project Delays: None at this time.

Schedule: This project is scheduled to be completed end of 2027, as required by the terms of the WIFIA Loan. To meet this aggressive deadline and minimize schedule delays, the new treatment plant will be constructed using two different contracts: a site preparation contract for slow sand filter (SSF) demolition and related site work will be bid in the summer of 2023, followed by a bid for the construction of the new plant.

Commission and Hazen staff working on plant layouts during an architectural workshop

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42-inch Raw Water Transmission Main

Project Purpose: This project is for the repair of the 42-inch bypass raw water conveyance PCCP pipeline, which was damaged when a new energy dissipating valve (EDV) failed in 2019. The 42-inch bypass provides an important route for raw water to bypass the Cobble Mountain Hydroelectric Station (CMHS), the Intake Reservoir, and the 72-inch Intake Tunnel. Returning this route to service will allow the Commission to take the CMHS and 72-inch Intake Tunnel offline for maintenance when needed.

With the 42-inch raw water transmission main out of service, the Commission currently relies on the Diversion Gates (the low-level dam outlet) to release water from the Cobble Mountain Reservoir when the CMHS is routinely offline for maintenance. This outlet was not designed to operate as a regular intake and is not operable remotely, requiring staff to regularly perform a complicated confined space entry that, in an emergency, would require assistance from a technical rescue team. With the 42-inch bypass out of service, there is currently no bypass for the 72-inch Tunnel.

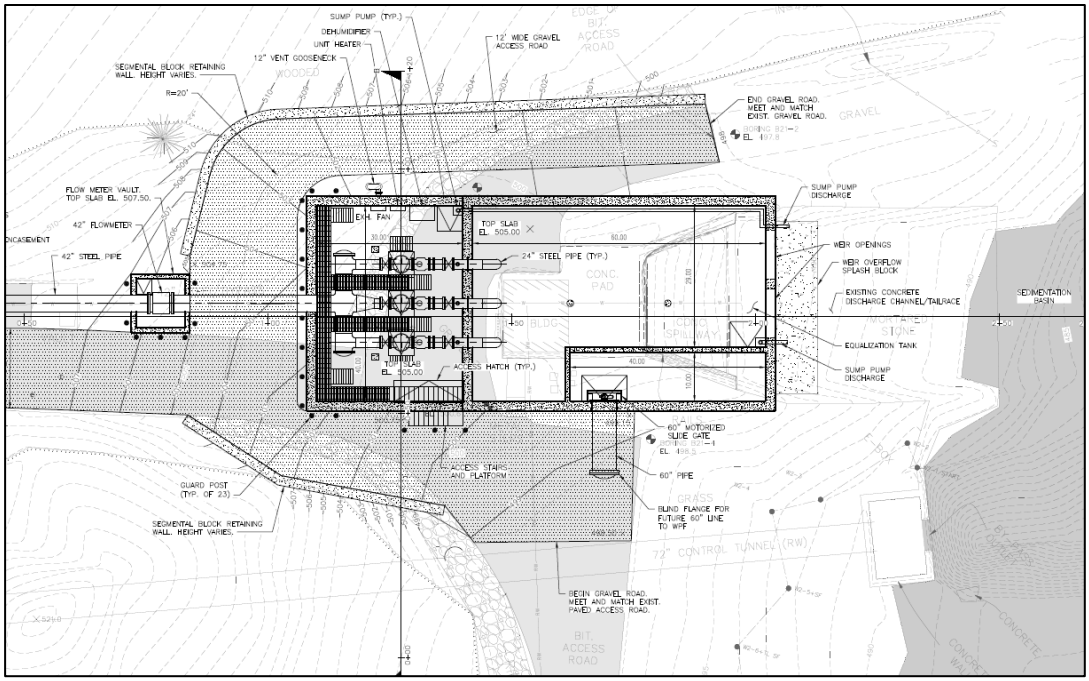
Delivery Approach: Design-Bid-Build with AECOM (Engineer).

Progress: AECOM is preparing designs for two contracts: one contract for repairs to the existing 42-inch PCCP pipeline, and one contract for replacement of the existing failed EDV structure with a completely redesigned structure that includes three Mokveld axial flow control valves, an equalization tank, and modifications to the existing outlet. To date, AECOM has completed 90% design plans for the 42-inch repair and 30% design plans for the EDV facility.

Supply Chain: Supply chain impact on this project is uncertain. Current lead times on materials indicate that this may be less of a concern than some of our other projects, but possible long lead time items include the energy dissipating valves.

Project Delays: None at this time.

Schedule: Project anticipated to be completed end of 2024.



Excerpt from the 30% Design Site Plan

DBP Compliance

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ACH Bulk Chemical Storage/Chlorination System Improvements - *COMPLETE*

Project Purpose: This project will provide a bulk storage tank and piping for Aluminum Chlorohydrate (ACH), a coagulant used at the plant. ACH has been used since 2016 but has been stored in totes in a temporary configuration.

The project also includes replacing components of the gaseous chlorine system that are due for routine replacement, including the chlorine tank scales and all chlorine piping. This work will allow the gaseous chlorine system to continue to operate reliably until the new plant is online.

This project will allow the existing Direct Filtration Plant and chlorine system to continue to operate reliably until the new plant is online.

Delivery Approach: Design-Bid-Build with Tighe & Bond (Engineer) and RH White (Contractor).

Progress: RH White completed the replacement of components of the gaseous chlorine system. The gaseous chlorine system was placed back in service in August. RH White completed the new ACH bulk storage tank system in September.

Supply Chain: None at this time.

Project Delays: The project was delayed by two months due to delays in completing the electrical work associated with the ACH bulk storage tanks.

Schedule: Substantial completion for the project per the contract was August 2022. Actual substantial completion was awarded at the end of September 2022.

New bulk storage pads and secondary containment in the new ACH storage room.

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Cobble Mountain Hydroelectric Station Improvements for Primary Raw Water Conveyance

Project Purpose: The Cobble Mountain Hydroelectric Station (CMHS) is an essential component of the Commission's raw water conveyance system. As part of the primary raw water conveyance route, the CMHS delivers water from the Broome Gate Intake down to the Intake Reservoir while generating power by using the 450-foot elevation difference between the two reservoirs. This project will identify alternatives for conveyance and hydropower generation in response to failing infrastructure at the facility. The existing turbines have reached the end of their operational lives, and only one out of the original three turbines is currently operational on a limited schedule to reduce wear.

When the CMHS is offline for maintenance, the remaining routes for raw water conveyance are the 42-inch bypass (currently out of service) and the low-level Diversion Gates, which are not designed for regular operation. Restoring the CMHS conveyance route is vital to establishing reliable raw water conveyance for the Commission.

Delivery Approach: To be determined.

Progress: Stantec and Kleinfelder completed an assessment of the Cobble Mountain Hydrostation and provided an alternatives analysis for turbine upgrades. The Commission is currently evaluating their proposed alternatives for refurbishing this facility.

Supply Chain: None at this time.

Project Delays: None at this time.

Schedule: Project schedule has not yet been established.

Inside Cobble Mountain Hydroelectric Station during a visit from Congressman Richard Neal in October

Engineering Capital Projects Schedule

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