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*This scope of services is based on City Master Contract #4743/4744, dated June 20, 2024.*

## **PHASE 1000 – HYDRAULIC MODELING SERVICES**

This scope includes services related to the following activities:

1. Project Management
2. Cottage Standpipe Decommissioning assessment
3. Pumping Review
4. Low Service Pressure Zone Calibration
5. Hydraulic Modeling Software Roadmap
6. On-Call Hydraulic Modeling Services

### **A. Task 1050 - Project Administration**

1. Provide administration and management functions required to successfully complete the work including budget and schedule control, document control, coordination of activities, monthly invoicing, and project closeout. Maintain a change register of any scope changes affecting the project budget or schedule. Scope changes shall be discussed with SPRWS, and written approval will be received before proceeding.

### **B. Task 1100 - Cottage Standpipe Decommissioning assessment**

The Cottage Standpipe analysis consists of confirming the level of impact for decommissioning Cottage Standpipe and making a recommendation for the long-term status of the standpipe. Previous analysis indicated the impacts were minimal under future max day of 90 MGD.

1. Review results of previous analysis.
2. Perform new analysis under long term future system conditions with the Hayden Heights pressure zone decommissioned, and the Hillcrest Golf Course site redevelopment implemented.
3. Provide summary tables quantifying changes in draw down/cycle times and turnover rate under ADD and MDD for McKnight, Stillwater, and Cope tanks with Cottage Standpipe in and out of service, along with changes in pumping demand for the Hazel Park Pump Station.
4. Provide analysis of projected ADD and MDD compared to industry standard storage volumes for adequate fire protection and supply redundancy including having one remaining tank out of service for maintenance.
5. Provide a technical memorandum to summarize findings and attend one meeting to discuss the results of the analysis.
6. Assumptions: SPRWS will supply the hydraulic model to be used in the assessment and define the conditions under which the impacts of

decommissioning will be analyzed. Additional items to be provided by SPRWS are:

- a. the latest plans for the Hillcrest Golf Course redevelopment
  - b. any other known major projects in the Hazel Park pressure zone that could impact the long-term analysis
  - c. guidance of any additional pumping or operation changes that are planned to be made in the area
7. Schedule: Complete by December 2024

C. Task 1200 – Pumping Review

1. Review and summarize the status of Xcel peak/off-peak rate structure, and how SPRWS's current pumping operations are impacted by the rate structures. Pumping operation for key pump stations (McCarron High Service/Low Service, Hazel, and West Side) will be performed.
2. Plot pump SCADA data provided by SPRWS and document existing patterns of operations representing an average day (ADD) and maximum day demands (MDD).
3. Develop two potential operational patterns, one each for ADD and for MDD system pumping that will optimize overall power consumption savings and generally maximize life cycles of pumping assets.
4. Compare patterns to the Xcel rate structures to determine where typical operations are causing extra costs to be incurred. Conduct one meeting to discuss these initial findings, and review if the proposed pumping modifications are likely to provide the desired results.
5. Assuming pumping modifications seem viable, use the hydraulic model to assess modifications to the operating patterns and make recommendations for operations at each pump station under the ADD & MDD conditions to minimize cost of operations and cycle the use of individual pumps to equalize service life, while still maintaining expected service levels. Conduct one meeting to discuss final recommended modifications for pump operations.
6. Hazel Park station and West Side station are operated in a manual mode by operators, which can be prone to human error. Develop operating parameters where both stations could be operated in automatic mode based on specific level readings and optimized to reduce pumping expenses.
7. Provide a technical memorandum summarizing findings.
8. Assumptions: SPRWS will supply the hydraulic model to be used in the assessment, Xcel rate structures and bills, as well as SCADA data for all pumps including known lifetime operation hours, and tanks in the distribution system for either the calendar year of 2023, or a different consecutive 12-month period of their choosing.
9. Schedule: Complete by January 2025. Additional time is requested to allow for SPRWS to review the Cottage Standpipe analysis from Task 1100 and incorporate those results into the final operation settings.

## D. Task 1300 – Low Service Pressure Zone Calibration

1. Assess GIS data provided by SPRWS and provide a field testing plan of hydrant pairs and flow test forms to SPRWS for SPRWS to collect field data. Up to 15 hydrant pairs are anticipated.
2. Analyze the Low Service pressure zone under static conditions to validate the boundary conditions in the model.
3. Perform a C-Factor calibration using the flow test results collected by SPRWS.
4. Assumptions: SPRWS will supply the hydraulic model to be used in the assessment, GIS data of the SPRWS distribution system, the SPRWS flow test map/form, and SCADA data for the relevant pressure zones at the time of the flow tests. SPRWS will also complete the field testing.
5. Schedule: This task is planned to be complete by December 2024. The hydrant pairs to be tested will be provided in August/September pending notice to proceed timeline.

## E. Task 1400 – Hydraulic Modeling Software Roadmap

1. Provide a hydraulic modeling software roadmap document to provide general guidelines to SPRWS for hydraulic model maintenance and upgrades through the end of 2025. Topics shall include integrating live SCADA to construct a digital twin and adopting Aquanuity, and the process of validating the new software. Additionally, a C-Factor validation road map shall be constructed to guide the continued validation of the model's calibration. This road map shall be a 5-year cyclical pattern that will validate all pressure zones in the distribution system.
2. Assumptions: SPRWS will provide Black & Veatch with its general hydraulic modeling goals and assumptions for the next two years.
3. Schedule: This task is planned to be complete by November 2024.

## F. Task 1500 – On Call Services/Support

1. Provide SPRWS on-call hydraulic modeling services and support. Anticipated activities may include supporting the annual update to the hydraulic model, analysis related to the selection and performance of water main CIP projects, validation activities, software implementation, and analysis of system operation changes. SPRWS may consider additional activities to the above tasks that the on-call services could be used to perform such as updating SPRWS's scripts to apply new C-Factors to SPRWS Hydraulic Model, including new St. Anthony and Roselawn C-Factors, and 1-2 meetings to provide SPRWS staff knowledge of calibration process. 60-hours of on-call work has been budgeted.