Request for Council Action

TO:	Mayor and City Council
THROUGH:	Tim Murray, City Administrator
FROM:	Mark DuChene, City Engineer
MEETING DATE:	October 27, 2020
SUBJECT:	Accept Professional Services Proposal for Comprehensive Water Plan Update

Background:
The City last completed a Comprehensive Water System Plan in 1992. With the adoption of the City's 2040 Comprehensive Plan, it is a good time to update the City's Comprehensive Water Plan so that it aligns with the land use designations for the existing and planned expansion areas of town.

While many of the improvements identified in the 1992 plan have been completed, some larger projects remain and many of the assumptions on future land development and growth that were in place in 1992 have changed. Before the City makes significant financial investments in completing the remaining projects identified in the 1992 plan, it would be beneficial to evaluate the current system against the already completed infrastructure projects while considering the future growth identified in the 2040 Comp Plan to identify the most critical and beneficial improvements for the future.

Recommendation:
Accept Professional Services Proposal from SEH for Comprehensive Water Plan Update

Attachments:
- Copy of Proposal

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October 22, 2020

RE: City of Faribault, Minnesota
Comprehensive Water Plan Update Proposal
SEH No. P-FARIT 14.00

Mr. Mark Duchene, PE
Director of Engineering
City of Faribault
1200 Belview Trail
Faribault, MN 55021

Dear Mr. Duchene:

The City of Faribault is taking a very important step by water system comprehensive plan update for current and long-term water needs of the City. This important step will help to assure that water system will be ready to serve future generations well. A comprehensive water plan paired with a water system model are vital components that will help the City prepare, plan and program for the communities future health, growth and prosperity. Since we have already worked with you to develop the model, we are well positioned to help the City focus on the technical details, identify feasible solutions to meet the needs of your community and develop a clear plan for future water system projects. Water system infrastructure requires substantial investment, and careful planning can help prioritize capital improvements and allow focused allocation of resources where they are most needed.

PROJECT BACKGROUND

The City of Faribault has recently taken major steps to improve the water system including the development of a new water treatment facility and a new elevated water storage tank. Now, that the City is in the process of developing a new comprehensive plan for the City, envisioning development through 2040, now is a great time to evaluate the water system and develop a plan for the supporting the future growth and redevelopment of the City. Since large scale improvements to the City's supply/treatment and storage are in progress, this proposal will focus on evaluation and planning for the complete water distribution system while incorporating the new system improvements and their impacts.

WORK PLAN

For this Water system master plan we will divide the project into three (3) phases and an option added phase which will deliver the comprehensive water plan within the proposed schedule. The following provides a description of the tasks we will perform in completing each of the phases. Accompanying the Work Plan discussion is a detailed breakdown of project tasks, project staff, task hours, billing rates and total cost which will inform the proposal process.

Task 1 – Water Demand Analysis and Planning

As part of the water system evaluation, historical water system demands will be analyzed to determine average per capita water use averages and analyze peak water system demands. Historical water use will then be paired with future land use and population projections to make an estimate of future water system demands through 2040. These future demands will then later be compared with existing water system supply, distribution and storage capacities. This work will be foundational in developing future population based water use projections. In addition we will consult the latest City Land Use mapping Developed as part of the recent comprehensive planning process. Analysis of this land use mapping will be utilized to make an estimate of ultimate water use potential based on full development. This will help determine the sizing of system components to be incrementally planned for future system needs.

Individual tasks included in this include:

- Water Needs Analysis:
  - Review current and future service area population forecasts and update water demand projections over the planning period.
  - Collect available current demographic data and planning forecasts for the identified service area based on the City's Comprehensive Plan.
  - Collect and review water demand data information including billing (AMI), SCADA pumping records, DNR annual reports, other historical data sources, and other available planning and engineering reports.
- Demand Analysis: Develop unit demands (gallons/day/unit) to be used for projecting future water requirements.
- Forecast future average day demand in 5-year increments starting with year 2020 and going through year 2040.
- Develop peaking factors for maximum day (MD), maximum hour (MH), average day (AD), average summer day (ASD), and average winter day (AWD).
- Develop land use based water use projections.

Task 2.1– Water Distribution System Modeling & System Evaluation

The first step in the water system evaluation process will be to the update of the existing water system model. The model will be utilized as a tool to evaluate deficiencies in the existing water system and evaluate improvement alternatives related to water supply (well capacity), system pressures, pipe flow and transmission capacities, and system reliability and resiliency.

Since the model is relatively new, the update process will be relatively minor, by adding recent facilities constructed and additional water mains added since the original model construction in 2018.

Model Update

SEH will work with existing City mapping data to import any new water infrastructure information into the proposed water system model. The current water distribution piping, elevated storage tanks, well pump curves and operational data will be reviewed to assure the model represents current conditions. Historical usage data (from billing records) will be analyzed and updated in the model to closely represent current water system conditions.

Model Evaluation

The updated, calibrated model will be utilized to model the adequacy of the distribution system and to recommend improvements. The model will simulate the operation of the Faribault water system during average day, maximum day and fire flow events. Water system operational flow capacities and system pressures will be examined to assure that the water system is capable of delivering an effective level of service. The resiliency of the water system will also be tested to determine if redundant water lines are needed to serve the water system adequately in the future.

Overall Water System Evaluation

As part of the water system evaluation, historical water system demands will be analyzed to determine average per capita water use averages and analyze peak water system demands. Historical water use will then be paired with future land use and population projections to make an estimate of future water system demands through 2040. These future demands will then be compared with existing water system supply, distribution and storage capacities. Potential water system deficiencies related to projected water system demands will be identified in addition to deficiencies identified in ration to water system modeling (model evaluation). These deficiencies will then be addressed by potential water system improvement alternatives.

Individual tasks for this effort include:

- Update existing water system model using current GIS sources related to water system infrastructure (New Water Main and facilities).
- Using GIS-based mapping, SEH will associate demands to junction nodes spatially throughout the water system, assigning each demand to the correct demand location. GIS geocoding can be used to locate meters based on address. A demand allocator tool will automatically assign demands based on the GIS fields.
- Allocate new and updated water demands throughout entire water system.
- Develop diurnal curves for the full system, representing maximum day conditions.
- Update the full system Distribution System Hydraulic Model.
- Create full water system hydraulic profile drawings.
- Operation Data Review: SEH will request 1 historical maximum demand week of total system data including system demand, tank levels and influent flow rates in a minimum hourly basis. This data will then be used in the model to complete an extended period calibration of system facilities.
- Using the updated and calibrated hydraulic model, perform an evaluation of the full distribution system.
  - Ten day extended period simulations will be used for scenario evaluations. Time periods to be considered will include current system (2020), 10-year (2030), and 20-year (2040).
- Develop a hydraulic analysis plan. Plan will include the following:
  - System configuration and pressure management.
  - Water supply capacity analysis.
  - Storage volume capacity analysis.
  - Pumping capacity analysis.
  - Fire flow capacity analysis.
  - Emergency operations analysis.
  - Scenarios needed to analyze system, identify deficiencies and needed improvements.
  - Analysis evaluation criteria and methodology.
  - Draft plan provided to Project team for review and comment.
  - Following approval of plan, perform hydraulic analysis of water system.
- Perform a deficiency analysis.
- Hydraulic Analysis Report:
  - Prepare Hydraulic Analysis Report.
  - Provide draft report to Project team for review and comment.
  - Incorporate project team comments and finalize report.
  - Incorporate Hydraulic Analysis Report as a chapter into Master Plan Update report.
- Water Treatment Plant Evaluation:
  - Review current treatment processes.
  - Evaluate existing capacity and the ability to support future system growth.

Task 2.2 – Water Main Replacement Prioritization

This task is included as a value added effort for the review if the water distribution system piping. The work included in this section would help aid pipe replacement decisions related to consequence of failure analysis within the water distribution system model. The model will be utilized to weight the performance impact if each particular section of water main throughout the distribution system were to break. For example, a water main leading to a water tower would have a greater impact on the water system if it were to break when compared to a small diameter dead end main feeding only a few customers. This analysis and ranking can be combined with other available pipe information such as age and material type to develop a pipe priority replacement score. This score can then later be used to prioritize the replacement of various water mains. Other considerations such as fire flow and transmission needs will be included in the analysis. This task will supplement the other water system analysis tools in developing an overall water system plan. Below is a summary of the prosed tasks:

- Request additional data as necessary to develop out and inform the risk based water main priority analysis.
- Work with the City to develop a list of sensitive water customers that would be greatly impacted by a loss of water service.
- Conference call: Develop and gain consensus with regard to the approach for developing the Likelihood of failure (LoF) and consequence of failure (CoF) data elements for the analysis of the water main.
- Develop LoF and CoF scoring factors which will he uses to create a prioritization analysis.
- Develop color coded mapping to document the recommended timing of the pipe replacements.
- Workshop: conduct a collaborative meeting with the City to review the results of the analysis.
- Prepare draft and final technical memorandums documenting the pipe replacement prioritization analysis.

Task 3 – Comprehensive Water Plan Summary

The ultimate goal of the project is to develop a sustainable Comprehensive Water System Master Plan. The work done in this section will reach that goal by utilizing previous planning work through the development of recommended water system improvements.

Water System Improvement Alternatives Analysis

As part of this task, we will utilize input from the project team to identify potential water system improvement alternatives that will best remedy the deficiencies identified in the previous section. The hydraulic model will be used to simulate potential solutions for the deficiencies discovered in Task 2, and to evaluate means to adequately serve proposed development areas. The analysis performed in this task will focus on the entire water system, but will also consider anticipated development areas based in feedback received from the City and long range planning information. As we work with project team to develop improvement alternatives, those that best mitigate identified deficiencies will help formulate the ultimate water system plan. We will also verify benefits of recommended improvement projects with the hydraulic model (as appropriate). Recommended improvement project alternatives will be illustrated and identified on Master Plan report figures and/or maps. Ultimately we will work with the project team to prioritize proposed projects based on criticality and category. For each selected project we will prepare a preliminary schedule for projects taking into account financial, siting, permitting, and staffing capacity and goals. Ultimately the most effective projects will be recommended and scheduled to assure the water system will meet the demands of the City of Faribault.

Capital Improvement Planning (CIP)

The work described in Task 3 will develop and identify the most cost effective solutions for improving and maintaining the existing water system. We will work with the project team to select the appropriate capital improvement projects and schedule the implementation according to projected water system need. The development of the CIP will provide the City with a water system planning roadmap through the 2040 design year and beyond. The final CIP will include phased benchmarks for implementation of each project, related budget and cost estimates as well as recommended funding plan for the plan activities.

Task included in this process will include:

- Conduct meeting with project team and City stakeholders to review system improvement recommendations and additional modeling results.
- Work with project team to develop improvement alternatives to mitigate identified deficiencies.
- Classify system projects as addressing one of the following primary improvement categories:
  - Water Supply.
  - Water Treatment.
  - Hydraulic capacity.
  - Fire flow.
  - Storage.
  - Growth.
  - System optimization.
  - Pipeline repair, upgrade or replacement.
- Verify benefits of recommended improvement projects with newly developed hydraulic model (as appropriate).
- Projects shall be described and justified with reference to an identified deficiency and benefit to the City.
- Recommended improvement project alternatives will be illustrated and identified on Master Plan report figures and/or maps.
- Improvement Project Prioritization and Scheduling.
  - Work with City stakeholders and project team to prioritize proposed projects based on criticality and category.
  - Prepare a preliminary schedule for projects taking into account financial, siting, permitting, and staffing capacity and goals.
- Financial Analysis and Capacity.
  - Prepare an opinion of probable cost for each recommended improvement project.
- Work closely with Project team to refine and finalize recommended improvement project list.
- Provide draft project list/map to Project team for review and comment.
- Incorporate Project team comments and finalize recommended project list and map.
- Incorporate Project team comments and finalize recommended project list and map.
- Provide assistance to City stakeholders for the development of a water system CIP.
- Develop a potential capital improvement project lists using two major categories:
  - Facilities:
    - Supply.
    - Pumping.
    - Storage.
    - Other.
  - **Pipelines:**
    - Hydraulic capacity.
    - Replacement.
    - Rehabilitation.
- Deliver anticipated project needs to the City with budgetary cost estimates.
- Refine project cost estimates for identified recommended projects after City selects preferred CIP alternatives.

- Incorporate all findings and reports (as appropriate) into final master plan report.
- Prepare a master plan executive summary.
- Provide report documentation as outlined in this scope.

COST PROPOSAL

Based on the scope of work requested and the information provided in our project approach, we have developed the following proposed costs, summarized by task. A complete project task hour breakdown is included as an attachment to this proposal.

Phase/Tasks	Total
Task 1 – Water Demand Analysis and Planning	$9,100
Task 2.1 – Water Distribution System Modeling & System Evaluation	$15,500
Task 2.2 – Water Main Replacement Prioritization	$12,700
Task 3 – Comprehensive Water Plan Summary	$15,600
Task Totals	**$52,700**

Should you have any questions or need additional information, please do not hesitate to contact me at 218.855.1720 or ckatzenberger@sehinc.com. We appreciate the opportunity to work with you, and look forward to putting our experience to work for you.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Chad T. Katzenberger, PE
Project Manager
(Lic. MN)

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