

CITY COUNCIL AGENDA ITEM
CITY OF SHORELINE, WASHINGTON

AGENDA TITLE:	Authorizing the City Manager to Execute a Professional Services Contract with Brown and Caldwell for System Capacity Modeling Plan Development in an Amount Not to Exceed \$316,306
DEPARTMENT:	Public Works Department
PRESENTED BY:	Randy Witt, Public Works Director Lance Newkirk, Utility and Operations Manager
ACTION:	<input type="checkbox"/> Ordinance <input type="checkbox"/> Resolution <input checked="" type="checkbox"/> Motion <input type="checkbox"/> Discussion <input type="checkbox"/> Public Hearing

PROBLEM/ISSUE STATEMENT:

Staff is requesting Council to authorize the City Manager to execute a contract with Brown and Caldwell to provide engineering services for the development of the system capacity modeling plan. This contract will further explore the existing data conditions of the surface water system and deliver a modeling plan to standardize the technologies and deliverables for modeling sub-basins throughout the city.

In December of 2018, the Shoreline City Council adopted the 2018 Surface Water Master Plan, which identified the current and future needs of the surface water system within City limits. One of the elements identified in the master plan as being necessary to help sustain a successful surface water system is a Conveyance Capacity Assessment to support the ongoing Condition Assessment work. Tonight's action would authorize the City Manager to execute the contract with Brown and Caldwell to develop that plan.

RESOURCE/FINANCIAL IMPACT:

This consultant services contract will be funded from the Surface Water Capital Fund.

RECOMMENDATION

Staff recommends that Council move to authorize the City Manager to execute a contract for professional services with Brown and Caldwell in an amount not to exceed \$316,306.

Approved By: City Manager **DT** City Attorney **MK**

BACKGROUND

In December of 2018, the Shoreline City Council adopted the 2018 Surface Water Master Plan, which identified the current and future needs of the surface water system within City limits. One of the elements identified in the Master Plan as being necessary to help sustain a successful surface water system is a Conveyance Capacity Assessment to support the ongoing Condition Assessment work.

The 2018 Surface Water Master Plan notes that a system capacity model would help to provide new and updated modeling analyses to forecast future system demands, identify capacity deficiencies, and evaluate improvement projects. There are 52 identified sub-basins city-wide. This plan will serve to standardize the long-term efforts to model all sub-basins and build a comprehensive model helping to inform decision making across multiple departments.

DISCUSSION

Contract Scope of Work

Under this proposed contract, Brown and Caldwell will advance the city-wide system capacity model previously identified in the 2018 Master Plan. The Master Plan started the process by highlighting the multitude of factors that contribute to a successful capacity model and why a city-wide system capacity model is important to a surface water utility. The next steps in this implementation is to conduct a more comprehensive study of the current data needs across all sub-basins and to further develop the goals of the capacity model as it relates to the City's use after implementation.

Upon conclusion of this contract, the City will receive a modeling plan which will guide the development of the city-wide system capacity model. The modeling plan will address the existing critical data gaps for each sub-basin along with cost estimates to fulfill those data needs, select and standardize the software to be used in subsequent capacity modeling contracts, and establish the flow monitoring and calibration parameters.

In addition to the modeling plan, Brown and Caldwell will develop the capacity model on a selected sub-basin to serve as an example to the city and future consultants on the implementation of the modeling plan. The consultant's Scope of Work (Attachment A) outlines key tasks to provide program deliverables.

Consultant Selection

In April 2019, the City solicited consultants to provide their qualifications (RFQ 9300) for the Surface Water System Capacity Modeling Plan. Three submittals were received from the following firms: Aqualyze, Brown and Caldwell, and Otak Inc. City staff reviewed the consultant submittals and selected Aqualyze and Brown and Caldwell to move forward for an interview to determine the most qualified firm. Brown and Caldwell showed that they were the most qualified firm to deliver the project considering their experience in a very similar project with the City of Auburn, and their experience establishing policy guiding documents related to surface water programs. The Brown and Caldwell team also includes consultants KPG and ADS Environmental Services to assist with the data collection and flow monitoring needs of the project.

This contract will be effective upon execution and will expire on December 31, 2020.

COUNCIL GOAL(S) ADDRESSED

This contract implements City Council Goal #2: Continue to deliver highly-valued public services through management of the City's infrastructure and stewardship of the natural environment, and specifically Action Step #7: Continue implementing the proactive strategy of the adopted 2017-2022 Surface Water Master Plan.

RESOURCE/FINANCIAL IMPACT

Funding for this project will come from the Surface Water Utility Fund with a total budget of \$318,270 reserved for the System Capacity Modeling Study.

RECOMMENDATION

Staff recommends that Council move to authorize the City Manager to execute a contract for professional services with Brown and Caldwell in an amount not to exceed \$316,306.

ATTACHMENTS

Attachment A: Proposed Brown and Caldwell Scope of Work for the Surface Water System Capacity Modeling Plan

Attachment A: Scope of Work

Surface Water System Capacity Modeling Plan

Brown and Caldwell (BC) is pleased to present this scope of work (SOW) to the City of Shoreline (City) to develop the Surface Water System Capacity Modeling Plan (Modeling Plan). The purpose of the Modeling Plan project is to develop a framework and path forward to develop, cost, and schedule sub-basin scale hydrologic and hydraulic (H&H) models for the City's pipe, ditch, and ditch-culvert surface water conveyance system. The project also includes the development of a citywide H&H model geodatabase and a calibrated sub-basin H&H model. City staff anticipate using surface water system capacity information to make planning and design decisions for development review, capital improvement project (CIP) engineering, pipe repair and replacement, and operations and maintenance (O&M).

Scope of Work

The activities, deliverables, and assumptions associated with each task are described in detail below. Tasks 8, 9 and 10 are "optional" tasks; the work under these tasks will not be performed without prior written approval from the City.

Task 1: Define Modeling Objectives and Requirements

The purpose of this task is to identify and document modeling objectives. BC will facilitate a workshop with City staff to develop modeling objectives and requirements and review sub-basin prioritization. BC will complete the following activities:

- Identify draft modeling objectives and requirements to present in workshop.
- Prepare for and conduct a 2-hr workshop with City staff to discuss modeling objectives and requirements and to review prioritization.
- Prepare draft and final memorandum summarizing workshop outcomes and recommendations for citywide and sub-basin modeling objectives and requirements, and sub-basin prioritization review.

City Activities:

- Provide potential capacity-based policy decisions and sub-basin prioritization criteria prior to the workshop.
- Workshop attendees will develop modeling objectives and requirements during the workshop.
- Schedule and provide location for the workshop at City Hall and invite City staff to attend workshop.
- Compile review comments, resolve any conflicting comments, and provide BC with a single set of comments on the draft modeling objectives and requirements, capacity-based policy, and sub-basin prioritization review memorandum.

Deliverables:

- D1. Draft and final objectives, requirements, and prioritization review memorandum

Assumptions:

- Workshop materials will be available to participating City staff one week prior to the workshop for staff review and workshop preparation.
- Up to 3 BC members will attend the workshop.

Task 2: Data Review and Needs Assessment

The purpose of this task is to perform a data review and needs assessment to inform the development of the Modeling Plan. BC will complete the following activities:

- Prepare a request for available data, including current geospatial data, updated condition assessment data, and relevant information.
- Review available data for use in modeling, identify gaps, and prepare a summary of additional data needs.
- Prepare geospatial information systems (GIS) base maps to view and organize available geospatial data.

- Summarize and tabulate available data and data gaps by sub-basin.
- Develop data collection needs cost estimate by sub-basin.
- Outline methodologies for data interpolation or extrapolation for missing data, where possible.
- Outline methodologies for developing GIS data for drainage area assessments to meet conditions of the City's Salmon-Safe Certification as conditions relate to capacity model data needs.
- Present the findings from the data review and needs assessment to City staff in a 1-hour meeting at City of Shoreline City Hall (City Hall).
- Prepare a summary of recommendations for selection of a sub-basin to model the modeling approach and additional data collection and associated costs.

City Activities:

- Provide BC with flooding observations, water level recordings, flow rate estimates or other anecdotal hydraulic or system operation system from observations and service requests.
- Provide BC with all available data requested in a complete and documented transmittal.
- Identify drainage area assessment conditions for Salmon-Safe Certification.
- Provide updated Utility staff loaded rate for data collection, and flow monitoring for use in cost estimates.
- Provide data collection timing and cost estimates from other current and proposed City projects.
- Schedule and provide location for the presentation at City Hall and invite City staff to attend presentation.

Deliverables:

- D2. Brief data request to be submitted by email.
- D3. Presentation to City staff with findings from the data review and needs assessment
- D4. Brief summary of recommendations for modeling of a pilot sub-basin to be submitted by email.

Assumptions:

- The City anticipates collecting some missing infrastructure data with the Utility's condition assessment program.
- Pilot sub-basin selection will be based on a subjective assessment of the potential for the highest quality outcomes, representative characteristics, and relevance to a wide range of potential uses.
- Data collection costs will be developed in current year dollars.
- Data collection (if needed) will be performed under Task 8 with written approval from the City.
- The accuracy of analyses or other efforts that lead to any recommendations is reliant upon the quality and completeness of data and general information provided by the City.

Task 3: Modeling Software Evaluation

The purpose of this task is to evaluate hydrologic & hydraulic (H&H) modeling software specifically for the City to use in developing surface water system capacity models. BC will complete the following activities:

- Evaluate 3 software packages for H&H capacity modeling based on a general set of evaluation criteria.
- Prepare memorandum summarizing the findings from the software evaluations.

City Activities:

- Compile review comments, resolve any conflicting comments, and provide the BC team with a single set of comments on the draft modeling software comparison and recommendations memorandum.
- Select a preferred modeling software for use in the Modeling Plan project.

Deliverables:

- D5. Draft and final modeling software evaluation memorandum

Assumptions:

- BC will develop evaluation criteria based on objectives from Task 1; these could include ease of use, training availability, quality and clarity of results presentation, scenario comparison capabilities and version tracking, applicability for water quality pulse statistics analysis, and licensing and use fees.

- Model use training (if needed) will be performed under Task 9 with written approval from the City.

Task 4: Build geodatabase and sub-basin model

The purpose of this task is to build both a citywide modeling geodatabase and a pilot sub-basin model. The citywide modeling geodatabase will provide a central source of data for future model development. The pilot sub-basin model will serve as a test case and example for future modeling work.

Subtask 4.1 Build citywide modeling geodatabase

BC will develop a citywide modeling geodatabase. The geodatabase will be developed in the most recent version of ArcGIS and will include hydrologic- and hydraulic-based databases and shapefiles that are prepared and ready for sub-basin model import. BC will perform the following activities:

- Create a geodatabase, import data, and convert to model-ready formats.
- Develop modeling parameters within geodatabase.
- Develop data source documentation and metadata to include in geodatabase.
- Implement data estimation, interpolation, and/or extrapolation techniques to fill in missing data, where possible.
- Develop processes and protocols for updating the geodatabase with model import-ready data.
- Develop hydrologic and/or meteorological time series datasets for continuous simulation modeling and update protocols.
- Perform quality assurance/quality control (QA/QC) review on modeling geodatabase and meteorological database.
- Document geodatabase development methodologies, processes, and protocols as part of a single Task 4 draft and final technical memorandum.

Subtask 4.2 Build sub-basin model

BC will develop an uncalibrated model for the selected sub-basin. The sub-basin model GIS data will be a direct export from the modeling geodatabase. BC will perform the following activities:

- Develop an approach to model development, reasonableness checks, and quality controls.
- Develop a pilot sub-basin model from the modeling geodatabase.
- Identify and summarize missing key infrastructure needed to develop an operational model.
- Delineate model subcatchments based on topography, infrastructure extent and modeling objectives.
- Develop sub-basin hydrologic parameters.
- Connect meteorological data, subcatchments and infrastructure within the model.
- Develop processes and protocols for model data imports (i.e., input data), model build and simulation, debugging and error checking, and running simulations.
- Perform uncalibrated model simulations for peak and total flow results reasonableness checks and refine parameters, as necessary.
- Perform quality assurance/quality control (QA/QC) review on sub-basin model; develop a QA/QC checklist and guidance for future modeling efforts.
- Calibrate the sub-basin model with available historical anecdotal information such as observations and service requests.
- Document modeling methodologies, processes, and protocols as part of a single Task 4 draft and final technical memorandum.

City Activities:

- Select a sub-basin area for the pilot sub-basin model prior to the start of Subtask 4.2.
- If available, provide additional sub-basin model area specific flooding observations, water level recordings, flow rate estimates or other anecdotal hydraulic or system operation system from observations and service requests.
- Infrastructure data collected by City staff or other contractors will be provided to the BC team in electronic format.
- Compile review comments, resolve any conflicting comments, and provide BC with a single set of comments on the draft and final memorandum documenting modeling geodatabase and pilot sub-basin model development.

Deliverables:

- D6. Citywide modeling geodatabase
- D7. Calibrated pilot sub-basin model
- D8. Draft and final geodatabase and sub-basin model development memorandum

Assumptions:

- The geodatabase structure (subfiles and database fields) will be based on the modeling objectives and requirements, and selected modeling software. The geodatabase will be developed first as it will contain the data required to build the sub-basin model.
- The hydrologic approach will be based on an extended meteorological record, continuous simulation modeling and partial duration analysis to determine event-specific return periods for capacity evaluation.
- The citywide geodatabase model will include datasets such as those outlined in Table 1 in Appendix E-2 of the SWMP.
- Data collected in Task 8 or from other sources will be updated in a GIS format prior to GIS data import into the modeling geodatabase and pilot sub-basin model.

Task 5: Monitoring and Calibration Guidelines

The purpose of this task is to develop citywide monitoring and calibration guidelines for use in calibrating future sub-basin models with flow monitoring data. BC will perform the following activities:

- Develop goals, objectives, and criteria for monitoring and calibration.
- Develop an approach to drainage system flow monitoring including guidelines for selecting monitoring equipment and locations.
- Develop cost estimates for flow monitoring activities by either a professional services contract or by City staff.
- Develop a monitoring and calibration memorandum to document:
 - Current and potential monitoring activities by the City
 - Guidelines for flow monitoring equipment and its use
 - Guidelines for sub-basin scale calibration
 - Cost estimates for flow monitoring

City Activities:

- Provide updated Utility staff loaded rate for performing flow monitoring for use in cost estimates.
- Compile review comments, resolve any conflicting comments, and provide BC with a single set of comments on the flow monitoring and calibration guidelines memorandum.

Deliverables:

- D9. Draft and final monitoring and calibration guidelines memorandum

Assumptions:

- Flow monitoring costs will be developed in current year dollars.
- Flow monitoring (if needed) will be performed under Task 10 with written approval from the City.

Task 6: Modeling Plan Development

The purpose of this task is to incorporate written material and recommendations from other tasks into the Modeling Plan document and to develop the remaining key sections of the Modeling Plan. The Modeling Plan will be developed as a guidance document for future model development outlining model development, flow monitoring and calibration methodologies, as well as modeling work scheduling and costs. Where relevant, memorandums and/or associated appendices developed for other tasks will be included as appendices to the Modeling Plan. BC will complete the following activities:

- Prepare Modeling Plan outline and identify relevant information from previous tasks to include in preliminary draft.
- Prepare a preliminary draft of the Modeling Plan.
- Develop cost estimates for model development.

- Update sub-basin prioritization based on previous tasks work.
- Develop recommendations for priorities and scheduling of future data collection and modeling activities.
- Revise the preliminary draft of the Modeling Plan and prepare a second draft that incorporates results from optional tasks, as well as costs, schedule, and recommendations for future modeling activities.
- Revise and finalize the Modeling Plan based on City staff review comments on the draft Modeling Plan.

City Activities:

- Compile review comments, resolve any conflicting comments, and provide BC with a single set of comments on the preliminary draft and draft Modeling Plans.

Deliverables:

- D10. Preliminary Draft Modeling Plan
- D11. Draft Modeling Plan
- D12. Final Modeling Plan

Assumptions:

- The Modeling Plan will be prepared as a guidance document and will incorporate relevant information from previous tasks and updated information from lessons learned during sub-basin model development.
- Data collection, flow monitoring and modeling project costs will be developed in current year dollars.
- Each iteration of the Modeling Plan will be submitted electronically via e-mail in PDF; if desired, the documents can also be provided in Word format.
- One preliminary draft Modeling Plan will be prepared.
- One draft Modeling Plan will be prepared.
- One final Modeling Plan will be prepared.

Task 7. Project Management

BC's project manager will be responsible for team coordination, staff supervision, budget and schedule controls, status reports, and adherence to QA/QC procedures. At the outset of the project, BC will conduct kickoff meeting at City Hall to initiate activities of Tasks 1 - 3, and 5-7 and to discuss schedule. The BC project manager will then provide the City with a detailed schedule to complete the project, including major milestones, deliverables, and proposed workshop and presentation dates.

BC will conduct semi-monthly conference calls with the City's project team to review project status, coordinate data/information exchange, address outstanding issues, preview upcoming tasks, and answer any other questions that may arise. BC will also prepare monthly invoices, including expenditures by task, hours worked by project personnel, and other direct expenses, with the associated backup. Project status reports will accompany each invoice, including an up-to-date comparison between cumulative charges and work progress by task.

If at any point BC or the City identify potential changes or deviations from the original scope of work, BC will document the requested changes using a Project Change Request (PCR) and submit the suggested changes to the City prior to proceeding with any of the new work. The City project manager will review the PCR and provide BC with written approval for modifications to the existing scope and budget.

City Activities:

- Coordinate City staff attendance on semi-monthly status calls, as needed.

Deliverables:

- D13. Proposed project schedule
- D14. Brief summary e-mails following each semi-monthly status call containing key decisions and action items from the discussion
- D15. Monthly progress reports and invoices including a detailed progress report at each of two major milestones

Assumptions:

- All deliverables will be submitted in electronic format.

- Total duration of the project will be 18 months; an equivalent number of progress reports and invoices are to be provided on a monthly basis.
- Up to two members of the BC team will participate in ½-hour semi-monthly status calls; 36 over the 18-month duration.
- Up to three revisions to the project schedule will be provided throughout the course of the project.
- BC is not responsible for any schedule or cost impacts related to delays caused by protracted reviews, changes in scope of work, or other situations outside of our control.

Task 8: Data Collection (Optional)

The purpose of this task is to collect infrastructure information such as pipe and structure location, pipe diameter and pipe invert elevation. BC and the City PM will work collaboratively to develop recommended activities for this task. The budget for this task is a reserve to be used upon written approval from the City PM.

Task 9: Model Training (Optional)

The purpose of this task is to provide City staff training in surface water modeling for the selected software platform. BC and the City PM will work collaboratively to develop recommended activities for this task. The budget for this task is a reserve to be used upon written approval from the City PM.

Task 10: Flow Monitoring and Calibration (Optional)

The purpose of this task is to collect surface water flow monitoring and to perform sub-basin model calibration with flow monitoring data. BC and the City PM will work collaboratively to develop recommended activities for this task. The budget for this task is a reserve to be used upon written approval from the City PM.

Shoreline, City of (WA) – SW System Capacity Modeling																	
Phase	Phase Description	PM	PA														
		Ales, Margaret A	Yan, Diane F	Foged, Nathan H	Milne, Michael M	Lawler, Amanda M	Kansakar, Pratistha	Retzlaff, Ryan G	Merrill, Milford S	Wilson, Joanna B	Total Labor Hours	Total Labor Effort	APC	Other - 1	Travel	Total ODCs	Total Effort
010	Define Modeling Objectives	\$162.00	\$108.00	\$225.00	\$225.00	\$118.00	\$140.00	\$185.00	\$225.00	\$103.00	77	12,353	616	0	65	65	13,034
****	Default Task	40	3	8	0	3	20	2	1	0	77	12,353	616	0	65	65	13,034
020	Data Review	22	2	7	0	72	56	0	2	0	161	22,141	1,288	0	65	65	23,494
****	Default Task	22	2	7	0	72	56	0	2	0	161	22,141	1,288	0	65	65	23,494
030	Software Evaluation	6	1	2	0	0	22	56	2	0	89	15,420	712	0	0	0	16,132
****	Default Task	6	1	2	0	0	22	56	2	0	89	15,420	712	0	0	0	16,132
040	Build Geodatabase and Mor	20	6	14	0	214	226	0	28	0	508	70,230	4,064	0	0	0	74,294
001	Build Geodatabase	5	0	4	0	80	42	0	8	0	139	18,830	1,112	0	0	0	19,942
002	Build Sub-Basin Model	15	6	10	0	134	184	0	20	0	369	51,400	2,952	0	0	0	54,352
050	Monitoring and Calibration	32	6	9	3	24	76	0	8	0	158	23,804	1,264	0	0	0	25,068
****	Default Task	32	6	9	3	24	76	0	8	0	158	23,804	1,264	0	0	0	25,068
060	Model Plan Development	188	24	37	12	48	76	0	10	0	371	58,827	2,968	0	0	0	61,795
****	Default Task	188	24	37	12	48	76	0	10	0	371	58,827	2,968	0	0	0	61,795
070	Project Management	158	60	14	14	2	2	0	0	12	262	40,128	2,096	0	265	265	42,489
****	Default Task	158	60	14	14	2	2	0	0	12	262	40,128	2,096	0	265	265	42,489
080	Data Collection (Optional)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
****	Default Task	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
090	Model Training (Optional)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
****	Default Task	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
100	Flow Monitoring (Optional)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
****	Default Task	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
GRAND TOTAL		444	102	91	29	361	478	58	51	12	1,625	242,903	13,008	60,000	395	60,395	316,306

Hours and Dollars are rounded to nearest whole number. To display decimals, change the format of the cells.