RESOLUTION
(30 - 2017)

A RESOLUTION OF THE FAIRVIEW CITY COUNCIL AUTHORIZING A PROFESSIONAL SERVICES CONTRACT, FOR ENGINEERING AND RELATED PROFESSIONAL SERVICES FOR THE STORMWATER HYDRAULIC MODELING PROJECT

WHEREAS, in 2016 the City Council adopted the City's Storm water Master Plan (SSMP); and

WHEREAS, The SSMP details the need for system hydraulic modeling as a prerequisite capital improvement project (GN-4); and

WHEREAS, the City received proposals to perform engineering and related professional services in response to the 2016 Request for Qualifications for Engineering Services; and

WHEREAS, Cardno was selected based on expertise, project understanding, responsiveness, previous work samples, and other relevant factors; and

WHEREAS, Cardno desires to enter into a contract with the City of Fairview for professional engineering services for storm water hydraulic modeling

NOW, THEREFORE, BE IT RESOLVED BY THE FAIRVIEW CITY COUNCIL AS FOLLOWS:

Section 1 The Fairview City Council hereby authorizes the City Administrator to enter into a Professional Services Contract with Cardno for professional engineering services for the Storm water Hydraulic Modeling Project for the City of Fairview for work described in substantially the same form as the attached Exhibit "A.".

Section 2 This resolution is and shall be effective from and after its passage by the City Council.

Resolution adopted by the City Council of the City of Fairview, this 19th day of July, 2017.

Mayor, City of Fairview
Ted Tosterud

ATTEST

Devree A Leymaster
City Recorder, City of Fairview
Devree Leymaster

7-26-2017
Date

Cardno
Shaping the Future

EXHIBIT A

System Hydraulic Modeling (CIP GN-4)

Scope of Services

Project Background

Per capital improvement project (CIP) fact sheet GN-4, CIP FV-1 (Fairview Creek high flow bypass improvement), NN-1 (No Name Creek capacity improvements between NE Sandy Blvd and NE 230th Ave), and NN-2 (No Name Creek capacity improvements between NE Halsey Street and NE 227th Avenue) are interconnected, and flows associated with each CIP contribute to or are impacted by the other project areas. Designing these CIPs requires refinement of the City's xpswmm model to evaluate alternatives for these three connected projects. The results from the updated xpswmm hydraulic model will be used to guide the CIP designs to convey existing and future contributing flows without having adverse impacts on downstream or neighboring properties.

All three projects are impacted by the flow split between No Name Creek and Fairview Creek that occurs at NE Halsey Street. Upstream flow control and/or adjustments to the flow split NN-2 are needed to address flooding downstream of NE Halsey Street. In addition, the flows to Fairview Creek from the flow split NN-2 contribute to the design of the Fairview Creek high-flow bypass FV-1. Flows that remain in No Name Creek will impact the design of NN-1. During recent storm water master plan update inconsistencies were observed in the modeling of offsite areas that contribute flow to No Name Creek upstream of NE Halsey Street (location of NN-2), and also to No Name Creek upstream of NE Sandy Boulevard (location of NN-1). Inconsistencies were also observed between the model and hydraulic result tables in the CSMP. A comprehensive model update is needed to verify offsite flow contributions and to evaluate design options for the combined projects of FV-1, NN-1, and NN-2.

Project Approach (Specific Scope of Services)

Task 1: Project Management, Administration and Meetings

Task Description
Consultant will provide project management of the project scope, budget and staff to meet the stated objectives

1.1 Project Management
Consultant will direct, coordinate, and monitor the activities of the project with respect to budget, schedule, and contractual obligations. Communicate regularly with City staff regarding project issues via telephone, electronic mail, fax, and post mail. Prepare and submit bi-weekly progress reports to the City. Progress reports will consist of a brief narrative summary.

Assumptions

The Client Project Manager will be Cedomir Jesic. He will be the primary contact person for all matters pertaining to the project.

Deliverables
Consultant will provide to the City the following items:

- Prepare monthly invoices and progress updates
- Conduct project filing and administration

1.2 Project Team Meeting
Consultant will provide a minimum of biweekly conference calls and/or meetings between the consultant and City personnel to review project progress, discuss project challenges and findings, and review early study results. All meetings shall be presented and/or facilitated by the consultant. Consultant will ensure that the City personnel and consultant team members maintain a shared understanding regarding study direction, objectives, and deliverables.

1.2.1 Kickoff Meeting and Project Overview
Consultant will initiate the project kickoff meeting. Consultant will prepare an agenda for the kickoff meeting, invite necessary attendees, collect data, and discuss the schedule of the project.

Deliverables
Consultant will provide the City the following items:

- Meeting agendas and notes – electronic copy.

1.3 Invoicing and Project Updates
Consultant will keep the City of Fairview informed of project progress, upcoming milestones and issues that may impact the project. Consultant will submit monthly status updates outlining work completed, remaining tasks and any outstanding issues and how they will be resolved, and any necessary task changes. Monthly Status Updates will be submitted to the City with monthly invoices.

1.4 Project Schedule
Consultant will prepare an overall project schedule using Microsoft Project that will detail all project task timeline and critical milestones. This schedule will be updated every three months throughout the duration of the project.

Deliverables
Consultant will provide the City the following items:

- Microsoft Project Schedule

1.5 Quality Assurance and Quality Control
Consultant will conduct internal Quality Assurance and Quality Control meetings and follow-up with technical experts as necessary during the course of the project.

Task 1 Deliverables (all digital)

- Monthly Progress Report
- Schedule with Monthly Updates
- Meeting Minutes
- Monthly Invoices

Task 2: Data Gathering and Analysis

2.1 Data Collection/Review/Analysis

This task will involve the necessary efforts to gather, review, and analyze the required data to update existing xpswmm hydraulic model for the City of Fairview. The Consultant will work to collect data from the City of Fairview, City of Gresham, City of Wood Village, and Multnomah Drainage District that will aid hydraulic model update. The data will consist of information concerning existing and future conditions in the watershed. All data collection activities will be accomplished by gathering available information from either the agencies that will be contacted or from the data collection questionnaire that will be provided to the municipalities. A special effort will be made to obtain any usable information that the municipalities may have acquired or developed as part of its watershed planning effort.

Data to be collected will include, but may not be limited to (and will be based on available information and/or questionnaire results). Information will be collected and compiled regarding:

- Comprehensive land use plans and current zoning maps to develop a build-out scenario for the future land use data layer for modeling purposes
- Existing municipal ordinances
- Stormwater-related problems and proposed solutions

To better pinpoint areas of concern throughout the watershed, problem areas will be identified through staff input in the compilation of problem area survey forms. The identification of the problem areas will help in assessing the stormwater management controls needed in the future for the watershed. Those problem areas identified as "significant" will be field evaluated, and the model will utilize these sites as points-of-interest to develop design storm flows. A collection of past studies/investigations will be compiled and reviewed for proposed solutions and reasons why progress has not been made. The plan will summarize these problem areas, provide much of the hydrology that will be required in design of proposed solutions, provide schematic potential solutions to correct these problems, and specify possible sources of funding to pursue. The plan will make suggestions for other programs/activities to deal with the issues raised during the planning process. Information will be collected and compiled regarding:

- Existing and proposed flood control projects
- Existing and proposed stormwater control facilities
- Existing and proposed stormwater infrastructures collection and control facilities, including a designation of those areas to be served by stormwater collection and control facilities within a 10-year period, a schedule and the proposed methods of financing the development, construction, and operation of such facilities, and an identification of the existing or proposed institutional arrangements to implement and operate the facilities, where this information is readily available.
    - ✓ Soils
    - ✓ Geology
    - ✓ Flow obstructions
    - ✓ Topographic mapping -- Because the watershed is considerably flat, a 10 meter resolution Digital Elevation Model (DEM) may not be sufficient for modeling purposes, and the availability of LIDAR data will be investigated for use in the topographic development
    - ✓ Aerial photographs
    - ✓ Engineering and planning studies
    - ✓ Fairview Streamflow data

  Currently there are 3 stream gauges in the watershed as follows:

Gauge No.	Location	From	To
14211814	Fairview Creek At Glisan St	2007-10-01	2016-07-14

This data will be collected and put in a format to be used in the calibration process.

- ✓ Rainfall data – rainfall data required for use in calibration and to develop design storm amounts will be collected.
- ✓ Floodplain information

2.2 Review of Existing Plans/Studies/Reports/Programs

A comprehensive review of related documents and/or programs will be performed, and a coordinated list of the goals and objectives from each of the project documents will be developed. Existing documents to be reviewed shall consist of, but not be limited to:

- City of Fairview Consolidated Stormwater Master Plan (2007)
- Consolidated Stormwater Master Plan Update (2016)
- Hydromodification Study (2014)
- Multnomah Drainage District Hydraulic Model
- City of Fairview Hydraulic Model
- City of Gresham Stormwater Master Plan
- Flood Insurance Studies (various),
- Zoning Maps
- Any other studies discovered during the planning process

Consultant will submit a list of information to be collected and provided by the City. The provided information will be reviewed by the Consultant to determine if it is sufficient for completion of the project objectives.

2.3 Conduct Interviews

Consultant will conduct interviews with City personnel familiar with the surface water collection system to collect information on the operation and maintenance of the system and any known deficiencies. Consultants will make site visits with City personnel to specific facilities if necessary.

2.4 Conduct Field Investigations

Consultant will conduct field investigations to identify locations where offsite flows contribute to the City's system and areas where offsite flows are diverted or controlled prior to entering the City's system. Consultant will perform limited surveying where needed, to obtain this missing data.

2.5 Data Preparation for Technical Analysis

This task involves the engineering work necessary to transform the information collected under Task 2.1 into a geographic information system (GIS) that can be used for the later technical tasks. Included will be the preparation of "land characteristics" GIS data layers for modeling and display purposes.

The GIS data layers will include:

- *Base Mapping* – Existing base map information (roads, streams, municipal boundaries, text, etc.) will be collected from City of Fairview, the municipalities within, and the most accurate data will be utilized to develop the watershed base map. All data will be projected into the coordinate system utilized by the Multnomah County. All data from the various municipalities will be merged into a seamless base map.
- *Aerial Photographs* – The most recent aerial photographs will be incorporated into the GIS for analyses purposes.
- *Land Use/Land Cover Information* – Existing Existing Land Use files will be collected from the County and overlaid with parcel data collected by the County. Current aerials (photographic and/or digital images if available) will be collected and utilized to update the land cover maps into the format required for hydrologic modeling (TR-55 land use classifications). Land

development projects completed subsequent to existing data will be added as necessary. Prepared GIS layers will be field checked for accuracy.

- *Future Land Use Conditions* – Existing zoning information and the County and the City comprehensive plans will be utilized to convert the existing land development conditions mapping to the future land use scenario for development for ultimate build-out conditions.
- *Predevelopment Conditions Analysis* – A no development scenario will be developed to compare existing and future condition flow to flows that occurred prior to any development.
- *Soils Information* – Digital County soils data will be collected where available. The data collection effort will be coordinated with NRCS to obtain "official soils data where available." If digital data will not be available in time for this study, the County Soils Survey maps will be digitized and attributes attached to illustrate NRCS hydrologic soils groups, permeability for potential recharge areas, and erodibility. Overlay mapping will be necessary to prepare the hydrologic soils group map necessary for modeling.
- *Digital Elevation Models* – Digital elevation models (DEMs) will be utilized to delineate the subareas for which detailed modeling will be completed. The DEMs will be merged to form a seamless watershed map and projected to the appropriate coordinate system.
- *Digital Raster Graphics (DRGs)* – Digital USGS topographic maps will be compiled and utilized for watershed and subwatershed delineation cross referencing and location of obstructions and problem areas.
- *Wetlands* – Wetlands will be identified in the watershed through the utilization of maps compiled for the State.
- *Geology* – Digital geologic maps will be developed for the watershed from existing USGS and DNREC sources. Geologic features pertinent to the features of the watershed, i.e., limestone, sandstone, etc., will be extracted and displayed to portray the goals of the plan.
- *Problem Areas, Flood Control Structures, Stormwater Management Facilities, etc.* – These will be located on the appropriate base map and data or attributes attached or linked to the locations.
- *Floodplains* – Floodplain data will be transposed to the appropriate base map and displayed with the development in the watershed. Proposed land developments will be projected in the GIS to display their relationship to the floodplains.
- *Environmental Characteristics* – Environmental characteristics such as open space, buffers, streambank erosion problems will be displayed on the appropriate base map where appropriate.

Task 2 Deliverables (all digital)

- Data Gap Analysis Memorandum

Task 3: Hydraulic Modeling Update and Calibration

Hydraulic modeling update will include following significant watersheds:

- ***Fairview Creek***
- ***No-Name Creek***

3.1 Subwatershed Delineation

Consultant will update existing sub-basin delineation within each stormwater major watershed, including offsite basin that contribute flow to Fairview and No-Name Creek. Each sub-basin shall consist of geographically contiguous lands that are characterized by uniform modeling characteristics and a shared path of discharge to another sub-basin or receiving stream Consultant will utilize LIDAR data to define drainage patterns for these areas and incorporate them within the model. Consultant will update basins with new development which has occurred since original basin delineation.

The subwatersheds will be further delineated to subareas based on the following:

- the location of existing problems, as identified by the City staff, the field reconnaissance or from data previously compiled in any previous studies,
- the location of major obstructions (primarily bridges), road culverts, or stormwater control facilities,
- other points of interest, such as stream gauging or water quality monitoring stations, locations of water quality concerns, or outfall sections downstream of existing developments or where development is anticipated to occur.

This task will also include mapping of relevant watershed planning information onto GIS data layers. This mapped information will include:

- storm sewer systems - for significant system components, areas where storm sewering exists (service areas) will be indicated generally on the final watershed base map. Storm sewer maps will be collected and included in the Technical Appendix.
- existing flood protection and stormwater management facilities.
- proposed stormwater facilities within the 10-year planning period - where known and confirmed by the municipalities
- stormwater related "problems" - those areas indicated and where confirmed by technical modeling/analysis (for example, flooding points or areas of streambank erosion).

3.2 Update Hydrologic Component of Model

This task includes the update of the existing xpswmm hydrologic model for the analysis of the existing and projected land characteristics of those subareas determined in Task 3.1. This model is most adaptable to a mixture of natural and man-made / urban hydrologic regimes that exist in the City of Fairview. Input data including rainfall information, drainage network layouts and capacities, impoundments, and GIS based data developed under Task 2.5 will be input into the model.

3.3 Hydraulic Model Update

Perform a comparison of City of Fairview's GIS pipe data to model pipe data and identify areas of missing information. In ordered to minimize cost we may elect to bring the current set of GIS data into the xpswmm model and not utilize the existing xpswmm link data. It may actually take longer to do comparison than to recreate new links.

3.3.1 Set Boundary Conditions

Utilize Multnomah Drainage District latest xpswmm model data to starting elevation for Fairview Lake. Determine upstream boundary conditions. First approach will be to use USGS stream stage data. Upstream gages data available for Fairview Creek. Incorporate USGS test information for established Manning's "n" values. As a result of sensitivity analysis Manning's "n" values may need to be adjusted to calibrated model.

3.3.2 Finalize xpswwm model

The model will be run to get preliminary results. It will then be calibrated to obtain a model that can predict the hydrologic response of the watershed with confidence and reliability. Calibration efforts will include the adjustment of model parameters to accurately simulate natural runoff conditions of the watershed. Consideration will be given to all calibration techniques including, but not limited to, use of any available gauging information, comparison with rainfall and runoff information from similar watersheds, comparison with flood insurance study information, regression analyses, and short-term gauging.

3.4 Model Runs

The calibrated model will be run for the selected subareas under the determined design storm(s) for both

the existing and future projected land uses. This will also involve the detailed evaluation of modeling results to perform a problem identification analysis (i.e., a "cause and effect" analysis). This will concentrate on identifying the downstream storm runoff impacts of projected future land development projects. This evaluation will consider both the increase in current downstream storm runoff problems, as well as new downstream runoff problems. This work step also consists of performing a technical evaluation of the hydrologic analysis for existing and future land use conditions (ultimate build-out). Identify required system improvements for the updated analysis approach and design criteria. Identify improvements required in the short term to correct existing deficiencies and in the long term to provide for future development.

Assumptions
The City of Fairview will provide zoning information to include the entire urban growth boundary (UGB), including areas outside of the City that contribute flows to the Fairview Creek and No-Name Creek. The results of this task will be summarized in the final technical report (Task 6) rather than create an additional document for this standalone task.

Task 3 Deliverables (all digital)

- List of locations were 2D modeling would be of benefit

Task 4: Alternatives Development and Evaluation

The purpose of this task is to analyze and identify potential storm sewer facility collection and conveyance alternatives and select the most viable alternatives for further analysis. The subtask assumes the City will provide input and feedback as alternatives are developed, analyzed, screened, selected and recommended. Anticipated work under this item includes the following subtasks:

In collaboration with City staff, establish criteria that will identify "trouble-spots" for the 2-, 5-, 10-, 25-, and 100-year, 24-hour rainfall events. In addition, a high intensity, short duration storm will be analyzed. An analysis of downstream impacts during these storms will be performed to determine the required design storm(s) based on the watershed hydrologic response of the eight storms. If the rainfall data is available for the December 2015 storm event, this storm will also be simulated.

4.1 Storm Sewer System Analysis

Using the data collected and the hydraulic model, alternatives to improve system deficiencies, eliminate system restrictions, and accommodate future service areas will be developed and evaluated. These alternatives will include gravity storm sewers and or channel improvements to adequately collect and convey stormwater under existing and future flow conditions. The proposed alternative will meet the previously listed goals and will address future storm system demands, infrastructure needs, regulatory issues, and implementation. Each alternative ultimately recommended will include a detailed description, cost analysis, layout drawings, or other appropriate material.

4.1.1 Existing Storm Sewer Evaluation

Consultant will evaluate the capacity of the existing stormwater infrastructure. This task will quantify existing conditions deficiencies for each storm event. The analysis will include underground piping and City-managed streams, bridges and culverts. Models will be reviewed for locations of surcharge and flooding. The models will also be compared to areas of reported flooding. The created 1D xpswmm models are able to report the amount and duration of flooding that occurs at a particular node. It is unable to predict where the water leaving the storm system will drain. Along with the preliminary deficiency list, Consultant will also provide the City with a list of locations where water leaving the system should be evaluated in a 2D model. Consultant will meet with City staff to discuss deficiency locations. The

meeting will result in the establishment of a final set of matrix criteria to evaluate the existing-conditions models. A final list will be developed and submitted to the City.

4.1.2 Build-Out Storm Sewer Evaluation

Consultant will evaluate the capacity of the build-out stormwater infrastructure. Consultant will complete a built-out basin analysis based on the latest planning criteria provided by the City. The planning criteria will be specific enough to identify new communities to be served. Consultant will assign a percent imperviousness to each land use. For residential land uses Consultant will calculate the existing percent imperviousness for developed areas of the same land use. For commercial and industrial land uses the latest landscape development requirements will be used to estimate impervious percentages. The percent impervious will then be assigned to the build-out basins of similar zoning.

4.1.3 Existing Conditions Deficiency List

Consultant will generate a preliminary and final deficiency list for the City of Fairview. The list will include reported areas of flooding, flood occurrences as determined from the hydraulic models and areas where storm service is not provided.

4.1.4 Build-Out Deficiency List

Consultant will generate a preliminary and final deficiency list for the City of Fairview.

4.2 Infrastructure Alternatives

Detailed improvement alternatives for conveyance will also be developed. Alternatives for expanding the conveyance system to serve future storm system demand within the City of Fairview UGB will be developed, including line sizes. All alternatives will be developed in close coordination with designated City staff from the Public Works and Engineering Departments.

4.3 Selection of Preferred Alternatives

Under this subtask, consultant will provide guidance and recommendations to the City with a common sense approach to complying with applicable regulations. Alternatives that are technically sound, protective of the environment, respective of the surrounding community, and cost-effective in collecting and conveying and that meet City goals and objectives, will be selected. The selected alternatives will be described in further detail and will include a project cost estimate.

Deliverables

Consultant will provide the City the following items:

- Preliminary and Final Deficiencies List
- Improved Infrastructure xpswmm Model
- Existing and Improved Infrastructure Shapefile
- Existing and Build-Out Basin Map
- Build-Out Improved Infrastructure xpswmm Models
- Imperviousness Analysis
- Preliminary and Final Build-Out Deficiencies List

Task 5: Capital Improvement Projects Update

5.1 Improvement Prioritization and CIP Coordination

Included in this subtask is a review of proposed improvements and associated costs with City staff to establish prioritization guidance. With City input on project priorities, a prioritized CIP will be developed for inclusion in the master plan document. The CIP will be tabulated with grouped and prioritized annual recommended improvements and include project cost estimates and tabulated annual capital cost needs, as well as average capital cost needs, on a five-year increment basis. The CIP will consist of a list of

recommended improvements and budget level project cost estimates for each proposed improvement. The list will include a brief description of each improvement and the benefits of undertaking and completing the improvement. The CIP will include an implementation program that will identify and prioritize the recommended improvements so that immediate improvements can be included in the current 5-year CIP and others can be programmed into subsequent planning horizons.

5.2 Cost Estimates

Under this subtask planning level project cost estimates will be developed for all recommended improvements. Detailed break downs of cost estimating data will be provided to allow for quick reference and updating purposes. All project cost estimates will include appropriate allowances and contingency factors as well as cost index referencing to provide for future cost estimate updating. SDC eligible portions of each improvement will be identified.

Deliverables

Consultant will provide the City the following items:

- Existing and Build-Out CIP Shapefiles
- Existing and Build-Out CIP - Cost Estimate Spreadsheet

Task 6: Technical Memorandum

6.1 Technical Memorandum

Consultant will summarize work completed within this scope of work as part of a Technical Memorandum. The memorandum will outline the methodology and results of the modeling efforts. Consultant will prepare a draft report for review by the City. Consultant will then meet with the City to discuss comments. City comments will be incorporated within the final memorandum.

Deliverables

Consultant will provide to the City the following items:

- One electronic and one hard copy of the Draft Technical Report
- One electronic and three hard copies of the Final Technical Report
- One electronic copy of all generated shapefiles, xpswmm models and supporting documents developed for this analysis.