

Mr. Mike Brofka
Water Superintendent
City of West Allis
6300 McGeoch Avenue
West Allis, Wisconsin 53219

Subject: City of West Allis – WaterGEMS Model Development

Dear Mike:

Pursuant to our meeting on April 18, 2018, Baxter & Woodman is pleased to submit our proposed scope and engineering fee estimate to assist the City in developing a WaterGEMS hydraulic computer model of the City's water system. Our scope of services and engineering fee are presented below.

SCOPE OF SERVICES

Project Management

1. Plan, schedule, and control the activities that must be performed to complete the Project. These activities include, but are not limited to, budget, schedule, and scope.
2. Provide a regular status report via email that describes the tasks completed and outlines goals for the following period.

Project Kickoff Meeting

1. A Project kickoff meeting with City staff and the Project team will be held for the Water Model Project.
 - a. The purposes of the meeting are to establish clear lines of communication, introduce the City staff to the team members, and establish the City's detailed needs, objectives, and goals for the Project.
 - b. The meeting will also be utilized to obtain information, plans, atlases, and other data to be supplied by the City, and set schedules and guidelines for future meetings.

Existing Conditions/History Review

1. Review the following information provided by the City:
 - a. Existing water system GIS mapping and data.
 - b. Other existing water distribution system maps and construction record drawings, including any recent system changes and improvements, with pipe ages and pipe material indicated.
 - c. Water consumption records and water billing data.
 - d. List of known problem areas (low pressure, high pressure, poor water quality, low fire flow, etc.).
 - e. Descriptions of existing storage, pumping, treatment and supply facilities.
 - f. Description of standard operating procedures for the water system.
 - g. Current population estimates or densities by quarter section, census tract, or other small geographic area.
 - h. Copies of any available topographic maps.

2. Determine existing water demands using water consumption records from individual service accounts, if available in an acceptable electronic format.

Data Transfer and Presentation

1. Update GIS data with any missing age, material and diameter information.
2. Data will be reviewed for connectivity and cohesiveness to simplify integration with WaterGEMS software.
3. Create unique Structure ID Numbers for each structure to develop an identification system in place with unique values. Use Structure ID Numbers to establish a link with the WaterGEMS model database, allowing model results to be incorporated within the GIS database.
4. Import the WaterGEMS network model into the geographic data model to allow alterations to the water system pipe network within the modeling software to be maintained and incorporated into the Geodatabase.
5. At the completion of the model creation project, the WaterGEMS model data will be exported back into the existing GIS.
 - a. This one-to-one relationship will allow any alterations that have been made to the water network within the modeling software to be maintained and incorporated into the existing geodatabase.
 - b. This strategy will allow WaterGEMS model output to be incorporated within the GIS data for City use, and allows future water system updates to be migrated into and out of the geodatabase utilized by the WaterGEMS modeling software program.
6. Provide a digital copy of the ArcGIS data in a format as specified by the City.

Model Preparation

1. Create a hydraulic water model in WaterGEMS for the City water system using existing water mapping and GIS information.
2. Work directly with City staff to concur on system information, including control elevations, system pressures, and system constraints.
3. Confirm with City staff that the resulting system in the modeling software accurately represents the actual distribution system (insofar as it impacts the results of the model).

Field Testing

1. Perform distribution system field tests by flowing hydrants in specific areas to assist in the estimation of existing system pipe roughness coefficients (C-factors), and to assist in model calibration.
 - a. The hydrant flow tests will involve measuring timestamped flows and system pressures from selected hydrants throughout the water system.
2. An estimated 15 hydrant flow tests will be conducted with the assistance of City Water Utility staff.

Model Calibration

1. Calibrate the hydraulic model by using field testing results and water system boundary conditions (pumping and storage facility data).

2. Calibration activities will include adjustment of model parameters (primarily pipe C-factors) until field test data and model simulation results match within specific model calibration tolerances.
3. During the effort to calibrate the hydraulic model if unexpected and unknown system conditions are encountered, it may be necessary to perform additional investigations into why the model will not adequately calibrate (e.g., unknown closed valves in the system). Any additional work needed to be performed would be in addition to the original Model Project scope and engineering fee.

Model Documentation

1. Baxter & Woodman's standard approach to model documentation will provide the City and Water Utility with a complete record of the City's water system computer model that is created.
2. The documentation will include a listing of:
 - a. Computer model data files
 - b. Customer demand allocation data
 - c. Pipe roughness coefficients
 - d. Calibration field data and model simulation results
 - e. Junction node map file

ENGINEERING FEE

The Owner shall pay the Engineer for the of services performed or furnished based upon the Engineer's standard hourly billing rates for actual work time performed plus reimbursement of out-of-pocket expenses including travel, which in total will not exceed \$38,900.

We appreciate the opportunity to work with the City of West Allis on this important Project and we are available to begin work immediately upon your notice to proceed.