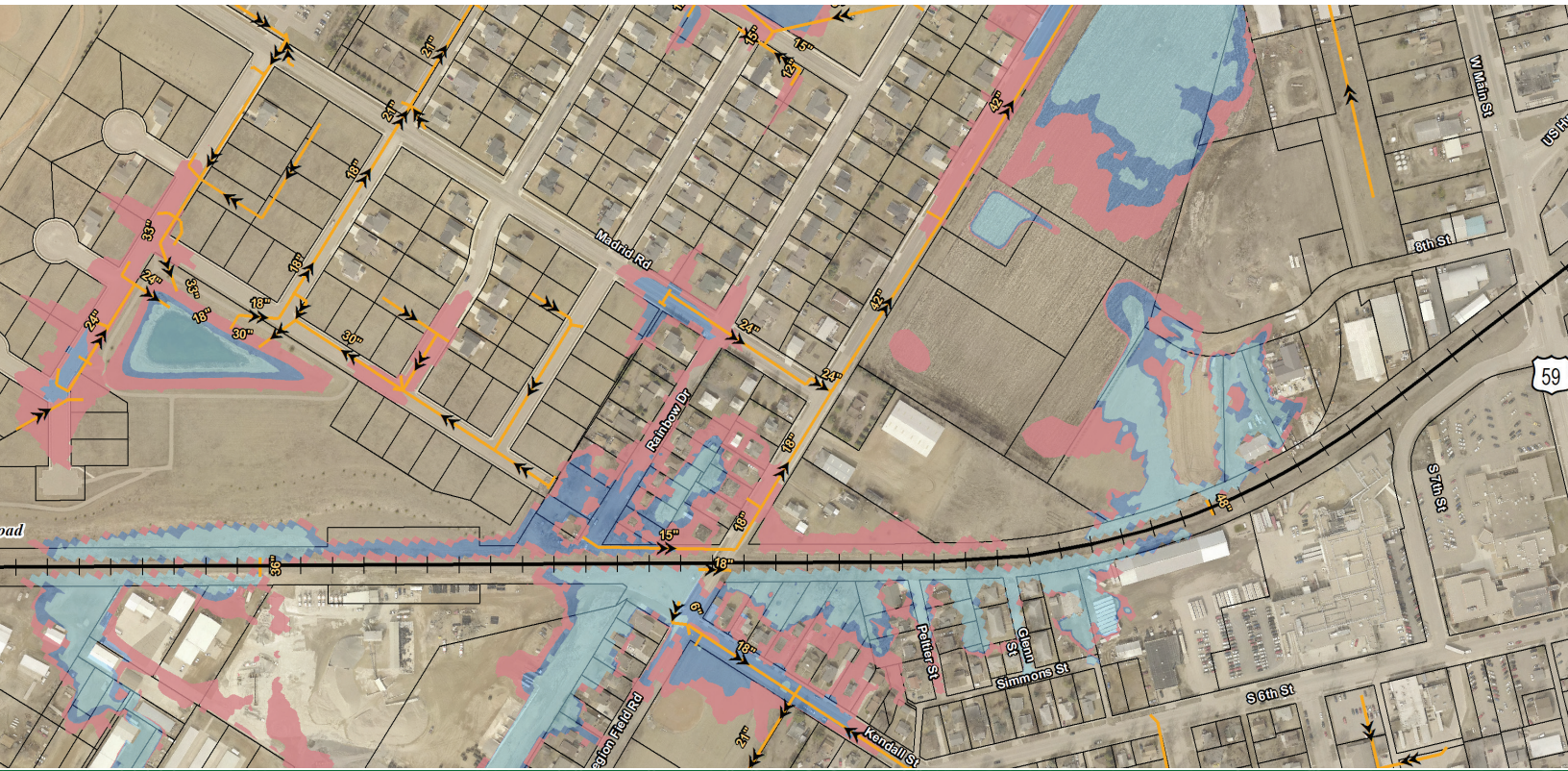




MARSHALL  
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Proposal for  
**2020 Comprehensive Stormwater  
Modeling**

City of Marshall | August 4, 2020



**BOLTON  
& MENK**

Real People. Real Solutions.

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August 4, 2020

Mr. Jason Anderson, P.E.  
Assistant City Engineer  
City of Marshall  
344 West Main Street, PO Box 477  
Marshall, MN 56258

RE: Proposal for 2020 Comprehensive Stormwater Modeling

Dear Jason:

The City of Marshall has initiated the 2020 Comprehensive Stormwater Modeling project to develop a city-wide stormwater model that will be invaluable when investigating local drainage issues as well and developing capital improvement plans. Like you, Bolton & Menk, Inc. takes great pride in delivering projects that are safe, sustainable, and functional. Our approach to engineering services makes the City of Marshall's priorities our priorities. We understand what needs to be accomplished for the successful completion of the 2020 Comprehensive Stormwater Modeling project.

**Local Expertise** – Local drainage issues have become a top priority as rainfall intensities continue to increase. The City of Marshall needs a consultant who is familiar with the needs of your community. Bolton & Menk has developed numerous solutions to local drainage issues over the last 30 years and looks to continue to build on our knowledge with this project.

**Fiscal Responsibility** – Like any community, the City of Marshall is watching its bottom line. Bolton & Menk engineers are creative problem solvers and will work to find the right solution within a reasonable budget. We look forward to working with city staff to collect the necessary project data to reduce the overall cost of the project.

**Guide for the Future** – The City of Marshall needs a consultant to provide overall direction by establishing and delivering a stormwater model that will offer a framework for future drainage improvements. The final stormwater model will provide insight on areas with known drainage issues as well as identify potential unknown problem areas. Using the modeling output will be invaluable when approaching city capital improvement planning to ensure the necessary drainage improvements are implemented.

In continued service to the City of Marshall, we are excited at the opportunity to complete the 2020 Comprehensive Stormwater Modeling project. I will personally serve as your lead client contact and project manager. Please contact me at 952-217-2287 or [Joshua.Stier@bolton-menk.com](mailto:Joshua.Stier@bolton-menk.com) if you have any questions regarding our proposal.

Respectfully submitted,  
**Bolton & Menk, Inc.**

Joshua G. Stier, P.E.  
Senior Project Engineer

Enclosures:  
Scope of Services and Budget

## Description of Proposed Project

This project includes the development of a city-wide hydrologic and hydraulic model of the existing city stormwater infrastructure. This model will be capable of quantifying existing storm sewer capacity, stormwater basin performance, and water quality improvements provided by existing infrastructure. The model will serve as a benchmark of existing conditions as it currently exists and will be a valuable tool when managing the city MS4 permit and developing capital improvement plans.

### Scope of Work

#### Task 1 – Watershed Delineation

Bolton & Menk will perform watershed delineation using publicly available LiDAR data and city provided storm sewer system information to analyze surface water drainage patterns. Several drainage studies have been performed throughout the city; the watershed data generated as part of these projects will supplement to create a city-wide dataset that delineates watershed boundaries on a localized basis. It is anticipated drainage areas will be delineated to mainline storm sewer manholes but will not go to a level of detail that would encompass individual catch basins. Once the dataset is developed, it will be shared with the city for review to ensure accuracy prior to proceeding to Task 2.

#### Task 2 – Stormwater Management Model

Bolton & Menk will develop a hydrologic and hydraulic model using Autodesk's Storm and Sanitary Analysis 2020. This model will incorporate as-built and survey information, as available and provided by the city, to ensure accuracy. This program will be used because of its flexibility to quickly and accurately model stormwater runoff and ponding for a variety of rainfall events. The model will incorporate major water features including mainline storm sewer, stormwater basins, and major culvert crossings. The model will use the Soil Conservation Services Technical Release (TR-20) hydrology method, which uses a rainfall hydrograph to route runoff through the system. The model will use Atlas 14, 24-hour rainfall data along with the NRCS MSE 3 rainfall distribution as recommended for the City of Marshall. As part of the model development, an assumptions document will be created to justify the development of the model.

#### Subtask 2.1 – Hydrology Inputs

The watershed dataset developed as part of Task 1 will be updated to include site specific hydrology inputs, including curve numbers and time of concentration for each individual watershed. The curve number will be auto generated using geospatial techniques that account for the land use, impervious, and soil types within each watershed to ensure consistency and accuracy when assigning the runoff coefficient. The time of concentration will be developed based on methods described in Part 630: Hydrology, Chapter 15 of the National Engineering Handbook. It is expected that several of these methods will be used based on the range of watershed size.

#### Subtask 2.2 – Hydraulic Inputs

The city provided mainline storm sewer pipe sizes and invert elevations will be inputted into the model. Additionally, all major culvert crossings, stormwater basins, and treatment basins will be included. The storage curves for stormwater basins will be based on LiDAR data in locations where as-built information does not exist. We assume limited detail will be input relative to the Redwood River and the diversion channel as detailed modeling of this has already been performed and is available from the Minnesota DNR. Tailwater conditions at storm sewer outfalls will be properly included in the model.

#### Subtask 2.3 – Model Calibration

Following the input of the hydrologic and hydraulic data, a high-level review of the modeling output will be performed to ensure the model is performing as expected. Areas of concern will be reviewed in further detail, compared with known ponding levels, and adjusted to achieve a result similar to that observed during known significant rainfall events. It is expected that additional ponding nodes and overland flow routing will be inputted in locations that experience localized flooding. These additions will be noted in the assumptions document provided as part of the hydraulic model.

### Task 3 – Meetings/Review

To successfully deliver a practical stormwater management model for the city, it is anticipated meetings and extensive coordination will be required. These meetings will be needed to address key drainage issues throughout the city that are to be included in the modeling.

### Task 4 – Model Output/Reporting (Optional)

Once the comprehensive citywide stormwater model is developed and calibrated, a detailed review of the city stormwater infrastructure can be performed. Upon request, Bolton & Menk will create Geospatial datasets that include location of surcharged pipes and manholes, localized flooding locations, and detailed high water levels associated with select rainfall events.

A summary report will be generated, as requested, to further document the model assumptions and results.

The summary report will include figures to graphically represent watersheds, manhole, and pipe locations. The hydraulic performance of the storm sewer systems will be summarized for select rainfall events.

### Information To Be Provided By The City

For the purposes of this proposal, we assume the city will provide the following information.

- Major watershed limits, in CAD format, previously developed by the city
- Rim and invert elevations and pipe sizes of the storm sewer system
- Available record drawings for residential subdivisions, commercial developments, and street reconstruction projects that include storm sewer construction, stormwater basin grading plans
- Geospatial information regarding existing and anticipated land use

## Schedule

|     |                                   | 2020 |     |     |     |
|-----|-----------------------------------|------|-----|-----|-----|
|     |                                   | Sep  | Oct | Nov | Dec |
| 1.0 | Watershed Delineation             |      |     |     |     |
| 1.1 | Data Collection                   |      |     |     |     |
| 1.2 | Watershed Delineation             |      |     |     |     |
| 2.0 | Stormwater Management Model       |      |     |     |     |
| 2.1 | Hydrology Inputs                  |      |     |     |     |
| 2.2 | Hydraulic Inputs                  |      |     |     |     |
| 2.3 | Model Calibration                 |      |     |     |     |
| 3.0 | Meetings/Review                   |      |     |     |     |
| 3.1 | Project Meetings                  |      |     |     |     |
| 4.0 | Model Output/Reporting (Optional) |      |     |     |     |
| 4.1 | GIS Spatial Datasets              |      |     |     |     |
| 4.2 | Summary Report                    |      |     |     |     |

## Fees

The fees outlined below do not include preparation of an engineer's report nor fees associated with future planning associated with the developed stormwater model. A description of the scope of services and fee estimate for these services can be provided after the Surface Water Management Model has been developed and the scope of work is defined.

### Detailed Cost Estimate

| Client: City of Marshall                        |                                           | Bolton & Menk, Inc. |                  |                 |                 |            |
|-------------------------------------------------|-------------------------------------------|---------------------|------------------|-----------------|-----------------|------------|
| Project: 2020 Comprehensive Stormwater Modeling |                                           |                     |                  |                 |                 |            |
| Task No.                                        | Work Task Description                     | Project Manager     | Project Engineer | Design Engineer | Total Hours     | Total Cost |
| 1.0                                             | Watershed Delineation                     | 8                   | 20               | 68              | 96              | \$11,200   |
| 2.0                                             | Stormwater Management Model               | 12                  | 44               | 244             | 300             | \$34,240   |
| 3.0                                             | Meetings/Review                           | 24                  | 0                | 0               | 24              | \$3,360    |
| <b>Total Hours</b>                              |                                           | 44                  | 64               | 312             | 420             |            |
| <b>Average Hourly Rate</b>                      |                                           | \$140.00            | \$130.00         | \$110.00        |                 |            |
| <b>Subtotal</b>                                 |                                           | \$6,160             | \$8,320          | \$34,320        |                 |            |
| <b>Total Fee (Hourly, Not-to-Exceed)</b>        |                                           |                     |                  |                 | <b>\$48,800</b> |            |
| 4.0                                             | Model Output/Reporting (Hourly, Optional) | 6                   | 40               | 16              | 62              | \$7,800    |

*Additional services will be provided on an hourly basis in accordance with our schedule of fees.*

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There is no such thing as a one-size-fits-all solution. We recognize that every project and client are unique and we treat them that way.