



Task Order No. 22-03
City of Manitowoc, Wisconsin (CITY)
and Strand Associates, Inc.® (ENGINEER)
Pursuant to Technical Services Agreement dated April 11, 2013

Project Information

Services Name: Stormwater Hydrology and Hydraulics Study

Whereas, CITY desires engineering assistance to prepare a study including the preparation of an existing condition XPSWMM model and alternatives analysis for L14-Lake Michigan (Red Arrow Discharge), LR1-Little Manitowoc River (Fenway Terrace), and R22-Manitowoc River (South 19th Street) watersheds, and

Whereas, ENGINEER is knowledgeable in said engineering services and has available and offers to provide personnel and facilities necessary to accomplish the services within the required time limits of CITY.

Scope of Services

ENGINEER will provide the following services to CITY.

Task 1–Administration and Meetings

Participate in one in-person kickoff meeting, two virtual progress meetings, and one in-person meeting to discuss the final report.

Task 2–Existing Condition Stormwater Model

1. Provide a data request to CITY for existing stormwater-related reports, existing stormwater best management practices (BMP) information, existing storm sewer conveyance system information (rim/inverts elevations, and pipe size/type), and existing geographic information system (GIS) files showing locations of existing stormwater BMPs. Review relevant existing reports and findings.
2. Provide up to five eight-hour days of field topographic survey and inventory of existing stormwater conveyance network (up to 120 structures). Update CITY-provided storm sewer GIS shapefiles with survey information (structures-rim and invert elevation; pipes-size, material, and invert elevation) for upload into XPSWMM.
3. Develop hydrology parameters (watershed delineation, runoff curve numbers based on impervious area, and time of concentration) that will represent the watersheds to the storm sewer system within the three study watersheds.
4. Generate existing conditions XPSWMM 2D modeling that incorporates storm sewer sizes of 18-inch or larger within the three study watersheds. Existing stormwater flood control features that are contiguous to the conveyance features will be included. Perform a critical duration evaluation using National Oceanic and Atmospheric Administration Atlas 14 Rainfall Amounts and Huff Rainfall Distribution (Bulletin 71).
5. Prepare existing condition flood extent and depth mapping for the three modeled areas for the ten-year, 25-year, 50-year, and 100-year design storm events.
6. Prepare a draft and final narrative describing the existing condition model.

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Task 3–Flood Mitigation Alternatives Analysis

1. Analyze up to three alternatives per watershed to potentially reduce flooding at the following locations:
 - a. LR-1 Little Manitowoc River–Fenway Terrace–Intersection of Pine Street and 5th Street.
 - b. L-14 Lake Michigan–Red Arrow Discharge–Along South 23rd Street between Division Street and Grand Avenue including the area around Ron Rubick Field as well as the area on South 30th Street between Division Street and USH 151.
 - c. R22–Manitowoc River–South 19th Street–The neighborhood bounded by Custer Street, Mero Street, South 35th Street, and South 29th Street.
2. Analyze alternatives utilizing one CITY-selected design storm level of service for each location, based on design discussions at the kickoff meeting.
 - a. Alternative 1–Upsized storm sewer from the flooding areas to the watershed’s storm sewer system outfall.
 - b. Alternative 2–Incorporation of a stormwater detention basin to reduce peak flows to the existing storm sewer system.
 - c. Alternative 3–A combination of Alternatives 1 and 2.
3. Prepare proposed condition flood extent and depth mapping for each alternative analyzed for the three modeled areas for the ten-year, 25-year, 50-year, and 100-year design storm events.
4. Provide a narrative, figure, and opinion of probable construction cost for each of the alternatives.

Task 4–Future Condition Stormwater Model

1. Generate a future condition land use map for L14-Lake Michigan (Red Arrow Discharge) and R22-Manitowoc River (South 19th Street) watersheds based on information provided by CITY. The LR1–Little Manitowoc River (Fenway Terrace) watershed is built out and will not be included in the future condition modeling.
2. Develop future condition hydrology parameters (watershed delineation, runoff curve numbers based on impervious area, and time of concentration) for up to 22 potential future developments.
3. Develop 22 mock detention basins to mimic CITY’s stormwater management ordinance requirements regarding peak flow reduction at up to 22 potential developments.
4. Incorporate the future condition hydrology parameters and mock detention basins into the CITY-selected alternative XPSWMM model for the L14-Lake Michigan (Red Arrow Discharge) and R22-Manitowoc River (South 19th Street) watersheds, as appropriate.
5. Prepare future condition flood extent and depth mapping for the two modeled areas with the CITY-selected alternative in place for the ten-year, 25-year, 50-year, and 100-year design storm events.

Task 5–Stormwater Report

Prepare a stormwater report documenting the stormwater hydrology and hydraulics and submit to CITY in draft and final format. Provide one portable document format file of the draft and final report and a total of five hard copies of the final report.

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Compensation

CITY shall compensate ENGINEER for Services under this Task Order a lump sum of \$129,900.

Schedule

Services will begin upon execution of this Task Order, which is anticipated on May 23, 2022. Services are scheduled for completion on September 23, 2022.

CITY’s Responsibilities

In addition to those items found in the associated Agreement for Technical Services, CITY shall be responsible for the following:

1. Assist ENGINEER in field inventory of stormwater conveyance features.
2. Provide traffic control, if needed, during the surveying phase of the project.
3. Provide the most recent version of the following GIS shapefiles:
 - a. Stormwater system including manholes, inlets, piping, outfalls, and BMPs.
 - b. Most recent light detection and ranging data.
 - c. Most recent aerial photography map.
 - d. List of CITY BMPs to be modeled.
 - e. Sanitary and watermain systems.
 - f. Wetland mapping.
 - g. Future land use mapping.
 - h. Parcel mapping.

TASK ORDER AUTHORIZATION AND ACCEPTANCE:

STRAND ASSOCIATES, INC.®

CITY OF MANITOWOC

By: _____
Joseph M. Bunker
Corporate Secretary

By: _____
Justin M. Nickels
Mayor

Date: _____

Date: _____

By: _____
Mackenzie Reed-Kadow
City Clerk
Date: _____