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November 5, 2018

RE: City of La Crosse  
Ebner Coulee LOMR submittal  
SEH No. 148443 14.00

Mr. Bernard Lenz, PE  
Utilities Manager  
City of La Crosse  
400 La Crosse Street  
La Crosse, WI 54601

Dear Mr. Lenz:

Short Elliott Hendrickson Inc. (SEH) appreciates the opportunity to provide this proposal for continuing professional services for the Ebner Coulee watershed floodplain mapping updates. This proposal outlines our proposed scope of services, based on our understanding of the project.

#### SCOPE OF SERVICES

Our scope of services for completion of the Ebner Coulee Letter of Map Revision project is broken down into three Phases. Phase 1 being the finalization of the Ebner Coulee model calibration and floodplain mapping as described in the August 2018 submittal to the Wisconsin DNR (WiDNR). Phase 2 involves the hydrologic and hydraulic modeling and subsequent floodplain mapping, report preparation, and meetings with the WiDNR for the identified FEMA floodplain (FIRM Panel 55063C0262D) south of Farnam Street and bounded by the railroad tracks on the west, 31<sup>st</sup> Street South on the east and State Road on the south. Phase 3 involves the formal LOMR submittal, and ultimately approval, to first the WiDNR and subsequently FEMA.

#### PHASE 1 – EBNER COULEE MODEL CALIBRATION AND FLOODPLAIN MAPPING

##### Task 1.1. Field Investigations and Topographic Surveys

For this task we propose additional topographic survey in the area near Floral Lane just northwest of the location in which Ebner Coulee exits the confined valley section and enters the channelized raised berm section. This is the area where overtopping occurred during the July 2017 event and high water information is available. The field surveys include a topographic survey of the Ebner Coulee channel, the driveway culverts and bridge crossings.

##### Task 1.2. SRH2D Model Development and 2017 Peak Flow Rate Refinement

This additional survey information will be utilized to develop a refined estimate of the "actual" peak flow rate of the 2017 event based on field estimates. We anticipate accomplishing this by creating a detailed SRH2D model of the area in which the overtopping and flooding occurred due to the plugged culverts. SEH will modify the discharge rates in the model until the computed high water approximates the surveyed high water marks. The high water marks are in a relatively flat area, so the flood extents should be fairly sensitive to flow rate changes and thus more easily calibrated.

#### Task 1.3. Updated Hydrologic/Hydraulic Analysis and Floodplain Mapping

The estimated return period of the 2017 storm will be utilized to create a new calibrated HEC-HMS hydrologic model which can then be utilized to recreate calibrated frequency based events. These discharge rates will serve as the calibrated flow rates for use in the LOMR submittal.

Utilizing the updated peak flow rates, the coupled 1D/2D HEC-RAS hydraulic model will be utilized to estimate the proposed flood inundation mapping resulting from the various frequency events. Due to the regulatory framework, we will develop a fully 1-dimensional HEC-RAS model that replicates the 1D/2D HEC-RAS results for the LOMR submittal.

#### Task 1.4. Updated Letter Report

SEH will update the previous technical letter report to summarize the additional analysis and results from this phase of the study which will be provided as background in support of the Letter of Map Revision Submittal.

#### Task 1.5. Presentation at Floodplain Committee Meeting

The SEH Project Manager/Engineer of Record will attend and present the results of this analysis at a Flood Task Force Committee Meeting.

### PHASE 2 – FLOODPLAIN ANALYSIS FOR AREA SOUTH OF FARNAM

An initial review of the Flood Insurance Study lists a combination of unsteady hydraulic UNET modeling, HEC-1 modeling, along with rating curves and weir equations utilized to estimate the flood levels in the proposed study area (designated as a pond in the original study). In addition due to limited topographic data available at the time of the initial study, approximate methods were utilized to estimate available stage-storage information.

As part of this study, we propose to develop an updated hydrologic and hydraulic model for the contributing drainage area south of Farnam Street utilizing available LIDAR topographic information and storm sewer base mapping. Due to the fact that flooding in this study area is caused by a combination of surface and subsurface (storm sewer system) drainage, we propose to utilize XPSWMM to perform the hydrologic and hydraulic calculations for this area.

Given the complexity of the flooding in this area, we propose to follow a similar study process to that utilized for the upstream channelized portion of Ebner Coulee. A summary of the tasks is described below.

#### Task 2.1. Data Collection and Review

The first step in this phase will be to perform an in depth review of the available LIDAR topographic mapping, existing GIS City storm sewer data, and original hydrologic modeling (1979) used to produce the effective FIRM for this area. Per the City recommendations, it is assumed that the existing storm sewer base mapping is complete and accurate and no field surveys necessary to complete this task. SEH staff will work with the City to ensure we have the most recent and up to date storm sewer base mapping for the area. This information along with available LIDAR information will serve as the basis from which the XPSWMM model will be developed and floodplain mapping generated.

#### Task 2.2. XPSWMM Model Development

SEH will develop a 1D/2D xpswmm model for the study area. These models will incorporate City provided GIS storm sewer data of the existing stormwater drainage systems and LIDAR topographic data to simulate surface flows and flooded area. To keep an appropriate level of detail, the models will include the main conveyances (pipes, channels, etc.) and will not incorporate individual inlets and associated

storm leads. The inflow hydrograph into the large storm sewer inlet upstream of Farnam Street will be taken from the 1D/2D HEC-RAS model and input into the XPSWMM to evaluate the impact to the storm sewer conveyance system downstream of Farnam Street. If it is determined that flow over Farnam Street occurs, this will also be input into XPSWMM utilizing the overtopping hydrograph. If it is believed that insufficient inlet capacity is causing flooding issues in the area, additional detail can be added to the model to capture this. SEH will discuss this approach with the WIDNR to ensure the State's overview and concurrence of the methodology used in support of a Letter of Map Revision submittal.

#### Task 2.3. XPSWMM Modeling and Mapping of Historic Events and Calibration

Utilizing the results from the historic rainfall-runoff analysis completed previously for the channelized portion of Ebner Coulee upstream, we will input the estimated historic rainfall hyetographs into the XPSWMM program to estimate the peak runoff rates and extents of the resulting flooded area for each of the historic events. We will develop figures to depict the expected inundation areas for each of the historic rainfall events. Similar to the methodology employed for the channelized portion of Ebner Coulee, we propose to review available high water information from the July 2017 event and work with the City as necessary to conduct additional resident surveys to gather flooding and high water information for this area. SEH will modify the hydrologic parameters in the model until the computed high water approximates the estimated high water marks.

#### Task 2.4. Floodplain Mapping

The calibrated XPSWMM model will be executed for the frequency based events to develop the high water elevations associated with the 10-percent, 2-percent, 1-percent, and 0.2-percent Annual Chance events. If desired, SEH will develop a HEC-HMS model calibrated to the results of the XPSWMM to move forward into the Letter of Map Revision submittal as the proposed effective model for the area.

The XPSWMM model will be used to determine if above ground flooding is expected to occur in the area. If flooding does occur, it will be mapped using the constant high-water elevations developed by the XPSWMM model.

#### Task 2.5. Summary Technical Letter / Preparation of Review Submittal to the Wisconsin DNR

SEH will provide a technical letter report summarizing the results of the analyses performed and a request for review and comment by the Wisconsin DNR against their requirements for State overview and concurrence in support of the Letter of Map Revision Submittal.

#### Task 2.6. Council Factsheet

The results of this task will be highlighted in a factsheet, similar to that prepared for the previous Ebner Coulee Study, which will utilize figures and graphics to convey the results to the City Council and City Committees. This will be a results and impacts focused document focused on the expected differences between the current FIRM and a new FIRM if moved forward into a LOMR.

#### Task 2.7. Presentation at Floodplain Committee Meeting

The SEH Project Manager/Engineer of Record will attend and present the results of this analysis at a Flood Task Force Committee Meeting.

### PHASE 3 LOMR SUBMITTAL

SEH will prepare the Application/Certification forms for the LOMR. This task includes compilation of the Technical Support Data Notebook and floodplain and floodway mapping. This task also includes time to respond to both Wisconsin DNR and FEMA comments. It is difficult to determine the amount of effort required responding to FEMA comments until they are formally received. Response efforts required to

obtain FEMA approval beyond the assumed effort will be considered beyond the scope of the initial agreement and will be discussed with the City prior to performing the required work.

#### SCHEDULE

SEH will begin work as soon as authorized by the City with the estimated project schedule as outlined below. The schedule is dictated by the time required to receive the BNSF Temporary Occupancy Permit for surveying the Ebner Coulee channel along the BNSF railroad, WiDNR review timeline, FEMA review timeline, and the FEMA standard 6 month period from the issuance of the Letter of Final Determination for approval of the LOMR to the LOMR becoming effective.

- |  |                                |
|--|--------------------------------|
| • Completion of Phase 1 Field Investigations:                  | 7 weeks from Notice to Proceed |
| • Completion of Phase 1 / Presentation to Floodplain Committee | February 2019                  |
| • Completion of Phase 2 / Presentation to Floodplain Committee | April 2019                     |
| • LOMR Submittal to WiDNR                                      | May 2019                       |
| • LOMR Submittal to FEMA                                       | July 2019                      |
| • Approval of LOMR   | April 2020                     |
| • LOMR Becomes Effective                                       | October 2020                   |

#### FEES

Our fees will be based on an hourly not-to-exceed amount of \$148,800, including mileage, equipment, and expenses. Our estimated task-hour breakdown for the scope of work outlined above is included as an attachment.

We appreciate the opportunity to work with the City of La Crosse. If you have any questions, please feel free to contact me at 651.490.2125 or via e-mail at [bwoznak@sehinc.com](mailto:bwoznak@sehinc.com).

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.



Brad Woznak, PE,PH,CFM  
Senior Professional Engineer

btw

Attachment

c: Randy Sanford - SEH

**Ebner Coulee LOMR Estimate  
Estimated Task - Hours**

PHASE / TASK	STAFF					
	Project Manager	Senior Prof Engineer	Hydraulic Engineer	GIS Technician	Word Processor	Survey Crew
<b>PHASE 1 - EBNER COULEE MODEL CALIBRATION AND FLOODPLAIN MAPPING</b>	BW	RP	RM	LO	STAFF	STAFF
<b>1.1. Field Investigations and Topographic Surveys</b>		8	16			32
<b>1.2. SRH2D Model Development and Peak Flow Rate Refinement</b>						
Surface Creation			8			
Model Mesh, Inputs, Boundary Condition			20			
Calibration Iterations to determine 2017 peak flow		6	20			
<b>1.3. Updated Hydrologic/Hydraulic Analysis and Floodplain Mapping</b>						
Calibrated 100-year flow calculation using HEC-HMS and 2017 peak flow - for top of channelized section	2	10	20			
HEC-HMS model updating for flow inputs at Jackson St and/or Farnam St			20			
XPSWMM or other analysis of flow removal due to storm sewer on 29th St			20			
Updating and refining 1D/2D HEC-RAS model	4	20	80			
Development and calibration of pure 1D regulatory HEC-RAS model with floodway analysis	4	20	80			
<b>1.4. Updated Letter Report</b>	8	20	40			
<b>1.5. Presentation at Floodplain Committee Meeting</b>	6		9			
<b>PHASE 2 - FLOODPLAIN ANALYSIS FOR AREA SOUTH OF FARNAM</b>						
<b>2.1. Data Collection and Review</b>	2	10	30			
<b>2.2. XPSWMM Model Development</b>	2	10	50			
<b>2.3. XPSWMM Mapping of Historic Events and Calibration</b>						
Flow rate determination/adjustment at Farnam St			10			
XPSWMM mapping & calibration		5	30			
Citizen Survey support	10		30			
<b>2.4. Floodplain Mapping</b>						
Highwater elevation determining for 10, 50, 100, 500 year return periods			10			
Flood mapping following FEMA guidelines	4	5	30			
<b>2.5. Summary Technical Letter / Preparation of Review Submittal to the Wisconsin DNR</b>	8	40	20			
<b>2.6. Council Factsheet</b>	8	10	10			
<b>2.7. Presentation at Floodplain Committee Meeting</b>	6					
<b>PHASE 3 - LOMR SUBMITTAL</b>						
<b>3.1. Technical Support Data Notebook Preparation (updated FIS and FIRM)</b>						
Project Narrative/Technical Write-up	4	4	24		2	
Compilation of Computations		2	8			
Preparation of Report Figures		2	8	8		
Preparation of Topographic Map, Floodplain, and Floodway Mapping		8	20	28		
Submittal to City and Wisconsin DNR	1	1	4		1	
Response to City and Wisconsin DNR comments	4	10	30	4	2	
<b>3.2. Meetings</b>						
Discussion / Review Meeting with City and Wisconsin DNR	2	6	10			
<b>3.3. LOMR Submittal to FEMA</b>	2	4	12	2	2	
<b>3.4. Respond to FEMA Comments</b>	4	20	40	4	2	
<b>Total Hours</b>	<b>81</b>	<b>221</b>	<b>709</b>	<b>46</b>	<b>9</b>	<b>32</b>
<b>PHASE 1 - EBNER COULEE MODEL CALIBRATION AND FLOODPLAIN MAPPING</b>	24	84	333	0	0	32
<b>PHASE 2 - FLOODPLAIN ANALYSIS FOR AREA SOUTH OF FARNAM</b>	40	80	220	0	0	0
<b>PHASE 3 - LOMR SUBMITTAL</b>	17	57	156	46	9	0

<b>Phase 1</b>	\$60,100
<b>Phase 2</b>	\$43,200
<b>Phase 3</b>	\$33,700
<b>FEMA Review Fee*</b>	\$8,000
<b>Expenses/Fees Associated with RR Survey</b>	\$3,800
<b>Estimated Total Project Cost:</b>	<b>\$148,800</b>

\* Case will be made for fee exemption based on a map change based on flood hazard information meant to improve upon that shown on the flood map or within flood study. If not this could be the fee.