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Memorandum

To: Bassett Creek Watershed Management Commission (BCWMC)
From: Barr Engineering Co. (Barr)
Subject: Item 4D: Bassett Creek Park Pedestrian Bridge Improvement – Crystal, MN
BCWMC October 20, 2022 Meeting Agenda
Date: October 13, 2022
Project: 23270051.53 2022 2287

4D Bassett Creek Park Pedestrian Bridge Improvement–Crystal, MN BCWMC 2022-08

Summary:

Project Proposer: City of Crystal
Proposed Work: Installation of a new pedestrian bridge and associated grading
Basis for Review at Commission Meeting: Proposed crossing and fill in the floodplain
Impervious Surface Area: No change
Project Schedule: Fall/Winter 2022 Construction
Recommendation for Commission Action: Approval

General Project Information

The proposed project is located along the North Branch of Bassett Creek, approximately 130 feet north of Bassett Creek Park Pond in Crystal. The work includes replacement of a pedestrian bridge and associated grading, resulting in 0.12 acres of disturbance and no change in impervious surface from existing to proposed. Although the existing bridge abutments remain in place, the bridge has been removed. For clarity, this structure will be referenced as the existing bridge.

The initial application and submittal was received on August 26, 2022. The BCWMC engineer reviewed the submittal and provided comments to the city on September 2, 2022. The comments were addressed and revised plans and documentation were submitted on September 30, 2022.

Floodplain

The proposed project includes work in the BCWMC 100-year floodplain. The 1% annual-chance (base flood elevation, 100-year) floodplain elevation along the North Branch of Bassett Creek at the project site is 850.9 feet NAVD88. The February 2021 BCWMC Requirements for Improvements and Development Proposals (Requirements) document states that projects must meet the following criteria:

- Projects within the floodplain must maintain no net loss in floodplain storage
- Projects within the floodplain must maintain no increase in flood level at any point along the trunk system (managed to at least a precision of 0.00 feet).

- The lowest member of all crossings shall be at least 1 foot above the floodplain to prevent debris accumulation unless approved by the BCWMC.

Floodplain Storage

The proposed project will result in approximately 134 cubic yard of floodplain fill due to the installation of the new bridge. The proposed project will create 157 cubic yards of compensating storage northwest of the proposed bridge, resulting in a net gain of approximately 23 cubic yards of floodplain storage.

Floodplain Elevation (No Rise)

A HEC-RAS model was developed to model the existing and proposed condition to demonstrate no rise in flood level along the creek. The HEC-RAS model was used to perform a relative comparison of the existing bridge and the new bridge at this location.

Information used to create the HEC-RAS model included flow data and boundary conditions from the BCWMC XP-SWMM model, topography data from the MDNR, and survey data collected as part of the proposed project. The HEC-RAS model included roughly 320 feet of Bassett Creek north of Bassett Creek Park Pond. Approximately 190 feet of channel upstream of the pedestrian bridge was modeled, and 130 feet of the downstream channel was modeled. The applicant developed 8 cross-sections along this reach to define the channel and/or bridge geometry that was used to calculate the water surface level. Figure 1 shows the cross-section locations.

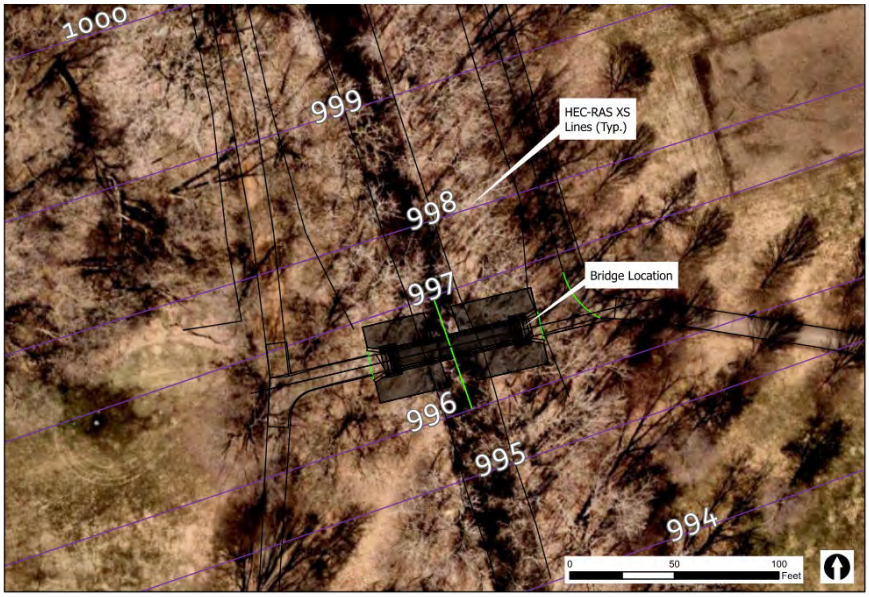

Figure 1: Model Extents in HEC-RAS

Table 1 reports the 100-year high water elevation for all eight cross sections for the existing conditions (existing bridge) and proposed conditions (new bridge). Results shown in Table 1 demonstrate "no increase in flood level" when comparing the existing and proposed bridge.

Table 1: Comparison of Existing and Proposed 100-Year High Water Elevation

Cross-Section	100-Year Existing High Water Elevation (ft)	100-Year Proposed High Water Elevation (ft)	Increase in Flood Level from Proposed to Existing (ft)
1000	850.91	850.91	0.00
999	850.92	850.92	0.00
998	850.91	850.91	0.00
997	850.91	850.91	0.00
996	850.90	850.90	0.00
995	850.90	850.90	0.00
994	850.90	850.90	0.00

Lowest Crossing Member

The existing bridge and the proposed bridge both have portions of the bridge deck lower than the 100-year floodplain elevation. For the proposed project, the lowest member is 4.2 feet below the 100-year floodplain (compared to 4.5 feet for existing conditions). The conveyance area under the bridge will increase by approximately 65 square feet under proposed conditions (from 349 square feet to 414 square feet).

The Requirements document states the lowest member of all crossings shall be at least 1 foot above the floodplain unless approved by the BCWMC, to minimize obstruction of flood flows. The floodplain in this area is over 250 feet wide, thus spanning the floodplain to avoid impacts is not feasible. Also, raising the bridge abutments would be counterproductive because fill would be needed at the bridge approaches, which would reduce the cross-sectional area of the floodplain. At this location along the creek, a significant portion of the conveyance area is in the floodplain, so the modification in the bridge elevation should not significantly alter the 100-year flow flows. Due to the wide floodplain, flood flows will pass around the proposed bridge, thus, the new bridge will not result in stage increases during flooding (as shown in Figure 1). The BCWMC has approved similar pedestrian/golf cart bridge projects at wide floodplain locations where the bridge across the creek did not meet the lowest member criteria (i.e. Theodore Wirth Park, Golden Valley Country Club). City staff will remove and clear debris as it collects under the bridge as part of its maintenance plan.

Lakes, Streams, and Wetlands

The proposed project includes work adjacent to wetlands. The City of Crystal is the local government unit (LGU) responsible for administering the Wetland Conservation Act; therefore, BCWMC wetland review is not required.

Rate Control

The proposed project does not create one or more acres of new or fully reconstructed impervious surfaces; therefore, BCWMC rate control review is not required.

Water Quality

The proposed project does not create one or more acres of new or fully reconstructed impervious surfaces; therefore, BCWMC water quality review is not required.

Erosion and Sediment Control

The proposed project results in more than 10,000 square feet of land disturbance; therefore, the proposed project must meet the BCWMC erosion and sediment control requirements. Proposed temporary erosion and sediment control features includes stabilized construction entrance, silt fence, and floating silt curtain. Permanent erosion and sediment control features include stabilization riprap, seed and turf.

Recommendation

Approval

Barr Footer: ArcGIS 10.8.1, 2022-08-31 11:52 File: I:\Client\BassettCreek\gis\maps\Permits\Maps-2022\2022-08 Bassett Creek Park Pedestrian Bridge Improvement.mxd User: EMA