Bloomington Ferry Pedestrian Bridge

Shakopee, Minnesota

The original Bloomington Ferry Swing Bridge was closed in 1976 due to structural deterioration and rebuilt in 1977 with a new superstructure on the original center pivot pier and abutments. This bridge was closed to vehicular traffic in 1995 and replaced with the new Trunk Highway 169 (TH 169) crossing over the Minnesota River approximately one-half mile upstream.

As part of the Minnesota Valley State Trail System a pedestrian/bicycle crossing over the Minnesota River was originally planned to be incorporated into the new TH 169 river crossing. However, during the Environmental Impact Statement process conducted as part of the TH 169 project, the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources indicated that the new TH 169 crossing was not a suitable environment for pedestrians and bicyclists. These agencies recommended that the trail cross the Minnesota River elsewhere. The decision was made to use the old Bloomington Ferry Bridge as a pedestrian/bikeway bridge. However, the existing bridge, if utilized, would have required a great deal of renovation and maintenance to remain in use. Estimated costs associated with this work led to the conclusion that repairing and renovating the old bridge was not a cost-effective, long-term solution. Therefore, the decision was made to construct a new pedestrian/bikeway bridge at the location of the old Bloomington Ferry Bridge.

A bridge type study was prepared for this location and proposed several structure types and aesthetic treatments. Several site constraints had to be overcome for this project, including:

- developing a structure that provided an unrestricted opening for the Minnesota River (the old bridge, with its center pier, caused problems with ice flows and mobility of boaters);

• keeping the proposed structure above the 100-year flood elevation;

• wide seasonal fluctuations in river elevations;

• maintaining difficult site grades and meet current bicycle design standards; and

• retaining aesthetic views of this environmentally sensitive area within the Minnesota Valley Wildlife Refuge.

A three-span parabolically arched welded steel plate girder structure with a cast-in-place concrete deck was selected for the site. In order to fit the site constraints of the river banks, and the need to provide an unrestricted opening for the Minnesota River, span lengths of 90'-255'-90' were selected. This end span ratio of 0.35 created a difficult uplift problem for the designers to overcome. Several options were developed and evaluated during the design process to account for the uplift. The chosen solution was a combination of a concrete counterweight at the abutments and a thickened concrete deck in the end spans. This solution required the designers to provide a construction sequence to assist the contractor. During erection of the beams, the contractor was required to provide a temporary tie-down system at the abutments until the counterweights were poured.

The steel girder consisted of a parabolically arched bottom flange and varied from a web depth of 66" at the center span and abutments to 120" at the piers. Due to the Minnesota River's wide seasonal fluctuation in river elevations, the contractor constructed cofferdams to facilitate construction of the piers, which were located at the edges of the river. Even with the aid cofferdams, the contractor was unable to work in the river at various times due to seasonal flooding.

To complement the aesthetics of this project site, cut stone treatments on the abutments and piers and decorative ornamental metal railings were utilized. Unpainted weathering steel was chosen for the girders. The use of unpainted weathering steel girders enabled the designers to satisfy the need for both a functional and aesthetically pleasing structure, with clean lines, that will complement the heavily wooded natural setting in which the bridge is located.

This project utilizes a conventional type of bridge structure in an innovative use of span lengths and formed shape. A span length of 255' for the center span pushes the limits for a conventional pedestrian girder. This use of simple conventional methods of a counterweight and a thick end span deck to overcome the uplift forces at the abutments allowed the designers to maximize the center span length while utilizing simple and easy methods to overcome difficult erection and construction issues.

An important aspect in bridge engineering is the use of materials in the correct shapes and proportions for the specific site location. This project achieves that goal at this environmentally sensitive area.

Project Team

Owner
Minnesota Department of Transportation

Designer
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Steel Fabricator
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Steel Detailer
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