

MINNESOTA HISTORIC PROPERTY RECORD

PART I. PROPERTY IDENTIFICATION AND GENERAL INFORMATION

Common Name: 6679
Bridge Number: 6679
Identification Number: HU-BRT-005

Location:

Feature Carried: TH 76
Feature Crossed: S. Fork of Root River
Descriptive Location: 2.8 Miles South of W. Jct. TH 16
Town, Range, Section: 103N-6W-9
Town or City: Brownsville Township
County: Houston

UTM:

Zone: 15
Easting: 615555
Northing: 4843811

Quad:

Sheldon
7.5 Minute Series
1927

Present Owner:

State

Present Use:

Mainline

Significance Statement:

Carrying Minnesota Trunk Highway 76 over the South Fork of the Root River, Bridge No. 6679 stands in a rural area about two miles south of the city of Houston in central Houston County. Supported by concrete U-abutments and concrete solid piers, the three-span superstructure consists of six lines of continuous/cantilevered, 36-inch-deep, rolled, I-beam stringers, laterally braced by channel-section bridging and stiffened by steel plates welded to their flanges. The structure's span profile is 80-100-80 feet. The main span includes a 65-foot suspended section pinned, at each end, to cantilever arms extending over the piers. The stringer system supports a bituminous-surfaced concrete deck, with a 30-foot-wide roadway between bi-rail concrete railings. The bridge has rocker-type expansion bearings. Metal plaques on the railing endposts identify the construction date as 1949.

With the conclusion of World War II, the Minnesota Highway Department resumed its legislatively mandated task of designing and constructing the state's trunk highway system. A high priority was to build several new routes designated by the legislature in 1933, but left unimproved for lack

of funding during the Depression. These new routes included a section of graveled road designated as Trunk Highway 76, which traveled north-south through the center of Houston County. As part of the route's realignment and improvement, the highway department in 1947 completed site survey work for Bridge No. 6679, a new crossing of the South Fork of the Root River, about two miles south of the city of Houston. After completing plans for the structure in May 1948, the highway department a few months later awarded a low-bid contract for its construction, in the amount of \$117,840, to contractor Leon Joyce of Rochester, Minnesota. Joyce began work in August, and had much of the concrete substructure in place by the fall of 1948, but the project was then delayed by steel shortages. In January 1949, the Illinois Steel Bridge Company of Jacksonville, Illinois, which was handling the fabrication work for Joyce, informed the highway department that "we do not expect to receive the structural steel for this job from the mills until April or May unless there is an easing up of the critical steel situation." The company's prognosis was optimistic, for it was not until the following July that fabrication got under way. According to a maintenance card on file with the Minnesota Department of Transportation, the contractor finally completed the superstructure in November 1949.

Bridge No. 6679 marked the emergence of a new type of bridge engineering in Minnesota, known as continuous/cantilevered steel-beam construction. On a national level, the type was introduced in the late 1920s by the Georgia State Highway Board, and it was strongly advocated in the 1930s by the Nebraska Department of Roads. The type's popularity partly resulted from the appearance on the market of new deep-section I-beams, with a maximum web depth of 36 inches. Even in simply supported spans, the new beams were suitable for clear openings up to 75 feet, which made them competitive with pony trusses. When used in continuous construction, which reduced stresses in load-bearing members, the new beams were feasible for clear spans exceeding 100 feet. Although continuous construction generally required unyielding foundations, engineers were able to apply the new I-beam technology to sites that might experience some foundation settlement by inserting a pinned suspended section into the main span, which allowed the superstructure to compensate for substructure movement. Technically, the resulting structure was of continuous/cantilever design -- since the suspended span was pinned to cantilever arms that were continuous over the piers.

The Minnesota Highway Department first experimented with continuous/cantilevered design in 1939 in the construction of an overhead grade separation in St. Paul (Bridge No. 5664). Although this structure was well adapted to its site, it was a relatively modest piece of engineering, achieving a clear main span of only 66 feet. In Bridge No. 6679, however, the state highway department used continuous/cantilevered design for a 100-foot main span, which was, by twenty feet, the longest steel-stringer span yet built in Minnesota. Honored by a photograph in the highway department's biennial report for 1948-1950, Bridge No. 6679 was the prototype for at least ten other steel-stringer bridges, but none equalled its main span length of 100 feet. When the City of St. Paul Engineer's Office surpassed the 100-foot mark in 1954, it did so through the use of light-weight speciality steel (Bridge No. 90396).

As Minnesota's best example of continuous/cantilevered steel-stringer design, Bridge No. 6679 is eligible for the National Register in the area of engineering under Criterion C, within the historic context of "Historic Iron and Steel Bridges in Minnesota." The survey sample upon which this context was based did not include any steel-stringer examples. Consequently, the Registration Criteria outlined in the Multiple Property Documentation Form (MPDF) associated with this context do not specifically address such properties. However, in its general discussion of eligibility requirements, the MPDF does state that bridges may be eligible under Criterion C if "they embody distinctive characteristics of bridge engineering." Bridge No. 6679 satisfies this criterion.

Bridge No. 6679 is also eligible, under Criterion C, for the Modernist design of its bi-rail concrete railings. Although the Minnesota Highway Department prided itself on its bridge engineering, the

agency was far less concerned with bridge aesthetics. As Chief Bridge Engineer M.J. Hoffman observed in 1931: "The engineer in general and the bridge engineer in particular have been very frequently criticized for the lack of beauty or aesthetics in their structural work. . . . In public undertakings of this kind, the economical aspects usually tend to outweigh the item of aesthetics, and in numerous instances, quite properly so." For the most part, the highway department restricted its architectural treatment of bridges to railing ornamentation, adopting whatever style was in vogue at the time. During the 'teens and 'twenties, Minnesota bridge railings tended to display Classical Revival detailing, and in the 'thirties, Art Deco detailing. In the early 1940s, however, the highway department began experimenting with a clean-lined Modernist aesthetic, which, for the first time, was in advance of architectural practice in Minnesota. Because of the suspension of highway projects during World War II, the new railing design was not fully elaborated until 1946, when the highway department released a new set of standardized bridge plans for county use. These plans featured a stark, bi-rail, concrete railing with simple rectangular posts. Without any of the usual ornamental devices -- reveals, setbacks, projections, or applied surface detailing -- the railing relied solely on its structural form for its bold and handsome aesthetic statement. In the best Modernist tradition, state bridge engineer E.J. Miller explained that in the new design "simplicity makes for improved appearance and results in lower maintenance costs." Designed in 1948 and constructed in 1949, Bridge No. 6679 was among the first structures to employ the new Modernist railings.

PART II. HISTORICAL INFORMATION

Date of Construction:

1949

Contractor and/or Designer (if known):

Contractor: Leon Joyce, Rochester, Minnesota

Designer: Minnesota Highway Department

Historic Context:

Historic Iron and Steel Bridges in Minnesota

National Register Criterion:

C

PART III. DESCRIPTIVE INFORMATION

Descriptive Information:

3-span, steel, continuous/cantilevered, rolled, I-beam stringer

concrete U-abutments; concrete solid piers

concrete deck carried by 6 rolled I-beam stringers with channel bridging

railings: concrete bi-rail with concrete posts; rocker-type expansion bearings; cover plates welded to bottom of stringers; bridge plates: on southeast railing endpost ("Minnesota Highway Depart Bridge No. 6679"), on southwest railing endpost ("Fed. Aid Proj. FAS 46-2 Minn. 1949")

PART IV. SOURCES OF INFORMATION

References:

Minnesota Department of Transportation Bridge Database; Bridge No. 6679 File (inspection reports, maintenance card), in Minnesota Department of Transportation, Waters Edge Building, St. Paul; Bridge No. 6679 Storage File (plans, contract, correspondence), in Minnesota Department of Transportation Records Center, St. Paul; Searcy B. Slack, "Experience with Girder-Beam Bridges in Georgia," *Engineering News-Record* 107 (16 July 1931): 100-101; Josef Sorkin, "Design of Highway I-Beam Bridges," University of Nebraska Civil Engineering Thesis, 1936; "New I-Beam and Column Sections Produced by Carnegie," *Engineering News-Record* 98 (3 March 1927): 362-363; "Elements of the New 33-In. Rolled Structural Sections," *Engineering News-Record* (5 July 1928): 16; Thomas J. Misa, *A Nation of Steel* (Baltimore and London: Johns Hopkins University Press, 1995), 170; Herbert W. Ferris, ed., *Historical Record, Dimensions and Properties, Rolled Shapes* (New York: American Institute of Steel Construction, 1954), 36-48; Historic Bridge Inventory Form for Bridge No. 5664, in State Historic Preservation Office (SHPO), Minnesota Historical Society, St. Paul; Minnesota Highway Department, *Biennial Report, 1948-1950*, 68; Historic Bridge Inventory Form for Bridge No. 90396, in SHPO; E.J. Miller, "Standard Bridge and Culvert Plans," *Better Roads* (June 1947):23-24; Fredric L. Quivik, "Iron and Steel Bridges in Minnesota," Multiple Property Documentation Form, 1988, Sec. F, 8, 19, in SHPO; field inspection by Demian Hess, 24 October 1995.

PART V. PROJECT INFORMATION

Historians:

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Mead & Hunt, 2006

MHPR NO. HU-BRT-005