MINNESOTA HISTORIC PROPERTY RECORD

PART I. PROPERTY IDENTIFICATION AND GENERAL INFORMATION

Common Name: Robert Street Bridge

Bridge Number: 9036

Identification Number: RA-SPC-3177

Location:

Feature Carried:	Robert Street (TH 952A)
Feature Crossed:	Mississippi River, RR, Second and Shepard Streets
Descriptive Location:	0.7 Miles Southeast of TH 35E and 94
Town, Range, Section:	28N-22W-6
Town or City:	St. Paul
County:	Ramsey

UTM:

Zone:	15
Easting:	493060
Northing:	4976600

Quad:

St. Paul East
7.5 Minute Series
1927

Present Owner:

State

Present Use:

Mainline

Significance Statement:

The Robert Street Bridge is historically significant as an outstanding example of an unaltered, monumental, multi-span, reinforced concrete arch bridge. It is the product of a very complex engineering design process to enable this bridge to be built in this location with its established vehicular, railroad, streetcar and river-navigation demands. The resulting bridge includes a monumental reinforced concrete rainbow arch, by far the largest in Minnesota, which is outstanding not only for its engineering, but for its aesthetic effect in the overall design of the bridge. In addition, the bridge received special architectural treatment by the architect assigned to the design team.

Work on the bridge was begun on June 19, 1924. The bridge was completed and dedicated on August 6, 1926. It was a joint undertaking of Ramsey County and St. Paul. Plans and specifications were prepared by Toltz, King & Day, Inc. The Toltz, King & Day, Inc. design team included Max Toltz, mechanical engineer; W.E. King, structural engineer; B.W. Day, architect; Roy Childs Jones, architectural designer; P.E. Stevens, office engineer; W.A. Thomas, electrical

engineer; and John F. Greene, in charge of arch design and resident engineer. The contractor was Fegles Construction Company, Ltd.

The Robert Street Bridge was built to replace an 1884-1885 wrought-iron span that, by the 1920s, had proved inadequate for drastically increased traffic and streetcar demands. The original structure was designed for horse-drawn vehicles with no provision for streetcars. Streetcar tracks were added in 1893. By 1920, the bridge was carrying 2,730 vehicles and 400 streetcars every 12 hours. Two years later the vehicular traffic had increased 55 percent. This traffic increase had been caused by widening Robert Street in 1912-1914 and by connecting Robert Street with University Avenue, a major artery linking St. Paul with Minneapolis. This brought traffic to and from Minneapolis and downtown St. Paul on the north, and St. Paul's west side neighborhood and South St. Paul on the south. In fact, cities as far south as Winona, Minnesota, viewed the new bridge as a needed "capitol highway" to give them greater access to the state capitol.
The engineering firm commissioned to design the new bridge, not only had to provide a span with adequate vehicular and streetcar capacity, but had to accommodate the congested local conditions, with the location of nearly every pier being determined by the clearances required by existing structures and railroad property. The engineers had to reckon with Second Street, the freight shed and tracks of the C.St.P.M.&O. Railway, the tracks of the St. Paul Union Depot, which handles the entire passenger traffic of the city, the main line of the Chicago Great Western Railroad, the river channel of the Mississippi as defined by the War Department and the south end of the bridge then terminating in a busy manufacturing district. These factors and their various requisite clearances dictated the exact location of the roadway. They came together with foundation conditions and the existing Chicago Great Western railroad lift bridge which strictly defined the navigation channel, to dictate the location, size and design of the piers. The net result is the combination of barrel-arch and rib-arch flanking spans and especially the rainbow arch main span over the navigation channel.

Because of the many factors dictating elements of the main span, a rainbow arch was the only solution if an arch was to be used. The solution was an unusual rainbow arch. Instead of the usual compound curves resembling a basket handle, with the long radius at the crown and the shorter radii at the haunches, the radius is 122.16 feet at the crown and 191.60 feet at the haunch. The structural-steel-arch inside each concrete rib also is a significant feature. The steel arch is designed to carry the dead load of the steel arch, floor and concrete rib.

According to the bridge architect Roy Childs Jones in the Engineering News-Record of November 4, 1926, "The Robert Street Bridge is unique in that its designers included in their own permanent organization both architects and engineers." This design team, Jones wrote, allowed the bridge to avoid "applied ornament" on a predetermined structure. Instead, the team could "select and control the structural features so as to secure for the bridge an inherent beauty of form and proportion." The design team faced "the complicated requirements of street grades and of railroad and channel clearances," which precluded "any simple and regular composition of arches and piers." For the most part, then, architectural treatment in this bridge involved working with "shapes and proportions and relations of the structural members" and employing shadow and line. There also was a conscious effort to deal aesthetically with concrete as a material and Jones felt that unbroken surfaces and lines did not work well in concrete. Instead, a choice was made to create a totality out of a series of "definitely bounded segments," produced by "the breaking up of all surfaces with lines of light and shade." This was accomplished by using "vertical breaks and grooves, by bevels, and by wedge-shaped indentations." The result of this practice is readily seen in the surface treatment of the massive rainbow-arch ribs.

PART II. HISTORICAL INFORMATION

Date of Construction:

1926

Contractor and/or Designer (if known):

Contractor:

Designer: Engineer: Toltz, King & Day, St. Paul, Minnesota
Architect: Roy Childs Jones

Historic Context:

Reinforced-Concrete Highway Bridges in Minnesota

National Register Criterion:

C

PART III. DESCRIPTIVE INFORMATION

Descriptive Information:

The Robert Street Bridge is located in downtown St. Paul, Ramsey County, where it carries Robert Street (U.S. Trunk Highway 52) over the Mississippi River, Second Street, Shepherd Road, and the railroad tracks. It links the downtown St. Paul business and commercial district at Kellogg Avenue with the city's west side neighborhood and the city of South St. Paul, together a mixed industrial-commercial-residential area. On the north the bridge reaches the top of the river bluff; on the south it opens to the river's flood plain. The bridge is involved with a wide variety of transportation networks: it crosses river, rail, and vehicular traffic; it carries vehicular traffic, in part to Holman Field, the downtown St. Paul airport. Adjacent, and so close that its north approach spans are literally beneath the Robert Street Bridge, is the Chicago Great Western Railroad Lift Bridge (1912, 1925). The location of the existing lift bridge determined the location of the river navigation channel, which is beneath the main spans of each bridge. The Robert Street Bridge parallels the Wabasha Street Bridge (1889; MNDOT No. 6524), which is located about three blocks west, and the Lafayette Freeway Bridge (1968), which is located about seven blocks east.

Aligned on a northwest-southeast axis, the Robert Street Bridge is a reinforced-concrete, multiple-arch bridge, with an overall structure length of 1,428.9 feet. Starting at the north end, the bridge includes: a reinforced-concrete trestle with three spans of varying length, totaling 89 feet; a skew steel deck-girder span of about 53 feet across Second Street; three flat, open-spandrel, barrel arches of 95.5, 71, and 98 feet, with a combined length of about 291 feet; a two-rib, through arch (also known as a rainbow arch) of 264 feet, center to center piers, with a 244-foot clear span; four five-rib, open spandrel arch spans of 112 feet each; and a prestressed-concrete beam approach. The out-out deck width is 80.4 feet, carrying a 56-foot roadway and 9.5-foot sidewalks on each side. The main span meets the federal navigation requirements of 62-foot headroom above low water.

Of particular engineering interest in the Robert Street Bridge is the main span. The two main ribs are each 6 feet wide and 8 feet deep at the crown, and spaced 64 feet, 8 inches, center to center. Each rib is fundamentally a structural steel frame, designed to carry the weight of the steel structure, including the steel floor system, and the dead load of the concrete arch proper. The dead load of the concrete roadway and the live loads are carried by the composite concrete and structural steel arch. The arch ribs have heavy steel cross-bracing below the roadway (W.E. King and Roy Childs Jones, "Engineering and Architectural Design of a Long Concrete Bridge," in Engineering News-Record 97 (November 4, 1926): 732-37).

Aesthetically, the most important element of the structure is the monumental rainbow arch that dominates the bridge. The overall detailing of the surfaces has been described by Roy Childs Jones, the architectural designer, in general terms, as involving "the breaking up of all surfaces with lines of light and shade," with modeling "accomplished by vertical breaks and grooves, by bevels, and by wedge-shaped indentations." According to Childs, "the idea was to make, out of natural patches of lighter and darker toned material, patterns definitely bounded by strong lines of shadow; and to effect an emphasized interest in light shade in place of the unattainable color interest (which is inherent in concrete)." The railing, a focus of the architect, is comprised of precast perforated panels anchored between poured, heavily reinforced members at top and bottom, and between posts from side to side. Although the south railing is erected on grade, the panels are set vertically. Twelve large medallions, modeled by the Brioschi-Minuti Co. of St. Paul, mounted on the piers, are the only applied ornament (See King & Jones; see also John F. Greene, "Some Lessons Learned in Building Long Concrete Bridge," in Engineering News-Record 97 (November 11, 1926): 785-88). The original light standards have been replaced with

modern light poles. Moderne characterizes the basic style of the bridge.

The bridge was rehabilitated in 1989, including the replacement of approach spans.

PART IV. SOURCES OF INFORMATION

References:

Robert M. Frame, "Robert Street Bridge," National Register of Historic Places Nomination Form, August 15, 1988, available in State Historic Preservation Office, Minnesota Historical Society, St. Paul. Green, John F. "Some Lessons Learned in Building Long Concrete Bridge." Engineering News-Record 97 (November 11, 1926): 785-88; King, W.E. and Roy Childs Jones. "Engineering and Architectural Design of a Long Concrete Bridge." Engineering News-Record 97 (November 4, 1926): 732-37.

PART V. PROJECT INFORMATION

Historians:

Robert M. Frame

Form Preparer:

Mead & Hunt, 2006

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