

MINNESOTA HISTORIC PROPERTY RECORD

PART I. PROPERTY IDENTIFICATION AND GENERAL INFORMATION

Common Name: Stone Arch Bridge

Bridge Number: 27004

Identification Number: HE-MPC-0176

Location:

Feature Carried: Pedestrian Trail
Feature Crossed: Mississippi River
Descriptive Location: St. Anthony Falls
Town, Range, Section: 29N-24W-23
Town or City: Minneapolis
County: Hennepin

UTM:

Zone: 15
Easting: 479599
Northing: 4980854

Quad:

Minneapolis
7.5 Minute Series
Not available

Present Owner:

State

Present Use:

Carries pedestrian and bicycle trail

Significance Statement:

The Stone Arch Bridge is a monumental symbol of the growth and expansion of James J. Hill's St. Paul, Minneapolis, and Manitoba Railway Company, which formed a significant portion of the Great Northern Railway and his railway empire in the Northwest. The bridge was a key element in his expansion to the Pacific, and it continues today to represent Hill's vision.

During the early 1870s, Hill was closely watching the Red River of the North that flowed north to Lake Winnipeg. Fort Garry (present-day Winnipeg) was a critical post for the Hudson Bay Company, which was trying to keep control over the Canadian fur trade but did not serve independent traders. Hill did service the individual traders, and in order to minimize this dangerous competition, Norman Kittson of the Hudson Bay Company decided to join with Hill to form the Red River Transportation Company.

Hill traveled up Red River in 1870 to investigate the cause of a French and Indian mob that had captured the Hudson's Bay Company post in Fort Garry. During that trip and others, Hill saw the

rich soil of the region and noticed the St. Paul & Pacific Railroad's steady decline. Grasshoppers were plaguing the farmers, and their presence made it difficult for locomotives to get traction on the rails. Hill thought that if he could buy the railroad line then he could make a profit from it by extending it to Fort Garry. The Panic of 1873 proved the final death blow for the St. Paul & Pacific, sending it into bankruptcy and receivership. Hill saw his chance to acquire the St. Paul & Pacific and other lines in similar crises.

But first Hill needed to secure more capital. He went to Norman Kittson. They each had a little money but needed much more, so they approached Donald Smith of the Hudson Bay Company and told him their plan for making the St. Paul & Pacific a profitable line. Smith offered money and talked with George Stephen, president of the Bank of Montreal. Stephen did not support the group at first in their efforts to acquire the line, but joined them three years later in their pursuit. The four, known as "the Associates," secured legislative changes, worked with bondholders, and worked for extended dates for construction of segments of rail line that were still required for completion. In March 1878, the Associates signed an agreement to purchase bonds controlled by Dutch investors. In total, they purchased the rail line, valued at \$19 million, for only \$5.4 million.

In May 1879, the St. Paul, Minneapolis, and Manitoba Railway Co. formed, with James J. Hill serving as general manager. Hill aggressively upgraded and expanded this railroad network, in part by bargaining for trackage rights with Northern Pacific Railway. Hill set his sights on crossing the continent, but before that could happen, he had to cross the Mississippi River.

Part of Hill's network included the Minneapolis Union Railroad (a belt line between St. Paul and St. Anthony). To provide access to a new railroad station in Minneapolis and to bring passenger traffic from St. Paul directly into the city's downtown business district, Hill and the City of Minneapolis formed a partnership to construct a bridge across the Mississippi River at St. Anthony Falls.

Hill originally wanted an iron bridge crossing the Mississippi above the Falls of St. Anthony at Nicollet Island. Bridge engineer Col. Charles C. Smith realized, however, that such a design would create a bottleneck on the river and could destabilize the eroding sandstone beneath the falls. The Falls had already been rendered unstable by the Eastman Tunnel disaster of 1869, and if a new bridge at this location further eroded the sandstone, the Falls could collapse causing a loss of its waterpower resources. Smith presented Hill with a bridge design that placed the east bank bridgehead below the Falls and the west bank bridgehead running parallel to the river in order to provide a straight entry into the Union Depot.

The 2100-foot bridge, designed by Colonel Smith, is composed of 23 Kasota limestone arches built on St. Cloud granite piers that rest on the St. Peter Sandstone bedrock. The spans vary in length from 40 to nearly 100 feet. The bridge's deck is located approximately 60 feet above the water. To meet the proposed Union Depot on the west riverbank, the bridge was designed with a 817-foot, six-degree curve at the west end. It carried double tracks with a deck width of approximately 24½ feet between the parapets.

In his article, "Hill's Folly: The Building of the Stone Arch Bridge", Ray Lowry described the materials used in the structure:

The foundations for the bridge's piers were built of solid granite hauled in from Sauk Rapids, Minnesota. All exposed work on the upper portion of the bridge was built of magnesium limestone quarried at Mankato, Minnesota, and Stone City, Iowa. Marble used for the trimming on the deck of the structure came from Bridgeport, Wisconsin. Limestone, used for the unexposed portions of the bridge, was quarried on the site. In all, 100,000 tones of stone were needed for the project and the logistics of supplying such a huge amount of material was no

simple matter. From June 1882 until November 1883, not less than five marble-laden railroad cars were contracted to leave Bridgeport each and every day. During the same period, 2,000 carloads of Mankato limestone were used.

In order to bond such a huge amount of stone together, an equally large amount of mortar was required. In all, 30,554 cubic yards of various cements were used on the project. Because much of the masonry work was done during the winter, a method of preparing cement in subfreezing temperatures had to be devised. Col. Smith, the chief engineer of the project, came up with a simple solution to this problem. Eight quarts of salt were incorporated into each barrel of cement and then mixed with hot water. The salt content of the solution prevented the cement from freezing and, upon drying, the salt was simply absorbed into the pores of the stone.

The bridge was constructed between 1881 and 1883. Hill employed 600 workers who worked throughout the summer and winter (utilizing horse and steam power) to complete the bridge. The total cost was approximately \$650,000.

Shortly after the bridge was constructed (between 1907 and 1910), the arches were reinforced. This included the installation of transverse steel rods between the spandrel walls, which were encased with concrete fill inside the spandrels. This was presumably done to counteract bulging of the spandrel walls due to poor drainage, but also served to allow heavier loads. In 1925 the railroad tracks were widened, and the parapet walls were cut back to accommodate the increased size of trains.

In 1962, two of the spans were replaced by a 196-foot Warren deck steel truss to allow river traffic to pass upstream to north Minneapolis, as part of the "Upper Harbor" project which also included two sets of locks and dams. The straight truss was set in the curved portion of the bridge, so its width was greater: 36 feet between the centerlines of the outer beams.

In April of 1965, a record flood of the Mississippi River undermined one of the piers and caused it and the two adjoining arches to sag about 14 inches. Repairs included reinforcement of the arch barrels in spans #6 & 7, and encasement of the footings on Piers #5, 6, & 7. Additional steel tie rods were installed to reinforce the spandrel walls, and many of the limestone blocks were refaced with concrete (scattered locations throughout the bridge).

In 1978, the last passenger train crossed the bridge and by 1982, the rail use had ceased. The line was officially abandoned in 1987. The Hennepin County Regional Railroad Authority purchased the bridge in 1989. Ownership was transferred to the Minnesota Department of Transportation in 1992. In 1993 the bridge was extensively remodeled for use as a pedestrian bridge (the bridge also carries tourist "trolley" busses). A.G. Lichtenstein & Associates provided the design, and the contract was awarded to Johnson Brothers Construction.

In 1994, the bridge was rehabilitated and opened to pedestrians, bicyclists and the River City Trolley. The deck features walking and bike lanes, metal safety rails, and ornamental light fixtures. An interpretative panel and view scopes were added in 1997.

Structural repairs conducted in 1993 to the stone arch spans included crack repair (using epoxy injection), and re-facing of numerous limestone blocks (with a 7" stone veneer). To prevent future bulging of the spandrel walls due to trapped water, all of the original spandrel fill (rock ballast) was removed. A waterproof membrane was placed on the interior spandrel surfaces, and a new drainage system was installed. The spandrel area was then re-filled with aggregate, and a bituminous roadway (flanked by concrete sidewalks) was placed on the bridge deck. The steel deck truss span was re-painted, and the truss bearings and expansion joints were replaced. Ornamental steel railings and light posts were installed along the entire length of the bridge.

The successful renovation and adaptive re-use of the Stone Arch Bridge has received numerous honors, including a 1995 award from the Minneapolis Heritage Preservation Commission and the Minneapolis Chapter of the American Institute of Architects, as well as a 1996 "Design for Transportation National Award" from the U.S. Department of Transportation. The Stone Arch Bridge now serves as a key link in the St. Anthony Falls Heritage Trail, connecting historic buildings and archaeological sites on both sides of the river.

The American Society for Civil Engineers listed the bridge in 1978 as a National Historic Engineering Landmark, stating that "it is acknowledged to be one of the finest stone viaducts in the world, due to its massive masonry, lofty arches, and graceful curvature."

The Stone Arch Bridge is a contributing element to the St. Anthony Falls Historic District under Criterion A. Also, the bridge is eligible under Criterion C as a significant engineering example of a stone arch railroad bridge.

PART II. HISTORICAL INFORMATION

Date of Construction:

1883

Contractor and/or Designer (if known):

Contractor:

Designer: Col. Charles C. Smith

Historic Context:

National Register Criterion:

A, C

PART III. DESCRIPTIVE INFORMATION

Descriptive Information:

The 2100-foot bridge, designed by Colonel Smith, is composed of 23 Kasota limestone arches built on St. Cloud granite piers that rest on the St. Peter Sandstone bedrock. The spans vary in length from 40 to nearly 100 feet. The bridge's deck is located approximately 60 feet above the water. To meet the proposed Union Depot on the west riverbank, the bridge was designed with a 817-foot, six-degree curve at the west end. It carried double tracks with a deck width of approximately 24 ½ feet between the parapets.

PART IV. SOURCES OF INFORMATION

References:

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City of Minneapolis

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1987 Hill's Folly: The Building of the Stone Arch Bridge. Hennepin County History, Winter.

Luecke, J.C.

1997 The Great Northern in Minnesota: The Foundations of an Empire. Grenadier Publications, St. Paul, Minnesota.

Peterson, G.O.

2003 Historic Context: The St. Paul and Pacific Railroad Main Line. Prepared for the Minnesota Department of Transportation by URS/BRW. June 2003.

PART V. PROJECT INFORMATION

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Mead & Hunt, 2006

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