James J. Hill’s Stone Arch Bridge

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The Stone Arch Bridge in Minneapolis is the oldest, and probably one of the best-known, engineered structures in Minnesota. Built during a period of rapid growth and westward expansion, it served as a vital rail artery for over 90 years. When changing railroad requirements made it redundant, it fell into a period of disuse, only to find a new life as a pedestrian and bike trail and the centerpiece of a renewed focus on the city’s riverfront heritage.

The Problem
In the early 1880’s, Minneapolis had a population of nearly 50,000 and was developing rapidly on the west side of the Mississippi River. But its rail link to St. Paul was on the east bank. City leaders in business and government agreed that a new bridge was needed to bring railroad passengers into the heart of the City. They turned to James H. Hill, the “Empire Builder” and president of the St. Paul, Minneapolis, and Manitoba Railway.

Design and Construction
Hill initially favored an iron bridge at Nicollet Island, a narrow point in the river. But Hill’s engineer, Col. Charles C. Smith, saw flaws in that location. He thought that the bridge’s piers would trap ice and logs, creating jams. Perhaps more serious, Smith recognized that bridge construction at this location could damage the limestone bedrock beneath the riverbed, leading to undermining and erosion of the falls. The falls’ hydropower was the lifeblood of the city’s lumber and flour mills. Such erosion had already occurred in the late 1860s, when a water power tunnel project was attempted just above the falls. It nearly resulted in the destruction of the falls; tragedy was averted by the heroic efforts of workers who labored through the winter to plug the river bed hole and arrest the erosion of the falls. With this in mind, Smith recommended a more expensive location downstream. His bridge would extend from the west bank, at a point just downstream from the flour mills, diagonally across the river to St. Anthony on the east bank.

Construction began in January 1882. By spring 1882, all of the bridge’s 23 pier foundations were complete. By spring 1883, the piers were rising above the river and the arches were taking shape. The first revenue train crossed the Stone Arch Bridge on April 16, 1884. It had taken just over two years to
construct the bridge, using 100,000 tons of stone placed by steam engines, horse-powered cranes, and manual labor. For the next 90 years, rail traffic on the Stone Arch Bridge grew with the development of Minneapolis. The bridge carried passenger trains of the Great Northern Railroad and other railroads that served Minneapolis’s Great Northern Depot. Freight trains traveling between St. Paul and the Pacific Northwest used the bridge. Engineers removed several of the bridge’s arches in the early 1960s to construct the Corps of Engineers Upper Falls lock and dam; the arches were replaced with a steel truss.

Col. Smith’s design ensured that the structure would endure. During the record Mississippi River flood of 1965, one of the piers was undermined by flood waters. A train crew reported that the bridge moved as they rolled across; one of the piers had sunk 11 inches. But the bridge didn’t fall. It was temporarily closed while engineers devised a plan to reinforce the pier’s foundation and the affected arches. The bridge re-opened after six months of repair. The reinforced concrete installed below the sagged arches in 1965 is visible today.
The bridge’s design did not incorporate new technology. Its primary structural elements—stone arches—were universally used in bridge design. But the bridge was unusual for its time in terms of the permanence of its design and construction. During the rapid railroad expansion of the time, most bridges were built as quickly as possible from locally available lumber. They were expected to last only a few years. The Stone Arch Bridge, on the other hand, was built for the ages. When completed in 1884, it carried small steam locomotives and railcars weighing only a few tons. Ninety years later, it carried diesel locomotives and trains with a total weight in excess of 10,000 tons. It is a fine example of a rail tycoon’s dream, transformed into enduring reality through the skill and vision of Col. Smith and other civil engineers.

The Stone Arch Bridge was dedicated as Minnesota’s first National Civil Engineering Landmark in 1975 by ASCE. The mayors of Minneapolis and St. Paul arrived for the dedication in locomotives painted red, white, and blue in recognition of the approaching United States bicentennial.

One of the bridge’s piers was undermined during the 1965 flood. The pier, and the overlying track, sagged 11 inches. Photo by Kent Kobersteen, Classic Trains Collection.
Re-Use
By 1978, passenger trains had declined. The Great Northern Depot at the west end of the Stone Arch Bridge was abandoned and demolished. Changing rail traffic patterns rendered the bridge surplus; its tracks were removed. But the structure was sound and governmental leaders found a new use for the bridge. In the early 1990s it was re-purposed into a pedestrian and bike path. After 90 years, and the demise of many historic civic landmarks, the Stone Arch Bridge continues to be admired and enjoyed by Minnesota’s residents and visitors.

So, the next time you bike across the beautiful Stone Arch Bridge and admire the views of St. Anthony Falls and the historic milling district, spare a thought for the vision and skill of engineers who created, maintained, repaired, and re-invented this enduring monument.

Sources
Hennepin County History, November 1988, pp. 18-26

Photo Archives of the Minnesota Historical Society