HISTORIC BRIDGES OF MISSISSIPPI

Xi Fang
Location

Hennepin Avenue Bridge

Stone Arch Bridge

Franklin Avenue Bridge
| **Location:** | North of downtown Minneapolis and south of Northeast Minneapolis |
| **Bridge Type:** | Stone Arch, Deck Truss Section Over Lock |
| **Length:** | 2,100 feet overall |
| **Width:** | 28 feet |
| **Date Built:** | Opened 1883 |
| **Designer:** | James J. Hill |
History of Stone Arch Bridge

• 1883 - After twenty-two months of intensive work, the Stone Arch Bridge was completed.
• 1907-1911 – Renovations were done to improve the bridge’s drainage system and strengthen its structural support in order to transport heavier loads.
• 1925 – Another renovation conducted to increase the width to allow bigger trains that would house more passengers.
• 1961 – The lock and dam was built at St. Anthony falls which required arch number 13 and 14 to be replaced with a 200-foot Warren truss and allow barges to pass.
• 1965 – The bridge went under renovation when the Mississippi River flooded causing the seventh pier to sink about 14 inches.
• 1978 – The last passenger train crossed the Stone Arch Bridge.
• 1994 – The bridge was converted into a biking/walking path.
Historical Significance of Stone Arch Bridge

- The only arched bridge made of stone on the entire length of the Mississippi River.
- The second oldest next to Eads Bridge.
- The stone used to make the bridge was locally sourced, including granite from Sauk Rapids for the piers and magnesium limestone from Mankato and Iowa for the upper portion.
- It served as a working railroad bridge until 1965 but is still seen as a symbol of the railroad age.
Under construction in 1883

200-foot truss

Stone detail

Truss span chord connections

Truss span bearings
Hennepin Avenue Bridge

Location: Minneapolis, Minnesota
Bridge Type: Steel Suspension
Length: 1.037 feet, 625 foot suspended span
Width: 135 feet
Date Built: Opened 1990 (new)
History of Hennepin Avenue Bridge

• **The first bridge** was built in 1854 and was opened on January 23, 1855. It was proclaimed as a link between the Atlantic and Pacific, and it was called the "Gateway to the West". The bridge was 620 feet long and 17 feet wide. It was a pure suspension bridge with tall wooden towers, wire suspension cables, a stone base, and cast iron anchors. The bridge was built by private investors and was operated as a toll bridge. The historical society further reports that the bridge suffered from maintenance problems and quickly deteriorated. Hennepin County purchased the bridge in 1869 to prepare for construction of a new bridge.

• **The second bridge** was another pure suspension bridge. It was 675 feet long and 32 feet wide, with towers that were slightly taller than the first bridge. Due to the importance of the river crossing, the second bridge was built parallel to the first bridge, and the first bridge was not removed until after the second bridge opened in 1876. Despite the second bridge being built to last longer than the first bridge, it also suffered from maintenance problems, and it was removed in 1891.
History of Hennepin Avenue Bridge

• **The third bridge** was started in 1888 and was completed in 1891. This bridge was a steel arch bridge that was designed in-house by Minneapolis bridge engineers which included Frederick Cappelen, who designed many of the large concrete arch bridges over the river in the early 1900s. The third bridge was 1160 feet long, spanning the river in two 580 foot arches. The bridge had a 56 foot wide wooden roadway and two 12-foot wide sidewalks. The historical society reports that the wooden deck was replaced with a steel grid in 1954.

• By the 1980s, various members of city government believed that the third bridge had outlived its usefulness. A bridge inspection revealed that the bridge was in bad shape. Some engineers felt that the bridge could not economically be repaired. Other engineers stated that the bridge could be fixed and could support modern traffic loads. Preservationists wanted to save the nearly century old bridge. At one point in the process, it was determined that the river crossing had to be a minimum of 6 lanes. That doomed the third bridge. It was removed to make way for the fourth bridge.

• The design of **the fourth bridge** that emerged was a pair of parallel suspension bridges supported by 150 foot tall towers. It came with an amazing price tag that was more than three times the cost of a conventional structure. Interestingly enough, the resulting bridge is the shortest pure suspension bridge to carry highway traffic built in modern times.
Historical Significance of Hennepin Avenue Bridge

• Officially, it is the **Father Louis Hennepin Bridge**, in honor of the 17th-century explorer Louis Hennepin, who was the first European to see the Saint Anthony Falls, a short distance downriver.

• Two of the three previous structures have been suspension bridges, while a third—which existed nearly a century—was composed of steel arch spans.

• This location was the site of what is believed to be the first permanent bridge over the Mississippi River. What was once the most important bridge over the Mississippi River is now the most elegant and stylish bridge to span the mighty river.

• It was the first bridge built to span the Mississippi river, and made crossing its length above the Falls much easier. The rushing rapids helped to create industry on the river and spurred a population boom that made Minneapolis the most populated city in Minnesota.
The base of the downriver leg of the tower located on Nicollet Island. A viewing platform is incorporated into the tower at the bridge deck level.

A close view of the connection between the vertical suspension cables and the bridge girder.
A close view of the connection between a bridge suspension cable and two vertical suspension cables.

The suspension cable anchor point on the northeast corner of the bridge.
Franklin Avenue Bridge

<table>
<thead>
<tr>
<th>Location:</th>
<th>Minneapolis, Minnesota</th>
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<tbody>
<tr>
<td>Bridge Type:</td>
<td>Steel Reinforced Concrete Arch</td>
</tr>
<tr>
<td>Length:</td>
<td>1.054 feet, 400 foot longest span</td>
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<tr>
<td>Width:</td>
<td>4 traffic lanes</td>
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<tr>
<td>Date Built:</td>
<td>Opened 1923, Rebuilt 1971-1973</td>
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History of Franklin Avenue Bridge

- The reinforced-concrete open-spandrel arched structure was completed in 1923.
- By 1970, the Cappelen Bridge was in such poor shape that it had to be closed down. The bridge was stripped down to its main arches and **rebuilt from 1971 to 1973**. When it was rebuilt, engineers calculated that the original bridge was vastly overbuilt, and needed only half as many vertical supports.
- In the rebuilding, the horizontal stringers were built wider and a 4-lane deck with wide sidewalks was installed. With adequate care, the rebuilt structure could last several hundred years.
- A bike lane was added in 2005.
- The bridge was extensively rehabilitated from 2015-2016, including restoring some of the details lost in the 1970s reconstruction.
Historical Significance of Franklin Avenue Bridge

• Officially, it is the **F.W. Cappelen Memorial Bridge**. This huge graceful 400 foot long steel reinforced concrete arch bridge featured the longest such arch of any bridge in the world when it was built.
• Frederick W. Cappelen is one of the great names from the golden age of bridge building. He passed away during the construction of the Franklin Avenue Bridge. The bridge was named in his honor as a tribute.
• The bridge is also noteworthy for its use of Melan style reinforcing, a late example of this early concrete reinforcing method, but perhaps used because it would provide greater stability for the immense span length required.
Restoration of Franklin Avenue Bridge

- Repairing concrete substructures
- Painting the bridge deck and underside, as well as treating traffic railings to protect and preserve the bridge
- Reestablishing vegetation along both ends of the bridge