

# Final Designation Study Report



## Railroad Swing Bridge #1556

Across the Milwaukee River at Jefferson St.

*City of Milwaukee  
Department of City Development  
Spring, 2005*

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# HISTORIC DESIGNATION STUDY REPORT

## RAILROAD SWING BRIDGE #1556

### I. NAME

Historic: Drawbridge #1556  
Common name: Railroad Swing Bridge #1556

### II. LOCATION

The Milwaukee River at North Jefferson Street  
NW ¼ Sec. 33-7-22

4th Aldermanic District, **Ald. Robert Bauman**

Legal Description: NW ¼ Sec. 33-7-22

### III. CLASSIFICATION Structure

OWNER: Union Pacific Railroad Co.  
Attn: John Herdzina  
Real Estate Dept.  
1400 Douglas St. STOP1690  
Omaha, Nebraska, 68179-1690

Union Pacific Railroad Co.  
Keith Eich  
4823 N. 119<sup>th</sup> St.  
Milwaukee, WI 53225

### V. DESIGNATION REQUESTED BY: Timothy Stemper

### VI. YEAR BUILT: 1915<sup>1</sup>

**ENGINEER:** W.C. Armstrong<sup>2</sup>

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<sup>1</sup> Engineering News November 26, 1915, p. 1051.

<sup>2</sup> Ibid, p. 1053.

## VI. PHYSICAL DESCRIPTION

### Introduction



The construction of Swing Bridge #1556 was complicated and brilliantly executed making it a subject of national interest and a report in one of the leading engineering journals of the day. Weighing more than 800 tons, the massive 243-foot long bridge carried the double track main line of the Chicago and Northwestern railway over the Milwaukee River. The bridge represents an unparalleled era of bridge building in America that helped to improve

transportation and unite the nation. This bridge is one of a few left in existence in Wisconsin that operates by pivoting from the center like a giant turntable. By comparison, the most familiar bridge today is the bascule type, which is the classic drawbridge that features one or two leaves that open upward.

In 1915 Swing Bridge #1556 carried 100 steam-powered trains per day (an average of four per hour, 24 hours per day) and it was a vital link on the heavily traveled rail route between Milwaukee and Chicago. It is located about ½ mile south of the site where the Chicago & Northwestern depot stood until 1968 at the foot of E. Wisconsin Avenue. The big swing bridge is one of the last resources associated with the magnificent depot that still remains in the memories of many Milwaukeeans.

### Description

Railroad Swing Bridge #1556 is a very large Double Warren type overhead truss bridge located in the middle of the Milwaukee River about 600 feet east of the Milwaukee Street bascule bridge. The bridge, which is 32 feet wide and 243 feet long, rests on a wood piling and stone abutment and swings 90 degrees to permit river traffic to pass by it or train traffic to pass over it. The large trusses that rise above the bridge deck on either side of it identify the structure as an overhead truss type and it is further defined by the unique criss-cross pattern of steel work on its two long sides, which is the hallmark of the so-called Double Warren style truss.

Two parallel sets of railroad tracks run across the steel deck. At the top and center of the bridge is a simple, hip-roofed wooden bridge keeper's house that serves as a vantage point to watch for approaching trains and it contains the controls for moving the big bridge.

The bridge is powered by large electric motors and an electric power mast and wires are attached to the roof of the bridge keeper's house. The bridge has remained in nearly its original condition since it was built. Bridge maintenance records indicate that there have been some minor modifications to the guardrails, although that change has little impact on the overall cognizance of the structure. The bridge has oxidized (rusted) and hasn't been painted in years, but it appears to be in restorable condition. The designation pertains to the existing structure and abutments only and does not include any shoreline property or structures.

## VII. SIGNIFICANCE

Railroad Swing Bridge #1556 is significant as Milwaukee's largest swing bridge ever constructed and it is the city's best remaining example of railroad bridge engineering and architecture. Very few of these structures remain in the State of Wisconsin and their preservation is encouraged by the Wisconsin State Historical Society as well as the National Parks Service. The bridge, built to serve the Chicago and Northwestern Railway station at the foot of E. Wisconsin Avenue (razed), also recalls Milwaukee's stature as a major railroad hub during the late nineteenth and early twentieth centuries.



## VIII. HISTORY

### *Design and engineering*

Swing Bridge #1556 was a technical marvel for its era and remains that way today. The big bridge is a splendid example of railroad engineering from an era when railroad transportation was at its zenith in America. The construction of railroads in America began in earnest during the 1850s and

their development helped to unite America as a nation by moving vast quantities of freight and large numbers of passengers over great distances very quickly and at a reasonable cost.

Swing bridges were a common sight associated with railroading and transportation in Milwaukee a century ago. Nearly all of them, however, have vanished or been replaced with modern, upward-acting bascule type bridges. The State Historical

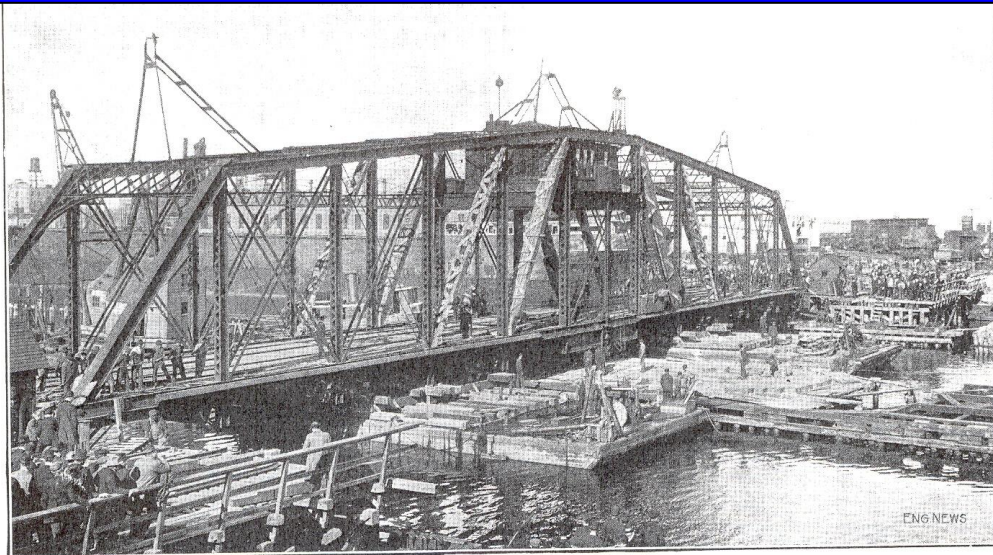
### **Looking east at the 1890 swing bridge (razed)**

The present swing bridge was preceded by at least two earlier bridges. This bridge constructed in 1890 was similar in design to the present one but didn't feature the prominent bridge house on top of it. Weighing it at 500 tons it was substantially lighter than the 800-ton bridge that is there today.

society has recognized the importance of old railroad bridges but notes that not enough study has been directed toward them. Four railroad swing bridges survive in the city today and bridge #1556 is by far the largest and most visible. The locations of the other swing bridges are at the intersection of the Menomonee Canal and N. Plankinton Avenue at the south end of downtown; in Bay View on the south side at the intersection of the Kinnickinnic River and S. Kinnickinnic Avenue; and on the north side of the Menomonee River valley at West Florida Street over the Burnham Canal. In terms of its architectural and engineering significance, Swing Bridge #1556 is believed to be one of the largest of its kind in Wisconsin.

### **Moving the Old Bridge.**

To make way for the present swing bridge, the old 1890 bridge pictured here had to first be moved and the tracks temporarily rerouted. On October 25, 1914 the bridge was lifted off its foundation with huge pontoons and then floated about 60 feet down river. The main line railroad tracks were diverted temporarily to meet it. With the old bridge out of the way, construction began on a new foundation in the middle of the river for a larger, heavier bridge.



SHIFTING THE MILWAUKEE RIVER DRAWBRIDGE OF THE CHICAGO & NORTHWESTERN RY. AT MILWAUKEE, WIS.  
(OCT. 25, 1914)

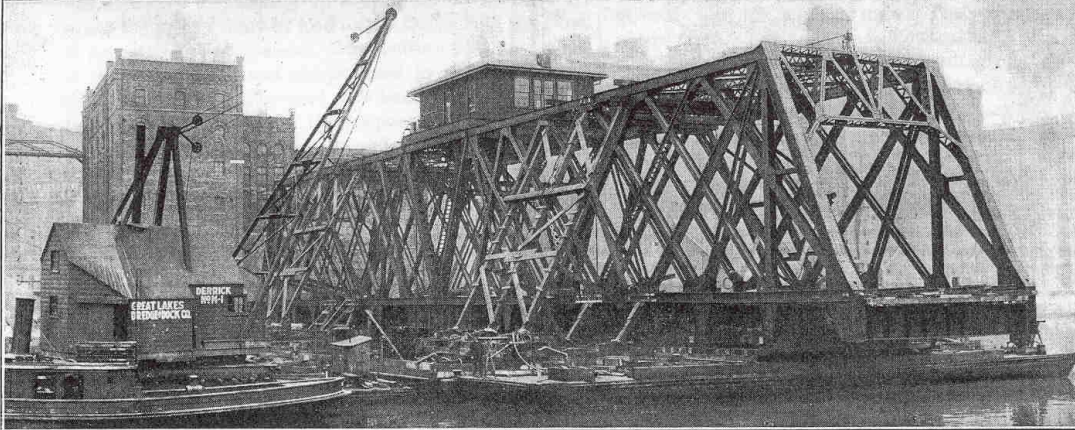
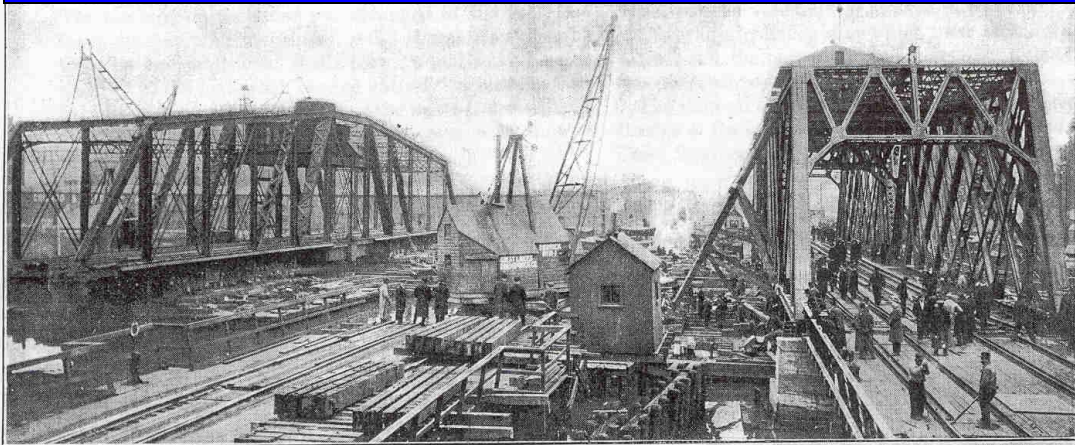
The criss-cross ironwork on each side of the swing bridge is called a truss. It is an ingenious means of utilizing short pieces of material configured in triangles to create a beam, which can span longer distances than is possible with simple post and beam construction. The underlying principle of truss design is the triangle, a very simple, stable geometric shape. A variety of geometric patterns evolved in truss designs during the 19th century in order to meet the nation's transportation needs. The first truss designs in the early 1800's were all wood construction and confined mostly to horse and buggy traffic. Gradually the truss bridge evolved to incorporate more and more iron into its construction. Finally all-iron truss bridges were developed by the

middle of the 19<sup>th</sup> century and collectively they became a veritable art form of American engineering.<sup>3</sup>

Still functional, the bridge remains part of an active line on the Union Pacific Railroad. It has been used infrequently since the demolition in 1968 of the Chicago and Northwestern Railroad station it was built to serve. It is believed to be the third railroad bridge on that site. The first structure was a single-track swing bridge that was probably built during the 1870s. It weighed 210 tons according to a newspaper account in 1890.<sup>4</sup> It was replaced in 1890 by a larger, double track swing bridge weighing 500 tons. That bridge was reputed to be “the finest bridge in the city,” at the

### Old Meets new on March 14, 1915

The swap of the old 1890 bridge (top photo left) with the new bridge took place in a matter of only a few hours. The event was a remarkable feat of engineering that remains impressive to this very day. In the bottom photo barges and cranes nudge the new bridge into place where it still remains.



FLOATING TWO DRAWBRIDGES ON THE MILWAUKEE RIVER AT MILWAUKEE, WIS.; CHICAGO & NORTHWESTERN RY.  
(MAR. 14, 1915)

<sup>3</sup> Wisconsin Cultural Resource management Plan Madison: Wisconsin State Historical Society, Vol 2, 1986, P. 2-2-12-3 of the Transportation chapter.

<sup>4</sup> Milwaukee Sentinel, Monday, December 29, 1890, p. 3, col. 1.

time and cost \$100,000 to build.<sup>5</sup>

The 1890 bridge was similar in design to the present one but the bridge tender's house on top of the structure was more concealed compared with the one on the present bridge. The second, 1890 bridge also proved too light for the increasingly heavy traffic on the line and so in 1915 it was replaced with a much heavier, stronger and wider bridge that is still there today. Many early swing bridges were too light for the loads they were later subject to carry and had to be replaced, usually with an upward-acting bascule bridge. Bridge #1556 is one of the few known 20<sup>th</sup> century replacement swing bridges that has proved to stand up to the vigors of the most demanding service.

The bridge today stands in the same location as its predecessor, which was built in 1890. Building the new bridge in 1914-15 was a tricky, three-part process that essentially involved swapping the new bridge for the old one in a manner that would not disrupt traffic on the heavily traveled main line of the Chicago Northwestern Railroad. The big, first step was moving the old bridge out of the way to a temporary location where it would continue to rotate and carry the mainline railroad traffic. On October 25, 1914, the 500-ton bridge was lifted off its foundation by pontoon barges and then floated down the Milwaukee River about 60 feet where the re-routed mainline tracks were reattached to it in a matter of only four hours. *Engineering News*, a national professional publication of the era, carried a photo feature of the extraordinary event.<sup>6</sup> Train traffic was disrupted for a total of only 5 hours.

With the relocation completed, a new foundation in the middle of the river was built in place of the old one. Work simultaneously progressed on a new 800-ton swing bridge that was built atop a temporary foundation about 60 feet upstream in the middle of the Milwaukee River. The old bridge not only continued to serve train traffic, it also acted as a turntable that was used to deliver materials from the shoreline to the middle of the river where the new foundation and bridge were being constructed. River traffic was also never disrupted for any length of time. When the new bridge was finished it was floated on pontoon barges into place on top of the new foundation and the old bridge was floated away down river where it was quickly dismantled. Floating the new bridge into place and removing the old bridge from its temporary location took only 6 hours beginning in the early morning hours of March 14, 1915.

The construction of the new bridge was done under the supervision of W. C. Armstrong the Chief Engineer of Bridges for the Chicago & Northwestern Railway.<sup>7</sup> Relatively little is known at this time about him. Chicago firms did all the work of building the bridge and the American Bridge Co of Gary, Indiana supplied the bridge materials.<sup>8</sup> The complicated job of removing the old bridge and floating the new one to its present location was done by the Great Lakes Dredge and Dock Co. under the direction of W.H. Finley an engineer of the Chicago and North Western Railway

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<sup>5</sup> *Milwaukee Sentinel*: Wednesday, December 24, 1890 P. 9.

<sup>6</sup> *Engineering News*. April 8, 1915, Vol. 73 No. 14,

<sup>7</sup> *Ibid*.

<sup>8</sup> Chicago and Northwestern record books for swing bridge #1566. Photocopy of page supplied by the railroad archive.



In sum, the massive structure was built to last and it still captures the attention of those who pass by. This major visual feature of Milwaukee remains completely functional and it is one of the few remaining examples of an impressive form of engineering that began in America, but has now all but vanished.

### **The Chicago Northwestern Railway**

The Chicago & Northwestern Railroad is steeped in history. Founded in 1859 during the infancy of railroading in America, the company grew by leaps and bounds acquiring many smaller railroads to build a vast network of railway service throughout the upper Midwest.<sup>9</sup> During the late nineteenth and early twentieth centuries, the Chicago & Northwestern was vital to the development of Wisconsin serving the rich mineral, lumber and agricultural region to the north and west of Milwaukee.

The railroad was headquartered in Chicago, but Milwaukee was a major hub and Swing Bridge #1556 was literally a gateway to its impressive passenger station at the foot of E. Wisconsin Avenue. The soaring tower of the Romanesque revival style station built in 1892 marked a bustling center of activity that was one of the city's best-known structures and a popular feature of picture postcards a century ago.

The railroad peaked in prosperity during the decade of 1910-1920 when Swing Bridge #1556 was built. But then the Great Depression of the 1930s brought

tough economic times and bankruptcy to the firm. The company got back on its feet financially, but the railroad then faced new competition in the post World War II era from automobiles, super highways, airplanes and trucks.



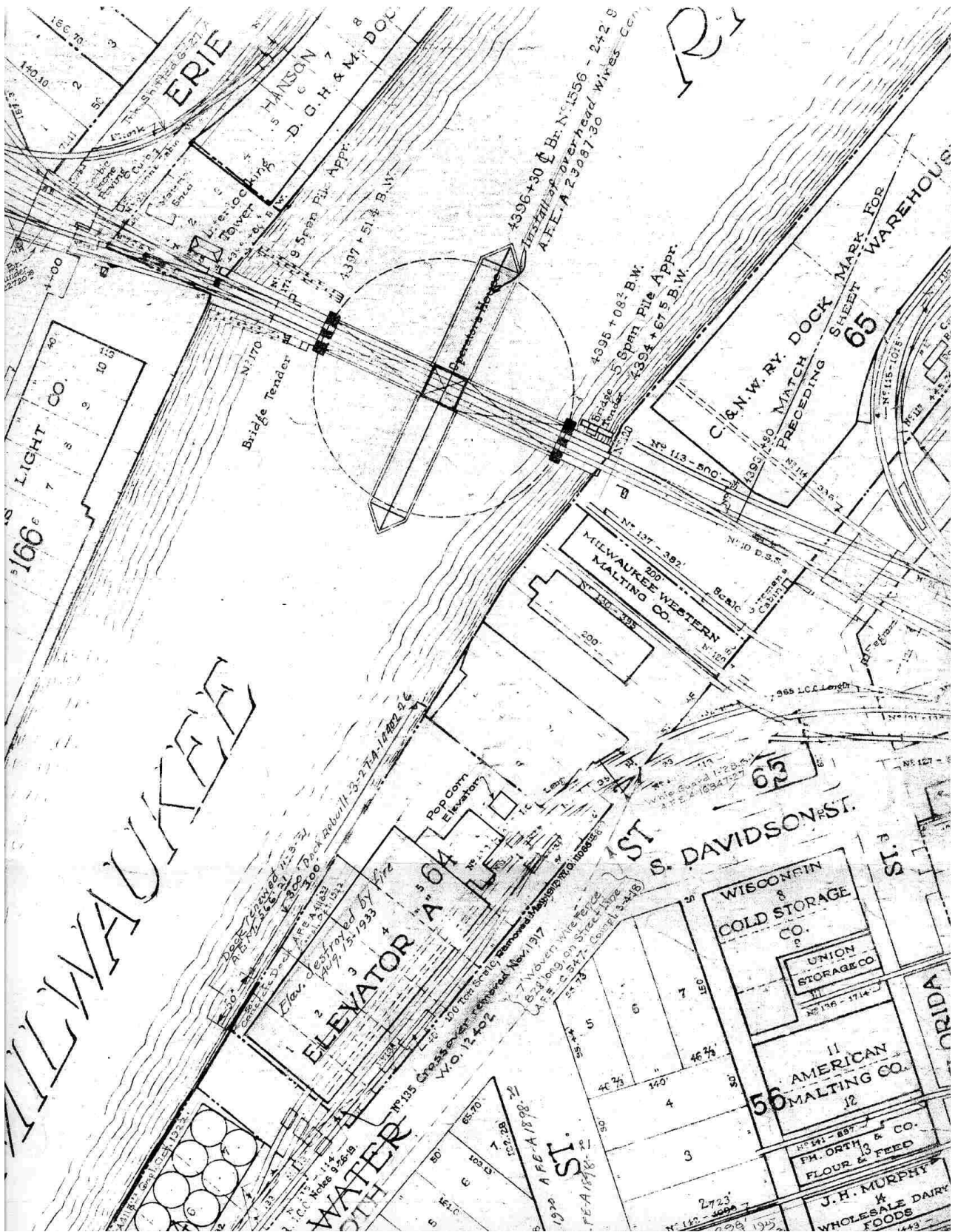
**The Chicago Northwestern Railroad Depot (razed 1968) at the foot of E. Wisconsin Ave.**

<sup>9</sup> *History of Milwaukee County from its first settlement to the year 1895*. Howard L. Conard, editor. Chicago: American Biographical publishing Co. ca 1896 Vol. II, p 4-6.

With the golden age of railroading behind it, the company moved into the 1950s with overused equipment and a deteriorating infrastructure. Still the company managed to rebound during the late 1950s under new leadership that instituted cost-cutting reforms and consolidated service. As a result, much of the system was eliminated and abandoned. Running much leaner, the railroad used government subsidies to upgrade track and extended new service into Wyoming's rich coal mining region.

Prosperity returned to the railroad during the late 20<sup>th</sup> century and in 1995 it was purchased by the Union Pacific Railroad, which still owns Swing Bridge #1556 today. While the Chicago Northwestern name is gone, the Milwaukee Swing Bridge remains one of its tangible engineering legacies.

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The Chicago and Northwestern Archive map shows the swing bridge and the structures around it. Ca. 1920

## IX. STAFF RECOMMENDATION

The Railroad swing bridge #1556 meets two criteria (e-5, and e-9) for designation in the city's Historic Preservation Ordinance. It is one of the few surviving railroad swing bridges in the state and certainly the most visible railroad bridge in the City of Milwaukee. It is a pivotal feature of the Third Ward neighborhood in which it is located.

**e-5 Its embodiment of the distinguishing characteristics of an architectural type or specimen.**

*Rationale:* Criterion **e-5** is applied because the Swing Bridge is the largest bridge of its kind ever built in Milwaukee. The Warren type overhead truss design is indicative of late 19<sup>th</sup> and early 20<sup>th</sup> century engineering techniques that have all but vanished.

**e-9 Its unique location as a singular physical characteristic which represents an established and familiar visual feature of a neighborhood, community or the City of Milwaukee.**

*Rationale:* Criterion **e-9** is applied because for nine decades Swing Bridge #1556 has been a major visual feature in its Third Ward neighborhood and it is the city's most outstanding railroad bridge.

## REFERENCES

*Chicago Northwestern Railway Historical Society Archives*

*Engineering News*, 1890, 1914 and 1915

*History of Milwaukee, City and County*, Vol. III. Chicago: The S. J. Clarke Publishing Co. 1922.

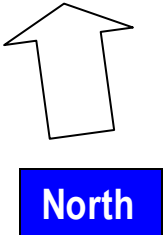
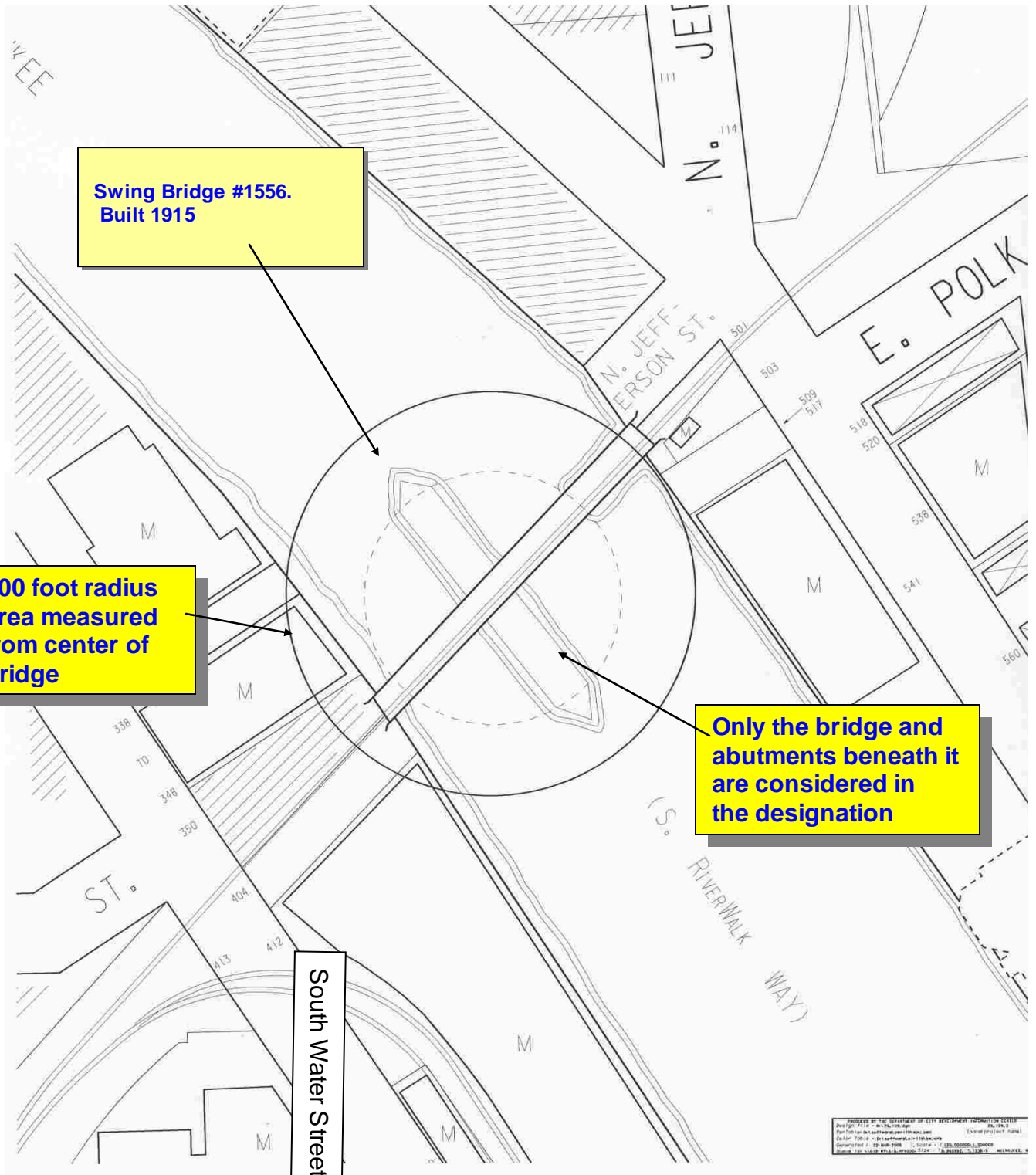
*History of Milwaukee*. Frank A. Flower, Ed., Chicago: Western Historical Publishing Co., 1881.

*History of Milwaukee County from its first settlement to the year 1895*. Howard L. Conard, editor. Chicago: American Biographical publishing Co. ca 1896 Vol. II

Milwaukee City Directories.

Milwaukee Sentinel

*Wisconsin Cultural Resource Management Plan*. Madison: State Historical Society, 1986, Vol 2.



## **X. PRESERVATION GUIDELINES**

The guidelines are primarily intended to preserve the bridge and are not meant to inhibit or prevent ordinary repairs. Proper maintenance techniques are encouraged in the guidelines. Restoring missing or altered original features, is highly encouraged, but **not** required in the designation. The preservation guidelines represent the principal concerns of the Commission regarding his historic designation. The commission reserves the right to make final decisions based upon particular design submissions.

### **Bridge tenders House:**

#### **A. Roofs**

Retain the original roof shape. Avoid making changes to the roof shape that would alter the building's height or roofline.

#### **B. Windows and Doors**

1. Retain existing window and door openings. Retain the existing configuration of panes, sash, surrounds and sills. Avoid making additional openings or changes in existing fenestration by enlarging or reducing window or door openings to fit new stock window sash or new stock door sizes. Avoid changing the size or configuration of windowpanes or sash.

### **Bridge structure:**

#### **A. Steel and iron**

1. Retain original material and design whenever possible. Avoid removing architectural or engineering features that are essential to maintaining the structure's character and appearance. Steel and iron that is rusted can be sandblasted to remove oxidation. Cleaned steel must be primed and painted immediately to prevent the formation of new rust.
2. Retain or replace deteriorated material with new material that duplicates the appearance of the old as closely as possible. Avoid covering architectural or structural features with modern materials that are incompatible with the historic character of the structure. New steel of matching size and configuration may be installed to replace steel that is missing or deteriorated beyond the point of repair.

#### **B. Masonry abutments**

1. Abutment size, shape and materials should be retained. Wooden pilings can be replaced or substitute materials can be installed as needed.

C. Additions

Additions to the bridge are generally discouraged.

D. Signs

The installation of any permanent exterior sign requires the approval of the Commission. Approval will be based on the compatibility of the proposed sign with the architectural character of the structure.

E. Site features

Any fencing, paving and lighting fixtures should respect and enhance the historic architectural character of the structure.

F. Adaptive Reuse Potential

Reuse of the bridge at the existing site for purposes other than a railroad bridge will be considered on a case-by-case basis.

G. Guidelines for Demolition

Although demolition is not encouraged and is generally not permissible, there are instances when demolition may be acceptable if approved by the Historic Preservation Commission. The Commission shall take the following guidelines, with those found in subsection 9(h) of the ordinance, into consideration when reviewing demolition requests.

1. Condition

Demolition requests may be granted when it can be clearly demonstrated that the condition of a structure or a portion thereof is such that it constitutes an immediate threat to health and safety and is beyond hope of repair.

2. Importance

Consideration will be given to whether or not the structure is of historical or architectural significance or displays a quality of material and craftsmanship that does not exist in other structures in the area.

3. Location

Consideration will be given to whether or not the structure contributes to the neighborhood and the general street appearance and has a positive effect on other structures in the area.

4. Potential for Restoration

Consideration will be given to whether or not the structure is beyond economically feasible repair.

5. Additions

Consideration will be given to whether or not the proposed demolition is a later addition that is not in keeping with original design of the structure or does not contribute to its character.