Executive Summary

Bridge Number: 94246

Bridge 94246, also known as the Northern Pacific Railway Bridge No. 9, carries the Dinkytown Bikeway Connection and a pedestrian trail over the Mississippi River and West River Road, in Minneapolis. The bridge, owned by the City of Minneapolis, is a former double track railroad bridge that was converted into a pedestrian/bicycle bridge in 1999. The bridge is significant for its configuration as a deck truss, which is a rare truss type in the state, and innovative reuse of 1885 pin-connected deck truss spans that were reinforced in 1922 with riveted deck truss spans. Additionally the bridge is significant for community planning and development for its association with a movement in Minneapolis to separate railroad crossings from vehicular and pedestrian crossings.

Bridge 94246 is a seven-span structure that is 949 feet long. It consists of two 249-foot-long steel deck trusses and five steel deck plate girder spans. The three westerly approach spans to the truss spans are nominally 95 feet long. The two easterly approach spans to the truss spans are nominally 84 feet long. The width of the deck on the approach spans is approximately 28 feet, and on the truss spans is 27 feet, providing a 25-foot clear width between the railings.

Bridge 94246 is in fair condition overall and appears to adequately serve its purpose of carrying pedestrian/bicycle traffic. With proper maintenance activities, it is believed Bridge 94246 could continue to serve in its present capacity for 20 years or longer. An abridged report is presented because Bridge 94246 has been recently rehabilitated and there are plans for additional rehabilitation.

Any work on Bridge 94246 should proceed according to the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards) [36 CFR part 67] and *The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations,* as adapted by the Virginia Transportation Research Council (Guidelines).





Bridge Location





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I – Project Introduction

Bridge Number: 94246

This Abridged Bridge Report is a product of a comprehensive study performed for approximately 140 historic bridges owned by county, city, township, private and other state agencies besides MnDOT. The study is the second phase of a multi-phased process developed and executed in partnership with representatives from the Federal Highway Administration (FHWA): State Historic Preservation Office (SHPO); MnDOT State Aid; MnDOT Cultural Resources Unit (CRU); the US Army Corps of Engineers (USACE); local public works and county highway departments; county and township boards and city councils; the preservation community and the general public. To perform the study, MnDOT retained the consultant team of LHB Inc., Mead & Hunt Inc., and The 106 Group.

The general goals of the study include:

- Gathering and compiling the existing historic and bridge condition data and other relevant information on the bridges in the study group into bridge reports.
- National Register nominations for a select number of bridges within the study group which the bridge owner may request a nomination to be prepared.
- Updating MnDOT's *Management Plan for Historic Bridges in Minnesota* based on the study's findings.
- Producing a narrative for the MnDOT Historic Bridge Website to disseminate information regarding locally owned historic bridges in Minnesota.
- Investigating and preparing a summary regarding how other states have funded historic bridge programs and structured Programmatic Agreements when multiple non-state entities are the owners of historic bridges.

The Bridge Reports compile and summarize the historic and engineering information concerning the structures. It is important to note that this report indicates if a bridge is located within a known historic district, but it does not identify all known or potential historic properties. Potential impacts to adjacent or surrounding historic properties, such as archaeological sites or other structures must be considered. Contact MnDOT CRU early in the project planning process in order to identify other potential historic properties. Due to private ownership, recently completed engineering/preservation studies, or recently executed rehabilitation projects, a small number of bridges were identified for abridged reports. An abridged report compiles readily available information, especially data about the bridge's historic significance. Additionally, recent rehabilitation work that has been completed is described and documented with photographs where available. It is important that historic bridges receive appropriate annual maintenance work. This bridge was not assessed for annual maintenance needs however technical guidance on stabilization, preservation and maintenance activities can be found in the *Management Plan for Historic Bridges in Minnesota*, available on MnDOT's website.

Recommendations are not included within the Abridged Bridge Reports. However any future work should be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards). The Standards are basic principles created to help preserve the distinct character of a historic property and its site, while allowing for reasonable change to meet new engineering standards and codes. The Standards recommend repairing, rather than replacing deteriorated features whenever possible. The Standards apply to historic properties of all periods, styles, types, materials and sizes and encompass the property's location and surrounding environment.



I – Project Introduction

Bridge Number: 94246

The Standards were developed with historic buildings in mind and cannot be easily applied to historic bridges. The Virginia Transportation Research Council (Council) prepared Guidelines, which adapted the Standards to address the special requirements of historic bridges. They were published in the Council's 2001 Final Report: A Management Plan for Historic Bridges in Virginia, *The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations,* provide useful direction for undertaking historic bridge preservation and are included in the Appendix to this plan.

Existing bridge data sources typically available for Minnesota bridges were gathered for the study. These sources include:

- PONTIS, a bridge management system formerly used by MnDOT to manage its inventory of bridges statewide, and its replacement system, SIMS (Structure Information Management System)
- The current MnDOT Structure Inventory Report and MnDOT Bridge Inspection Report. Reports are available for the majority of the bridges (not available for bridges in private ownership)
- Database and inventory forms resulting from the 2012 Minnesota Local Historic Bridge Study and other prior historic bridge studies as incorporated into the database
- Existing Minnesota historic contexts studies for bridges in Minnesota, including *Reinforced-Concrete Highway Bridges in Minnesota, 1900-1945, Minnesota Masonry-Arch Highway Bridges, 1870-1945, Iron and Steel Bridges in Minnesota, 1873-1945 and Minnesota Bridges 1955-1970*
- Field investigations documenting the general structural condition and determining characterdefining features

Additional data sources researched and gathered for some of the bridges as available also included:

- Files and records at MnDOT offices
- Original bridge construction plans, rehabilitation plans, and maintenance records of local owners
- Files and documents available at the SHPO office, including previous inventory forms, determinations of eligibility, studies, and compliance documents
- Existing historic and documentary material related to the National Register-eligible bridges

The Appendix contains the following: a Glossary explaining structural and historic preservation terms used in the plan, the Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior's Standards, a list of engineering and historic documents available for this bridge, and copies of the MnDOT Structure Inventory and Bridge Inspection Reports current at the time of the report preparation.

The Abridged Bridge Report will provide the bridge owner and other interested parties with detailed information related to the historic nature of the bridge and varied information concerning the condition of the bridge depending on information furnished at the time of report preparation. This information will enable historic bridge owners to make more informed decisions when planning for their historic properties.



II - Historic Data

Bridge Number: 94246

This narrative is drawn from previous documents, as available for the subject bridge, which may include determination of eligibility (also known as Phase II evaluation), Minnesota Architecture/History form, National Register nomination, Multiple Property Documentation Form, and/or applicable historic contexts. See Sources for details on which documents were used in compiling this Historic Data section.

Contractor Frankman Company

Designer/Engineer Northern Pacific Railway/American Bridge Company (1922 girder spans)

Description

The Northern Pacific Railway (NP) Bridge No. 9, later known by its Minnesota Department of Transportation (MnDOT) Inventory Number Bridge 94246, is located in Southeast Minneapolis, Hennepin County, and spans the Mississippi River. Constructed in 1922-1924, it is a seven-span bridge with two Pratt deck truss main spans and deck plate girder approach spans. The bridge currently carries pedestrian traffic over the Mississippi River from 20th Avenue South on the west bank to East River Road on the east bank. The bridge has a northeast-southwest alignment and crosses the river at a right angle; the southern approach spans (Spans No. 5, 6, and 7) use an eight-degree curve to achieve this alignment. The total length of the bridge is 952 feet, and it is 28 feet wide.

The substructure is comprised of two abutments and six piers, all of reinforced-concrete construction. They are numbered one through eight, consecutively, from northeast to southwest. Abutment No. 1 is a "U" type concrete abutment that rests on a limestone foundation. Pier Nos. 2, 6, and 7 are reinforced-concrete columns with mass concrete footings placed atop the sandstone bedrock. Pier Nos. 3, 4, and 5 consist of mass concrete columns and footings also resting atop the sandstone bedrock. Abutment No. 8 is a six-post, reinforced-concrete tower buried by the embankment. This abutment rests partially on sandstone bedrock.

The superstructure of the bridge is comprised of seven spans numbered one through seven, consecutively, from northeast to southwest. The two Pratt deck truss main spans (Spans 3 and 4) are from the original NP Bridge No. 9, while Spans No. 1, 2, 5, 6, and 7 were fabricated in 1922 and are deck plate girder approach spans of riveted steel construction. Span No. 1 has four lines of deck plate girders, is 87 feet long, and is on an eight degree curve. Span No. 2 has four lines of deck plate girders and is 84 feet long. Spans No. 3 and 4 are both eight-panel, steel Pratt deck trusses that are 249 feet in length. Each span is comprised of three parallel trusses. The outer trusses, floorbeams, and stringers are from the original NP Bridge No. 9. The trusses are 42 feet wide and have approximately 30-foot panels which are 24 feet apart. The outside trusses are pin and eyebar connected, with steel rocker bents supporting the ends of the girder spans adjacent to the truss spans. The steel middle trusses in each span were added in 1922 to reinforce the original c.1885 structure, and have riveted connections (NP Engineering Department 1925a:124). Each of the two main spans features four c.1999 navigation lights. Span Nos. 5, 6, and 7 each have four lines of deck plate girders and are on an eight degree curve. Span No. 5 is 95 feet long, Span No. 6 is 94 feet long, and Span No. 7 is 94 feet long.

A number of features were added as part of a rehabilitation completed in 1999. They include the current bridge deck, which consists of concrete pavement on the two main spans of the original NP Bridge No. 9



II - Historic Data

Bridge Number: 94246

and asphalt on the other five spans and the approach. Also added were painted rectangular tubular steel railings set into concrete pads extending the length of the bridge on each side. The railings have square posts, ornamental railing panels with square top and bottom rails, and square pickets. There are two square, horizontal railings below the panel and one above it. Approximately 16 painted metal light posts were also added. They are staggered along each side along of the bridge; 12 on the west side, 14 on the east. The lights are comprised of a slender standard with a gooseneck and a panhead fixture. Each light is approximately 15 feet tall. Two concrete endposts are located at each end of the bridge. The western endpost on the northeast end of the bridge features a bridge plate that reads "City of Minneapolis Minnesota BR 94246 Built 1922 Remodeled 1999." A sheet-metal historic marker, mounted vertically on two metal posts, is located at the north end of the bridge.

Significance

In 1885, the NP acquired right-of-way so it could construct a railroad line from St. Anthony Junction, across the Mississippi River, to the Minneapolis milling district. On the east side of the river, the route ran just south of the University of Minnesota (University) campus, roughly two blocks north of Washington Avenue, and just south of what was then Arlington Street. By the following year, the line, including a new deck truss bridge with two Pratt main spans crossing the Mississippi River, had been completed. At the time the bridge was built, the panel length of approximately 30-feet in the main spans was believed to be greater than any truss built in the United States (Maltby 1903:425-427). The line was put into operation on June 1, 1886 and was known as the St. Paul Division, 13th Subdivision, Line "A."

In the late nineteenth century, the University began to expand southward, meaning that the rail line now ran directly through campus. The intersection of University Avenue and Oak Street, at the eastern end of the A line, had become a busy at-grade crossing where trains, streetcars, pedestrians, and other modes of transportation met, causing congestion and raising safety concerns. By 1904, the City of Minneapolis was calling for a grade separation at this intersection. However, the railroad would not agree to this grade separation and for several years the NP line remained unchanged.

The issue of relocating the line north of campus and separating the rail and vehicular at-grade crossing came to a head in 1909 when the University Board of Regents took the issue to the Minnesota Legislature. Siding with the University that the railroad was responsible for creating and paying for the grade separation, the Legislature passed S.F. No. 134 – "An Act to require the Northern Pacific Railway Company to cover its tracks through the campus of the University of Minnesota." Responsibility for enforcing the act was placed on the Board of Regents of the University. However, the lack of enforcement of the law by the Board of Regents, disagreements with the City of Minneapolis over grade separations, and subsequent refusal of the NP to comply, stalled any action on relocation of the line.

In 1918, Frederick William Cappelen, City Engineer for the City of Minneapolis, proposed revisiting the idea of removing the tracks from campus and constructing a new line to the north of the campus. The Board of Regents proposed that the University would pay the excess costs associated with a realignment that exceeded the estimated cost of improving the existing line. The NP considered this offer, and during 1920, worked out several alternative alignments to reroute the line. On January 21, 1921, a meeting was held between University representatives, Cappelen, and the NP, during which an agreement for a new alignment was finally reached.



II – Historic Data

Bridge Number: 94246

The grade separation of the A Line was part of a larger pattern in Minneapolis that began in the late 1880s and continued into the early 1930s. This initiative largely came about through efforts of the Minneapolis City Council, which approved legislation to require railroads to create grade separations. The goal was to reduce congestion resulting from trains blocking multiple intersections for prolonged periods and to improve safety. 1922 marked the beginning of a multi-year program of grade separation in Minneapolis by the NP.

In the planning for the relocation of the A Line, it was determined that the new Bridge No. 9 would be located at milepost (MP) 10 and was to be composed of seven double-track spans. The two main trusses were to be the Pratt, pin-connected trusses from the original Bridge No. 9. When these two trusses were moved to their new location, they were reinforced in the middle with new riveted trusses. Steel rocker bents which supported the ends of the girder spans adjacent to the truss spans were also added. The reinforced trusses would allow a significantly greater carrying capacity. Two lines of safety railing made from gas pipe were installed along each side and ran the full length of the bridge. The bridge featured a ballasted deck on reinforced-concrete slabs on all girder spans, and an open deck with walks on the truss spans.

The girder spans and rocker bents were fabricated by the American Bridge Company. Girder spans included six approximately 90-foot, two approximately 85-foot, and two approximately 80-foot deck plate girder spans for the single track. The truss spans were two approximately 245-foot-long, pin-connected Pratt deck trusses from the original Bridge No. 9, reinforced with two new trusses in the middle that were purchased from the American Bridge Company. Due to wear and corrosion, the two old spans were sent for remodeling and reboring of pin holes to the Minneapolis Steel and Machinery Company before they were installed in their new location. Frankman Company was the contractor for the erection of the bridge in its new location.

Erection of the truss spans began on August 17, 1923. The new NP double track route, known as the University Line Change, was completed on December 2, 1924. Operation of regular trains over the new line began on February 14, 1925. It is unknown exactly when the NP ceased operating trains over the line and the bridge, but by 1981 one of the tracks had been removed, and the remaining track was no longer in service. At that time, the railway company proposed to transfer the bridge to the City of Minneapolis. However due to the expense to repair the structure, transfer of the bridge from the BN to the City did not take place at this time. In 1987, BN sold Bridge No. 9 to the City of Minneapolis. The bridge appears to have remained idle until it was rehabilitated in 1999. In June of 2000, the City of Minneapolis reopened Bridge No. 9 as a pedestrian bridge.

More recent repairs (2012-2013) to Pier 4, which included stabilizing the pier by placing a reinforcedconcrete shell around the shaft and cap of the existing pier, underpinning it with new foundation elements, and repairing the bridge seat concrete under the bearings, were evaluated by the SHPO. The SHPO determined that this work did not alter the appearance of the pier and, therefore, met the "Secretary of the Interior's Standards for Rehabilitation." According to correspondence between SHPO and MnDOT, the City of Minneapolis is also planning to perform repair and stabilization work to Pier 3, similar to the work done for Pier 4.



II – Historic Data

Bridge Number: 94246

Bridge 94246 has undergone a number of transportations since its original 1886 construction. The 1924 truss additions to the original 1886 structure slightly affect the integrity of the original design and workmanship of the 1886 structure. However, the primary significant engineering features of the 1886 bridge were the pin and eyebar deck truss design, and the 30-foot panel lengths. These significant features are still intact, still functioning, and visually prominent within the present structure. As such, the 1886 trusses retain sufficient integrity of design, materials, and workmanship to convey their engineering significance from the period 1886. The bridge also retains integrity of association with the NP, setting and its feeling as a crossing over the Mississippi River.

The NP Bridge No. 9 that was constructed between 1922 and 1924, reusing the original crossing's 1886 trusses, remains in its original location and retains its setting within the Mississippi River Valley. It also retains its use as a crossing of the Mississippi River in Minneapolis. Although the tracks were removed from the bridge and railroad corridor in 1999, and the grade paved for use as a major river crossing for a pedestrian/bicycle trail, the bridge maintains its sense of function and destination. The two c.1885 pinconnected, deck trusses from the original NP Bridge No. 9 were reinforced and then installed in their present location in 1922-24. The necessity of strengthening the bridge to carry greater loads reflects the ongoing use of these trusses and embodies the unique engineering solution that allowed them to be reused in the structure opened in 1924. As such, these features do not diminish its integrity of design, materials, or workmanship, but rather contribute to the bridge's integrity of design from its 1924 period of significance. The removal of the railroad tracks and ties, paving of the bridge deck, and installation of modern railings and lights in 1999 minimally affect the bridge's integrity of design, materials, and workmanship. The periods of significance for the bridge within both historic contexts are 1886 and 1924. The year 1886 corresponds with the date the original NP Bridge No. 9 was completed. The year 1924 corresponds with the year the current NP Bridge No. 9 opened in its new location.

NP Bridge No. 9 is significant under *Criterion A* in the area of Community Planning and Development for its association with events that contributed to the broad pattern of history in the development of Minneapolis. The bridge is an intact example of the NP's effort to separate grade crossings on its tracks throughout the city, thereby providing greater safety for the trains and for pedestrian and vehicle traffic. The bridge is significant under *Criterion C* in the area of Engineering for its design and construction as a pin and eyebar deck truss bridge, which utilized trusses, floorbeams, and stringers from the 1886 bridge.

Additionally, Bridge 94246 is significant as a representative example of deck truss, a rare bridge type in the state that often was used as a design solution to an unusual site condition, and because it employs experimental or innovative elaborations of contemporary engineering practice to meet unusual or extreme site conditions. When the original NP Bridge No. 9 was built in 1886, the size of the crossing and the length of the structure required to bridge is presented a unique engineering challenge. The design solution was to utilize 30-foot long panels in the main span. At the time, the panel length was believed to be greater than any truss built in the United States at that time. Moreover, the reuse and reinforcement of the two 1885 deck truss spans in the new NP Bridge No. 9 is an example of an innovative elaboration of contemporary engineering practice to meet an unusual condition, in this instance to allow the reuse of an existing, outdated structure that lacked the structural capacity to meet the current needs of the day.



II – Historic Data

Bridge Number: 94246

Historic Context	Railroads in Minnesota, 1862-1956; Iron and Steel Bridges in Minnesota, 1873-1945						
National Register Status Eligible (Individually)							
Criterion A Significance Community Planning and Development							
Criterion C Significance	Engineering: Important type; Engineering: Distinctive method of construction						
Historic District	N/A						
SHPO inventory number	HE-MPC-9006						
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II – Historic Data

Bridge Number: 94246

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- 1925c *University line Change: Report of Assistant Engineer*. On file at the Minnesota Historical Society, St. Paul, Minnesota.
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Shirole, A.M., PE

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Quivik, Fredric L. and Dale L. Martin

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1994 Evaluation of Bridges 99162 and 99163 as Potential Historic Structures in Minneapolis, Hennepin County, Minnesota (Final Report). Prepared by Marcia Ohlhausen. On file at the State Historic Preservation Office, St. Paul, Minnesota.

Field inspection by Mead & Hunt, Inc. 12 June 2013.



II – Historic Data

Bridge Number: 94246

Character-Defining Features

Character-defining features are prominent or distinctive aspects, qualities, or characteristics of a historic property that contribute significantly to its physical character. Features may include materials, engineering design, and structural and decorative details. Often, the character-defining features include important historic fabric. However, historic fabric can also be found on other elements of a bridge that have not been noted as character-defining. For this reason, it is important to consider both character-defining features and the bridge's historic fabric when planning any work.

Feature 1: Deck truss configuration.





II – Historic Data

Bridge Number: 94246

Feature 2: Innovative reuse of original 1885-1886 pin-connected Pratt deck truss spans in 1922-1924 railroad bridge construction, reinforced with riveted Pratt deck trusses to create two new spans with four truss lines.





III – Bridge Data

Bridge Number: 94246

Date of Construction (remodel) Common Name (if any)	1885; 1922 (1999) Northern Pacific Railway Bridge No. 9					
Location Feature Carried: Feature Crossed: County: Ownership:	BR#9 PED (ABAN RR) Miss River & W River Rd Hennepin City of Minneapolis					
*Data Current (as of): Main Span Type: Main Span detail: Substructure Type - Foundation Type: Abutment: Piers: Total Length: Main Span Length: Total Number of Span(s): Skew (degrees): Structure Flared: Roadway Function: Custodian/Maintenance Type:	Sep 2013 304 STEEL DECK TRUS PRATT 1-Concrete - 0-Unknown 1-Concrete - 0-Unknown 952 ft 249 ft 7 0 No Flare N/A (PED) City	SS				
Reported Owner Inspection Date Sufficiency Rating Operating Rating Inventory Rating Structure Status Posting Design Load	11/07/2012 N/A PED PED A - Open VEH: SEMI: DBL: RR					
Current Condition Code Deck: Superstructure: Substructure: Channel and Protection: Culvert:	7 5 4 7 N	Roadway Clearances Roadway Width: Vert. Clearance Over Rdwy: Vert. Clearance Under Rdwy: Lat. Clearance Right: Lat. Clearance Left:	24.0 ft 17.9 ft 38 ft (Nav) 17.9 ft 0 ft			
Current Appraisal Rating Structural Evaluation: Deck Geometry: Underclearances: Waterway Adequacy: Approach Alignment: Fracture Critical Deficient Status	N N 9 8 N No N/A	Roadway Data ADT Total: Truck ADT Percentage: Bypass Detour length: Number of Lanes: Waterway Data Scour Code: K-LIMITED RISK	1 (2009) Not given 1 milie N/A (PED)			
Non-MnDOT Data						
Approach Roadway Characteristics Lane Widths: Shoulder Width: Shoulders Paved or Unpaved: Roadway Surfacing:	12 ft Walk N/A (PED) N/A (PED) Concrete	**Number of Crashes reported in MnMCAT within 500 feet of Bridge Site	N/A (PED)			
Location of Plans Plans Available	City of Minneapolis 1922 Original & 1999 Re	hab Plans				

* Non-MnDOT data collected during field survey. All other fields of data collected from MnDOT September of 2013. See Appendix C for MnDOT inventory and inspection report data. ** Unless a significant number of crashes are noted on or near a bridge, the accident data is not detailed in this report.



IV – Existing Conditions/Recommendations

Existing Conditions

An abridged report is presented. Bridge 94246 was converted from a railroad bridge to a pedestrian/bicycle bridge in 1999. Bridge 94246 has been recently rehabilitated, and there are plans for additional rehabilitation. In 2012 and early 2013, the main river Pier 4 was encapsulated in concrete. The timber fender system was replaced with a new timber fender system around the pier. In 2012, high-strength tension rods and steel weldments (external post-tensioning) were added to the exterior top of Pier 2. The City plans to perform repair and stabilization work at Pier 3, similar to the work done for Pier 4. The City also plans to perform repair and stabilization work at Pier 5 at some time in the immediate future. A report prepared in 2012 recommended that Abutment 1, Pier 6 and Pier 7 should be rehabilitation of this bridge in 1999 at the time of its conversion from a railroad bridge to a pedestrian/bicycle bridge, and the planned and ongoing rehabilitation, this report focuses only on maintenance recommendations. However, it is recommended that the City perform a live load rating analysis for the truss spans and girder spans of the superstructure to determine the structural capacity for the current loads. An electronic copy of the rehabilitation plans is available from MnDOT CRU (see Appendix C for all electronic resources provided to MnDOT CRU as part of this bridge report).

Available information, as detailed in the Project Introduction section, concerning Bridge 94246 was reviewed prior to visiting the bridge site. The site visit was conducted to establish the following:

- 1. General condition of structure
- 2. Conformation to available extant plans
- 3. Current use of structure
- 4. Roadway/pedestrian trail geometry and alignment (as applicable)
- 5. Bridge geometry, clearances and notable site issues

General Bridge Description

Bridge 94246 is a former double track railroad that was converted into a pedestrian/bicycle bridge in 1999. The bridge crosses the Mississippi River and West River Road, and is now known as the Dinkytown Bikeway Connection over the Mississippi River at the University of Minnesota in Minneapolis. The bridge is a seven-span structure that is 949 feet long. It consists of two 249-foot-long steel deck trusses and five steel deck plate girder spans. The three westerly approach spans to the truss spans are nominally 95 feet long. The two easterly approach spans to the truss spans are nominally 84 feet long.

The 1999 conversion from a railroad bridge to pedestrian/bicycle bridge consisted of the following work: removal of track, ties, planking, fence and handrails; constructing a new cast-in-place, reinforced-concrete deck on the two truss spans; removing the ballast and constructing granular aggregate base and asphalt surface over the existing cast-in-place concrete deck in the five approach spans; constructing concrete railing parapet in the approach spans; installing a conduit system for lighting and navigation lights; installing new ornamental steel tube railing on both sides of the bridge deck for the full length of the bridge; and installing new light poles. The width of the deck on the approach spans is 28.5 feet, and provides 25 feet clear width between the railings. The width of the deck on the truss spans is 27.0 feet, and also provides 25 feet clear width between the railings. The ornamental steel tube railings are 4.5 feet high as measured from the top of the deck to the top of the top railing. Strip seal expansion joints were constructed in the concrete



IV – Existing Conditions/Recommendations

deck over Piers 3, 4 and 5. Sealed joints were constructed in the asphalt deck over Piers 2, 6 and 7. No work was done to the trusses or girders as part of the 1999 construction. The bridge was last painted in 1937 and is in a rusted condition. In 2012, high-strength tension rods and steel weldments (external post-tensioning) were added to the exterior top of Pier 2 to provide compression for the deteriorated concrete in the pier. In 2012 and early 2013, the main river Pier 4 was encapsulated in concrete. The timber fender system was replaced with a new timber fender system around the pier.

Serviceability Observations

The bridge is currently open to pedestrian and bicycle traffic only. It is closed to vehicle traffic with planters/barricades located at both ends.

Condition Observations

Superstructure

The asphalt surface in the approach spans is in good condition, with some minor cracks. The concrete deck in the truss spans is in good condition with some minor cracking. The strip seal expansion joints are in good condition but contain some sand and debris. The poured deck joints have loss of adhesion in many areas with moisture leaking through. The ornamental metal railing is oxidizing with some paint peeling and rust in many areas. Many weep holes are painted over and are not allowing water to drain. Some of the grout is loose at the bases of the posts. The approach painted steel girder spans display uniform moderate to heavy rust, with pack rust under the concrete deck surface. The painted steel truss spans have uniform moderate to heavy rust, with pack rust at many of the connections and crevices. Heavy pack rust and debris was observed at the expansion and fixed bearings of all spans. The underside of the concrete deck in the approach spans has spalls with reinforcing steel bars exposed, has cracks with efflorescence and rust stains, and many spalls with reinforcing steel exposed.

Substructure

The concrete abutments are in poor condition with heavy scale, spalling, map cracking and vertical cracks. The west abutment has some heavy scale spalls with rebar exposed and heavy graffiti. In 2012, the top exterior of Pier 2 was reinforced with exterior high-tension rods and steel weldments to provide compression force in the concrete. Pier 4 was completely encapsulated with reinforced concrete in 2012-2013, and a new timber fender system was installed around the base of the pier. Abutment 1 and Pier Nos. 3, 5, 6, and 7 are in poor condition, with scaling, map cracking and deteriorated concrete around the edges of the bearing areas. A previous report in 2012 recommended that these substructure units be rehabilitated as part of a comprehensive rehabilitation project within the next few years. The city plans to perform repair and stabilization work at Pier 3, similar to the work done for Pier 4. The city also plans to perform repair and stabilization work at Pier 5 at some time in the immediate future.

Channel

The bridge crosses the Mississippi River. Inspection reports indicate a limited risk for scour. Inspection reports also indicate a navigation vertical clearance of 38 feet and a navigation horizontal clearance of 232 feet. Navigation lights are in good condition.

Date of Engineering Site Visit by Mead & Hunt June 12, 2013



IV – Existing Conditions/Recommendations



Condition 1: General view of bridge, looking north (note truss spans over Mississippi River and recent pier 4 concrete encapsulation)



Condition 2: East end of bridge looking west (note planters and asphalt pavement)



IV – Existing Conditions/Recommendations



Condition 3: Concrete deck and metal railing on truss spans (note faded pavement marking and minor debris accumulation on deck)



Condition 4: Condition of ornamental railing



IV – Existing Conditions/Recommendations



Condition 5: Railing and expansion joint in deck over Pier 4 (note minor debris accumulation in joint and deteriorated paint on railing)



Condition 6: Asphalt surface on west approach spans (note minor map cracking is asphalt and paint condition of railing)



IV – Existing Conditions/Recommendations



Condition 7: Looking east along north side of bridge (note spalled concrete on outer edge of deck)



Condition 8: Pier 6, Spans 5 and 6 over West River Road and pedestrian/bicycle paths (note condition of paint on girders)



IV – Existing Conditions/Recommendations



Condition 9: Piers 3 and 4, truss spans 3 and 4; note paint condition of truss spans (note recent work done for Pier 4; similar encapsulation work is proposed for Pier 3)



Condition 10: Pier 4 (note concrete encapsulation and timber fenders)



IV – Existing Conditions/Recommendations



Condition 11: Piers 5 and 6, Span 5 (note steam line)



Condition 12: Underside of approach girder span 5 (note condition of structural steel, leakage of water on Pier 6 and deteriorated concrete on top and side of Pier 6)



IV – Existing Conditions/Recommendations



Condition 13: Underside of truss span 4 (note condition of structural steel of truss span)



Condition 14: Pier 5, north side (note bearings and condition of concrete)



IV – Existing Conditions/Recommendations



Condition 15: Truss Span 4 bearing on Pier 5, north side



Condition 16: Post-tensioning reinforcement on top of Pier 2 for Spans 1 and 2



IV – Existing Conditions/Recommendations

Overall Recommendations

Bridge 94246 was converted from a railroad bridge to a pedestrian/bicycle bridge in 1999. Bridge 94246 has been recently rehabilitated, and there are plans for additional rehabilitation. Because of the recently completed and proposed rehabilitation plans, the focus of this report is to provide maintenance activity recommendations.

The bridge is currently open to pedestrian and bicycle traffic. The recommendations which follow assume the structure's use will remain the same.

It is recommended that the City perform a live load rating analysis for the truss spans and girder spans of the superstructure to determine the structural capacity for the current loads. Costs associated with this rating are not included in this cost estimate.

Recommended Annual Maintenance Activities

- 1. Clean debris from strip seal expansion joints
- 2. Clean debris from bridge deck surface
- 3. Re-caulk joints in deck, estimated 325 linear feet; 10-year cycle
- 4. Restripe the bike lane lines across entire bridge, estimated 2,850 linear feet; 10-year cycle
- 5. Spot paint bridge ornamental railing where paint has peeled and steel is corroding, estimated 200 linear feet
- 6. Monitor condition of asphalt surface in approach spans, and seal if necessary
- 7. Monitor condition of concrete deck in truss spans and seal if necessary
- 8. Monitor condition of all bearings



V – Projected Costs

Summarized Maintenance Construction Cost Estimate

It is important to recognize that the work scope and cost estimates presented herein are based on a limited level assessment of the existing structure or from a previous study. In moving forward with future project planning, it will be essential to undertake a detailed structure assessment addressing the proposed work for the structure. It is also important that any future preservation work follow applicable preservation standards with emphasis to rehabilitate and repair in-place structure elements in lieu of replacement. Only through a thorough review of options and comprehensive structural and historic assessment can a definitive conclusion for replacement of historic fabric be formed.

The opinion of probable maintenance cost provided below is presented in 2013 dollars. This cost was developed without benefit of a detailed, thorough bridge inspection, bridge survey or completion of preliminary design for the estimated work. The estimated cost represents an opinion based on background knowledge of historic unit prices and comparable work performed on other structures. The opinion of cost is intended to provide a programming level of estimated cost. This cost will require refinement and may require significant adjustments as further analysis is completed in determining the course of action for future structure improvements. A 20 percent contingency has been included in the maintenance cost estimate.

Maintenance Cost (refer to the work item breakdown on the next page)

Opinion of Annual Cost- Maintenance Activities: \$ 16,140



V – Projected Costs

	MAINTENANCE COST ESTIMATE (2013 DOLLARS) Bridge No. 94246 February 4, 2014								
			ESTIMA	TED QUANTITI	ES AND COST				
ITEM NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL ESTIMATE				
MAINTE	NANCE COSTS								
1	CLEAN DEBRIS FROM BRIDGE DECK SURFACE	LUMP SUM	1	\$1,500.00	\$1,500.00				
2 3	CLEAN DEBRIS FROM STRIP SEAL EXPANSION JOINTS RECAULK JOINTS IN DECK (ANNUALIZED @ 10%-10 YEAR CYCLE)	LUMP SUM LF	1 325	\$500.00 \$8.00	\$500.00 \$2,600.00				
4	RESTRIPE BICYCLE LANES ACROSS ENTIRE BRIDGE (ANNUALIZED @ 10%-10 YEAR CYCLE)	LF	2850	\$1.00	\$2,850.00				
5	SPOT PAINT ORNAMENTAL RAILING (10% PER YEAR)	LF	200	\$30.00	\$6,000.00				
	20% CONTINGENCY	LUMP SUM	1	\$2,690.00	\$2,690.00				
	ESTIMATED MAINTENANCE COSTS \$16,140.00								



Appendices

Bridge Number: 94246

Appendix A. Glossary



Glossary

Abutment – Component of bridge substructure at either end of bridge that transfers load from superstructure to foundation and provides lateral support for the approach roadway embankment.

Appraisal ratings – Five National Bridge Inventory (NBI) appraisal ratings (structural evaluation, deck geometry, under-clearances, waterway adequacy, and approach alignment, as defined below), collectively called appraisal ratings, are used to evaluate a bridge's overall structural condition and load-carrying capacity. The evaluated bridge is compared with a new bridge built to current design standards. Ratings range from a low of 0 (closed bridge) to a high of 9 (superior). Any appraisal item not applicable to a specific bridge is coded N.

Approach alignment – One of five NBI inspection ratings. This rating appraises a bridge's functionality based on the alignment of its approaches. It incorporates a typical motorist's speed reduction because of the horizontal or vertical alignment of the approach.

Character-defining features – Prominent or distinctive aspects, qualities, or characteristics of a historic property that contribute significantly to its physical character. Features may include structural or decorative details and materials.

Condition, fair – A bridge or bridge component of which all primary structural elements are sound, but may have minor deterioration, section loss, cracking, spalling, or scour.

Condition, good – A bridge or bridge component which may have some minor deficiencies, but all primary structural elements are sound.

Condition, poor – A bridge or bridge component that displays advanced section loss, deterioration, cracking, spalling, or scour.

Condition rating – Level of deterioration of bridge components and elements expressed on a numerical scale according to the NBI system. Components include the substructure, superstructure, deck, channel, and culvert. Elements are subsets of components, e.g., piers and abutments are elements of the component substructure. The evaluated bridge is compared with a new bridge built to current design standards. Component ratings range from 0 (failure) to 9 (new) or N for (not applicable); elements are rated on a scale of 1-3, 1-4 or 1-5 (depending on the element type and material). In all cases condition state 1 is the best condition with condition state 3, 4 or 5 being the worst condition. In rating a bridge's condition, MnDOT pairs the NBI system with the newer and more sophisticated Pontis element inspection information, which quantifies bridge elements in different condition states and is the basis for subsequent economic analysis.

Corrosion – The general disentegration of metal through oxidation.

Cutwater - The wedge-shaped end of a bridge pier, designed to divide the current and break up ice.

Decay - Deterioration of wood as a result of fungi feeding on its cell walls.

Delamination - Surface separation of concrete, steel, glue laminated timber plies etc. into layers.

Deck geometry – One of five NBI appraisal ratings. This rating appraises the functionality of a bridge's roadway width and vertical clearance, taking into account the type of roadway, number of lanes, and ADT.

Deficiency – The inadequacy of a bridge in terms of structure, serviceability, and/or function. Structural deficiency is determined through periodic inspections and is reflected in the ratings that are assigned to a bridge. Service deficiency is determined by comparing the facilities a bridge provides for vehicular, bicycle, and pedestrian traffic with those that are desired. Functional deficiency is another term for functionally obsolete (see below). Remedial activities may be needed to address any or all of these deficiencies.

Deficiency rating – A nonnumeric code indicating a bridge's status as structurally deficient (SD) or functionally obsolete (FO). See below for the definitions of SD and FO. The deficiency rating status may be used as a basis for establishing a bridge's eligibility and priority for replacement or rehabilitation.

Design exception – A deviation from federal design and geometric standards that takes into account environmental, scenic, aesthetic, historic, and community factors that may have bearing upon a transportation project. A design exception is used for federally funded projects where federal standards are not met. Approval requires appropriate justification and documentation that concerns for safety, durability, and economy of maintenance have been met.

Design load – The usable live-load capacity that a bridge was designed to carry, expressed in tons according to the AASHTO allowable stress, load factor, or load resistance factor rating methods. An additional code was recently added to assess design load by a rating factor instead of tons. This code is used to determine if a bridge has sufficient strength to accommodate traffic load demands. A bridge that is posted for load restrictions is not adequate to accommodate present or expected legal truck traffic.

Deterioration – Decline in condition of surfaces or structure over a period of time due to chemical or physical degradation.

Efflorescence – A deposit on concrete or brick caused by crystallization of carbonates brought to the surface by moisture in the masonry or concrete.

Extant – Currently or actually existing.

Extrados – The upper or outer surfaces of the voussoirs which compose the arch ring. Often contrasted with intrados.

Footing – The enlarged, lower portion of a substructure which distributes the structure load either to the earth or to supporting piles.

Fracture Critical Members – Tension members or tension components of bending members (including those subject to reversal of stress) whose failure would be expected to result in collapse of the bridge.

Functionally obsolete – The Federal Highway Administration (FHWA) classification of a bridge that does not meet current or projected traffic needs because of inadequate horizontal or vertical clearance, inadequate load-carrying capacity, and/or insufficient opening to accommodate water flow under the bridge. An appraisal rating of 3 or less for deck geometry, underclearance, approach alignment, structural evaluation or waterway adequacy will designate a bridge as functionally obsolete.

Gusset plate – A plate that connects the horizontal and vertical members of a truss structure and holds them in correct position at a joint.

Helicoidal – Arranged in or having the approximate shape of a flattened coil or spiral.

Historic fabric – The material in a bridge that was part of original construction or a subsequent alteration within the historic period of the bridge (i.e., more than 50 years old). Historic fabric is an important part of the character of the historic bridge and the removal, concealment, or alteration of any historic material or distinctive engineering or architectural feature should be avoided if possible. Often, the character-defining features include important historic fabric. However, historic fabric can also be found on other elements of a bridge that have not been noted as character-defining.

Historic bridge – A bridge that is listed in, or eligible for listing in, the National Register of Historic Places.

Historic integrity – The authenticity of a bridge's historic identity, evidenced by the survival and/or restoration of physical characteristics that existed during the bridge's historic period. A bridge may have integrity of location, design, setting, materials, workmanship, feeling, and association.

Inspections – Periodic field assessments and subsequent consideration of the fitness of a structure and the associated approaches and amenities to continue to function safely.

Intrados – The innner or lower surface of an arch. Often contrasted with extrados.

Inventory rating – The load level a bridge can safely carry for an indefinite amount of time expressed in tons or by the rating factor described in design load (see above). Inventory rating values typically correspond to the original design load for a bridge without deterioration.

Keystone - Wedge-shaped stone, or voussoir, at the crown of an arch.

Load Rating – The determination of the live load carrying capacity of a bridge using bridge plans and supplemented by field inspection.

Maintenance – Work of a routine nature to prevent or control the process of deterioration of a bridge.

Minnesota Historical Property Record – A documentary record of an important architectural, engineering, or industrial site, maintained by the Minnesota Historical Socitety as part of the state's commitment to historic preservation. MHPR typically includes large-format photographs and written history, and may also include historic photographs, drawings, and/or plans. This state-level documentation program is modeled after a federal program known as the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER).

National Bridge Inventory – Bridge inventory and appraisal data collected by the FHWA to fulfill the requirements of the National Bridge Inspection Standards (NBIS). Each state maintains an inventory of its bridges subject to NBIS and sends an annual update to the FHWA.

National Bridge Inspection Standards – Federal requirements for procedures and frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of state bridge inventories. NBIS applies to bridges located on public roads.

National Register of Historic Places – The official inventory of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, which is maintained by the Secretary of the Interior under the authority of the National Historic Preservation Act of 1966 (as amended).

Non-vehicular traffic – Pedestrians, non-motorized recreational vehicles, and small motorized recreational vehicles moving along a transportation route that does not serve automobiles and trucks. Includes bicycles and snowmobiles.

Operating rating – Maximum permissible load level to which a bridge may be subjected based on a specific truck type, expressed in tons or by the rating factor described in design load (see above).

Pack rust – Rust forming between adjacent steel surfaces in contact which tends to force the surfaces apart due to the increase in steel volume.

Pier – A substructure unit that supports the spans of a multi-span superstructure at an intermediate location between its abutments.

Pointing – The compaction of mortar into the outermost portion of a joint and the troweling of its exposed surface to secure water tightness and/ or desired architectural effect (when replacing deteriorated mortar).

Pony truss – A through bridge with parallel chords and having no top lateral bracing over the deck between the top chords.

Posted load – Legal live-load capacity for a bridge which is associated with the operating rating. A bridge posted for load restrictions is inadequate for legal truck traffic.

Pontis – Computer-based bridge management system to store inventory and inspection data and assist in other bridge data management tasks.

Preservation – Preservation, as used in this report, refers to historic preservation that is consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. Historic preservation means saving from destruction or deterioration old and historic buildings, sites, structures, and objects, and providing for their continued use by means of restoration, rehabilitation, or adaptive reuse. It is the act or process of applying measures to sustain the existing form, integrity, and material of a historic building or structure, and its site and setting. MnDOT's *Bridge Preservation, Improvement and Replacement Guidelines* describe preservation differently, focusing on repairing or delaying the deterioration of a bridge without significantly improving its function and without considerations for its historic integrity.

Preventive maintenance – The planned strategy of cost-effective treatments that preserve a bridge, slow future deterioration, and maintain or improve its functional condition without increasing structural capacity.

Reconstruction – The act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location. Activities should be consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties.*

Rehabilitation – The act or process of returning a historic property to a state of utility through repair or alteration which makes possible an efficient contemporary use, while preserving those portions or features of the property that are significant to its historical, architectural, and cultural values. Historic rehabilitation, as used in this report, refers to implementing activities that are consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. As such, rehabilitation retains historic fabric and is different from replacement. MnDOT's *Bridge Preservation, Improvement and Replacement Guidelines* describe rehabilitation and replacement in similar terms.

Restoration – The act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time. Activities should be consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties.*

Ring stone – One of the separate stones of an arch that shows on the face of the headwall, or end of the arch. Also known as a voussoir.

Scaling – The gradual distentegration of a concrete surface due to the failure of the cement surface caused by chemical attack or freeze-thaw cycles or rebar too close to the surface and oxidizing from exposure to chlorides.

Scour – Removal of material from a river's bed or bank by flowing water, compromising the strength, stability, and serviceability of a bridge.

Scour critical rating – A measure of a bridge's vulnerability to scour (see above). MnDOT utilizes letter designations to represent specific descriptions of a bridges susceptibility and/ or present condition in regards to scour. Range in condition and scour susceptibility does not necessarily correlate alpha numerically to the MnDOT scour code letters so it is important to understand the specific scour description for each MnDOT scour code. The scour codes and descriptions can be found in the "MNDOT Bridge Inspection Field Manual".

Section loss – Loss of a member's cross sectional area and resulting strength usually by corrosion or decay.

Serviceability – Level of facilities a bridge provides for vehicular, bicycle, and pedestrian traffic, compared with current design standards.

Smart flag – Special Pontis inspection element used to report the condition assessment of a deficiency that cannot be modeled, such as cracks, section loss, and steel fatigue.

Spall – Depression in concrete caused by a separation of a portion of the surface concrete, revealing a fracture parallel with or slightly inclined to the surface.

Spring line – The imaginary horizontal line at which an arch or vault begins to curve. As example, the point of transition from the vertical face of an abutment to the start of arch curvature extending from abutment face.

Stabilization – The act or process of stopping or slowing further deterioration of a bridge by means of making minor repairs until a more permanent repair or rehabilitation can be completed.

Stringcourse – A horizontal band of masonry, generally narrower than other courses and sometimes projecting, that extends across the structure's horizontal face as an architectural accent. Also known as belt course.

Structural evaluation – Condition rating of a bridge designed to carry vehicular loads, expressed as a numeric value and based on the condition of the superstructure and substructure, the inventory load rating, and the ADT.

Structurally deficient – Classification indicating NBI condition rating of 4 or less for any of the following: deck condition, superstructure condition, substructure condition, or culvert condition. A bridge is also classified as structurally deficient if it has an appraisal rating of 2 or less for its structural evaluation or waterway adequacy. A structurally deficient bridge is restricted to lightweight vehicles; requires immediate rehabilitation to remain open to traffic; or requires maintenance, rehabilitation, or replacement.

Sufficiency rating – Rating of a bridge's structural adequacy and safety for public use, and its serviceability and function, expressed on a numeric scale ranging from a low of 0 to a high of 100. It is a relative measure of a bridge's deterioration, load capacity deficiency, or functional obsolescence. MnDOT may use the rating as a basis for establishing eligibility and priority for replacement or rehabilitation. Typically, bridges which are structurally deficient and have sufficiency ratings between 50 and 80 are eligible for federal rehabilitation funds and those which are structurally deficient with sufficiency ratings of 50 and below are eligible for replacement.

Through truss – A bridge with parallel top and bottom chords and top lateral bracing with the deck generally near the bottom chord.

Under-clearances – One of five NBI appraisal ratings. This rating appraises the suitability of the horizontal and vertical clearances of a grade-separation structure, taking into account whether traffic beneath the structure is one- or two-way.

Variance – A deviation from State Aid Operations Statute Rules that takes into account environmental, scenic, aesthetic, historic, and community factors that may have bearing upon a transportation project. A design variance is used for projects using state aid funds. Approval requires appropriate justification and documentation that concerns for safety, durability and economy of maintenance have been met.

Vehicular traffic – The passage of automobiles and trucks along a transportation route.

Voussoir - One of the separate stones forming an arch ring; also known as a ring stone.

Waterway adequacy – One of five NBI appraisal ratings. This rating appraises a bridge's waterway opening and passage of flow under or through the bridge, frequency of roadway overtopping, and typical duration of an overtopping event.

Appendices	Bridge Number: 94246

Appendix B. Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior's Standards



The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations

Adapted from:

Clark, Kenneth M., Grimes, Mathew C., and Ann B. Miller, *Final Report, A Management Plan for Historic Bridges in Virginia*, Virginia Transportation Research Council, 2001.

The Secretary of the Interior's Standards for the Treatment of Historic Properties, first codified in 1979 and revised in 1992, have been interpreted and applied largely to buildings rather than engineering structures. In this document, the differences between buildings and structures are recognized and the language of the Standards has been adapted to the special requirements of historic bridges.

- Every reasonable effort shall be made to continue an historic bridge in useful transportation service. Primary consideration shall be given to rehabilitation of the bridge on site. Only when this option has been fully exhausted shall other alternatives be explored.
- 2. The original character-defining qualities or elements of a bridge, its site, and its environment should be respected. The removal, concealment, or alteration of any historic material or distinctive engineering or architectural feature should be avoided.
- 3. All bridges shall be recognized as products of their own time. Alterations that have no historical basis and that seek to create a false historical appearance shall not be undertaken.
- 4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.
- 5. Distinctive engineering and stylistic features, finishes, and construction techniques or examples of craftsmanship that characterize an historic property shall be preserved.
- 6. Deteriorated structural members and architectural features shall be retained and repaired, rather than replaced. Where the severity of deterioration requires replacement of a distinctive element, the new element should match the old in design, texture, and other visual qualities and where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
- 7. Chemical and physical treatments that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the most environmentally sensitive means possible.

- 8. Significant archaeological and cultural resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
- 9. New additions, exterior alterations, structural reinforcements, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
- 10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Appendices

Bridge Number: 94246

Appendix C. Documents



Additional Electronic Data Bridge 94246

Historic Data

• Research

Local Data

• Questionnaire MN Local Historic Bridge Study

MnDOT Reports

- From City of Minneapolis
- 94246 Condition Sheet 2010
- 94246 Inspection 11-07-12
- 94246 Inventory 05-29-13

Photos

- 94246_From City of MpIs
- 94246 M&H Engineering 6-12-2013
- 94246 M&H Historic 6-12-13
- 94246 Photos 2004
- Historic Photos
- Report Photos

Plans

- 214-94246, 1999 Remodeling
- 94246, 1922

Mn/DOT BRIDGE INSPECTION REPORT

Inspecte BRIDG	ed by: Cl E 9424	TY OF MINNEAPOLIS	N RR) OVER M	IISS RIVER A	& W RIVER RD		INSP. DA	TE: 11-0	7-2012	
County: City: N Townshi Section: Span Ty	HENN IINNEAF ip: 24 Town /pe: S1	EPIN POLIS nship: 029NN Range: 24W FEEL DECK TRUSS	Location: PE Route: MUN Control Sectior Local Agency E	ED. BRIDGE SC I O Ref. I n: M Bridge Nbr:	DUTH OF CED Pt.: /aint. Area: 7214	Length: Deck Wi Rdwy, A Paint An Culvert	952.0 ft dth: 28.5 f rea / Pct. Ur ea/ Pct. Uns N/A	t Isnd: nd:	23,734 sq f	t 85 %
NBI De	ck: 7 S	uper:5 Sub:2 Chan:7 C	Culv: N	Open, Postec	l, Closed: OPE	EN				
Appraisa	al Rating	s - Approach: N Waterway: 8	3	MN Scour Co	de: K-LIMITED F	RISK	Def. Stat:	N/A	Suff. Rate:	N/A
Require	d Bridge	Signs - Load Posting: NOT R Horizontal: NOT REQ	EQUIRED Traf UIRED Vertical	fic: NOT REQU : NOT APPLIC	IRED ABLE					
STRUC	TURE U	NIT: 0								
ELEM NBR		ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
13	BIT. O/	L (CONC DECK)	2	11-07-2012	13,539 SF	13,539	0	0	0	0
	Notes:	13. WEST ASPHALT HAS	MANY LARGE LOI	NGITUDINAL A	ND TRANSVERSE	CRACKS. SI	EALCOATE	O IN 2012	Ŭ	
26	TOP O	F CONC DECK-EPX	2	11-07-2012	10,195 SF	10,195	0	0	0	0
	Notes:	26. THERE IS MANY FINE	TO MEDIUM SIZE	09-29-2011 TRANSVERSE	10,195 SF E AND LONGITUDI	10,195 NAL CRACK	0 S. SOME GI	0 RAFFITI.J	0	0
300	STRIP	SEAL JOINT	2	11-07-2012	89 LF	89	0	0	N/A	N/A
	Notes:	300. FULL OF SAND. MINO MISSING ON THE NORTH.	OR SPALL ON NO	09-29-2011 RTH SIDE BY (89 LF COVER PLATE WIT	89 H SOME GR	0 AFFITI. ON	0 E SCREW	N/A	N/A
301	POURE	ED DECK JOINT	2	11-07-2012	325 LF	0	325	0	N/A	N/A
	Notes:	301. LOSS OF ADHESION	IN MANY LOCATI	09-29-2011 ON WITH MOIS	325 LF STURE LEAKING T	0 HROUGH.	325	0	N/A	N/A
407	BITUM	NOUS APPROACH	1	11-07-2012	2 EA	2	0	0	0	N/A
	Notes:	407. ASPHALT OVERLAY EAST END AND ONE LONG IN 2012	HAS THREE MED GITUDINAL. MANY	09-29-2011 NUM TO LARG	2 EA E SIZE TRANSVER E CRACKS ON THI	2 RSE CRACKS E WEST, ON	0 AT THE PI E MASSIVE	0 ER ON TH . SEALCO	0 IE ATED	N/A
334	METAL	RAIL-COATED	2	11-07-2012	1,896 LF	1,851	15	30	0	0
	Notes:	[334. THE PAINT IS START WITH RUST DOWNSTREA UPSTREAM N.E. VERTICA MANY PAINTED OVER AN SOME OF THE GROUT IS ABUTMENTS.]	ING TO OXIDIZE I AM SIDE MIDDLE O LS HAVE BULGIN D NOT DRAINING LOOSE AT THE B	09-29-2011 WITH SOME PA OF BRIDGE, MA G FROM WATE , MINOR ACCIE ASE OF THE P	1,896 LF AINT PEELING ANI ANY AREAS OF RA ER EXPANSION. R DENT DAMAGE TO OSTS. HEAVY VEC	1,851 O RUST. 30' AIL ARE PITT AIL BOTTOM BOTTOM R GETATION O	15 HEAVY PAII ING. I HAS WEEF AIL AT EAS VER RAIL E	30 NT PEELIN P HOLES, T SIDE NO BOTH	0 NG WITH DRTH.	0
107	PAINTE	ED STEEL GIRDER	2	11-07-2012	1,818 LF	0	0	1,818	0	0
	Notes:	107. THERE IS UNIFORM	MODERATE TO H	EAVY RUST O	N ALL OF THE APP	PROACH GIF	DERS. PAC	K RUST A	AT THE	0
113	PAINT	STEEL STRINGER	2	11-07-2012	1,959 LF	0	0	1,959	0	0
	Notes:	(113. THERE IS UNIFORM FLOWERING AND HEAVY NORTH TRUSS AND EIGH	MODERATE TO H PACK RUST ON T T STRINGERS ON	EAVY RUST W THE UPPER GL	I,959 LF (ITH PACK RUST A JSSET PLATES. TH TRUSS.]	T MANY OF	THE CREVI	CES. RIVI GERS ON	ET THE	0
131	PAINT	STL DECK TRUSS	1	11-07-2012	1,493 LF	0	0	1,493	0	0
	Notes:	131 & 357. THERE IS UNIF CREVICES WITH SOME PU	ORM MODERATE	09-29-2011 TO HEAVY RU	1,493 LF UST THROUGHOU	0 T WITH PAC	0 KRUST AT	1,493 MANY OF	0 THE	0

Mn/DOT BRIDGE INSPECTION REPORT

Page 2 of 4

BRIDG	E 9424	6 BR#9 PED (ABAN	NRR) OVER	VIISS RIVER 8	W RIVER RD		INSP. DA	TE: 11-07	-2012	
STRUC	TURE U	NIT: 0								
ELEM NBR		ELEMENT NAME	EN	/ INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
152	PAINT	STL FLOORBEAM	1	11-07-2012	449 LF	0	0	449	0	0
	Notes:	1152 THERE IS LINIFORM N		09-29-2011	449 LF			449		0
	Notes.	CONNECTIONS.	IODERATE TO	NEAVE KOOL II	ikooghoot with	TFACKROC		REVICEO		
423	GUSSE	T PLATE (PAINT)	1	11-07-2012	1 EA	0	1	0	0	0
	Notes:	423. GUSSET PLATE CONN	ECTIONS. SOM	09-29-2011 ME PACK RUST \	1 EA WITH NO SIGNIFIC	0 ANT SECTIO	1 ON LOSS.	0	0	0
380	SECON	IDARY ELEMENTS	1	11-07-2012	1 EA	0	1	0	0	N/A
	Notes			09-29-2011					0	N/A
	Notes.	PLATES.	VAT BRACING.	HEAVT RUST W	ATH SOME HOLES			INECTION		
311	EXPAN	SION BEARING	2	11-07-2012	26 EA	0	26	0	N/A	N/A
	Notes:	1311, SOME OF THE BEARIN	IG NUTS AND E	09-29-2011 BOLTS ARE MISS	26 EA SING, THERE IS HE	0 EAVY PACK	26 RUST AT A	0 ALL OF THE	N/A	N/A
		BEARINGS. FULL OF DEBRI	S.							
313	FIXED	BEARING	2	11-07-2012	26 EA	0	26	0	N/A	N/A
	Notes:	1313 SOME OF THE BEARIN		09-29-2011	26 EA		26 RUSTATA		N/A	N/A
	110100.	BEARINGS. THERE IS SOM	E DEBRIS IN TH	E ROCKER ASS	EMBLIES. LOSS O	F BEARING	WEST SID	E OF PIER	3.	
210	CONCE	RETE PIER WALL	2	11-07-2012	197 LF	0	155	42	0	N/A
	Notes:	210. THERE ARE MANY CR	ACKS, DELAMI	09-29-2011 NATIONS, SPAL	167 LF LS WITH REBAR E	U XPOSED, F	135 RUST STAIN	32 IS,	0	N/A
		EFFLORESCENCE. THERE PIERS 3, 4 AND 5 DO NOT H CREW ENCAPSULATING PI	IS HEAVY GRA AVE REINFOR ER FOUR WITH	FFITI. FINE TO L CEMENT IN THE REBAR AND CO	ARGE SIZE VERTI M. AT TIME OF INS DNCRETE.	CAL AND D	IAGONAL C MINNEAPO	RACKING. LIS BRIDGE	E	
215	CONCR	RETE ABUTMENT	2	11-07-2012	64 LF	0	32	32	0	N/A
	Notes		SCALE SPAL	09-29-2011	56 LF		28	28	0	N/A
	Notes.	VERTICAL CRACKS. N.E. AI FULL HEIGHT VERTICAL CF GRAFFITI.	PPEARS TO HA RACK, HEAVY S	VE MINOR SETT	LEMENT. THE WE	ST ABUTME	OF DEBRIS	NE SMALL S 6, HEAVY	SIZE	
234	CONCR	RETE CAP	2	11-07-2012	203 LF	0	153	40	10	N/A
	Notes:	1234 THE WEST ABUTMEN		09-29-2011	167 LF	0 AVE SOME	135 DEBRIS ON	30 ITHEM TH	2	N/A
	Hotos.	EAST ABUTMENT CAP HAS	MASSIVE CRA	CKS AND IS FUL	L OF DEBRIS. THE	PIER CAP	S ARE SEV	ERELY	_	
		DETERIORATING, WITH SP. BACK PITCH CAUSING DRA	ALLS, SOME LO	SS OF BEARING	G AT PIERS 2 AND ARGE SIZE DIAGO	3. THE WE	ST ABUTME ERTICAL CI	ENT CAP H/ RACKS UNI	AS DER	
		BEARINGS. AT TIME OF INS	PECTION BRID	GE CREW ENC	APSULATING PIER	FOUR.				
387	CONCE	RETE WINGWALL	2	11-07-2012	4 EA	0	2	2	0	N/A
	Notes:	1387. THE ABUTMENT SIDE	WALLS ON THE	09-29-2011 EAST HAVE LA	4 EA RGE AREAS OF SO	0 CALING, SP	2 ALLS AND I	2 MAP CRAC	0 KING	N/A
	110100.	WITH EFFLORESCENCE AN	ID DELAMINAT	ON.		, Linto, or				
357	PACK F	RUST	2	11-07-2012	1 EA	0	1	0	0	N/A
	Notes:	357. PACK RUST AT ELEM	ENT 113, 131, 1	09-29-2011 52 AND 380.	1 EA	0	1	0	0	N/A
358	CONCI	DECK CRACKING	2	11-07-2012	1 EA	1	0	0	0	N/A
	Notes:	358. MANY TRANSVERSE	CRACKS.	09-29-2011	1 EA	1	0	0	0	N/A

Mn/DOT BRIDGE INSPECTION REPORT

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Inspecte											
BRIDG	SE 9424	16 BR#9 PED (ABAN	RR) OVER M	IISS RIVER 8	W RIVER RD		INSP. DA	TE: 11-07	-2012		
STRUC	STRUCTURE UNIT: 0										
ELEM NBR		ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5	
359	CONC	DECK UNDERSIDE	2	11-07-2012 09-29-2011	1 EA 1 EA	1 1	0 0	0	0 0	0	
	Notes:	(359. THE CONCRETE SUBS) CRACKS WITH EFFLORESCE LEAKING. MANY SPALLS WIT	URFACE ON TH ENCE AND RUS TH REBARS EX	HE APPROACH ST STAINS. PLY (POSED.	BOTH SIDES HAS : WOOD FORMS IN I	SPALLS WI PLACE ON	TH REBARS EAST SIDE	CENTER J), IOINT		
360	SETTL	EMENT	1	11-07-2012	1 EA	1	0	0	N/A	N/A	
	Notes:	360. MINOR SETTLEMENT A	T THE N.E. CO	RNER OF THE	N. ABUTMENT.	1	U	U	N/A	N/A	
361	SCOUF	२	1	11-07-2012	1 EA	1	0	0	N/A	N/A	
	Notes:	361. THERE IS SOME MINOF THE WOOD PROTECTION AT (RATED K - LIMITED RISK. M	R ACCIDENT D/ I WATER LEVE ONITORING RE	AMAGE TO THE L IN NOT BOLT EQUIRED.)	E DOWNSTREAM S	IDE OF THE	E PIER PRO	TECTION A ARE MISSI	ND NG.	19/24	
363	SECTIO	ON LOSS	1	11-07-2012	1 EA 1 EA	1	0	0	0	N/A	
	Notes:	363. SECTION LOSS, SEE 11	13, 131, 152, 31	1, 313, 380, 423	.	,	, e	Ū	Ū		
964	CRITIC	CAL FINDING	2	11-07-2012	1 EA 1 EA	0	1	N/A N/A	N/A N/A	N/A	
	Notes:	[964. Pier 2 shear cracking was Pier 4 shear cracking was obse testing by Braun indicated that Braun indicated that concrete of	s observed unde erved under the Pier 4 is unrein quality varies dra	er the outside of outside bearing forced (see Appe amatically in Pier	the bearing on both on both sides of the endix A - Braun Inter r 4. Multiple cores we	sides of the Pier (West a tech Report ere retrieved	Pier (West and East). N). Core sam I as rubble.]	and East). F londestructiv ples collecte	or ve ed by		
966	FRACT	URE CRITICAL	1	11-07-2012	1 EA	1	0	0	N/A	N/A	
	Notes:	1966. FRACTURE CRITICAL II	NSPECTION DO	09-29-2011 DNE 9/19/2011 E	1 EA BY CITY INSPECTO	1 RS.	0	0	N/A	N/A	
981	SIGNIN	IG	2	11-07-2012	1 EA	1	0	0	0	0	
	Notes:	981. HISTORICAL MARKERS ACCIDENT DAMAGE. THE RI	AT BOTH END VER PIER HAS	09-29-2011 OS, THE N. SIGN WO WAKE ZO	N IS FADING WITH S NE" SIGNS ATTACI	3 SOME SCR/ HED.	APE MARKS	S AND	0	0	
988	MISCE	LLANEOUS	2	11-07-2012	1 EA	0	1	0	N/A	N/A	
	Notes:	988. NAVIGATIONAL LIGHTII CENTER OF CHANNEL.	NG: GOOD. LIG	HTS ON DECK	TWO MISSING CO	VER PLATE	ES DOWNS	TREAM,	N/A	N/A	

Mn/DOT BRIDGE INSPECTION REPORT

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BRIDG	ed by: CITY E 94246	OF MINNEAPOLIS BR#9 PED (ABAN	W RIVER RD	INSP. DATE: 11-07-2012						
STRUC	TURE UNIT	Γ: Ο								
ELEM NBR		ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
967	GUSSET I	DISTORTION	1	11-07-2012 09-29-2011	1 EA 1 EA	1 1	0 0	0 0	0	N/A N/A
	Notes: IS	967. NO VISIBLE GUSSET PL	ATE DISTORT	ION.I						

General Notes: *CITY BRIDGE #7214 UPSTREAM SIDE OF BRIDGE ORIENTS TO THE NORTH AND TO BRIDGE PLANS. PLANS START WITH EAST BANK AS ABUTMENT #1 AND WEST BANK ABUTMENT #8 WITH 6 PIERS. CAT WALK SECURED WITH CITY LOCK #43 KEY NEEDED. NOTE: FOR ADDITIONAL INFORMATION LOOK IN SNOOPER REPORTS AND SCOUR REPORT. NOTE: HNTB PERFORMED AN INSPECTION AND ANALYSIS IN 1986. IN 1994 THE STATE PERFORMED AN IN-DEPTH SNOOPER INSPECTION AND WOODWARD-CLYDE COMPLETED AN EVALUATION OF THE BRIDGE AS A POTENTIAL HISTORIC STRUCTURE. IN 2008 SEH CONSULTANTS DID A IN-DEPTH INSPECTION. REPAIRS MADE: THE S.W. PIER PROTECTION WAS REPAIRED IN 1991. PIER PROTECTION AND BROKEN DECK BOARDS WERE REPAIRED IN 1993. FOUR SECTIONS OF BROKEN RAILING WERE REPAIRED IN 1995. THE BRIDGE DECK IS WAS REMODELED BY EDWARD KRAEMER AND SONS IN 1999. PERMANENT NAVIGATIONAL LIGHTS WHERE ATTACHED IN 2000. LIGHTING ON BRIDGE NEW IN 2000. CRACK SEALED THE SIDEWALK AND DECK IN 2002. NOTE: U OF M CONTACT: GENE HUSTED, GENERAL FOREMAN-CELL 282-9572 NOTE: TWO SNOOPER INSPECTIONS WERE DONE IN 2007, ONE AFTER 35W COLLAPSE AND ONE WITH TKDA CONSULTANT REVIEWING OUR INSPECTION TECHNIQUES. 2008 NEW STEAM LINE RAP INSTALLED WITH THE OLD ASBESTOS REMOVED. NOTE: BRIDGE IS CLOSED TO VEHICLE TRAFFIC. PLANTERS LOCATED AT BOTH ENDS.

Inspector's Signature

Reviewer's Signature / Date

Mn/DOT Structure Inventory Report

Bridge ID: 94246 BR#9 PED (ABAN RR) over MISS RIVER & W RIVER RD

Date: 05/29/2013

+ GENERAL +	+ ROADWAY +	+ INSPECTION +
Agency Br. No. 7214	Bridge Match ID (TIS) 1	Deficient Status N/A
District METRO Maint. Area	Roadway O/U Key 2-UNDER	Sufficiency Rating N/A
County 27 - HENNEPIN	Route Sys/Nbr MUN 0	Last Inspection Date 11-07-2012
City MINNEAPOLIS	Roadway Name or Description	Inspection Frequency 12
Township	MISS RIVER & W RIVER RD	Inspector Name MINNEAPOLIS
Desc. Loc. PED. BRIDGE SOUTH OF CED	Roadway Function MAINLINE	Structure A-OPEN
Sect., Twp., Range 24 - 029NN - 24W	Roadway Type 2 WAY TRAF	+ NBI CONDITION RATINGS +
Latitude 44d 58m 42.00s	Control Section (TH Only)	Deck 7
Longitude 93d 14m 24.00s	Ref. Point (TH Only)	Superstructure 5
Custodian CITY	Date Opened to Traffic	Substructure 2
Owner CITY	Detour Length 1 mi.	Channel 7
Inspection By CITY OF MINNEAPOLIS	Lanes 2 Lanes UNDER Bridge	Culvert N
BMU Agreement	ADT (YEAR) 1 (2009)	+ NBI APPRAISAL RATINGS +
Year Built 1922	HCADT	Structure Evaluation N
Year Fed Rebab	Functional Class. URBAN LOCAL	Deck Geometry N
Year Remodeled 1999	+ RDWY DIMENSIONS +	Underclearances 9
Temp	If Divided NB-EB SB-WB	Waterway Adequacy 8
Plan Avail. NO PLAN	Roadway Width 24.0 ft	Approach Alignment N
+ STRUCTURE +	Vertical Clearance 17.9 ft	+ SAFETY FEATURES +
Service On PED-BICYCLE	Max. Vert. Clear. 17.9 ft	Bridge Railing N-NOT REQUIRED
Service Under HWY:STREAM	Horizontal Clear. 24.0 ft	GR Transition N-NOT REQUIRED
Main Span Type STEEL DECK TRUSS	Lateral Cir Lt/Rt 17.9 ft	Appr. Guardrail N-NOT REQUIRED
Main Span Detail PRATT	Appr. Surface Width 28.0 ft	GR Termini N-NOT REQUIRED
Appr. Span Type STEEL DECK GIRD	Roadway Width 24.0 ft	+ IN DEPTH INSP. +
Appr. Span Detail	Median Width	Frac. Critical
Skew	+ MISC. BRIDGE DATA +	Underwater Y 60 mo 10/2012
Culvert Type	Structure Flared NO	Pinned Asbly.
Barrel Length	Parallel Structure NONE	Spec. Feat.
Number of Spans	Field Conn. ID PINNED	+ WATERWAY +
MAIN: 2 APPR: 5 TOTAL: 7	Cantilever ID	Drainage Area
Main Span Length 249.0 ft	Foundations	Waterway Opening 99999 sq ft
Structure Length 952.0 ft	Abut. CONC - UNKN	Navigation Control PERMIT REQD
Deck Width 28.5 ft	Pier CONC - UNKN	Pier Protection NOT REQUIRED
Deck Material C-I-P CONCRETE	Historic Status ELIGIBLE	Nav. Vert./Horz. Clr. 38 ft 232.0 ft
Wear Surf Type MONOLITHIC CONC	On - Off System OFF	Nav. Vert. Lift Bridge Clear.
Wear Surf Install Year	+ PAINT +	MN Scour Code K-LIMITED RISK
Wear Course/Fill Depth	Year Painted 2000 Pct. Unsound 85 %	Scour Evaluation Year 1997
Deck Membrane NONE	Painted Area	+ CAPACITY RATINGS +
Deck Protect. EPOXY COATED REBAR	Primer Type 3309-INORGANIC ZINC	Design Load RR
Deck Install Year	Finish Type URETHANE	Operating Rating RR
Structure Area 27,055 sq ft	+ BRIDGE SIGNS +	Inventory Rating RR
Roadway Area 23,734 sq ft	Posted Load NOT REQUIRED	Posting
Sidewalk Width - L/R	Traffic NOT REQUIRED	Rating Date 01-07-1999
Curb Height - L/R	Horizontal NOT REQUIRED	Mn/DOT Permit Codes
Rail Codes - L/R 40 40	Vertical NOT APPLICABLE	A: N B: N C: N