Bridge 4846 is a Pratt through truss located in Lake Washington Park in Kasota Township, Le Sueur County. Built in 1875, the bridge is owned by Le Sueur County and carries a pedestrian and bicycle path over Shanaska Creek. Bridge 4846 is significant as an early truss bridge in Minnesota and for its wrought iron construction, one of seven extant examples in the state. Additionally, the bridge is significant as being constructed by an important bridge fabricator, Soulerlin, James and Company of Milwaukee, Wisconsin.

Bridge 4846 is a single span 116-foot pin connected wrought iron through truss. The bridge has a timber plank deck and timber curbs and measures about 14 feet from gutter to gutter. The abutments are cast-in-place concrete.

Bridge 4846 is in fair condition overall. Surface rust and paint system failure is widespread but section loss and through corrosion is mainly limited to the floorbeams and stringers. Misalignment and/or twisting of these members about their longitudinal axis is also prevalent, likely a result of the bridge having been moved. With proper maintenance, stabilization and preservation activities, it is believed Bridge 4846 can be restored and continue to serve in its present capacity for 20 years or longer.

Any work on Bridge 4846 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 4846 – PEDESTRIAN over SHANASKA CREEK

PROJECT LOCATION
LE SUEUR COUNTY
SEC. 12, TO 109NN, R 26W
UTM ZONE: 15 NAD: 27
USGS QUAD NAME: SAINT PETER
EASTING: 1404684 ft.
NORTHING: 16081933 ft.
Executive Summary

Bridge Location

I. Project Introduction
II. Historic Data
III. Bridge Data
IV. Existing Conditions/Recommendations
V. Projected Costs

Appendices

A. Glossary
B. Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior’s Standards
C. Documents
This 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. The reports also document the existing use and condition of the bridges along with assessments of the maintenance, stabilization and preservation needs of each structure, including cost estimates. The maintenance activities, along with regular structural inspections and anticipated bridge component replacement activities are routine practices directed toward continued structure serviceability. Stabilization activities address immediate needs identified as necessary to maintain a bridge’s structural and historic integrity and serviceability. Preservation activities are near term or long term steps that need to be taken to preserve and in some cases restore a bridge’s structural and historic integrity and serviceability. In assessing preservation activities, a design life of 20 years or longer is typically considered. In addition to general restoration activities and dependent on the severity of deterioration, preservation activities may include spot repair, disassembly and reassembly or replacement of specific bridge components.

Recommendations within the Bridge Reports are 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.
The Standards were developed with historic buildings in mind and cannot be easily applied to historic bridges. The Virginia Transportation Research Council (Council) 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 maintenance, repair, rehabilitation, and replacement of historic bridges and are included in the Appendix to this report.

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 character-defining 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 report, 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 Bridge Report will provide the bridge owner and other interested parties with a comprehensive summary of the bridge condition and detailed information related to the historic nature of the bridge. This information will enable historic bridge owners to make informed decisions when planning for their historic properties.
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 Inventory 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 Soulerin, James and Company

Designer/Engineer Soulerin, James and Company

Description
Bridge 4846 is a single-span, wrought iron Pratt through-truss located in Lake Washington Park, in Kasota Township, Le Sueur County, Minnesota. The bridge has an overall structural length of 118 feet 10 inches and an overall width of 13 feet 8 inches, and carries a pedestrian and bicycle trail over Shanaska Creek. Located near the northwest edge of the park, the bridge is nestled in the tree-lined banks of the creek. There is an agricultural field to the north, Lake Washington to the east, and a wooded area to the south and west. The embankments of the creek are lined with trees, small rock, and grass. There are also walking paths nearby on both sides of the creek.

The superstructure consists of an eight-panel, wrought iron, Pratt through truss span with pin and eye-bar connections. The top chord and inclined endposts of the truss are built-up members that consist of two channel sections riveted together with a continuous top cover plate and rectangular batten plates along the lower flanges. The vertical posts consist of built-up wrought iron channel sections. The diagonal bracing consists of rectangular eye-bar rods with forged ends. Tubular lateral struts and top sway bracing is riveted to the top chords. The top lateral bracing, located between the vertical members and struts, consists of rods. The north portal strut consists of a channel with quatrefoil details cut (or punched) in the web and a bridge plate. The south portal strut consists of an early I-beam that is riveted to the top chords and a bridge plate. Both bridge plates read “1875.” Ornamental brackets comprise the portal bracing. The lower chords of the truss are comprised of independent eye-bars with punched ends that are connected to the vertical posts by pin connections. Seven floorbeams run transversely under the bridge. Round rod bottom lateral bracing is located between the floorbeams. Atop the floorbeams are eight I-beam stringers. The stringers support a wood plank bridge deck. A wood wheel guard sits atop the deck, just inside the posts. The bi-rail type railings are composed of angle iron, with vertical posts. The substructure of Bridge 4846 consists of reinforced-concrete abutments. The embankments under the abutments are packed earth.

The bridge was relocated in 1928, and was moved to its present location in 1984 when it was converted to a pedestrian bridge. The superstructure exhibits some repairs and member replacements, including the floorbeams and bottom laterals that were damaged in 1960. The wood deck was replaced and new abutments were constructed when the bridge was relocated to its present site.

Significance
Bridge 4846 was constructed in 1875 to carry horse-drawn traffic across the Blue Earth River, just south of Vernon Center in Blue Earth County, Minnesota. The bridge was built by Soulerin, James and Company of Milwaukee, Wisconsin, which was established by Leon Soulerin and Garth W. James in
1870. Two years later, the firm was renamed the Milwaukee Bridge & Iron Works, but continued to bid on projects under the partnership’s original name.

The bridge was constructed with wrought iron. Wrought iron construction dominated American metal-bridge construction until it was replaced by structural steel in the early 1890s. Blue Earth County is notable in the history of iron bridges in Minnesota because it experienced a rapid population growth in the late 1860s, due in part to the arrival of the railroad in 1868. Consequently, as described in the Multiple Property Documentation Form (MPDF) *Iron and Steel Bridges, 1873-1945* the County, “embarked on a program to build high quality, permanent bridges in the late 1860s, the county first turned to iron in 1872.” From the early 1870s to the turn of the twentieth century all but two bridges in the county were constructed of iron or steel. Bridge 4846 is one of seven extant wrought-iron constructed bridges in the state, and one of four that are Pratt through-trusses. The other six wrought-iron bridge examples include:

- Bridge 27664, 1887, Pratt through truss, Hennepin County
- Bridge 92366, 1885, Pratt through truss, Wright County
- Bridge L5669, 1873, Pratt through truss, Hennepin County
- Bridge 82524, 1877, Parker through truss, Washington County
- Bridge 94246, 1886, deck truss, Hennepin County
- Bridge L1393, 1882, deck girder railroad bridge, Winona County

To accommodate increased traffic and heavier, motorized vehicles, Bridge 4846 was replaced by a new bridge in 1928. Although it was already 53 years old, the bridge was still in good condition and reasonably portable, so it was moved to Kasota Township in Le Sueur County, just south of St. Peter. In its new location, the bridge carried County Road 102 over the newly built Trunk Highway (TH) 22, just southeast of the Minnesota River. Over the coming years, the bridge experienced routine maintenance and repair.

By the early 1980s, there was a growing recognition of the significance of Bridge 4846, but after over 100 years in service, it was showing signs of significant deterioration. Since the bridge had deteriorated to the point where it required replacement, MnDOT began planning to replace the structure between 1982 and 1983. As part of the planning process, MnDOT reached an agreement with the Le Sueur County Board of Commissioners, whereby Le Sueur County would take ownership of the bridge, preserve it, and move it to Lake Washington Park in Le Sueur County for use as a pedestrian bridge. The move occurred in 1984.

As a result of being relocated twice, the bridge no longer retains integrity of its original location. Today, Bridge 4846 spans Shanaska Creek, which like the Blue Earth River, is a relatively narrow body of water, lined with trees and surrounded by agricultural fields. Because it still crosses a body of water similar to its original crossing and is located in a comparable setting, integrity of association and feeling have been retained. The superstructure of Bridge 4846 is in largely original condition. Some repairs have occurred to the bridge, including replacement of some original wrought iron members with steel, replacement of the original wood deck, and installation of a new reinforced-concrete substructure when the bridge was moved in 1984. Despite these minor alterations, the bridge retains integrity of materials, workmanship,
II – Historic Data

Bridge Number: 4846

and design. The recommended period of significance is 1875, which corresponds with the year in which the Pratt truss was built.

Bridge 4846 is significance under Criterion C in the area of Engineering as a surviving example of a wrought iron truss in Minnesota. Additionally, the bridge is eligible for being constructed by an important bridge fabricator, Soulerin, James and Company of Milwaukee, Wisconsin.

Historic Context

Historic Iron and Steel Bridge in Minnesota, 1873-1945

National Register Status

Eligible (Individually)

Criterion A Significance

N/A

Criterion C Significance

Engineering: Evolution or transition of type; Work of a master

Historic District

N/A

SHPO inventory number

LE-KST-004

Sources Used to Compile Section II -- Historic Data


Arias, Laurie and Bill Krause

1984 Historic Truss Bridge Spans Park Creek. Dot Scene 7.

Bloomberg, Britta

1980 Minnesota Historic Properties Inventory Form Bridge #4846. Available at the State Historic Preservation Office, St. Paul, Minnesota.

Le Sueur County


Le Center Leader

1985 County Asks Permission to Move Bridge to Lake Washington County Park. 10 August. Le Center, Minnesota.

Minnesota Department of Transportation [MnDOT]

II – Historic Data

2013 Bridge 4846 File. Available at the Minnesota Department of Transportation, St. Paul, Minnesota.

Minnesota Historical Society

Minnesota State Historic Preservation Office (SHPO)

Murray, Rob

Quivik, Fredric L. and Dale L. Martin

The Free Press

Field investigation by LHB, Inc., 30 April 2014.

Field investigation by Mead & Hunt, Inc., 30 June 2013.
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: Design and construction of single-span wrought iron, pin-connected, Pratt through-truss.
Feature 2: Use of wrought iron members in truss construction.
**Minnesota Department of Transportation (MnDOT)**

**Local Historic Bridge Report**

### III – Bridge Data

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**Non-MnDOT Data**

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* 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.**

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*August 2014*
Existing Conditions
Available information, as detailed in the Project Introduction section, concerning Bridge 4846 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 4846 is a single-span, wrought iron Pratt through truss (pin and eye bar construction) with a span length of 116 feet. The 14-foot-wide bridge deck is comprised of transverse timber planks with longitudinal runner planks. The substructure consists of two non-historic concrete abutments.

Bridge 4846 is in fair condition overall. The truss members are mostly in good condition while the bridge structural floor system (floorbeams and stringers) is in poor condition due to corrosion and member misalignment. The existing concrete abutments are in good condition.

Serviceability Observations
The bridge is currently open to pedestrian traffic with no apparent load restrictions.

Condition Observations
Wrought Iron Truss Primary Members
The wrought iron truss primary members are in good condition. Bottom chord members are slightly twisted in some locations. Vertical members have been replaced and do not match the original construction. If the replaced member dates to the historic period (a few years after the bridge’s construction, for example) it would still be considered historic fabric.

Wrought Iron Truss Portal
The steel portal frames are in good condition, the portal frame on the south end is not as ornate as the portal frame on the north end.

Truss Floorbeams and Stringers
The existing floorbeams are in poor condition with several beams showing complete through-corrosion on the webs. Serious section loss was also noted at the connections with the bottom plane cross braces and at floorbeam top flanges where stringers bear. Most of the floorbeams exhibit a pronounced twist about their longitudinal axis, likely a result of the bridge being relocated. The stringers are in fair condition with moderate section loss noted in discrete areas. Many of the stringers lean out of plumb by as much as 2 inches. This also likely occurred during relocation of the bridge.
Truss Bottom In-Plane Cross Bracing
The in-plane cross bracing for the floor system consists of round bars with threaded ends. The bracing is loose and sags noticeably.

Truss Bearings
The bearings appear to be in fair condition. The southeast bearing is buried in earth and debris.

Timber Deck and Curbs
The non-historic timber plank deck appears to be in good condition, as do the longitudinal running planks. The timber curbs are in poor condition with serious damage and decay prevalent. The east curb is missing nearly in its entirety. The timber deck is not connected to the stringer top flanges. This condition contributes to the twist and misalignment of the stringers by allowing rotation.

Bridge Railings
The existing angle railings are in fair condition. The north 20 feet and the south 20 feet of each railing are damaged to the point of requiring replacement but the remaining portions of the railings are in good condition.

Abutments
The existing concrete abutments are in good condition.

Approach/Waterway Observations
The approach trail is in good condition with no noted serious deficiencies. The bridge slopes are in good condition and appear to be stable, though they are void of any erosion or scour protection such as riprap etc.

Date of Engineering Site Visit by LHB
April 29, 2014
Condition 1: Bridge approach, looking south

Condition 2: Bridge approach, looking north
Condition 3: Bridge elevation, looking west

Condition 4: North portal
Condition 5: South portal

Condition 6: Typical floorbeam through corrosion near ends
Condition 7: Typical floorbeam through corrosion near center of beam

Condition 8: Typical floorbeam through corrosion near ends
Condition 9: Twisted floorbeam

Condition 10: Twisted stringer
Condition 11: Sagging bracing rods and connection detail

Condition 12: Southeast bearing covered with earth and debris
Condition 13: Vertical member, original construction type

Condition 14: Vertical member, replacement
Condition 15: General view south showing timber deck, and damaged curb and railing
Overall Recommendations
The bridge is currently only open to pedestrian traffic and for recommendation purposes the future use for
the structure is presumed to remain the same. The preservation activities recommended are based on
the structural integrity and deficiencies of the bridge. Continued deterioration could create a situation
where the original fabric of the bridge would be lost.

Recommended Stabilization Activities
There are no stabilization activities recommended for Bridge 4846.

Recommended Preservation Activities

Superstructure

Wrought Iron Truss Primary Members
Perform a detailed assessment of the degree of section loss in the primary members of the truss
including the pins using non-destructive testing at the member connections. An analysis and load rating
of the truss should be performed based on expected pedestrian and light park maintenance vehicle loads.
It is likely that the current reduced loading requirements of the truss will minimize the amount of required
repairs and/or replacement of existing members. Costs for this assessment and rating have been
included in the “Preliminary Design and Assessment” estimate.

Wrought Iron Truss Floor System
Perform a detailed assessment of degree of section loss and through corrosion of the existing floorbeams
and stringers. The load capacity rating recommended above may be used to aid in determining which
members must be replaced. The current timber floor system should be removed to allow for inspection of
the structural floor system members and realignment and/or replacement as needed. The timber deck
components can be reinstalled but they should be properly connected to the stringer flanges. It is
anticipated that at least 5 floorbeams with severe sections loss and through corrosion will need
replacement and that 2 remaining will require realignment. Depending on loading requirements and
rating, it is likely that at least 70 linear feet of stringers will need replacement and nearly all remaining
stringers will need to be realigned to a web-vertical position. Timber curbs should be replaced in their
entirety, approximately 235 linear feet. All replacements should be performed with in-kind material.

Wrought Iron Truss Secondary Members
The in-plane bracing rods in the floor system should be tightened to improve their effectiveness. Care
should be exercised during tightening so as not to damage any of the original components.

Bridge Railings
The angle section railings should be replaced for 20 linear feet on each end of each railing (80 linear feet
total) due to severe vehicle impact damage. The railings should be replaced in-kind with material of the
same shape, type and finish, and placed in the same configuration as the original rail.
Paint System
The current paint system on the truss and floor system has failed and the system should be replaced. It is recommended that the in-place paint system be entirely removed to bare metal through abrasive blasting, which, through testing, is determined will not degrade portions of the wrought iron structure which are to remain. Following removal, the structure should be painted with a zinc-rich primer and a protective overcoat system with color and sheen to be selected based on a study of preservation standards. The in-place system will require testing to determine the presence of lead. Due to the toxicity of lead the removal of lead paint system requires an intensive encapsulation process. For purposes of cost estimating a lead based system has been presumed.

Bearings
The bearings are fairly deteriorated and, in the case of the expansion bearing, are non-functioning. It is likely replacement will be necessary though this will need to be further determined through more detailed inspection and cleanup. If replacement is determined to be necessary, replacement with components of like material and geometry should be considered to the extent possible as they are a visual element of the structure. For purposes of the preservation cost estimate replacement has been assumed.

Substructure

Abutments
The cast-in-place concrete abutments are in good condition and no work is required.

Slopes/Site
The existing abutment slopes are unprotected. Slope protection/scour protection should be installed.

Recommended Annual Maintenance Activities

1. Clear earth and vegetation from southeast bearing.

2. Re-set two signs off each end of bridge.
Summarized Maintenance, Stabilization and Preservation Construction Cost Estimates

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. 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. This includes elements which are preliminarily estimated for replacement within the work scope of this report. Only through a thorough review of rehabilitation and repair options and comprehensive structural and historic assessment can a definitive conclusion for replacement of historic fabric be formed.

The opinions of probable construction and administrative costs provided below are presented in 2013 dollars. These costs were developed without benefit of a detailed, thorough bridge inspection, bridge survey or completion of preliminary design for the estimated improvements. The estimated costs represent an opinion based on background knowledge of historic unit prices and comparable work performed on other structures. The opinions of cost are intended to provide a programming level of estimated cost. These costs 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 and 7 percent mobilization allowance has been included in the construction cost estimates.

Administrative and engineering costs are also presented below. Engineering and administrative costs are also to be interpreted as programming level only. Costs can be highly variable and are dependent on structure condition, intended work scope, project size and level of investigative, testing and documentation work necessary. Additional studies, evaluation, and historic consultation costs not exclusively called out may also be incurred on a case-by-case basis.

Maintenance, Stabilization and Preservation Costs (refer to the work item breakdown on the next page)

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Estimated Preliminary Design, Final Design, Construction Administration Costs

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## MAINTENANCE, STABILIZATION & PRESERVATION COST ESTIMATE (2013 DOLLARS)

**Bridge No. 4846**  
June 15, 2014

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<td></td>
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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 disintegration 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 inner 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 Society 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 historic, 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 disintegration 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 bridge’s 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.
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:

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.

1. 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 historic basis and that seek to create a false historic 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.
Appendix C. Documents
Additional Electronic Data
Bridge 4846

Historic Data
  • Research

Local Data
  • Le Sueur Co Questionnaire

MnDOT Reports
  • 4846 Condition Sheet 2011
  • 4846 Inspection 12-06-12
  • 4846 Inspection 12-12-13
  • 4846 Inventory 05-29-13
  • 4846 Inventory 4-24-14
  • 4846 Rating Report 1975

Photos
  • 4846 Photos 2005
  • 4846 M&H Photos 10-14-13
  • 4846 LHB Photos 4-30-14
  • Report Photos

Plans
  • No Data
Mn/DOT BRIDGE INSPECTION REPORT
BRIDGE 4846 PEDESTRIAN OVER SHANASKA CREEK INSP. DATE: 12-12-2013

County: LE SUEUR
City: Location: 0.3 MI E OF CSAH 19
 Township: KASOTA
 Route: CNTY 103
 Ref. Fl.: Deck Width: 13.7 ft
 Control Section: Maint. Area:
 Ref.: Relay Area / Pct. Unstd: 1,507 sq ft
 Section: 12 Township: 109N Range: 29W
 Local Agency Bridge Nbr:
 Open Type: IRON HIGH TRUSS
 NBI: Deck: 4 Super: 4 Sub: 6 Cham: 7 Culv: N
 Open, Posted, Closed: OPEN
 Appraisal Ratings - Approach: N Waterway: 7
 MN Scour Code: G-FND UNKN/EVAL
 Def. Stnt: N/A Suff. Rate: N/A
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED
 Horizontal: NOT REQUIRED Vertical: NOT REQUIRED

STRUCTURE UNIT: 0

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General Notes: "LAKE WASHINGTON COUNTY PARK. THIS STRUCTURE ONLY TAKES PEDESTRIAN TRAFFIC. L.S. county is looking into doing some rehab work on this bridge. (2012)"
# Mn/DOT Structure Inventory Report

**Bridge ID:** 4846  **PEDESTRIAN over SHANASKA CREEK**  
**Agency Br. No.:**  
**District:** 7  **Maint. Area:**  
**County:** 40 - LE SUEUR  
**City:**  
**Township:** KASOTA  
**Desc. Loc.:** 0.3 MI E OF CSAH 19  
**Sect., Twp., Range:** 12 - 109NN - 28W  
**Latitude:** 44° 15' 58.87" N  
**Longitude:** 93° 54' 00.79" W  
**Custodian:** COUNTY  
**Owner:** COUNTY  
**Inspection By:** LESUEUR COUNTY  
**BMU Agreement:**  
**Year Built:** 1875  
**Year Remodeled:** 1984  
**Temp. Plan Avail.:** NO PLAN  
**Plan:**  
**Service On:** PED-BICYCLE  
**Service Under:** STREAM  
**Main Span Type:** IRON HIGH TRUSS  
**Main Span Detail:** PRATT  
**Appr. Span Type:**  
**Appr. Span Detail:**  
**Skew:**  
**Culvert Type:**  
**Barrel Length:**  
**Number of Spans:** MAIN: 1  APPR: 0  TOTAL: 1  
**Main Span Length:** 115.7 ft  
**Structure Length:** 118.8 ft  
**Deck Width:** 13.7 ft  
**Deck Material:** TIMBER  
**Wear Surf Type:** N/A  
**Wear Surf Install Year:**  
**Wear Course/Fill Depth:**  
**Deck Membrane:** NONE  
**Deck Protect.:** N/A  
**Deck Install Year:**  
**Structure Area:** 1,628 sq ft  
**Roadway Area:** 1,507 sq ft  
**Sidewalk Width - L/R:**  
**Curb Height - L/R:** 0.50 ft  
**Rail Codes - L/R:** 32 32  
**Bridge Match ID (TIS):** 1  
**Roadway Ov. Key:** 1-ON  
**Route Sys/Nbr:** CNTY 103  
**Roadway Name or Description:**  
**Roadway Function:** N/A  
**Roadway Type:** 2 WAY TRAF  
**Control Section (TH Only):**  
**Ref. Point (TH Only):**  
**Date Opened to Traffic:** 07-01-1984  
**Detour Length:** 1 mi.  
**Lanes:**  
**ADT (YEAR):** 1 (2009)  
**HCADT:**  
**Functional Class:** RURAL LOCAL  
**ROW DIVISIONS:**  
**If Divided:** NB-EB SB-WB  
**Roadway Width:**  
**Vertical Clearance:** 16.0 ft  
**Max. Vert. Clear.:** 16.0 ft  
**Horizontal Clear.:**  
**Lateral Clr. - L/Rt:**  
**Appr. Surface Width:**  
**Roadway Width:**  
**Median Width:**  
**Structure Flared:** NO  
**Parallel Structure:** NONE  
**Field Conn. ID:** PINNED  
**Cantilever ID:**  
**Foundations:**  
**Abut. CONC - UNKN:**  
**Pier:** N/A  
**Historic Status:** ON REGISTER  
**On - Off System:** OFF  
**PAINT:**  
**Year Painted:** 1982  
**Pct. Unsound:** 55%  
**Painted Area:** 12,000 sf  
**Primer Type:** LEAD  
**Finish Type:** ENAMEL  
**PAINT:**  
**POST:**  
**Posted Load:** NOT REQUIRED  
**Traffic:** NOT REQUIRED  
**Horizontal:** NOT REQUIRED  
**Vertical:** NOT REQUIRED  
**SAFETY FEATURES:**  
**Bridge Railing:** N-NOT REQUIRED  
**GR Transition:** N-NOT REQUIRED  
**Appr. Guardrail:** N-NOT REQUIRED  
**GR Termini:** N-NOT REQUIRED  
**WATERWAY:**  
**Drainage Area:**  
**Waterway Opening:** 1000 sq ft  
**Navigation Control:** NO PRMT REQD  
**Pier Protection:**  
**Nav. Vert./Horiz. Clr.:**  
**Nav. Vert. Lift Bridge Clear:**  
**MN Scour Code:** G-FND UNKN/EVAL  
**Scour Evaluation Year:**  
**CAPACITY RATING:**  
**Design Load:** H 10  
**Operating Rating:** PED  
**Inventory Rating:** PED  
**Posting:**  
**Rating Date:**  
**Mn/DOT Permit Codes:** A: N B: N C: N