Bridge L8882, built in 1936 by the Works Progress Administration (WPA), carries East 50th Street generally east-west over Minnehaha Creek in Minneapolis, Hennepin County, Minnesota. The bridge is located within the Minnehaha Parkway, a regional recreational trail that is part of the Grand Rounds. It is owned by the City of Minneapolis. The bridge is significant as a concrete rigid-frame structure designed and constructed to resemble a stone-arch bridge. Additionally, it is a contributing resource to the determined-eligible Grand Rounds Historic District.

Bridge L8882 is a 32-foot-long, single-span, rigid-frame, concrete structure. The bridge deck has a clear width of 44 feet, consisting of a 32-foot roadway with curb and gutter, and two 6-foot-wide sidewalks. The non-historic replacement railing is comprised of large stucco pilasters with a metal pipe bi-railing extending between the pilasters.

Bridge L8882 is in fair condition and appears to adequately serve its purpose of carrying vehicular and pedestrian traffic. The most significant defects of the bridge structure include localized spalling, cracking and delamination of the concrete bridge slab underside, fracturing of the original stone masonry veneer stones, and fracturing and deterioration of stone masonry pointing mortar. With proper maintenance, stabilization and preservation activities it is believed Bridge L8882 could continue to serve in its present capacity for 20 years or longer.

Any work on Bridge L8882 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: L8882

Project Location

Hennepin County
SEC. 15, (NE 1/4 of SE 1/4) TO 028NN, R 24W
USGS Quad Name: Minneapolis South
UTM Zone 15, NAD 83
Easting: 478724 m. (1570617 ft.)
Northing: 4973241 m. (16316409 ft.)

Bridge L8882 – E 50th St Over Minnehaha Creek
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 historic bridges owned by county, city, township, private and other state agencies besides MnDOT. The study is the third 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 Ltd.

The general goals of the study include:

- Identification of bridges not included in the SIMS database or identified in previous studies, to either be studied further (those on local roads/systems) or tabulated for SHPO’s use (trails and abandoned bridges)
- Gathering existing historic data, bridge condition data, and other relevant information on the bridges in the study group and compiling into bridge reports
- Re-evaluation of Chicago, Milwaukee & St. Paul Grade Separation Historic District (Midtown Corridor)
- Preparing HAER documentation for a selected group of bridges
- Investigating and preparing a summary regarding how other states have funded historic bridge programs and suggestions for creation of a new funding mechanism for Minnesota’s local historic bridges

The Bridge Reports compile and summarize 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. In order to identify other potential historic properties, owners should contact MnDOT CRU early in the project planning process. 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 replacements, 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 changes 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, and 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:

- Structure Information Management System (SIMS): system used by MnDOT to manage its 
  inventory of bridges statewide
- 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 or 
  bridges that are not tracked in SIMS)
- Database and inventory forms resulting from Phase II of the Minnesota Local Historic Bridge 
  Study and other prior historic bridge studies as incorporated into the database
- Existing historic context 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 and Local Owner 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 this 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**  
Works Progress Administration (WPA),

**Designer/Engineer**  
Frederick Thornton Paul, Minneapolis City Engineer

**Description**

Bridge L8882, built in 1936 by the Works Progress Administration (WPA), carries East 50th Street generally east-west over Minnehaha Creek in Minneapolis, Hennepin County, Minnesota. The bridge is located within the Minnehaha Parkway, a regional recreational trail that is part of the Grand Rounds. The parkway drive consists of two single direction drives separated by the creek. The parkway drive extending north passes along the west side of the bridge while the southern drive is to the eastern end of the bridge. A pedestrian trail winds along both sides of the creek to the north and south. The bridge is located within a residential neighborhood comprised of homes constructed between the mid-1920s through the 1960s.

Bridge L8882 is a single-span, reinforced-concrete rigid-frame with a limestone veneer. The stone-clad fascia features a soldier course of voussoirs designed to simulate the appearance of ring stones on a true stone-arch structure. The bridge has a span length of 32 feet and an overall structure length of 37 feet. The bridge deck is 48 feet wide, consisting of a 32-foot roadway and two 6-foot sidewalks. The creek to the north has been lined with a stone retaining wall.

Bridge L8882 has an altered railing, comprised of massive stucco pilasters with a bi-rail metal pipe railing extending between the pilasters. The railing was altered in 1987 from its original stone masonry pilasters and metal pipe railing.

**Significance**

The following historical narrative was taken from the previous determination of eligibility for Bridge L8882, prepared by Jeffrey Hess, Hess, Roise and Company, in 1996 as part of the Minnesota Historic Bridge Inventory, a statewide bridge survey conducted in the 1990s.

Designed by the Minneapolis Engineer's Office, Bridge No. L8882 was constructed by the Works Progress Administration (WPA) in 1936. Upon completion, its “stone-arch” detailing resembled that of Bridge No. 90493, another city-designed concrete slab built over the creek on Portland Avenue in 1936. The original design of both bridges included ornamental railings with massive, stone-faced, concrete balusters and metal-pipe rails. These railings still survive on Bridge No. 90493, but were replaced on Bridge No. L8882 during the mid-1980s. The replacement railings feature stuccoed balusters and heavier pipe rails. Although the overall design is similar to the original, the aesthetic sensibility is much cruder.

Subsequent to the 1996 evaluation, plans for Bridge L8882 were located that identify the bridge as a reinforced-concrete rigid-frame structure with stone masonry veneer. This structure type was recognized
in the 2008 inventory form for the Grand Rounds Parkway completed by Marjorie Pearson for Hess, Roise & Co. The plans, dated 1939, also identify F.T. Paul, Minneapolis City Engineer, as the designer. While plans indicate the City constructed the bridge in 1939, the 1936 Park Board annual report confirm an earlier construction date of 1936.

Bridge L8882 is one of 18 bridges constructed during a 116-year period between 1892 and 2008 over Minnehaha Creek and on Minnehaha Parkway. The Minneapolis Board of Park Commissioners was established in 1883 and hired Horace Cleveland to plan and design the city's park system, a portion of which became known as the Grand Rounds. Cleveland was a landscape architect and an advocate for developing public open space who lived in Minneapolis for over a decade in the latter half of the 1800s. The Grand Rounds is a series of seven segments of interconnected parks and parkways that encircle the City and connect lakes, river, creeks, and other natural features. The Grand Rounds continued to be developed and expanded throughout the twentieth century. Minnehaha Parkway, which runs parallel to Minnehaha Creek, is part of the Grand Rounds. It was primarily developed during the last decade of the nineteenth century and saw significant improvements during the 1920s and 1930s. In 2012 the Grand Rounds was determined eligible for the National Register of Historic Places (National Register).

Bridge L8882 remains in its original location and continues to carry East 50th Street over Minnehaha Creek within the Minnehaha Parkway corridor in the Grand Rounds in Minneapolis, Minnesota. Therefore, it retains integrity of location and feeling. Its setting within the Minnehaha Parkway corridor and association with transportation, as it continues to carry vehicular traffic, are also retained. The bridge was previously evaluated in 1996 by Hess and found to have diminished integrity due to the loss of the original bridge railing. According to the previous evaluation, the original bridge design featured massive ornamental, stone-faced, concrete balusters with metal-pipe rails. In 1987 the railings were replaced with the current stucco balusters and heavier pipe rails. The removal of the original railing resulted in diminished integrity of design, workmanship, and materials. However, integrity of design for engineering as related to the reinforced-concrete rigid-frame design and construction remains intact, as does the stone masonry veneer designed to simulate a stone-arch bridge in a parkway setting, since the rigid-frame and the stone masonry arch are integral. As such, Bridge L8882 retains integrity to meet a registration requirement of the Reinforced-Concrete Bridges in Minnesota, 1890-1945 Multiple Property Documentation Form (MPDF).

Bridge L8882 is recommended individually eligible under Criteria C within the Reinforced-Concrete Highway Bridges MPDF. It is significant as a concrete rigid-frame structure designed and constructed to resemble a stone-arch. Within the historic context of the Federal Relief Construction MPD, Bridge L8882 does not have significance as a Transportation System as it does not meet the registration requirements for the property type. Bridge L8882 is also considered a contributing resource to the determined-eligible Grand Rounds Historic District. The period of significance is 1936, which corresponds with the year the bridge was built.

**Historic Context**

- Reinforced Concrete Highway Bridges in Minnesota, 1890-1945
- Federal Relief Construction in Minnesota, 1933-1941
Minnesota Department of Transportation (MnDOT)
Local Historic Bridge Report

II – Historic Data

<table>
<thead>
<tr>
<th>National Register Status</th>
<th>Eligible (individually); Contributing to Eligible Historic District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion A Significance</td>
<td>N/A</td>
</tr>
<tr>
<td>Criterion C Significance</td>
<td>Engineering: Important Type</td>
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<td>Historic District</td>
<td>Grand Rounds</td>
</tr>
<tr>
<td>SHPO inventory number</td>
<td>HE-MPC-1774</td>
</tr>
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</table>

Sources Used to Compile Section II -- Historic Data

Bridge L8882 File, Structure Inventory Report, Minnesota Department of Transportation, St. Paul, Minnesota.


Minneapolis City Engineer’s Office, Bridge Department, F.T. Paul, City Engineer. Bridge [L8882] over Minnehaha Creek at 4th Ave. S. Plan Set (6 sheets). July 26, 1939.


———. “Reinforced-Concrete Highway Bridges in Minnesota, 1900-1945.” Statewide, Minnesota.


Field inspection by Chad Perkins, 8 October 1996.

Field survey by Mead & Hunt, Inc., December 22, 2015
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: Rigid frame design with arched headwall.

Feature 2: Rustic style with stone masonry veneer construction.
Feature 3: Bridge location along Minnehaha Parkway, a contributing resource to the National Register-eligible Grand Rounds.
# Minnesota Department of Transportation (MnDOT)
## Local Historic Bridge Report

### III – Bridge Data

**Bridge Number:** L8882

<table>
<thead>
<tr>
<th>Date of Construction (remodel)</th>
<th>1936</th>
</tr>
</thead>
</table>

**Common Name (if any)**

**Location**

- Feature Carried: E 50TH ST
- Feature Crossed: MINNEHAHA CREEK
- County: Hennepin

**MnDOT Structure Data**

- *Data Current (as of):* Sep 2015
- Main Span Type: 108 CONC RIGID FRAME
- Main Span detail:
  - Abutment: 1-Concrete - 3-Footing/Pile
  - Piers: N-Not Applicable – N-Not Applicable
- Total Length: 37 ft
- Main Span Length: 32 ft
- Total Number of Span(s): 1
- Skew (degrees): 0
- Structure Flared: No Flare
- Roadway Function: Urban, Collector
- Custodian/Maintenance Type: City

**Reported Owner Inspection Date**

7/21/2015

**Sufficiency Rating**

79.4

**Operating Rating**

HS 18

**Inventory Rating**

HS 12

**Posted Load**

P - Posted for load

**Posting**

VEH: 26 SEMI: 40 DBL: 40

**Design Load**

UNKN

**Current Condition Code**

- Deck: 7
- Superstructure: 6
- Substructure: 6
- Channel and Protection: 5
- Culvert: N

**Current Appraisal Rating**

- Structure Evaluation: 4
- Deck Geometry: 4
- Underclearances: N
- Waterway Adequacy: 5
- Approach Alignment: 8

**Fracture Critical**

No

**Deficient Status**

ADEQ

**Roadway Clearances**

- Roadway Width: 32 ft
- Vert. Clearance Over Rdwy: N/A
- Vert. Clearance Under Rdwy: N/A
- Lat. Clearance Right: N/A
- Lat. Clearance Left: N/A

**Roadway Data**

- ADT Total (Year): 6775 (2015)
- Truck ADT Percentage: Not given
- Bypass Detour length: 1 miles
- Number of Lanes: 2

**Waterway Data**

- Scour Code: N-STBL;LIM SCOUR

**Non-MnDOT Data**

**Roadway Characteristics**

- Lane Widths: 16 ft
- Shoulder Width: N/A C&G
- Shoulders Paved or Unpaved: N/A C&G
- Roadway Surfacing: Bituminous

**Location of Plans**

City of Minneapolis

**Plans Available**

Original Plan (dated 1939)

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* Non-MnDOT data collected during field survey. All other fields of data collected from MnDOT September of 2015. 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.
Existing Conditions
Available information, as detailed in the Project Introduction section, concerning Bridge L8882 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 L8882 carries East 50th Street over Minnehaha Creek in Minneapolis. The 32-foot-long, single-span bridge is of concrete rigid-frame design (reinforced concrete abutments and bridge slab rigidly connected). The concrete headwalls, wingwalls and abutment ends are faced with limestone veneer. The reinforced-concrete bridge deck has a clear width of 44 feet and carries one lane of traffic in each direction on a 32-foot-wide roadway with curb and gutter. There are 6-foot-wide sidewalks (including curb) on both sides of the bridge. The original masonry pilasters with 3-inch-diameter metal pipe bi-railings have been replaced with stucco surfaced concrete pilasters with 5.5-inch-diameter metal pipe bi-railings. The metal pipe railing height is 2 feet 10 inches.

The City has repaired and made changes to the bridge in the last thirty years. Alterations include, replacing the original railing and north approach sidewalks in 1987, south approach sidewalks in 1992, adding rip-rap around the east abutment in 1995, and patching and repointing masonry walls in 1997. More recently, the bridge deck was overlaid with bituminous and new concrete approach panels were constructed in 2001. In 2009, the sidewalks and approach roadway were crack sealed, four sidewalk panels were replaced, and load posting signs were installed.

Bridge L8882 is in fair condition overall. The most significant defects of the bridge structure include localized spalling, cracking and delamination of the concrete bridge slab underside, fracturing of the original stone masonry veneer stones, and fracturing and deterioration of stone masonry pointing mortar.

Serviceability Observations
The bridge is currently open to vehicular and pedestrian traffic and is posted to 26T/40T/40T as the result of a load capacity rating completed in 2006.

Condition Observations
Access to some critical portions of the structure was limited. All observations and quantity estimates were made from ground level, either on the bridge slopes, in shallow areas of the stream or from the bridge deck. As such, the condition observations and recommendations that follow in this report are general in nature. A more in-depth inspection utilizing the appropriate access equipment to permit hands-on inspection should be undertaken to better quantify required repairs prior to refining a rehabilitation scope and undertaking any rehabilitation work. All condition observations herein for inaccessible elements are derived from a visual inspection and from information gathered from past inspection reports.
Minneapolis Department of Transportation (MnDOT)
Local Historic Bridge Report

IV – Existing Conditions/Recommendations

Reinforced-Concrete Abutments
Both abutments are in fair condition with some minor scouring and/or freeze-thaw damage of the concrete surfaces at the waterline. There is a vertical crack at the top of each abutment located at the centerline of the bridge, which continues to the slab underside. On the east abutment the crack extends 2 feet vertically from the bottom of the slab, and 3 feet vertically on the west abutment. The cracks have efflorescence, indicating leaching of salts and minerals from groundwater behind the abutment and/or water from the roadway above. However, the concrete surrounding the cracks appears to be sound with no rusting of reinforcement, or spalling/delamination of the abutment faces.

Reinforced-Concrete Bridge Slab
The reinforced-concrete bridge slab is rigidly framed to the bridge abutments. The condition of the bridge slab could be assessed only from the underside, as there is a bituminous overlay and concrete sidewalks over the top of the concrete slab. Bituminous surfacing over concrete, if not waterproofed, can lead to trapped moisture and accelerated deterioration. Due to the age of the bridge and the presence of the bituminous, surface delaminations are likely to exist in the concrete slab top though they may be limited since the bridge deck was last overlaid in 2001. City of Minneapolis records indicate that the bituminous overlay depth is approximately 8 inches. The bituminous overlay atop the concrete bridge slab is in fair condition. There is one crack down the centerline of the bridge which has been sealed and one minor slab spall in the northwest corner of the bridge. There are sealant joints between the bridge slab and approach panels that appear to be well maintained.

The slab underside is in fair condition. There are three minor areas of spalled concrete with exposed and corroded reinforcement. There are longitudinal cracks continuing through the slab from each vertical abutment crack, extending approximately 10 feet in length along the centerline of the bridge. The cracks at the centerline as well as along the construction joints have efflorescence, but the concrete surrounding the cracks and construction joints appears to be sound with no spalling or delamination. There is rust staining on the concrete near the transverse cracking, but it appears to be due to corrosion of reinforcement chairs and not of structural steel.

Slopes
The bridge slopes are in fair to poor condition. The southeast slope is severely eroded with a steep vertical drop at the stream edge with exposed and eroding soil. The southwest slope is stable. The northwest slope is stable with a retaining wall holding up the slope. The northeast slope is in fair condition with the upper portion of the slope stable, but erosion is occurring at the stream edge, exposing the originally buried portions of the abutment, pilaster and wingwall.

Headwalls and Wingwalls
The bridge headwalls and wingwalls are constructed of reinforced concrete faced with limestone veneer. The stone veneer which faces the bridge slab edge on the headwall is supported by an 8-inch-wide by 6-inch-high steel lintel angle aligned with the bottom of the bridge slab. The paint system on the lintel angle appears to have failed with significant corrosion occurring to the horizontal leg of the angle. The vertical leg of the lintel angle could not be assessed as it is located between the reinforced concrete and stone veneer. The stone veneer throughout the bridge is in fair to poor condition. Inspection records indicate
that the stone veneer was repointed in 1997; however several locations of the headwalls and wingwalls appear to be more recently repointed. The stones above the lintel angle (arch stones) are of a contrasting color and surface texture from the rest of the bridge. None of the arch stones appear to have been replaced, but some have been painted over to cover graffiti in the southwest corner of the bridge. The paint color matches well with the original stone color and blends in with the unpainted stones. The mortar in the lower portions of the pilasters and headwalls/abutments is in poor condition and has begun to crack and separate from the stone. There is a non-historic coping at the top of the walls that is made of form-lined concrete to achieve a stone-like appearance. Many stones, particularly below the concrete coping have been replaced. Several of the replaced stones do not match the original stones in color, type or texture. The stone veneer facing the northeast abutment edge is in poor condition with several stones missing and the remaining mortar and stones cracked and heavily deteriorated.

Bridge Railings
The bridge railings were replaced in 1987. The original railings consisted of solid stone masonry posts with metal tube railing between. The current concrete posts with stucco surfacing and galvanized metal pipe rail are in good condition.

Sidewalk and Curbs
The sidewalks and curb are in fair condition. They are constructed integral with the bridge slab and have been selectively repaired over time. The curb appears to be of newer construction as well as the sidewalk portion between the replaced rail posts. No significant defects were observed in the sidewalk or curb.

Approach Panels
The bridge approach panels were placed in 2001 and are in good condition. No approach panels existed prior to 2001.

Approach Roadway & Waterway Observations
No significant condition deficiencies were noted to the waterway in the immediate bridge vicinity. The bituminous approach roadway meeting the bridge was observed to be in good condition with no major settlement or cracking evident.

Twenty-six accidents have been reported within 500 feet of the bridge. The 1985 accident indicated on the inspection records is not included in this count, as recorded/available crash data does not date back this far. These accidents all occurred at the intersections and on the intersecting roadways east and west of the bridge. Geometrics of the roadway should be studied in order to determine whether the constraint of the bridge width is a contributing factor to the large number of accidents in the vicinity of the bridge.

Date of Engineering Site Visit by LHB
April 22, 2016 & May 5, 2016
Condition 1: North elevation

Condition 2: South elevation
Condition 3: West abutment

Condition 4: Crack in abutment and slab at centerline (east abutment pictured, west similar)
Condition 5: East abutment

Condition 6: Bridge slab underside (looking south)
Condition 7: Bridge slab spall (center of span, south edge)

Condition 8: Bridge slab and abutment construction joint efflorescence (looking west)
Condition 9: Southeast slope

Condition 10: Southwest slope and storm outlet
Condition 11: Northwest slope and retaining wall

Condition 12: Northeast slope
Condition 13: South lintel angle (looking west)

Condition 14: North lintel angle (center of span)
Condition 15: South headwall (note replaced, fractured, and painted veneer stones)

Condition 16: Southeast wingwall (note repointed mortar and replaced stones)
Condition 17: Northeast headwall and pilaster (note missing and loose stones)

Condition 18: North railing and sidewalk
Condition 19: Bridge deck and approach panels (looking west)

Condition 20: Spall in deck overlay
Condition 21: West approach (looking west)

Condition 22: East approach (looking east)
Overall Recommendations

The bridge is currently open to vehicular and pedestrian traffic. The recommendations that follow assume the structure’s use will remain the same.

Recommended Stabilization Activities

1. Clean exposed portions of the headwall lintel angles to bare steel and coat with a zinc-rich epoxy coating to slow the corrosion rate, see Headwall and Wingwall section below for additional discussion.

2. The northeast and southeast slopes are heavily eroded. It is recommended that these slopes be stabilized by re-grading the slopes and placing fabric and riprap on the slopes to help prevent further erosion. The riprap chosen should consist of native rock to blend with stones present in the existing stream and landscape. Placement of stones will also require a Minnehaha Watershed permit which stipulates type, size and shape of boulders to be installed. Coordination will be necessary in order to meet permit requirements as well as conform to SOI Standards when planning this stabilization item.

3. The bridge is posted to 26T/40T/40T. Posting signs are located at the southwest corner of the intersection of 50th Street and South 4th Avenue (approximately 160 feet from the west end of the bridge) and west of the intersection of 50th Street and Portland Avenue South (approximately 400 feet from the west end of the bridge). There are additional intersections between South 4th Avenue and Portland Avenue South. It is recommended to place posting signs on each end of the bridge between the railing ends and the intersections nearest the bridge.

Recommended Preservation Activities

Reinforced-Concrete Abutments

The reinforced-concrete abutments have no significant defects. No preservation activities are recommended.

Reinforced-Concrete Bridge Slab

It is recommended that the spalling in the bridge slab underside be repaired. There is approximately 20 square feet of concrete area to repair. The repair will consist of selective removal of deteriorated concrete to sound concrete. Following concrete removal, any exposed reinforcement bars should be cleaned and epoxy coated. Following repair of any reinforcement, and to maintain historic integrity, the concrete should be replaced with concrete of color, composition, forming and finish to match the original concrete. The concrete surface has a board-formed finish, which should be replicated with any repair performed.

Due to the favorable condition of the deck underside and the bituminous overlay, it is assumed that the top of the deck slab is in similar condition. However, with the presence of a bituminous overlay atop the
concrete and no record of whether the concrete has been waterproofed before the overlay was applied, it is possible that there is more extensive deterioration of the top of the bridge slab. At a minimum, the top of the bridge slab should be sealed at all roadway joints and cracks at regular intervals, as described in the maintenance activities below. Further investigation and testing should be performed to determine whether or not the surfacing should be removed to allow for repairs to the top of the bridge slab.

For cost estimating purposes, it is assumed that the repair will follow the general practice of the City of Minneapolis. This would include removal of the bituminous surface (approximately 8 inches); milling of a minimum of 2 inches of concrete to remove the highest chloride content from the old concrete and to remove any spalled or unsound surface concrete; performing partial & full depth concrete deck repairs, and placement of a 2-inch concrete low slump overlay. (It is assumed this repair scope will be required at some point in the next 10 years.) Removal of the deal load of the bituminous overlay may increase the load carrying capacity of the structure. The ability for the structure to carry legal loads without posting should be considered when planning the bridge rehabilitation scope.

Slopes

The northwest and southwest stopes are stable and there is no repair recommended for these locations. The northeast and southeast slopes are eroding and should be repaired as described above in the stabilization recommendations. All slopes should be continually monitored for further erosion and scour during annual routine inspections.

Headwalls and Wingwalls

The headwalls and wingwalls are at varying levels of deterioration. The upper portions of the walls have been recently and selectively repaired and repointed and are currently in fair condition. It is recommended that up to 20 percent of the wingwall faces, along with the upper areas of the headwalls and pilasters, should be repointed. The lower portions of the headwalls and pilasters are recommended to be 100 percent repointed. In all locations of repointing, care will need to be taken to ensure that original stones are salvaged in-place where possible. Several of the original stones are heavily fractured and may require replacement upon removal of the pointing mortar. It is estimated that approximately 20 percent of the veneer stones will need to be replaced. All damaged stones should be replaced with stones matching the original stone in type, color, texture, finish and origin (if possible). Where stones are missing and the masonry veneer is in very poor condition, such as in the northeast bridge corner and other select locations at the abutment ends, it is recommended that the stone veneer be dismantled and re-set. It is estimated that there will be approximately 50 square feet of stone veneer repair. Repointing and repair shall be executed with a mortar that is compatible with the original mortar in composition, strength, color, texture and tooling. To maintain historic integrity, it will also be necessary for the project construction details to fully define the repointing requirements, including but not limited to, such items as joint preparation, mortar finish and tooling, mortar curing, and preparation of repointing test panels.

The lintel angle supporting the headwall veneer stones is beginning to corrode and deteriorate, however the stone masonry veneer above the lintel angle appears to be stable. The mortar has been recently repointed in the majority of the locations above the lintel angle and many stones have been replaced with new stones. Replacement of the lintel angle would necessitate dismantling and re-setting of the masonry veneer above the lintel angle. The current condition of the veneer above the lintel angle does not warrant
this level of repair to the headwall. Removing this stone would cause the loss of many original stones, as they are already heavily fractured. Therefore, it is recommended that the lintel angle remain in place and be cleaned and repainted as indicated in the stabilization section above, as this repair will preserve more historic fabric than replacement of the lintel angle. Replacement of the lintel angle may eventually be required; however, is not anticipated to be necessary in the immediate future and has not been included in the preservation estimate.

Bridge Railings
The non-historic bridge railings are in good condition; therefore, no repair is recommended. The non-historic railing is similar to the original railing, but has modified the pilaster construction (concrete with stucco versus stone masonry) and metal bi-rail size (5.5 inches versus 3 inches). In the future, if the railing requires replacement, it should be replaced with a rail that is more historically sympathetic to the original rail design and materials. Any major rehabilitation of the bridge, however, will require a design exception since both the current railing and the original railing do not meet the current standards for height, opening size, or likely strength. Further study will be warranted during the design phase of any planned rehabilitation to determine what railing design will be acceptable aesthetically, structurally, and from a safety standpoint. For purposes of this report, it will be assumed that the current railing will remain in place. A contingency has been added to the estimate for rail improvements should a further study determine that the railings would require improvement for strength, geometry, or other factors.

Sidewalk and Curb
No significant defects were observed in the sidewalk and curb; therefore, no preservation repair is recommended.

Approach Panels
The approach panels have been recently replaced and are in good condition, however, should the bridge deck surfacing be replaced, the approach panels would need to be replaced in order to match into the new bridge deck elevation. Replacement of the approach panels has been assumed.

Approach Roadway Considerations
The existing roadway width is 36 feet. At the current ADT the minimum bridge width standard is 38 feet. With the setting of this bridge, there may also be a desire to study the introduction of bike lanes as well. Combined with 26 accidents in the vicinity of the bridge, there might be a need for geometry improvements within the next twenty years. The current rehabilitation recommendations assume the bridge width will remain the same. At the time of rehabilitation planning, additional study will be required which incorporates the safety needs of the adjacent intersections as well as the consideration for improving pedestrian accommodations.
Recommended Annual Maintenance Activities

1. Flush bridge superstructure and substructure (including stone and concrete surfaces) each spring with water to remove salt residue. The protocol of the City of Minneapolis annual flushing protocol should be followed. Care should be taken to ensure there is no damage to surface finishes of the bridge. It is recommended to perform testing in small areas at initiation of work.

2. Maintain sealant at bituminous joints and cracks in bituminous bridge slab overlay. It is estimated that approximately 20 percent of the joints will need to be sealed each year.
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 that 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 2016 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)

- **Opinion of Annual Cost- Maintenance Activities:** $3,600
- **Opinion of Construction Cost- Stabilization Activities:** $21,840
- **Opinion of Construction Cost- Preservation Activities:** $321,300

**Estimated Preliminary Design, Final Design, Construction Administration Costs**

- **Preliminary Design and Assessment:** $15,000
- **Final Design and Plans:** $55,000
- **Construction Administration:** $50,000
**MAINTENANCE, STABILIZATION & PRESERVATION COST ESTIMATE (2016 DOLLARS)**

Bridge No. L8882

April 19, 2017

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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 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 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 L8882**

**Historic Data**
- Research

**Local Data**
- N/A

**MnDOT Reports**
- L8882 Inspection Report 2015-07-21
- L8882 Structure Inventory Report 2016-07-07
- BRIDGE L8882 RATING (1980) Bridge
- L8882 CrashDetailReport 2016-06-15

**Photos**
- L8882 LHB 2016-04-22
- L8882 LHB 2016-05-05
- Bridge L8882_M&H Photos_12-22-2015
- Bridge L8882_Report Photos

**Plans**
- L8882-549 Minneapolis City Plans 1939
MINNESOTA BRIDGE INSPECTION REPORT

BRIDGE L9882 E 50TH ST OVER MINNEHAHA CREEK  

<table>
<thead>
<tr>
<th>ELEM NBR</th>
<th>ELEMENT NAME</th>
<th>INSPE DATE</th>
<th>QUANTITY</th>
<th>QTY CS 1</th>
<th>QTY CS 2</th>
<th>QTY CS 3</th>
<th>QTY CS 4</th>
</tr>
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<tbody>
<tr>
<td>600</td>
<td>CRITICAL DEFS OR SAFETY HAZARDS</td>
<td>07-21-2015</td>
<td>1 EA</td>
<td>1</td>
<td>0</td>
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Notes: NO CRITICAL FINDINGS.

38      | REINFORCED CONCRETE SLAB          | 07-21-2015 | 1,776 SF  | 1,740    | 0        | 36        | 0        |

Notes: THE SUBSURFACE HAS SEEPAGE WITH EFFLORESCENCE AND INCRUSTATION AT THE LONGITUDINAL CONSTRUCTION JOINTS. LARGE SPALL WITH REBAR EXPOSED ON THE NORTH. LARGE SIZE CRACKS WITH EFFLORESCENCE AND LEACHING ALONG THE CENTER LINE.

510     | WEARING SURFACE                   | 07-21-2015 | 1,184 SF  | 1,184    | 0        | 0        | 0        |

Notes: Concrete Slab with Bituminous Overlay Notes: GOOD (2013) DECK PATCHED AND SEALCOATED.

330     | METAL BRIDGE RAILING              | 07-21-2015 | 151 LF    | 151      | 0        | 0        | 0        |

        RAILING IS BELOW MINIMUM HEIGHT OF 34". MINOR POPOUT ON CAPS. [2013] CONCRETE HAS BEEN PATCHED.

515     | STEEL PROTECTIVE COATING          | 07-21-2015 | 999 SF    | 999      | 0        | 0        | 0        |

Notes: [2016] Migrator assumed CS1 and a quantity of 999 SF.

331     | REINFORCED CONC BRIDGE RAILING    | 07-21-2015 | 151 LF    | 151      | 0        | 0        | 0        |

        RAILING IS BELOW MINIMUM HEIGHT OF 34". MINOR POPOUT ON CAPS. [2013] CONCRETE HAS BEEN PATCHED.

321     | CONCRETE APPROACH SLAB            | 07-21-2015 | 1,280 SF  | 1,290    | 0        | 0        | 0        |

Notes: [2016] Migrator assumed an approach slab length of 20FT and used the inventory quantity of 32FT for the width.
        MINOR SCALING AT THE EDGES TO THE DECK. SMALL SPALLS FROM PLOWS AT CENTERLINE.

116     | REINFORCED CONCRETE STRINGER      | 07-21-2015 | 66 LF     | 0        | 66       | 0        | 0        |

Notes: MINOR CRACKING, SEVERAL MISSING STONE. [2013] NEW ALUMINUM PLATES, SUPPORTING NEW CAP STONE AND MORTAR AND SEAL. FASCIA LINTELS HAVE PACK RUST THROUGH OUT.

215     | REINFORCED CONCRETE ABUTMENT      | 07-21-2015 | 132 LF    | 40       | 92       | 0        | 0        |

Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1: 40 CS2: 0 CS3:0 CS4: 0).
        THERE IS SEEPAGE AND EFFLORESCENCE AT THE CONSTRUCTION JOINTS. TWO FINE SIZE CRACKS ALONG THE CENTER LINE. MINOR POPOUTS AND SMALL SPALLS. HEAVY SEDIMENT ON WEST ABUTMENT. GRAFFITI.
        Wingwall notes: SEVERAL CRACKED STONES. BROKEN STONES AT SW, NW AND NE. [2013] MORTAR AND SEAL REPAIRS.

858     | SCOUR                             | 07-21-2015 | 1 EA      | 0        | 1        | 0        | 0        |

Notes: THERE IS RAPIDITY OF THE BANKS AT THE S.E. ABUTMENT. HEAVY SEDIMENT BUILD UP ON THE WEST ABUTMENT. THE CREEK IS MEANING TO THE EAST. S.E. CORNER AND NEEDS MORE RIP RAP MATERIAL. MORE MATERIAL ERODED 2014 AND DEPOSITS AT W. SIDE. SCOUR REPORT IN FILE.

890     | LOAD PST OR VERTICAL CLR SIGNING  | 07-21-2015 | 1 EA      | 1        | 0        | 0        | 0        |
Notes: [2016] Structure requires a vertical clearance sign or load posting sign.

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity</th>
<th>Date</th>
<th>Quantity</th>
<th>Notes</th>
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<tbody>
<tr>
<td>891</td>
<td>OTHER BRIDGE SIGNING</td>
<td>07-21-15</td>
<td>1 EA</td>
<td>POSTED AT BOTH ENDS 2G-40-40. GOOD OBJECT MARKERS ATTACHED THE RAIL. FEW REFLECTORS BROKEN.</td>
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<tr>
<td>892</td>
<td>SLOPES &amp; SLOPE PROTECTION</td>
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<td>1 EA</td>
<td>Use this element to rate the condition of slopes and slope protection.</td>
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<tr>
<td>894</td>
<td>DECK &amp; APPROACH DRAINAGE</td>
<td>07-21-15</td>
<td>2 EA</td>
<td>DRAINAGE, GOOD.</td>
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<tr>
<td>895</td>
<td>SIDEWALK, CURB, &amp; MEDIAN</td>
<td>07-21-15</td>
<td>1 EA</td>
<td>CURB, REPAIRED N. SIDE. [2013] SIDEWALK REPAIRS. SIDEWALK ROUGH AND POPOUTS THROUGHOUT.</td>
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<tr>
<td>900</td>
<td>PROTECTED SPECIES</td>
<td>07-21-15</td>
<td>1 EA</td>
<td>Use this element to track the presence of protected species living on this structure.</td>
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### MINNESOTA BRIDGE INSPECTION REPORT
#### OLD ELEMENT SYSTEM

**BRIDGE L8882  E 50TH ST OVER MINNEHAHA CREEK**

**INSPE. DATE: 07-21-2015**

<table>
<thead>
<tr>
<th>ELEM NBR</th>
<th>ELEMENT NAME</th>
<th>ENV. INSP. DATE</th>
<th>QUANTITY</th>
<th>QTY CS 1</th>
<th>QTY CS 2</th>
<th>QTY CS 3</th>
<th>QTY CS 4</th>
<th>QTY CS 5</th>
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<tbody>
<tr>
<td>39</td>
<td>BIT. OIL (CONC SLAB)</td>
<td>2 07-21-2015</td>
<td>1,184 SF</td>
<td>1,184</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>07-15-2014</td>
<td>1,184 SF</td>
<td>1,184</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notes:</td>
<td>[GOOD] [2013] DECK PATCHED AND SEALCOATED.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 321      | CONC APPROACH SLAB  | 3 07-21-2015 | 2 EA    | 2        | 0        | 0        | 0        | N/A      |
|          |                    | 07-15-2014      | 2 EA    | 2        | 0        | 0        | 0        | N/A      |
| Notes:   | [MINOR SCALING AT THE EDGES TO THE DECK, SMALL SPALLS FROM FLOWS AT CENTERLINE.] |

| 333      | RAILING - OTHER     | 2 07-21-2015 | 151 LF  | 151      | 0        | 0        | N/A      | N/A      |
|          |                    | 07-15-2014      | 151 LF  | 151      | 0        | 0        | N/A      | N/A      |
| Notes:   | [RAILING IS BELOW MINIMUM HEIGHT OF 34". MINOR POPOUT ON CAPS. [2013] CONCRETE HAS BEEN PATCHED.] |

| 116      | CONCRETE STRINGER   | 2 07-21-2015 | 66 LF   | 0        | 66       | 0        | 0        | N/A      |
|          |                    | 07-15-2014      | 66 LF   | 0        | 66       | 0        | 0        | N/A      |
| Notes:   | [MINOR CRACKING, SEVERAL MISSING STONE. [2013] NEW ALUMINUM PLATES, SUPPORTING NEW CAP STONE AND MORTAR AND SEAL. FASCIA LINTELS HAVE PACK RUST THROUGH OUT.] |

| 215      | CONCRETE ABUTMENT   | 2 07-21-2015 | 92 LF   | 0        | 92       | 0        | 0        | N/A      |
|          |                    | 07-15-2014      | 92 LF   | 0        | 92       | 0        | 0        | N/A      |
| Notes:   | [THERE IS SEEPAGE AND EFFLORESCENCE AT THE CONSTRUCTION JOINTS. TWO FINE SIZE CRACKS ALONG THE CENTER LINE. MINOR POPOUTS AND SMALL SPALLS. HEAVY SEDIMENT ON WEST ABUTMENT. GRAFFITI.] |

| 387      | CONCRETE WINGWALL  | 2 07-21-2015 | 4 EA    | 4        | 0        | 0        | 0        | N/A      |
|          |                    | 07-15-2014      | 4 EA    | 4        | 0        | 0        | 0        | N/A      |
| Notes:   | [SEVERAL CRACKED STONES. BROKEN STONES AT SW, NW AND NE. [2013] MORTAR AND SEAL REPAIRS.] |

| 358      | CONC DECK UNDERSIDE | 2 07-21-2015 | 1 EA    | 0        | 1        | 0        | 0        | 0        |
|          |                    | 07-15-2014      | 1 EA    | 0        | 1        | 0        | 0        | 0        |
| Notes:   | [THE SUBSURFACE HAS SEEPAGE WITH EFFLORESCENCE AND INCRUSTATION AT THE LONGITUDINAL CONSTRUCTION JOINTS. LARGE SPALL WITH REBAR EXPOSED ON THE NORTH. FINE SIZE CRACKS WITH EFFLORESCENCE AND LEACHING ALONG THE CENTER LINE.] |

| 361      | SCOUR               | 2 07-21-2015 | 1 EA    | 0        | 1        | 0        | N/A      | N/A      |
|          |                    | 07-15-2014      | 1 EA    | 0        | 1        | 0        | N/A      | N/A      |
| Notes:   | [THERE IS EROSION OF THE BANKS AT THE S.E ABUTMENT. HEAVY SEDIMENT BUILD UP ON THE WEST ABUTMENT. THE CREEK IS MEANDERING TO THE EAST, S.E. CORNER AND NEEDS MORE RIP RAP MATERIAL. MORE MATERIAL ERODED 2014 AND DEPOSITS AT W. SIDE. SCOUR REPORT IN FILE.] |

| 964      | CRITICAL FINDING    | 2 07-21-2015 | 1 EA    | 1        | 0        | N/A      | N/A      | N/A      |
|          |                    | 07-15-2014      | 1 EA    | 1        | 0        | N/A      | N/A      | N/A      |
| Notes:   | [NO CRITICAL FINDINGS.] |

| 961      | SIGNING             | 2 07-21-2015 | 2 EA    | 2        | 0        | 0        | 0        | 0        |
|          |                    | 07-15-2014      | 2 EA    | 2        | 0        | 0        | 0        | 0        |
| Notes:   | [POSTED AT BOTH ENDS 26-40-40. GOOD OBJECT MARKERS ATTACHED THE RAIL. FEW REFLECTORS BROKEN.] |

| 964      | DRAINAGE            | 2 07-21-2015 | 2 EA    | 0        | 2        | 0        | N/A      | N/A      |
|          |                    | 07-15-2014      | 1 EA    | 0        | 1        | 0        | N/A      | N/A      |
| Notes:   | [DRAINAGE, GOOD.] |

| 966      | CURB & SIDEWALK     | 2 07-21-2015 | 1 EA    | 0        | 1        | 0        | N/A      | N/A      |
|          |                    | 07-15-2014      | 1 EA    | 0        | 1        | 0        | N/A      | N/A      |
| Notes:   | [CURB. REPAIRED N. SIDE. [2013] SIDEWALK REPAIRS. SIDEWALK ROUGH AND POPOUTS THROUGHOUT.] |

**General Notes:**

- S.E CORNER NEED MORE RIP RAP.
## MINNESOTA STRUCTURE INVENTORY REPORT

**Bridge ID:** L8882  
**E 50TH ST over MINNEHAHA CREEK**  
**Date:** 07/07/2016

<table>
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<tr>
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<th><strong>ROADWAY</strong></th>
<th><strong>INSPECTION</strong></th>
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<td>Bridge Match ID (TIS)</td>
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<td>METRO Maint. Area</td>
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<tr>
<td>County</td>
<td>27 - HENNEPIN</td>
<td>Route Sys/Nbr</td>
</tr>
<tr>
<td>City</td>
<td>MINNEAPOLIS</td>
<td>Roadway Name or Description</td>
</tr>
<tr>
<td>Description</td>
<td>0.1 MI W OF PORTLAND AVE</td>
<td>Roadway Function</td>
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<tr>
<td>Sect., Twp., Range</td>
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<td>Roadway Type</td>
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<tr>
<td>Latitude</td>
<td>44d 54m 44.46s</td>
<td>Control Section (TH Only)</td>
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<tr>
<td>Longitude</td>
<td>93d 18m 10.89s</td>
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<td>CITY</td>
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<tr>
<td>Owner</td>
<td>CITY</td>
<td>Detour Length</td>
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<td>Year Built</td>
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<td>Appr. Span Detail</td>
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<td>Navigation Control</td>
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<td>Pier Protection</td>
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