Bridge Number: L8901
Fremont Ave. S

FINAL MIDTOWN CORRIDOR INDIVIDUAL BRIDGE SUMMARY AND MANAGEMENT PLAN

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June 2015

Executive Summary

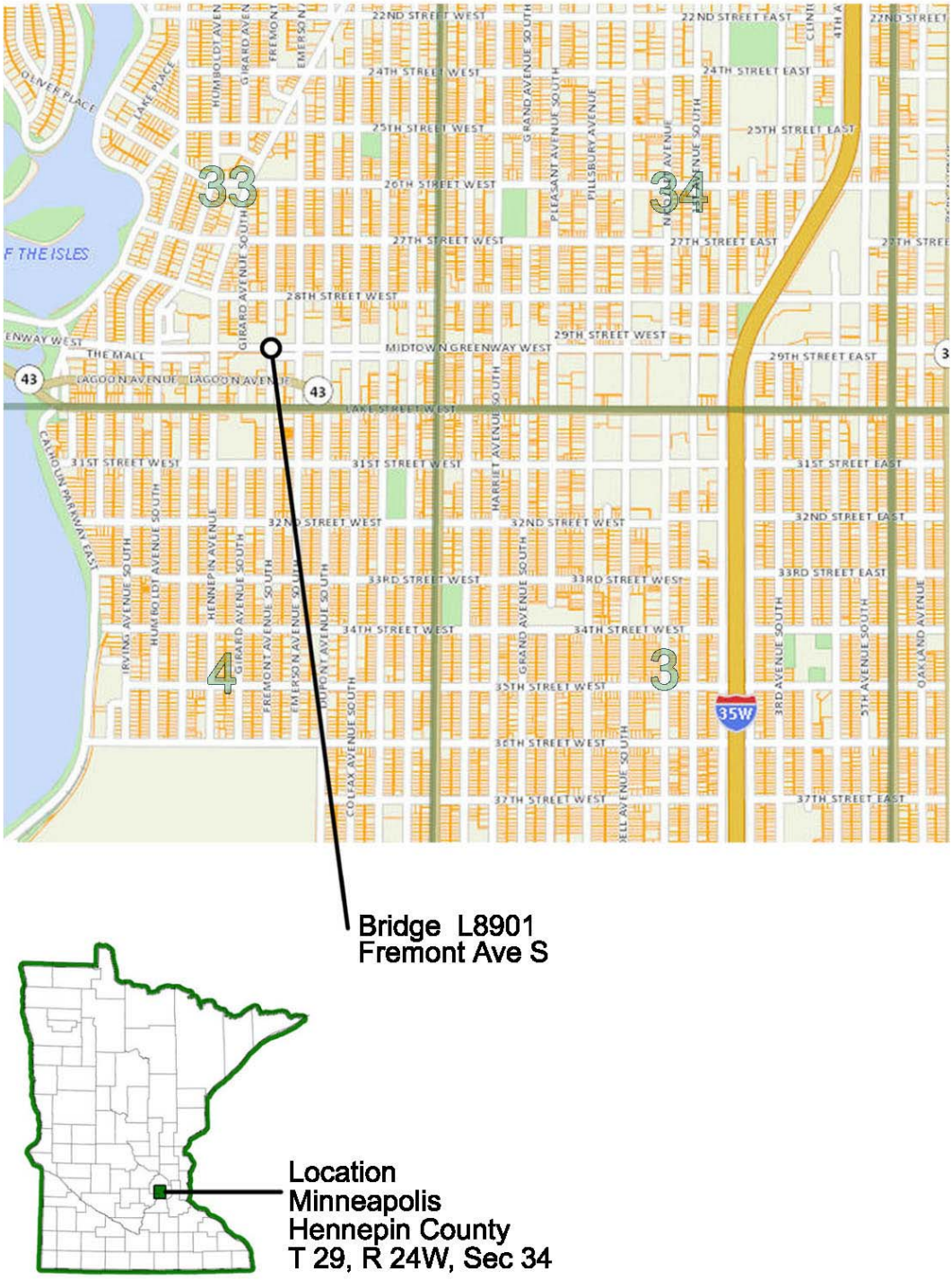
The Fremont Avenue Bridge (Bridge L8901) carries vehicular and pedestrian traffic over the Midtown Greenway in the city of Minneapolis. The bridge was constructed in 1912-1913 and is a contributing element in the Chicago, Milwaukee, and St. Paul Railroad Grade Separation Historic District.

The structure is a three-span continuous concrete multi-beam bridge with arched fascia girders. The overall bridge length is approximately 94 feet and the bridge width from curb to curb is 30 feet with an 8 foot sidewalk on both sides of the bridge. The railings consist of original 36 inch tall concrete railings with an added steel pipe to provide an overall height of approximately 42 inches. It has two stub abutments, with the Midtown Greenway trail located beneath the north and center spans of the bridge. The bridge's historic integrity has been diminished by the attachment of a large modern retaining wall to the southwest corner.

Bridge L8901 is a lightly used bridge with average daily traffic (ADT) of 1400 in 2011. It is in serious structural condition with the superstructure, substructure, and deck all having structural condition codes of 3. The bridge is structurally deficient, posted, and has an inventory rating of HS 4.6. (See page 15 for definition of structural condition codes, inventory rating, and structural deficiency.) All of the beams are in serious condition with spalls and most with exposed, corroded reinforcement. There are also spalls on the underside of the deck. The substructure is cracked and spalled; the abutments are also settling. The condition of this bridge is serious and the historic fabric is believed to be irreparable. The preservation alternative provided is either in-kind replacement of the entire bridge to historic dimensions or replacement with a new bridge whose design is closely modeled on the historic bridge.

Any work on Bridge L8901 should proceed according to the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR part 67) and the "Guidelines for Bridge Maintenance and Rehabilitation Based on the Secretary of the Interior's Standards" as adapted by the Virginia Transportation Research Council.

Bridge Location



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I – Project Introduction

This individual bridge summary and management plan is an appendix to the Midtown Corridor General Bridge Management Plan (2015) which must be used in conjunction with this document. The overall plan describes the objectives, methods, and results of the Midtown Corridor Historic Bridge Study and provides further information on the recommended stabilization, preservation, and maintenance activities contained herein. This individual plan is based on visual observations; the overall plan discusses additional testing that should be completed before any preservation alternatives are pursued. The overall plan discusses the likely cause of the existing deterioration, intent of the preservation alternatives, and what statutes need to be considered when working on this historic bridge.

The purpose of the Midtown Corridor Bridge Study and this individual bridge summary is to determine the work required to preserve the bridge in accordance with the Secretary of the Interior's Standards by assessing current conditions and proposing a set of treatment alternatives that address structural deficiencies, deteriorating historic fabric, and bridge longevity while at the same time protecting the historic character and integrity of the bridge and, in turn, that of the 2.8-mile Chicago, Milwaukee and St. Paul Railroad (CM&StP) Grade Separation Historic District.

The Midtown Corridor Bridge Study is part of a several-year cooperative effort, led by MnDOT, to promote the preservation of historic bridges across the state. "Historic" bridges are defined by federal law as bridges listed on, or eligible for, the National Register of Historic Places. The Midtown Corridor bridges are a subset of bridges addressed in the Minnesota Local Historic Bridge Study. Launched in 2012, two phases of the Minnesota Local Historic Bridge Study have been completed, with the most recent phase examining approximately 140 historic bridges across Minnesota owned by entities other than MnDOT. The Minnesota Local Historic Bridge Study is conducted through a partnership that includes MnDOT State Aid, the MnDOT Cultural Resources Unit (CRU), the Federal Highway Administration (FHWA), the State Historic Preservation Office (SHPO), the Army Corps of Engineers, local public works and county highway departments, county and township boards and city councils, the historic preservation community, and the general public.

The Minnesota Local Historic Bridge Study is designed to encourage the preservation of the state's locally-owned historic bridges by compiling historic and engineering data on each bridge, analyzing bridge condition, and preparing a set of recommended treatment activities for each bridge. The recently completed statewide study also prepared National Register nominations for a select number of bridges, providing updates to MnDOT's 2006 Management Plan for Historic Bridges in Minnesota, producing content for MnDOT's Historic Bridges website, and exploring how other states are funding and managing historic bridge programs with an emphasis on locally-owned bridges.

An individual bridge report was prepared for each bridge in the Minnesota Local Historic Bridge Study. Each individual report suggests stabilization, preservation, and maintenance activities for each bridge. Stabilization activities are designed to maintain the bridge in its current state until a more substantial repair project is undertaken. These measures might be emergency repairs, or minor repairs intended to prevent emergency repairs in the near future. Preservation activities are designed to preserve the bridge and keep it in service for the next 20 to 30 years. Maintenance activities include items such as annual inspections and cleaning, vegetation removal, minor concrete repairs, and spot painting. This individual bridge report was created for the Midtown Corridor Bridge Study with the same purpose as the Minnesota Local Historic Bridge Study.

This bridge report's activities follow the Secretary of the Interior's Standards for the Treatment of Historic Properties and, in particular, the Standards for Rehabilitation and accompanying Guidelines. The Secretary of the Interior's 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 take a conservative approach to the preservation of historic fabric and 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. Recommendations for the Midtown Corridor bridges are also

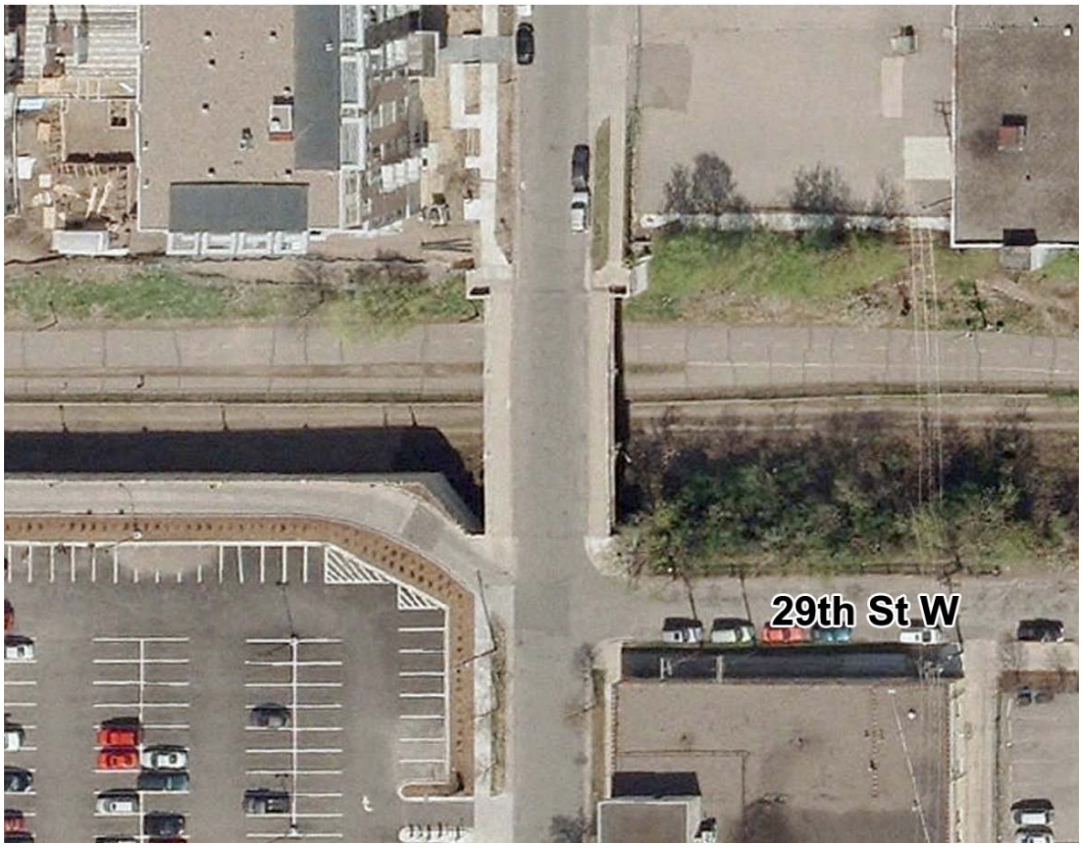
consistent with best practices outlined in the National Park Service's Preservation Brief 15 entitled *Preservation of Historic Concrete*, and with the "Guidelines for Bridge Maintenance and Rehabilitation Based on the Secretary of the Interior's Standards," as adapted by the Virginia Transportation Research Council.

To compile this report, engineering and historical data were gathered from a variety of sources including multiple field visits, original construction plans, current MnDOT Structure Inventory Reports and MnDOT Bridge Inspection Reports, load ratings where available, historic photographs and documents, and the National Register nomination for the CM&StP Railroad Grade Separation Historic District.

Included in the appendices of this report are a glossary of historic preservation and engineering terms, the Virginia "Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior's Standards," and engineering and historical documents pertinent to this bridge such as the current MnDOT Structure Inventory and Bridge Inspection reports.

This individual bridge report is designed to provide the bridge owner and other interested parties with a comprehensive summary of engineering and historic data and recommendations that will enable historic bridge owners to make informed decisions when planning for and managing their historic properties. Again, this report should be used in conjunction with the overall Midtown Corridor General Bridge Management Plan which provides additional information and a multi-bridge perspective.

Below is an aerial view of Bridge L8901 to provide an understanding of the physical context of the bridge.



Hennepin Co. aerial 2012

II – Historical Data

Contractor: Chicago, Milwaukee, and St. Paul (CM&StP) Railroad

Designer/Engineer: J. H. Prior, Engineer of Design, CM&StP Railroad
Charles Frederick Loweth, Chief Engineer, CM&StP Railroad

Description
Bridge L8901 carries Fremont Avenue S. over the Chicago, Milwaukee, and St. Paul Railroad. Built in 1912-1913, it is a three-span, Neoclassical Revival style, continuous concrete deck girder bridge.

Geometrics. The bridge is about 120 feet long (measured end of rail to end of rail) and about 49 feet wide, the same width as most of the CM&StP corridor bridges (which were 49 or 51 feet). The center span measures 31 feet 6 inches long and the outer spans about 30 feet, which is typical of the corridor.

The street is about 30 feet wide between the curbs. Like most corridor bridges, it carries two lanes of traffic. The concrete deck has a bituminous overlay. (The decks were originally paved with 4-inch-thick wood blocks ("Track Depression Work" 1915).) The sidewalks retain their original width of approximately 8 feet but have received an overlay. (Original plans indicate the sidewalks were to be divided into 4-foot squares; historic photos suggest this occurred on at least some bridges.)

Structure. The substructure is comprised of concrete abutments and two piers or bents. Each pier has four square columns with a rounded-arched cross beam system that extends to the fascia to support cantilevered raised sidewalks. The bridge seat has simple Neoclassical coping.

The multi-beam continuous structural system uses non-prismatic reinforced concrete beams (roughly 13 inches wide, 4 feet deep, and 5 feet apart). The lower edge of the beams is angled to follow the lower curve of the fascia beams.

The fascias are haunched and ornamented with recessed panels that align with the pier columns. Smoke shields are missing from both sides of the bridge.

Railings. The bridge has approximately 36-inch-tall solid concrete railings topped by a modern pipe rail at about 42 inches. The rail posts form squat, square columns with a base, shaft, and capital. The rail panels are similarly detailed. Both posts and panels have simple recessed panels in the shaft region.

Near the ends of the bridge the railings move apart laterally, tracing the edge of the abutments, with the sidewalks widening correspondingly. The rail ends were originally symmetrical west to east, with the south ends of the railings having longer returns that those on the north ends. About 18 feet has been removed from the south end of the west railing.

Concrete Surface. The bridge was originally unpainted (see Historic Integrity below). The surface of the abutments, piers, beams, underside of deck, and, to some extent, fascia, retains original board form lines. The fascia and railings have a fairly smooth finish. According to a 1915 article in *Engineering News*, the bridge railings built in 1913-1914 had a surface texture achieved by removing the forms after 24 hours and treating the concrete "with a stiff wire brush to expose the red granite screenings in the aggregate." For the railings built in 1915-1917, "It was decided to discontinue this practice, as a smooth concrete face seems to give a more pleasing effect and to bring out more clearly the angles and planes of the design." Instead, the forms remained in place at least 48 hours and the concrete was rubbed "with emery stone just enough to take out surface irregularities or brushed with cement grout to remove surface discolorations" ("Track Depression at Minneapolis" 1915).

The underside of the deck is blackened by locomotive smoke. The date blocks have evidently been covered by concrete patches.

Other. There is sloped gravel fill against the south abutment retained by a modern low keystone wall.

Attached to the northeast corner of the bridge is an original, likely-railroad-built, buttressed poured concrete retaining wall, aligned north-south, that helps support Fremont Avenue. (There may be a similar wall attached to the northwest corner.)

Adjacent to the northeast corner is an original poured concrete retaining wall that extends one block east to Emerson Avenue.

Adjacent to the southeast corner of the bridge is coursed rubble stone slope paving that likely dates from the early- to mid-20th century. There may be other early walls or wall segments adjacent to or near the bridge.

Also near the southeast corner of the bridge is a segment of railroad-built right-of-way fencing at the top of the trench that survives from the original development of the corridor. The fencing is drawn on the original bridge plans. It has metal pickets and poured concrete posts with pyramidal tops. Intact segments of this style of fencing include Fremont to Dupont (two blocks) and Colfax to Lyndale (three blocks) on the south edge of the trench (there may be others). Historic photos show the corridor also had one or two other styles of right-of-way fence without concrete posts; a surviving section, for example, is the pipe rail fence extending from the southeast corner of the Colfax Avenue Bridge.

Attached to the southwest corner of the bridge is a modern full height retaining wall built of large modular blocks topped by a metal fence. The wall is two blocks long, extending west to the Hennepin Avenue Bridge. It retains the north edge of property that projects several feet into the trench and is occupied by a large parking lot, a driveway, and part of the Uptown Transit Center at Hennepin Avenue.

Setting and Views. The bridge is located within the Chicago, Milwaukee, and St. Paul Railroad Grade Separation Historic District. (See the Master map in the Midtown Corridor General Bridge Management Plan (2015) for the historic district boundaries; the boundaries extend north of the corridor adjacent to the east side of the bridge.) The historic district's identical bridges span the trench and are closely spaced – one block apart – giving the corridor strong visual continuity and a tunnel-like effect. The trench is about 110-120 feet wide at the top of the slope and 22 feet deep; near Fremont Avenue the trench walls are mostly moderately to vertically sloped. A recreational trail now replaces the railroad tracks. The floor of the trench beneath the bridge is now at two grades, with the southern half of the trench lower than the northern half. A chainlink fence separates the two.

Vegetation on the trench slopes in most of the corridor consists largely of volunteer deciduous trees, shrubs, and herbaceous plants.

From both below and on top of the bridge, corridor views to the east include the trench and its wooded slope, with modern elements such as the Emerson Avenue Bridge (1986). Views to the west include the trench and its wooded slopes, with modern elements such as a large retaining wall that projects into the trench along the south slope. Views in both directions include a chainlink fence along the trench centerline. Views from the top of the bridge also include surrounding city blocks.

When the bridge was built, the setting was comprised of a rail corridor, with about 20 trackside industries, aligned through a largely residential neighborhood. In 1912 there was an industrial building at the northwest corner of the bridge and houses and vacant lots at other three corners. Today there are large recent apartment buildings to the northwest and northeast, a recent retaining wall to southwest (which projects into the trench), and a light industrial building to the southeast. When the bridge was built, 29th Street intersected Fremont Avenue at the south end of the bridge; today 29th has been closed west of Fremont for parking lot and building development. The bridge is located in Minneapolis' Lowry Hill East neighborhood.

Historic Integrity
Bridge L8901 generally retains historic integrity of location, design, setting, materials, workmanship, feeling, and association. However, integrity of design, setting, feeling, and association have been diminished somewhat by the large retaining wall at the southwest corner and by other changes to the setting. Alterations to the bridge and immediate setting include:

- About 18 feet has been removed from the south end of the west railing.
- Both smoke shields have been removed.
- Trains traveled the corridor until the summer of 2001. The last tracks were removed ca. 2002. (The original plans propose two main line tracks beneath the center span.)
- A bituminous-paved recreational trail was installed under the north and center spans, this segment opening in 2000. The grade of the northern part of the trench was elevated for the trail. A chainlink fence was installed to separate the trail from the railroad, which operated for another year or two south of the trail at the lower grade.
- Historically-inspired streetlights have been added to the trail near the bridge.
- A chainlink fence extends down the center of the trench both east and west.
- The concrete deck has a bituminous overlay. (It was originally paved with 4-inch-thick wood blocks.)
- Sidewalks have received a concrete overlay.
- In ca. 2010 simple pipe rails were added to the concrete rails to increase railing height.
- In ca. 2010 a low keystone block wall was installed to retain the south abutment slope.
- The date block(s) on the abutment(s) have been covered with concrete patches.
- Much of the abutments, the lower part of the piers, and roadway side of the railings have been painted grayish white. Painting of the piers and abutments occurred sometime after 1995.
- A modern, large modular block retaining wall extends west from the bridge on the south side of the trench.
- Several large apartment buildings have been recently built adjacent to this part of the corridor.
- See also changes described in Setting and Views above.

Attached to the northeast corner of the bridge is an original, railroad-built, buttressed poured concrete retaining wall (behind conifer) that helps support Fremont Avenue.

Significance

Bridge L8901, built in 1912-1913 to carry Fremont Avenue S. over the Chicago, Milwaukee, and St. Paul Railroad (CM&StP), is a fair example of the Neoclassical Revival style, continuous reinforced concrete girder bridges that are a significant component of the CM&StP Grade Separation Historic District. The 2.8-mile-long historic district is comprised of a railroad corridor trench as well as 40 bridges. Thirty-eight bridges carry urban streets over the trench, one bridge carries I-35W over the trench, and one bridge at 29th Street east of Dupont Avenue does not span the trench but historically provided track-level access to it. Twenty-seven of the bridges are original; 26 of the 27 (all but the 29th Street Bridge) are nearly identical. The massive grade separation project, which coincided with an expansion of the CM&StP main line, involved more than a decade of planning and controversy. The tracks were not only depressed, but the set of bridges that crossed them was designed with an emphasis on aesthetics. The project played a significant role in the development of Minneapolis by advancing civic planning, facilitating transportation, increasing safety, protecting the quality of adjacent residential neighborhoods, and enhancing community aesthetics, all while maintaining important rail service and the viability of trackside industries. The bridges were designed by the CM&StP and built in 1912-1917 by railroad labor. The Minnesota historic bridge study found the CM&StP corridor bridges to be significant within the statewide historic context "Reinforced Concrete Highway Bridges in Minnesota, 1900-1945." They are the work of designers identified in the context study as significant (J. H. Prior, H. C. Lothholz, and C. F. Loweth) and, as a collection, display unusual aesthetic qualities. According to the bridge study inventory form, "From an engineering perspective, the new crossings also were notable as early Minnesota examples of continuous, concrete, girder construction – a bridge type rarely used in the state for highway crossings" (Hess ca. 1997). The historic district was determined eligible for the National Register in 1997. It was officially listed on the National Register in 2005 under Criterion A (broad patterns of history) in the area of Community Planning and Development. The level of significance is listed as Local and the period of significance as 1912-1916. Bridge L8901 is a contributing element.

The corridor's bridges were generally built in sequence from west to east in 1912-1917 beginning with the Fremont Avenue Bridge. (There was no bridge built at Girard and the Hennepin Avenue Bridge was pre-existing.) According to the original plans, Bridge L8901 (CM&StP Bridge 0-1582) was built between late September 1912 and late June 1913. (See the plan sheets for details.)

The railroad trench and bridges were designed by J. H. Prior and H. C. Lothholz who successively served as Engineer of Design for the CM&StP. (Prior's signature appears on plans for bridges west of about Stevens Avenue, and Lothholz signed plans for bridges from approximately Stevens Avenue eastward.) The railroad's Chief Engineer for the design process was Charles F. Loweth. All three men are considered significant engineers within the statewide historic context "Reinforced Concrete Highway Bridges in Minnesota, 1900-1945" (Frame 1988).

The trench and bridges were constructed by crews of CM&StP workers supervised by W. R. Powrie, District Engineer for the railroad. Plans for nearby bridges indicate Assistant Engineer was D. M. Sprague and Foreman was Frank White. In July of 1915 there were 500 men on the corridor project, more than half of whom were working on the bridges (Bainbridge 1915; "Track Depression" 1915).

The Fremont Avenue Bridge in 1950, facing southwest (Norton and Peel, photographer; Minnesota Historical Society).

Historic Context	Urban Centers, 1870-1940 Railroad Development in Minnesota, 1862-1956 Reinforced Concrete Highway Bridges in Minnesota, 1900-1945
National Register Status	Contributing to Listed Historic District
NRHP Historic District	Chicago, Milwaukee and St. Paul Railroad Grade Separation Historic District
Criterion A Significance	Community Planning and Development
Criterion C Significance	N/A

SHPO Inventory Number HE-MPC-7337

Minneapolis HPC Status Not individually designated, not in a district

Sources Used to Compile Section II – Historical Data

Bainbridge, C. N. "A Large Track Depression Project at Minneapolis." *Railway Age Gazette*, Dec. 3, 1915.

Construction Plans for Fremont Avenue So. Crossing 0-1582. Seven sheets dated 1912-1913. CM&StP Railway Engineering Department. City of Minneapolis files.

Frame, Robert M. "Reinforced Concrete Highway Bridges in Minnesota." National Register of Historic Places Multiple Property Documentation Form (MPDF). Aug. 15, 1988. State Historic Preservation Office, St. Paul.

Hennepin County Regional Rail Authority (HCRRA). *Cultural Landscape Management Treatment Guidelines for the Chicago, Milwaukee, and St. Paul Railroad Grade Separation Historic District of the Midtown Corridor, Minneapolis, Minnesota*. 2006.

Photographs, Historic Aerial, of Minneapolis. 1937 and 1938. Borchert Map Library, University of Minnesota, Minneapolis.

Photographs, Historic, of Midtown Greenway Bridges. City of Minneapolis Public Works Department.

Photographs, Historic, of Midtown Greenway Bridges. Hennepin County Library, Minneapolis.

Photographs, Historic, of Midtown Greenway Bridges. Minnesota Historical Society, St. Paul.

"Photographs of Twenty-Four Early Minneapolis Businesses." Circa 1917. Photograph album. Hennepin County Library, Minneapolis.

Site visits to the bridge by ONE, SRF, Gemini Research, Braun Intertec, MacDonald and Mack, and Wiss Janney Elstner, 2013-2014.

Semes, Steven W. '"Differentiated' and 'Compatible': Four Strategies for Additions to Historic Settings." In *Sense of Place: Design Guidelines for New Construction in Historic Districts.* Philadelphia: Preservation Alliance for Greater Philadelphia, 2007.

TKDA and Hess Roise. *Midtown Corridor Historic Bridge Study*. Prepared for City of Minneapolis, 2007.

"Track Depression at Minneapolis." *Engineering News*, March 18, 1915.

"Track Depression Work of the C. M. and St. P. Ry. at Minneapolis." *Railway Review*, July 17, 1915.

Vermeer, Andrea C., and William E. Stark. "Chicago, Milwaukee, and St. Paul Railroad Grade Separation." National Register of Historic Places Registration Form. Dec. 23, 2004.

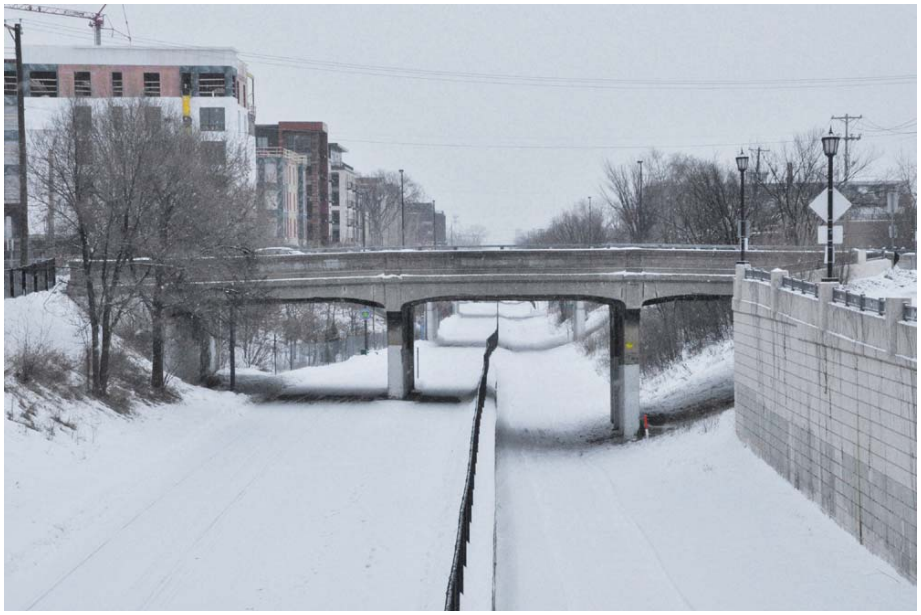
"Views of the 29th Street Track Depression Construction Project in Minneapolis." Chicago, St. Paul, and Minneapolis Railroad. Circa 1917. Photo album call #212. Minnesota Historical Society, St. Paul.

Character-Defining Features

Character-defining features are prominent or distinctive qualities or elements of an historic property that contribute significantly to its physical character, historic integrity, and significance. A list of character-defining features does not identify all important aspects of an historic property, however. Each historic property contains additional elements of location, design, setting, materials, workmanship, feeling, and

association that together comprise its historic integrity or authenticity. Character-defining features of Bridge L8901 are listed below. (See the Midtown Corridor General Bridge Management Plan (2015) for character-defining features of the historic district.)

Feature 1: Reinforced concrete three-span bridge carrying a city street and raised sidewalks over a railroad trench 110-120 feet wide and 22 feet deep with moderately sloping sides. Neoclassical Revival design shared by 26 bridges (originally 37). From both below and on top of the bridge, views of the trench and closely spaced identical bridges create visual continuity; the three spans create a tunnel-like effect.



Feature 2: Abutments with classical coping on bridge seats. Piers comprised of four square columns joined by rounded arches that extend to the fascia to support cantilevered sidewalks. Multiple beams integrated with the deck; beams are angled to follow the curve of the fascia beams. Fascias are haunched with recessed panel detailing over the piers. (Two characteristics of the corridor's bridges are currently missing: date block imprints are covered with shotcrete and both smoke shields have been removed.)

Feature 3: 36-inch-tall concrete railings with both posts and panels divided into classical base, shaft, and capital. Simple recessed panels. Railings move apart laterally, tracing the edge of the abutments; sidewalks widen correspondingly.

Feature 4: Unpainted concrete surfaces (most now painted) with board form lines on abutments, piers, beams, and underside of the deck; smoother finish on fascia and railings.

III – Bridge Data

Date of Construction (remodel) **1912-1913**
Common Name (if any)

Location

Feature Carried:	Fremont Avenue S. (MUN 1030)
Feature Crossed:	Midtown Greenway
County:	Hennepin
Ownership (assumed not confirmed):	Hennepin County Regional Rail Authority

MnDOT Structure Data

Data Current (as of):	Oct 2014
Main Span Type:	Continuous Concrete Girder, tee beam
Main Span detail:	
Substructure Type - Foundation Type:	
Abutment:	Concrete – Spread Footing on Soil
Piers:	Concrete – Spread Footing on Soil
Total Length:	94.0 ft
Main Span Length:	31.7 ft
Total Number of Span(s):	3
Skew (degrees):	0
Structure Flared:	No Flare
Roadway Function:	Urban Local
Custodian/Maintenance Type:	City of Minneapolis

Reported Owner Inspection Date 6/18/2014
Sufficiency Rating[1] 29.6
Operating Rating[2] HS 7.8
Inventory Rating[2] HS 4.6
Posted Load[3] P-Posted
Posting[3] VEH: 11; Semi: 19; DBL: 10
Design Load Unknown, designed before standard design trucks existed

Current Condition Code[4]

Deck:	3
Superstructure:	3
Substructure:	3
Channel and Protection:	N/A
Culvert:	N/A

Fracture Critical[5] No

Deficiency Status[6] Structurally Deficient

Current Appraisal Rating[7]

Structural Evaluation:	2
Deck Geometry:	5
Underclearances:	N/A
Waterway Adequacy:	N/A
Approach Alignment:	5

Roadway Clearances

Roadway Width:	30 ft curb to curb
Vert. Clearance Over Rdwy:	N/A
Vert. Clearance Under Rdwy:	12'-9" +/-
North Span:	29.0 ft clear opening; location of trail
Center Span:	29.5 ft clear opening; 2 levels with fence btw Trail on upper half
South Span:	29.0 ft; clear opening all sloped to abutment

Roadway Data

ADT Total:	1400 (2011)
Truck ADT Percentage:	Not available
Bypass Detour length:	1 mile
Number of Lanes:	2

1 - Sufficiency Rating is used to determine funding eligibility and priority for bridge replacement and rehabilitation. It is based on condition codes, inventory rating, appraisal ratings, ADT, and detour length.
2 - The bridges are load rated using an AASHTO defined 36 ton truck. An inventory rating of HS 12 implies the bridge may safely be able to carry a 21 ton truck indefinitely. An operating rating equal to HS 18 imples the maximum permissble live load that the bridge can carry is 32 tons.
3 - If the bridge is posted, the bridge cannot safely carry standard trucks used to design a new bridge. The posting values are determined by rating the bridge with model trucks determined by AASHTO. The trucks have specific distances between axles and axle loads. Typically, if the calculated operating rating is less than HS 27, calculations are completed to determine if posting is required. If the operating rating is greater than HS 27, it is assumed that posting is not required for the bridge.
4 - Bridges are provided structural condition codes based on inspection findings. The codes range between 9 and 0. A code of 9 is excellent condition; a code of 0 is failed – beyond corrective action. Code 3 is serious condition.
5 - A bridge is fracture critical if the failure of one member will likely cause a section or the entire bridge to collapse.
6 - Deficiency status is an additional check used to determine funding eligibility. If it is rated as structurally deficient or functionally obsolete, the bridge is eligible for funding. A bridge is structurally deficient if any of the deck, superstructure, or substructure condition codes are 4 or less, or if the structure evaluation appraisal rating is 2 or less. A bridge is functionally obsolete if any of the listed appraisal ratings are 3 or less.
7 - Bridges are rated on a scale of 0 to 9. Structural evaluation of 2 means intolerable, high priority of replacement. Deck geometry rating of 5 means somewhat better than minimum adequacy. Approach alignment rating of 5 means minor speed reduction required.

Non-MnDOT Data

Roadway Characteristics

Lane Widths:	15 ft
Shoulder Width:	0 ft; not striped
Shoulders Paved or Unpaved:	Paved
Roadway Surfacing:	Bituminous overlay

Sidewalk Characteristics

Sidewalk Width East & West:	8.0 ft
Railing Height East & West:	3.5 ft
Pedestrian Ramps:	N/A north; yes south
Type of Pedestrian Ramp:	Curb cutout

Location of Plans City of Minneapolis

Accident Data Info not specific enough to report

Previous Repairs, if any

Modular block wall added at bottom of slope in 2010. Metal railing added to the top of the concrete rail to improve railing height. Shade of white paint applied to abutments and pier columns to cover graffiti.

IV – Existing Conditions/Activities

As described in the Project Introduction section, the bridge was visited multiple times. These visits were conducted to determine the existing condition of the bridge and vertical clearance.

General Bridge Description:
Bridge L8901 is a 3-span continuous concrete girder bridge which carries two lanes of traffic over the Midtown Greenway in the city of Minneapolis. There are 9 tee beams in each of the three spans. There is a concrete deck topped with a bituminous overlay which is approximately 4 ¾" thick. The bridge has two stub abutments, and two 4-column piers. The roadway width is 30 feet from curb to curb and there is an 8 foot sidewalk on either side of the bridge. The railings are made of concrete and stand 36 inches tall. A steel pipe rail was added on top to provide an additional 6 inches of height.

Serviceability Observations:
The bridge is structurally deficient due to its condition. The NBI condition code for the deck, superstructure, and substructure is a 3. Bridges are provided structural condition codes based on inspection findings. The codes range between 9 and 0. A code of 9 is excellent condition; a code of 0 is failed – beyond corrective action. A code of 3 suggests serious condition. These codes are used to assist in determining the sufficiency rating of the bridge which is used to determine funding eligibility and priority for bridge replacement and rehabilitation. The bridge is also load posted.

The roadway and sidewalk geometrics on the bridge are consistent with the approaches on each end.

Condition Observations:

Superstructure:

This is the condition of the center span. All beams have some spalling or scaling present and all bays have at least minor deck spalls with reinforcement exposed.

This is the condition of the south span. Some beams only have scaling present, but the majority of the beams have spalling with exposed, corroded reinforcement. All bays have at least minor deck spalls with reinforcement exposed.

This is the condition of the north span. Similar to the center span, all beams have some spalling or scaling present and all bays have at least minor deck spalls with reinforcement exposed.

Substructure:

The south wing walls are cracked; the southeast corner is shown to the left. There are also numerous spalls and scaling on the face of the abutment.

The north wing wall cracks were repaired with shotcrete; the northeast wing wall crack reappeared. It is believed that this crack protrudes through the abutment.

There are also spalls and scaling on the face of the north abutment.

There are spalls located on all of the pier columns and arches between the columns. Structural cracks are also visible in the arches.

Railings and Sidewalks:

The railings are in satisfactory condition except for the large separation at the posts at the end of the bridge. Typical hairline cracks are found along the railing.

This is the northeast corner. Metal straps are being used to try to prevent the wing walls from settling further. The connection between the railing and wing walls were likely not designed with this purpose in mind.

The southeast corner is the only corner without the metal straps.

Approaches:

The approaches were milled at the time of this picture. Some additional spalls can be seen beneath the bituminous overlay.

Non-Structural Condition:
No utilities were observed.

Date of Site Visit: December 13, 2013 and May 26, 2014

Overall Considerations:
The Fremont Avenue Bridge is currently open to vehicular traffic, but is posted. The activities that follow assume the bridge will remain open to vehicular and pedestrian traffic.

Once a project begins and the purpose and need are identified, the owner may desire or need additional vehicle load capacity, railing crash capacity, additional lanes or sidewalk widths, etc. Designers should consider the use of design exceptions and the use of non-typical details during project development. It may be possible for a deviation from current standards to be accepted by all parties. Creative solutions are encouraged to provide safe, durable, and functional designs that minimize the impact to the historic integrity of the bridge.

Stabilization Activities:
For the purposes of this report, stabilization is defined as measures performed to maintain the bridge in its current state until a more substantial repair project is undertaken. These measures could be minor repairs which are intended to prevent the need for emergency repairs in the near future, or could be emergency repairs.

There are no stabilization activities for this bridge.

Preservation Activities:
For the purposes of this report, preservation is defined as actions taken to preserve the structural and historic integrity of the bridge for the next 20 to 30 years.

During the site visits completed in late 2013 and 2014, concerns with the bridge's condition were identified. According to the Secretary of the Interior's Standards, historic fabric should be retained and repaired where possible. All of the bridge is so seriously deteriorated that the entire structure is likely irreparable. Both abutments are showing signs of settlement, while the north abutment has a crack which is believed to protrude through the entire section. Both abutments also have scaling and spalls covering most of the surface area of the structure. The piers have spalls on the columns with cracks and spalls on the arches. Almost all beams have exposed, corroded reinforcement and all deck bays have some spalls with exposed reinforcement. For these reasons, the bridge condition is considered to be irreparable. In addition, this bridge is currently posted and it was suggested to not mill and overlay the bridge due to uncertainty of the superstructure's ability to support a milling machine.

When a project need and purpose are defined, testing can be completed to better define the damage. Consultation among interested parties should take into account the future project's Purpose and Need, preservation of the historic district's overall integrity, additional environmental impacts, and other factors.

One possibility is in-kind replacement of the bridge to original dimensions per the Secretary of the Interior's Standards for Reconstruction. In-kind replacement of a portion of an historic property (in this case the historic district) is undertaken only under special circumstances. In this case it may be justified because interpreting or understanding the significance of the property relies on experiencing the historic district as a designed collection of essentially identical bridges spaced one block apart. Because of its location near the end of the linear district and the fact that it is surrounded by replacement bridges, replacing the Fremont Avenue Bridge with a modern design, even if unobtrusive, would substantially diminish the ability of this portion of the district to convey its historic design intent and significance. The in-kind replacement should be clearly signed to explain to the public that it is a reconstruction.

If in-kind replacement is not feasible because of the Purpose and Need, a second option is to replace the bridge with a closely compatible bridge that strongly supports the historic integrity of the district and its design intent. For the reasons described above, the new bridge should reinforce the historic design consistency by being closely modeled on the historic bridges (see the character-defining features above) with a classically-influenced aesthetic and massing, three spans, smooth concrete surface, curved shapes, restrained detailing, etc. The goal would be a bridge subtly or mildly differentiated from the historic bridge it replaces.

For purposes of the preservation estimate, costs for either an in-kind replacement or a closely compatible bridge of similar size would be approximately the same.

Maintenance Activities:
Annual maintenance activities should be performed on this bridge. The maintenance activities should include an annual inspection, power washing of the deck each spring, clearing vegetation that interferes with the abutments and wing walls, and spot painting the metal railing to repair chipped paint.

V – Projected Costs

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 on rehabilitating and repairing 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 costs provided below are presented in 2014 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 25% contingency and 10% mobilization allowance has been included in the construction cost estimates. These values differ from the Minnesota Local Historic Bridge Study and are based off of previous estimates and bid tabs on work items performed in the Midtown Corridor.

Administrative and engineering costs are also presented below as 20% of the preservation activities. Engineering and administrative costs are also to be interpreted as programming level only. Costs can be highly variable and are dependent on the structure condition, intended work scope, project size, and level of investigative, testing, and documentation work necessary. Additional studies, evaluation, and historical 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:	$ 6,300
Opinion of Construction Cost - Stabilization Activities:	$ 0
Opinion of Construction Cost - Preservation Activities:	$ 2.9 million

(Note the estimated maintenance costs assume the preservation activities are already completed).

Estimated Preliminary Design, Final Design, and Construction Administration Costs: $ 580,000

MAINTENANCE, STABILIZATION, & PRESERVATION COST ESTIMATE (2014 DOLLARS)
Bridge No. L8901 (Fremont Ave.)
December 31, 2014

			ESTIMATED QUANTITIES AND COST		
ITEM NO.	ITEM	UNIT	QUANTITY / ANTICIPATED LIFE CYCLE (YRS)	UNIT COST	TOTAL ESTIMATE
MAINTENANCE COSTS					
1	ANNUAL INSPECTION	LUMP SUM	1	$1,000	$1,000
2	POWER WASHING DECK	LUMP SUM	1	$1,500	$1,500
3	VEGETATION REMOVAL	LUMP SUM	5	$10,000	$2,000
4	SPOT PAINTING METAL RAILING	LUMP SUM	10	$5,000	$500
	25% CONTINGENCY				$1,300
				ESTIMATED MAINTENANCE COSTS	**$6,300**
STABILIZATION COSTS					
1				$0	$0
	25% CONTINGENCY				$0
				ESTIMATED STABILZATION COSTS	**$0**
IN-KIND REPLACEMENT COSTS					
1	BRIDGE REMOVAL	CY	710	$500	$355,000
2	BRIDGE REPLACEMENT	SF	4610	$425	$1,959,250
	25% CONTINGENCY				$578,600
				ESTIMATED IN-KIND REPLACEMENT COSTS	**$2,893,000**

Appendix A. Glossary

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

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

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

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

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

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

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

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

Corrosion – The general disentegration of metal through oxidation.

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

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

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

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

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

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

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

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

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

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

Extant – Currently or actually existing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rehabilitation – The act or process of returning a historic property to a state of utility through repair or alteration which makes possible an efficient contemporary use, while preserving those portions or features of the property that are significant to its 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 distentegration of a concrete surface due to the failure of the cement surface caused by chemical attack or freeze-thaw cycles or rebar too close to the surface and oxidizing from exposure to chlorides.

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

Scour critical rating – A measure of a bridge's vulnerability to scour (see above). MnDOT utilizes letter designations to represent specific descriptions of a bridges susceptibility and/ or present condition in regards to scour. Range in condition and scour susceptibility does not necessarily correlate alpha numerically to the MnDOT scour code letters so it is important to understand the specifc 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 slighty 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 sufficientcy ratings of 50 and below are eligible for replacement.

Tee beam – A reinforced concrete superstructure system distinguished by a "T" shape. The lower portion of the system are rectangular reinforced concrete beams. The upper portion is a reinforced concrete deck. The two parts form an integral system which works together to resist applied loads.

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

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

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

2014 MnDOT Structure Inventory Report

Mn/DOT Structure Inventory Report

Bridge ID: L8901 **FREMONT AV S over MIDTOWN GREENWAY**

Date: 10/27/2014

+ GENERAL +	
Agency Br. No.	7787
District	METRO
Maint. Area	
County	27 - HENNEPIN
City	MINNEAPOLIS
Township	
Desc. Loc.	0.1 MI N OF LAKE ST
Sect., Twp., Range	33 - 029NN - 24W
Latitude	44d 57m 00.00s
Longitude	93d 17m 42.00s
Custodian	COUNTY
Owner	COUNTY
Inspection By	CITY OF MINNEAPOLIS
BMU Agreement	
Year Built	1913
Year Fed Rehab	
Year Remodeled	
Temp	
Plan Avail.	MUNICIPAL

+ STRUCTURE +	
Service On	HWY;PED
Service Under	PED;BICYCLE
Main Span Type	CCONC DK GIRD
Main Span Detail	
Appr. Span Type	
Appr. Span Detail	
Skew	
Culvert Type	
Barrel Length	
Number of Spans	
MAIN: 3 APPR: 0 TOTAL: 3	
Main Span Length	31.7 ft
Structure Length	94.0 ft
Deck Width	49.0 ft
Deck Material	C-I-P CONCRETE
Wear Surf Type	BITUMINOUS
Wear Surf Install Year	
Wear Course/Fill Depth	0.40 ft
Deck Membrane	NONE
Deck Protect.	N/A
Deck Install Year	
Structure Area	4,606 sq ft
Roadway Area	2,820 sq ft
Sidewalk Width - L/R	8.0 ft 8.0 ft
Curb Height - L/R	0.58 ft 0.58 ft
Rail Codes - L/R	36 36

+ ROADWAY +	
Bridge Match ID (TIS)	1
Roadway O/U Key	1-ON
Route Sys/Nbr	MUN 1030
Roadway Name or Description	
FREMONT AVE SO (MUN 1030)	
Roadway Function	MAINLINE
Roadway Type	2 WAY TRAF
Control Section (TH Only)	
Ref. Point (TH Only)	
Date Opened to Traffic	01-01-1913
Detour Length	1 mi.
Lanes	2 Lanes ON Bridge
ADT (YEAR)	1,495 (2007)
HCADT	
Functional Class.	URBAN LOCAL

+ RDWY DIMENSIONS +		
If Divided	NB-EB	SB-WB
Roadway Width	30.0 ft	
Vertical Clearance		
Max. Vert. Clear.		
Horizontal Clear.	29.9 ft	
Lateral Clr. - Lt/Rt		
Appr. Surface Width		31.0 ft
Roadway Width		30.0 ft
Median Width		

+ MISC. BRIDGE DATA +	
Structure Flared	NO
Parallel Structure	NONE
Field Conn. ID	
Cantilever ID	
Foundations	
Abut.	CONC - SPRD SOIL
Pier	CONC - SPRD SOIL
Historic Status	ELIGIBLE
On - Off System	OFF

+ PAINT +	
Year Painted	Pct. Unsound
Painted Area	
Primer Type	
Finish Type	

+ BRIDGE SIGNS +	
Posted Load	VEHICLE & SEMI
Traffic	NOT REQUIRED
Horizontal	NOT REQUIRED
Vertical	NOT APPLICABLE

+ INSPECTION +	
Deficient Status	S.D.
Sufficiency Rating	29.6
Last Inspection Date	06-18-2014
Inspection Frequency	12
Inspector Name	MINNEAPOLIS
Structure	B-OPEN (POST REC)

+ NBI CONDITION RATINGS +	
Deck	3
Superstructure	3
Substructure	3
Channel	N
Culvert	N

+ NBI APPRAISAL RATINGS +	
Structure Evaluation	2
Deck Geometry	5
Underclearances	N
Waterway Adequacy	N
Approach Alignment	5

+ SAFETY FEATURES +	
Bridge Railing	1-MEETS STANDARDS
GR Transition	N-NOT REQUIRED
Appr. Guardrail	N-NOT REQUIRED
GR Termini	N-NOT REQUIRED

+ IN DEPTH INSP. +	
Frac. Critical	
Underwater	
Pinned Asbly.	
Spec. Feat.	

+ WATERWAY +	
Drainage Area	
Waterway Opening	
Navigation Control	NOT APPL
Pier Protection	
Nav. Vert./Horz. Clr.	
Nav. Vert. Lift Bridge Clear.	
MN Scour Code	A-NON WATERWAY
Scour Evaluation Year	1993

+ CAPACITY RATINGS +	
Design Load	UNKN
Operating Rating	HS 7.80
Inventory Rating	HS 4.60
Posting	VEH: 11 SEMI: 19 DBL: 19
Rating Date	01-23-2013
Mn/DOT Permit Codes	
A: N B: N C: N	

BRIDGE INVENTORY REPORT.RPT

2014 MnDOT Bridge Inspection Report

10/27/2014 Page 1 of 2

Mn/DOT BRIDGE INSPECTION REPORT

Inspected by: CITY OF MINNEAPOLIS

BRIDGE L8901 FREMONT AV S over MIDTOWN GREENWAY INSP. DATE: 06-18-2014

County: HENNEPIN
City: MINNEAPOLIS
Township:
Section: 33 Township: 029NN Range: 24W
Span Type: CCONC DK GIRD
NBI Deck: 3 Super: 3 Sub: 3 Chan: N Culv: N

Location: 0.1 MI N OF LAKE ST
Route: MUN 1030 Ref. Pt.: 000+00.870
Control Section: Maint. Area:
Local Agency Bridge Nbr: 7787

Length: 94.0 ft
Deck Width: 49.0 ft
Rdwy. Area / Pct. Unsnd: 2,820 sq ft
Paint Area/ Pct. Unsnd:
Culvert N/A

Open, Posted, Closed: POSTING REC Postings: 11 - 19 - 19

Appraisal Ratings - Approach: 5 Waterway: N
MN Scour Code: A-NON WATERWAY Def. Stat: S.D. Suff. Rate: 29.6

Required Bridge Signs - Load Posting: VEHICLE & SEMI Traffic: NOT REQUIRED
Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
13	BIT. O/L (CONC DECK)	2	06-18-2014	2,820 SF	0	0	2,820	0	0
			07-03-2013	2,820 SF	0	0	2,820	0	0
	Notes: |THERE IS SEPARATION AND A GAP IN THE ASPHALT OVERLAY ALONG THE CURB LINES. MAP CRACKS REFLECTING THROUGH THE ASPHALT SURFACE.|								
407	BITUMINOUS APPROACH	1	06-18-2014	2 EA	2	0	0	0	N/A
			07-03-2013	2 EA	0	2	0	0	N/A
	Notes: |[2014] NEW ASPHALT BOTH. GOOD|								
333	RAILING - OTHER	2	06-18-2014	187 LF	0	187	0	N/A	N/A
			07-03-2013	187 LF	0	187	0	N/A	N/A
	Notes: |THERE ARE MANY CRACKS AND SPALLS WITH RUST STAINS AND REBARS EXPOSED. 6 INCH SEPARATION AT THE N.E. WITH FLAT STOCK BOLTED TO THE CONCRETE FACE FOR STABILITY, ALSO N.W. & S.W. 42" WITH EXTENSION.|								
110	CONCRETE GIRDER	2	06-18-2014	846 LF	0	0	254	593	N/A
			07-03-2013	846 LF	0	0	254	593	N/A
	Notes: |MOST OF THE GIRDERS ARE IN AN ADVANCED STATE OF DETERIORATION. THERE ARE LARGE SPALLS WITH REBARS EXPOSED. SOME OF THE HAUNCHES ARE HOLLOW SOUNDING. THE CONCRETE IS DISINTEGRATING AROUND REINFORCING STEEL WITH LOSS OF BOND WHICH IS AFFECTING THE LOAD CARRYING CAPACITY OF THE STRUCTURE. THERE IS LOSS OF SECTION TO THE REBAR. LOOSE CONCRETE OVER PATH , HAZARDOUS TO PEDESTRIANS AND BIKES.|								
205	CONCRETE COLUMN	2	06-18-2014	8 EA	0	0	8	0	N/A
			07-03-2013	8 EA	0	0	8	0	N/A
	Notes: |THERE ARE LARGE SPALLS WITH REBARS EXPOSED AND UNDERMINED, CRACKS AND HOLLOW AREAS ON ALL EIGHT OF THE COLUMNS. MODULAR BLOCK TOE WALL ON THE SOUTH.|								
215	CONCRETE ABUTMENT	2	06-18-2014	98 LF	0	79	20	0	N/A
			07-03-2013	98 LF	0	79	20	0	N/A
	Notes: |THERE ARE SIGNS OF SEEPAGE, AREAS OF HEAVY SCALING AND SPALLS WITH LARGE HOLLOW AREAS, LARGE CRACKS, EROSION AT THE CAPS AND THE BACKWALLS ARE IN AN ADVANCED STATE OF DETERIORATION. LOOSE CONCRETE ON THE NORTH ABUTMENT SEAT. THE N.E & N.W. CORNER HAS BEEN SHOTCRETE AND SHOWING FINE SIZE RANDOM CRACKS AND DELAMINATION. |								
234	CONCRETE CAP	2	06-18-2014	98 LF	0	69	30	0	N/A
			07-03-2013	98 LF	0	69	30	0	N/A
	Notes: |THERE ARE MANY CRACKS, AREAS OF HEAVY LEACHING, SCALE, DELAMINATION, EFFLORESCENCE AT ALL OF THE ARCHES AND CAPS.|								
387	CONCRETE WINGWALL	2	06-18-2014	4 EA	0	0	4	0	N/A
			07-03-2013	4 EA	0	0	4	0	N/A
	Notes: |THE WALLS HAVE HEAVY EROSION, SCALING, MASSIVE CRACKS AND CREVICES UP 4" AND 6" SEPARATION AT THE N.E. CORNER. THERE IS BOLTED FLAT STOCK AT THE S.W. CORNER. OBJECT MARKER AT THE BUS TURNAROUND IS DAMAGED. N.E. TIPPING OUT 2+ INCHES, WITH THE FLAT STOCK STABILIZER. MOVEMENT AT ALL FOUR. MONITOR CRACKS AT S.E. 2' 3 1/2", S.W. 20 1/4", N.E. 3' 8 1/2", MEASURED 6-23-14.|								

10/27/2014 Page 2 of 2

Mn/DOT BRIDGE INSPECTION REPORT

Inspected by: CITY OF MINNEAPOLIS

BRIDGE L8901 FREMONT AV S over MIDTOWN GREENWAY INSP. DATE: 06-18-2014

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
359	CONC DECK UNDERSIDE	2	06-18-2014	1 EA	0	0	0	0	1
			07-03-2013	1 EA	0	0	0	0	1
	Notes: |THE SUBSURFACE HAS SEVERE LEACHING, EFFLORESCENCE, LARGE SPALLS WITH REBARS EXPOSED AND AREAS OF MAP CRACKING, THIN SECTIONS, DELAMINATIONS.|								
360	SETTLEMENT	2	06-18-2014	1 EA	1	0	0	N/A	N/A
			07-03-2013	1 EA	1	0	0	N/A	N/A
	Notes: |SEE ELEMENT 387.|								
964	CRITICAL FINDING	2	06-18-2014	1 EA	1	0	N/A	N/A	N/A
			07-03-2013	1 EA	1	0	N/A	N/A	N/A
	Notes: |NO CRITICAL FINDINGS.|								
981	SIGNING	2	06-18-2014	1 EA	1	0	0	0	0
			07-03-2013	1 EA	1	0	0	0	0
	Notes: |LOAD POSTED 11T/19T/19T. S. BOUND LOAD POSTING IS ON BRIDGE, NO ADVANCE SIGNAGE. THE WINGWALL OBJECT MARKER IS DAMAGED AT THE S.E. WING. THE DO NOT ENTER SIGN ON THE S.W. IS LOOSE. |								
985	SLOPES	2	06-18-2014	2 EA	0	2	0	N/A	N/A
	Notes: |MINOR EROSION S. SIDE, WOOD CHIPS ON N.|								
986	CURB & SIDEWALK	2	06-18-2014	1 EA	0	1	0	N/A	N/A
			07-03-2013	1 EA	0	1	0	N/A	N/A
	Notes: |CURB; THERE ARE SEALED CRACKS AND SMALL SPALLS. THE N.E. AND N.W. APPROACH CURB HAS SPALLED AND THE ASPHALT PATCH IS LOOSE. SIDEWALK; THERE ARE FINE SIZED TRANSVERSE CRACKS. THE SIDEWALK SUBSURFACE HAS MANY TRANSVERSE, MAP CRACKS, AREAS OF LEACHING, EFFLORESCENCE, PATCHES AND SPALLS. THE S.E. APPROACH SIDEWALKS HAVE ASPHALT PATCHES. N.W. DELAMINATED AND UNDERMINED. [2014] S.W. SETTLEMENT. |								

General Notes: GATE COMBINATION #1684. 2012 LOAD RATING DONE BY TKDA. SIDEWALK PANELS REPLACED 2012. BLOCK WALL SUPPORTING TRAIL TIPPING OUT.

Inspector's Signature

Reviewer's Signature / Date

2013 Load Rating Report

FORM RC-CL Revised Jan. 2012

MnDOT BRIDGE RATING AND LOAD POSTING REPORT FOR COUNTY AND LOCAL AGENCIES

Bridge Location and Description

Bridge No. L8901

Hwy. No. Fremont Ave — Over ☒ / Under ☐ Midtown Greenway

Year Built 1913 — Year Remodeled — Replaces Br.

Type 206 - CConc Deck Girder — County Hennepin — Ref. Pt.

Description Bridge L8901 is a 3 span continuous concrete deck girder. It has a 30'-0" roadway width, 48'-0" deck width. The bridge has 2 8'-0" sidewalks and 2 concrete barriers with metal railing, 6" asphalt wearing course. No skew.

Location Minneapolis

Data for Basis of Report (Check all that apply)

- ☒ Bridge Inventory File
- ☒ Previous Bridge Rating and Load Posting Report
- ☒ Bridge Plans
  - ☒ New ☐ Overlay
  - ☐ Repair/Reconstruction Beam sheets missing. Bridge similar to L8916.
  - ☐ Other Dead Load Modifications
- ☒ Bridge Inspected by JRM and JGB Date 3/15/2012
  - ☐ Damaged Component
  - ☐ Deteriorated Component

Types of Analysis:
☐ Manual ☐ Computer* ☐ BARS ☒ Virtis, V.6.2 ☐ Other*
*

NBI Condition Ratings
Deck 3
Superstructure 2
Substructure 3
ADTT 44

Method of Rating (Check appropriate box)
- ☒ Load Factor (LF) ☐ Assigned Load Ratings
- ☐ Allowable Stress (AS)
- ☐ Load & Resistance Factor (LRFR)
- ☐ Load Testing
- ☐ No Rating Computations performed

Design Load Unknown

Design Method ASD

Summary of Rating and Load Posting Analysis

Load Posting — Required ☒ / Not Required ☐

Sign	TONS		
R12-1A ☐			
R12-5a ☐			
R12-5 ☒	11 M3	19 M3S2	19 M3-3
R12-X11 ☐		45	

Bridge Rating

Inventory	Operating
HS ☒ RF ☐ 4.6	HS ☒ RF ☐ 7.8

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature: Joseph R. Mueller Date: 1/23/2013

(Typed or Printed) Name: Joseph R. Mueller License No. 49106

(Typed or Printed) Employed by (☐Agency/☒Firm): TKDA

My signature below indicates that I have read and fully agreed with the load rating report.

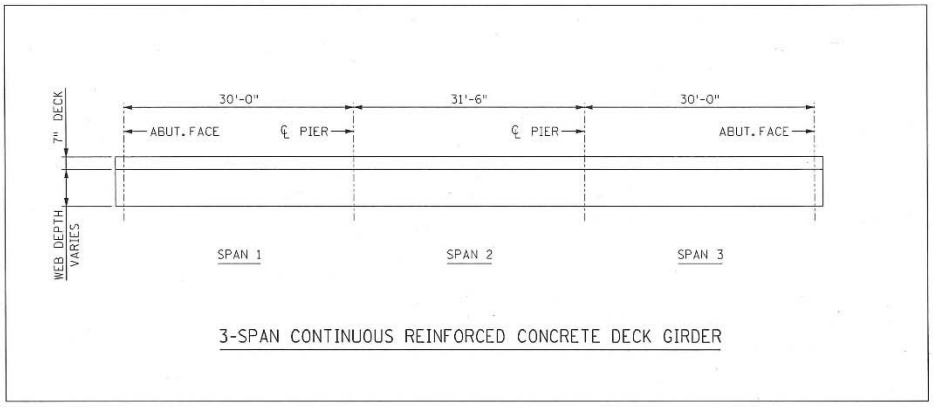
Program Administrator's Signature: Date: 02/05/2013

FORM RD-CL
Revised Jan. 2012

BRIDGE RATING DETAILS

Bridge Type 206
Rating Method LFR
Roadway Width 30'-0"
☐ Curved ☐ Tapered
Beam Spacing 5'-0"
☐ Live Load Distribution Factor
Single 0.769 Multiple 0.833
☐ Finite/Grid Element Analysis

Bridge No. L8901
Design Load: Unknown
Inventory Rating: 4.6
Operating Rating: 7.8
Rated JRM Checked MJD
Date 1/22/2013
Sheet 2 of 2



3-SPAN CONTINUOUS REINFORCED CONCRETE DECK GIRDER

BEAM ELEVATION [2]
Show span lengths, structure/beam depths.

Truck	Rating Factor	Span/ Pier	Location	Limit State [1]	Notes/Comments
HS 20 Inventory	0.23	Sp. 3	0.6L	Ultimate Moment	Beam "G8" - Truck
HS 20 Operating	0.39	Sp. 3	0.6L	Ultimate Moment	Beam "G8" - Truck
Post, M3	0.46	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Post, M3S2	0.49	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Post, M3S3	0.47	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Type SU4	0.40	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Type SU5	0.38	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Type SU6	0.36	Sp. 1	0.4L	Ultimate Moment	Beam "G8"
Type SU7	0.34	Sp. 1	0.4L	Ultimate Moment	Beam "G8"

1 Choose from: service or ultimate; shear or moment
2 Elevation may be on back or another sheet if it won't fit here.