2015 ROUTINE AND FRACTURE CRITICAL BRIDGE INSPECTION REPORT

BRIDGE # 69839
NB MICHIGAN ST over TH 194 SB

DISTRICT: District 1  COUNTY: St. Louis  CITY/TOWNSHIP: Duluth

Date(s) of Inspection: - 04/30/2015
Equipment Used: A-62, Other - Confined Space Entry procedures and equipment where required for the 2 Fracture Critical Piers.

Owner: State Highway Agency

Inspected By: Carter, Rodney; Fishbein, Joseph; Theisen, Scott

Report Written By: Rodney Carter
Report Reviewed By:
Final Report Date:

MnDOT Bridge Office
3485 Hadley Avenue North
Oakdale, MN 55128
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Bridge Location Map

Bridge 69839

Bridge 69839
I. Findings Summary

This report documents the findings of the 2015 Routine and Fracture Critical Inspection of Bridge 69839 (Northbound Michigan Street over TH 194 southbound). The inspection was conducted on April 30, 2015 by Rodney Carter, Joe Fishbein, and Scott Theisen of the MnDOT Bridge Office.

Significant Findings

No critical structural deficiencies were observed during this inspection.

Following is a summary of some of the more significant observations and recommendations during the 2015 inspection and those items not addressed from the 2011 & 2013 inspection:

1. There was a small 1/2" crack in a weld found at the connection of Girder C to the northeast face of Pier Cap 2 in 2011 (Photo 52). Magnetic particle testing was conducted at this location, Girder C of Pier 1, and also at Girder B of both piers. There were no new findings or changes.

Recommendation: Continue to closely monitor these locations during all future inspections.

2. The 1997 load rating did not take into consideration the integral steel pier caps, but was only based upon the steel girders (also noted in 2011 & 2013).

Recommendation: A new load rating should be performed that takes into consideration the load carrying capacity of the integral steel pier caps.

3. The post and beam concrete railings and deck overhangs have extensive deterioration (delamination and spalling), which was previously noted in 2011 & 2013. The condition is the same in 2015 (Photos 10, 11, & 50).

Recommendation: These areas will require continued inspection and maintenance to remove loose concrete, which represents a potential safety hazard to traffic below. Repair (or complete reconstruction) of the copings and railings should be considered.

4. There is pigeon debris on the interior of both pier columns and the caps. The interior of the cap is starting to corrode on the floor of Pier 1 near Girders B & C (Photos 48 & 53). Pigeon droppings are also present on girder flanges and bracing connections.

Recommendation: Pigeon droppings inside the pier columns and caps should be removed, as this presents a health hazard, impedes inspection of some welds, and accelerates deterioration of paint.

5. There is isolated flaking rust on the fascia girder splices and corrosion on the fascia girder bearings, which was noted in 2011. No change in 2015.

Recommendation: MnDOT District 1 should consider a spot painting contract for the bridge (last performed in 1995), or even consider a complete re-painting. The bridge is constructed of non-weathering steel.

6. Leakage of the strip seal joints is the likely cause of the abutment deterioration and fascia bearing corrosion, which was noted in 2011 (Photos 7 & 8). No change in 2015.

Recommendation: MnDOT District 1 should consider flushing and examining the strip seal joints for tears or pull-outs, patching the torn gland at the West Abutment, and perhaps consider replacing the joints entirely (they are nearly 30 years old).

8. The structure inventory recommends object markers because the roadway width narrows at the west end. There are no object markers on the bridge.

Recommendation: Install object markers at the west end of the bridge.
## NBI Condition Summary
Complete NBI and element condition ratings are provided in the 7-Day Fracture-Critical Report (Appendix B).

<table>
<thead>
<tr>
<th>Item</th>
<th>Current</th>
<th>Suggested</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck</td>
<td>5 (Fair Condition)</td>
<td>5 (Fair Condition)</td>
<td>(2014) No change. [2015 F/C inspection] No change in condition from previous inspection. Concrete deck wearing surface has unsealed cracks with moderate size and density. Underside of deck slab has very heavy spalling on overhangs with rust. Some may be over traffic lanes below. There are transverse cracks in the underside of slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed.</td>
</tr>
<tr>
<td>Superstructure</td>
<td>5 (Fair Condition)</td>
<td>5 (Fair Condition)</td>
<td>11/16/2011 G. Elmquist changed the NBI rating to correspond with 04/07/2011 F/C inspection report. (2014) no change. [2015 F/C inspection] No change in condition from previous inspection. The bridge concrete railings have delams and spalling, with some over traffic lanes below.</td>
</tr>
<tr>
<td>Substructure</td>
<td>7 (Good Condition)</td>
<td>7 (Good Condition)</td>
<td>[2015 F/C inspection] No change in condition from previous inspection.</td>
</tr>
<tr>
<td>Channel</td>
<td>N (Not Applicable)</td>
<td>N (Not Applicable)</td>
<td></td>
</tr>
</tbody>
</table>
II. Inspection Logistics

The focus of this report is the presentation of findings from the in-depth fracture critical and routine inspection of Bridge 69839 conducted on April 30, 2015. The 2015 inspection was performed by Rodney Carter, Joe Fishbein, and Scott Theisen of the MnDOT Bridge Office.

Bridge Description

Bridge 69839 carries northbound Michigan St. (the ramp to Superior St. and Mesaba Ave.) over southbound MNTH 194 (the ramp from southbound Mesaba Ave. to SB I-35). The plans show the bridge running west to east (the piers and spans are numbered from the west). The bridge has three continuous spans (steel multi-girder), with a total length of 317 ft. (see figure 1). Both piers are a “hammerhead” configuration, with an integral steel box girder cap welded directly to a cylindrical steel column (the column bases are bolted to a concrete footing). This bridge is classified as “fracture critical” due to the two integral steel pier caps. The abutments are reinforced concrete.

The bridge was designed by HNTB (Howard, Needles, Tammen, & Bergendorff). The plans are dated July 16, 1968. The bridge was constructed in 1969 (the primary construction contractor was E. W. Coons), and was opened to traffic August of 1971. The bridge deck was rehabbed in 1982. The contract included a 2” low slump concrete overlay & deck repairs, and new expansion joints. A spot painting contract was let in 1995.

The roadway width on the bridge deck is 29.5 ft. There are two lanes, with a steep (6%) upward grade to the east, and a slight horizontal curvature to the north. The average daily traffic (ADT) on the bridge is 5,500 (2007). Heavy commercial traffic (HCADT) is 165. The average daily traffic (ADT) on the ramp below the bridge is 9,250 (2004).

The design load rating is HS 20 (+Mod) - 1965 AASHO specifications. The most recent load rating was performed in 1997 (Appendix D). The operating load rating is HS 46.8 and the inventory load rating is HS 28.1. Load posting is not required; the bridge is open to legal loads.

Bridge 69839 is owned and maintained by MnDOT District 1. Design plans and shop drawings are available on the MnDOT Electronic Document Management System (EDMS). This bridge is currently classified as “Not Eligible” for the National Register of Historic Places.

Inspection Access

The steel pier caps were accessed using an Aspen Aerials A-62 “Snooper”. A right lane closure was required on the bridge (Layout B1) and a right lane closure on the roadway below (Layout 39). The traffic control was provided by D1 Carlton bridge crew.

Special Requirements

Confined space entry procedures were required to enter the steel pier caps. All personnel had received confined space training prior to this inspection. The Duluth Fire Department was called prior to entering the confined space and immediately after exiting the confined space each time.
Inspection Procedures

An in-depth (close-up visual) inspection was performed on the two fracture critical steel pier caps. This included an internal inspection of the pier caps and steel support columns (confined space entry procedures were required). This inspection also included a routine inspection of the superstructure, abutments, and deck since the bridge is not very long and could be done in a timely manner.

1. Fracture Critical Members: Integral Steel Pier Caps
   a. Perform confined space entry and inspection of fracture critical steel pier caps.

2. Fatigue Prone Details: Focus mainly on D, E, and E’ categories – See details list for locations.
   a. Check all fatigue prone details for defects.

3. Other Miscellaneous Inspection Details: Snooper Access.
   a. Check all girders and bearings for corrosion, proper function, orientation and missing hardware.
   b. Check substructure for movement, scaling, and cracking concrete.
   c. Visual inspection of deck, railing, signing.
III. Fracture Critical Members/Fatigue Prone Details

Fracture Critical Members

The National Bridge Inspection Standards (NBIS) defines a “Fracture Critical Member” (FCM) as “A steel member in tension, or with a tension element, whose failure would likely cause a portion of or the entire bridge to collapse.” The only fracture critical members on this bridge are the two welded steel integral pier caps.

Fatigue Prone Details

This section identifies fatigue prone details present on the primary structural steel members of this bridge. Steel structural members subjected to tension or reversal stresses can develop fatigue cracks. The three primary parameters affecting fatigue crack propagation are stress range, the number of stress cycles, and the type of detail. Other factors, such as out-of-plane bending, heat straightening, or field-welded repairs can increase the likelihood of fatigue cracking.

For the purpose of designing bridges for fatigue caused by in-plane bending stress, AASHTO describes weld details and connections using an alphabetical designation ranging from stress category “A” (best fatigue resistance) to stress category “E” (most susceptible to fatigue crack growth). Fatigue detail categories are defined in Table 6.6.1.2.3-1 of the AASHTO LRFD Bridge Design Specifications and Section 8.1.5 of the FHWA Bridge Inspector’s Reference Manual (BIRM). Any fatigue prone details present on the bridge that are not defined by AASHTO or FHWA - such as details prone to fatigue cracking due to out of plane bending - are also described in this section.
Figure 1A: Plan View of Bridge 69839 (from original plans)
Figure 1B: Elevation View of Bridge 69839 (from original plans)
Figure 2: Shop Drawing of Steel Pier Cap, Girder Stubs, and Upper Portion of Column

Figure 3: Cross-Section of Steel Pier Cap at Interior Girder
**Figure 4:** Cross-Section of Steel Cap at Column Bearing Stiffener

**Figure 5:** Shop Drawing of Pier Column Bases
<table>
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<tr>
<th>Member &amp; Location</th>
<th>Detail Description &amp; Photo Reference</th>
<th>AASHTO Stress Categ</th>
<th>AASHTO Detail Number</th>
<th>Potential Crack Initiation Point</th>
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<tr>
<td><strong>Steel Girders</strong></td>
<td>Lateral bracing gusset plates welded to girder web - the horizontal gusset plate weld intersects the vertical web stiffener weld</td>
<td>E</td>
<td>6.1</td>
<td>From the weld intersection and terminations of the gusset plate welds</td>
</tr>
<tr>
<td></td>
<td>“Tight fit” web stiffener detail at girder flange (at diaphragm stiffeners and intermediate stiffeners in tension zones)</td>
<td>NA</td>
<td>NA</td>
<td>In the toe of the flange/web weld and termination of the stiffener weld</td>
</tr>
<tr>
<td></td>
<td>Fillet welded web stiffeners</td>
<td>C’</td>
<td>4.1</td>
<td>From the toe of the fillet weld</td>
</tr>
<tr>
<td></td>
<td>Shop welded flange and web splices (full-penetration groove welds, ground smooth and radiographically inspected)</td>
<td>B</td>
<td>5.1</td>
<td>From internal discontinuities in the filler metal or the fusion boundary</td>
</tr>
<tr>
<td></td>
<td>Lateral bracing gusset plates welded to pier cap web - the horizontal gusset plate weld intersects the vertical stiffener weld to the interior girder</td>
<td>E</td>
<td>6.1</td>
<td>From the weld intersection and terminations of the gusset plate welds</td>
</tr>
<tr>
<td></td>
<td>Tack welds between interior stiffeners and top flange</td>
<td>E’</td>
<td>NA</td>
<td>From cracks in the tack weld or adjacent base metal</td>
</tr>
<tr>
<td></td>
<td>“Tight fit” internal web stiffener detail at top flange in negative moment regions</td>
<td>NA</td>
<td>NA</td>
<td>In the toe of the top flange/web weld or at the termination of the stiffener weld</td>
</tr>
<tr>
<td><strong>Steel Pier Caps</strong></td>
<td>Fillet welded web stiffeners</td>
<td>C’</td>
<td>4.1</td>
<td>From the toe of the fillet weld</td>
</tr>
<tr>
<td></td>
<td>Backer bar along bottom flange/web weld</td>
<td>B’</td>
<td>3.2</td>
<td>From discontinuities in the weld or backer bar</td>
</tr>
<tr>
<td></td>
<td>Intersecting weld at the interface of the column to the pier cap.</td>
<td>B’</td>
<td>3.2</td>
<td>From the weld intersection</td>
</tr>
<tr>
<td><strong>Steel Columns</strong></td>
<td>Horizontal field splice (complete joint penetration weld) located 4 ft. below the cap) - discontinuous welded backer bar in place</td>
<td>C</td>
<td>5.3</td>
<td>From discontinuities in the toe of the weld or along the fusion boundary</td>
</tr>
<tr>
<td></td>
<td>Welded attachments (ladder rungs)</td>
<td>E</td>
<td>NA</td>
<td>In base metal adjacent to weld</td>
</tr>
<tr>
<td></td>
<td>Fillet welded stiffeners</td>
<td>C’</td>
<td>4.1</td>
<td>From the toe of the fillet weld</td>
</tr>
<tr>
<td></td>
<td>Vertical complete joint penetration weld (one on each column) - ground smooth and RT tested</td>
<td>B</td>
<td>5.1</td>
<td>From internal discontinuities in the filler metal or the fusion boundary</td>
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IV. Inspection Field Notes

Photos referenced in the Field Inspection Notes are found in Section V of this report.
Field Inspection Notes – Bridge #69839 (District 1A – Duluth)

West Pier (Pier #1):

Pier Cap (External Notes): [2011] The paint system on the exterior surfaces is sound. There is no notable corrosion or section loss. There are pigeon droppings on the top of the cap and the cap faces. There are some minor gouges on the bottom edges of the cap - these are presumably from lifting cable during construction. ½” crack at Girder C to NE face of Pier Cap 2 – NDT completed. Both Girders B and C need to be monitored at Piers 1 and 2 during all future inspections. [2015 & 2013] MT testing done on the crack noted in 2011 and all similar details on both piers. No changes were observed in the crack and no further cracks were located. Photo 44

Pier Cap (Internal Notes): [2011] While the cap interior was cleaned of pigeon debris in 2004, a strong odor remains. There is surface corrosion on the floor of the cap from the pigeon debris. Some tack welds are present between the top flange and the “tight fit” interior stiffeners. [2015 & 2013] No change Photos 45 & 46


Column (Internal Notes): [2011] There is pigeon debris on the base and welded ladder rungs - this is a health hazard. The interior surfaces have no notable corrosion or section loss. The areas adjacent to the field splice were field painted. [2015 & 2013] No change. Photos 47 & 48

East Pier (Pier #2):

Pier Cap (External Notes): [2011] There was a small crack weld found at the connection of Girder C to the northeast face of Pier Cap 2. The paint system on the exterior surfaces is sound. There is no notable corrosion or section loss. There are pigeon droppings on the top of the cap and the cap faces. ½” crack at Girder C to NE face of Pier Cap 2 – NDT completed. Both Girders B and C need to be monitored at Piers 1 and 2 during all future inspections. [2015 & 2013] MT testing done on the crack noted in 2011 and all similar details on both piers. No changes were observed in the crack and no further cracks were located. Photo 52

Pier Cap (Internal Notes): [2011] while the cap interior was cleaned of pigeon debris in 2004, a strong odor remains. There is surface corrosion on the floor of the cap from the pigeon debris. Some tack welds are present between the top flange and the “tight fit” interior stiffeners. [2015 & 2013] No change. Photos 53 & 54

Column (External Notes): [2011] There is some minor surface corrosion on the column base. [2015] No change. Photo 43

Column (Internal Notes): [2011] There is pigeon debris on the base and welded ladder rungs - this is a health hazard. The interior surfaces have no notable corrosion or section loss. The areas adjacent to the field splice were field painted. [2015 & 2013] No change. Photos 55 & 56
### Girders

- **[10/10/08]** Rust is starting on new paint job. Freckled rust on all webs and starting on the columns except the outside fascia. Rust forming in splice plates.
- **[12-28-2010]** Post inspection note by G. Elmquist - 2009 F/C inspection report noted: Some flaking rust (minor section loss) is present at the fascia girder splices. Adjusted NBI and CS rating accordingly.
- **[2011]** ½” crack at Girder C to NE face of Pier Cap 2 – NDT completed. Both Girders B and C to be monitored at Piers 1 and 2 during all future inspections. Minor section loss on fascia girder splices.
- **[2012-2013]** All girders have light freckling. Beam ends have about 1% paint failure MT testing done on the crack noted in 2011 and all similar details on both piers. No changes were observed in the crack and no further cracks were located.
- **[2015 F/C Inspection]** Some flaking rust (minor section loss) is present at the fascia girder splices (CS3). Photos 30 & 51

### Diaphragms

- **[2011]** Steel diaphragms have prevalent surface corrosion.
- **[2013]** No change. **[2015 F/C Inspection]** No change. Photo 49

### Bearings

- **[2011]** The girders have sliding expansion bearings (guided) at the abutments - there are a total of 8 bearing assemblies. The interior bearings are generally free of corrosion and show evidence of recent movement. The fascia bearings have extensive corrosion and debris. No grease is evident on the sliding plates.
- **[2013]** No change in condition from previous inspection. The South Abutment expansion bearing at Girder A was in approximately the neutral position. However, the other bearings showed movement at the following locations: South Abutment Girder A 3/8” in expansion, North Abutment Girder A 1/2” in contraction, and North Abutment Girder D 1/4” in contraction at 30-40 degrees.
- **[2015 F/C Inspection]** No change. Photos 31 – 34, 40 & 41

### Paint System

- **[2011]** The superstructure and substructure were painted with a lead/aluminum system in 1970. A spot painting contract was performed in 1995 - it appears that this included primarily the bottom flanges of the girders. Currently, there is minor paint failure and surface corrosion (approximately 15-20% unsound paint), with isolated areas of flaking rust (minor section loss).
- **[2015 & 2013]** No change.

### Steel Pier Caps

See detailed notes on previous pages.

### Steel Pier Columns

See detailed notes on previous pages.

### Abutments & Wingwalls

- **[2010]** Abutment repaired - Dow Rychlak readjusted NBI to 7 after repair. Abutment is still cracking at corners of backwall. SE wingwall has spall on top.
- **[2012-2013]** - 8 vertical cracks and 2 cracks at corners on West Abutment West Abutment B4 leaking crack with efflorescence.
- **[2015 & 2013]** Both abutments and all wingwalls have random leeching cracks with efflorescence. Photos 36 - 39, & 42

### Bridge Deck (Underside)

- **[2007-2013]** Slab has very heavy spalling on underside of overhangs with rust. There are transverse cracks in the slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed.
- **[2007]** Span 3 - map cracking and efflorescence full length of span.
- **[2015 F/C Inspection]** Underside of deck slab has very heavy spalling on overhangs with rust. There are transverse cracks in the underside of
<table>
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<tr>
<th>Element</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wearing Surface</strong></td>
<td>Slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed. Photos 49 &amp; 50.</td>
</tr>
</tbody>
</table>
| **Railings**     | 2007-2013 14 ft. wide transverse crack up to 1/8 in. wide in left lane of span 2 should be sealed. Cracks sealed in (09) with 2501.  
12012 Needs crack sealing.  
2013 There are moderate cracks throughout the deck with failed sealing material  
2015 F/C Inspection Concrete deck has unsealed cracks with moderate size and density. (Photo 20) Cracks are spaced about every 5' throughout deck. Construction joint in center of deck is unsealed (Photo 21). |
| **Chain Link Fence** | Use this element to rate the chain link fence on the south west approach rail. 2011-2013 The majority of the chain link fence has minor coating failure with surface rust present. Fence on SW corner is in poor condition with torn holes and loose pipe in fencing. 2014 No change.  
2015 F/C Inspection No change. Photos 4. |
| **Expansion Joints** | 2007 Strip seals are partially clogged with debris.  
2008 Northeast cover plate is gone. Concrete under plate is scaled away. Northeast end strip-seal cut too short so water and dirt are draining over onto bridge seat.  
2013 West Strip Seal open 2 1/4" at 26 degrees. East Strip Seal open 1 3/4" at 26 degrees  
2015 F/C Inspection Both strip seals are filled with dirt. There is a 3' hole in Strip seal at SW fog line in the right lane (CS3). There is 3' hole in Strip seal at NW fog line in the left lane (CS3). (Photos 7-8) The following measurements taken at fog lines for West strip seal (SW is open 2", NW is open 1 1/2") at 60 deg. The following measurements taken at the fog lines for the East strip seal (SE is open 1 1/8", NE is open 1 1/4") at 60 deg. Photos 22 – 23, & 28 – 29 |
| **Poured Joints** | This element quantity includes the end block joints, as well as the longitudinal joint running down the center line of the deck.  
2011-2013 The centerline joint (from the 1982 overlay) does not appear to be sealed - there is leaching on the underside of the deck below.  
2015 F/C Inspection No change |
| **Approaches**    | 2011 East Abutment has bituminous patching. The west approach is breaking up at the joint with the bridge.  
2013 The east approach has longitudinal cracks, map cracks, and extensive patching along the end block (The west approach has settled 1/2"  
2015 F/C Inspection There is spalling & cracking at West approach headblock for the entire length. There is a 2' x 5' spall at East approach headblock. Photos 5 – 6, & 24 - 25 |
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| Signing       | [2013] Element added as the structure inventory recommends object markers because the roadway width narrows at the south end. Rate CS-3; there are no object markers installed at this time.  
               | [2015 F/C Inspection] No change.                                                                                                                                                                                                  |
| Guardrail     | [2009] South guardrail impact damage. 2 posts bent & flexbeam damaged.  
               | [2012-2013] Guardrail damage still present  
               | [2015 F/C Inspection] No change. Photos 13 & 26                                                                                                                                                                                  |
| Slopes        | [2011] The bituminous treated aggregate slope has been driven on. The surface needs to be redressed and new bituminous should be sprayed on the slopes. The tops of the slopes need polyguard treatment.  
               | [2013] No change.                                                                                                                                                                                                                   |
| Curbs/Sidewalks | [10/11/08] Spall on the west side with rusting rebar. 4.5 ft x 6 in. & 3 ft. x 6 in. west curb.  
               | [2013] There is spalling along the curb throughout the bridge.  
               | [2015 F/C Inspection] Curb has settled at Southwest approach 1 1/2", and at Northwest approach 2". Northwest curb is filled with bituminous. No change in spalling of curb on bridge. Photos 14 – 15, & 18 - 19 |
| Miscellaneous | [2011] Under-deck lighting is in good condition.  
               | [2012] Heavy pigeon waste needs flushing on all girders and columns. Steel column interiors should be cleaned.  
               | [2013] No change.  
               | [2015 F/C Inspection] All deck cracks need to be sealed. All the drains and deck surface need to be flushed or cleaned. Heavy pigeon waste needs flushing on all girders and columns. The Steel column interiors should be cleaned. The bridge delaminations and spalling in the concrete railings and deck underside should be monitored for hazards located over traffic lanes below. Any hazards should be removed when necessary. |
Pictures

Photo 4 - Southwest Approach Rail & Fence

Photo 5 - West Approach
Pictures

Photo 6 - Spalling & Cracking at West Approach Headwall

Photo 7 - 3' Hole in West Strip Seal at Southwest Fog Line in the Right Lane
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Photo 8 - 3' Hole in Strip Seal at NW Fog Line in the Left Lane

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Photo 53 - Pier 2 Cap Looking South
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Photo 54 - Pier 2 Cap Looking North

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Pictures

Photo 56 - Pier 2 Column Looking Up

Photo 57 - Pier 2 Cap Access Door
Appendix A: SI&A
### GENERAL

| Bridge ID: 69839 | NB MICHIGAN ST | over TH 194 SB | Date: 09/30/2015 |

- **Agency Br. No.**
- **District** District 1
- **Maint. Area** 1A
- **City** Duluth
- **County** 069 - St. Louis
- **Township**
- **Desc. Loc.** AT JCT TH 35
- **Sec, Twp., Range** 34 - 080N - 14W
- **Latitude** Deg 46 Min 26 Sec 35.25
- **Longitude** Deg 92 Min 6 Sec 37.05
- **Custodian** 01 - State Highway Agency
- **Owner** 01 - State Highway Agency
- **BMU Agreement**
- **Year Built** 1969
- **MN Year Reconstructed**
- **FHWA Year Reconstructed**
- **MN Temporary Status**
- **Bridge Plan Location** 1 - CENTRAL
- **Date Opened to Traffic** 1/1/1969
- **On-Off System** 1 - ON
- **Legislative District** 07B

### ROADWAY

- **Bridge Match ID (TIS):** 2
- **Roadway O/U Key Route On Structure**
- **Route Sys** 10 - MUN
- **Number** 194
- **Roadway Name or Description** NB Michigan sT
- **Level of Service** 1 - MAINLINE
- **Roadway Type** 1 - 1-way traffic
- **Control Section (TH Only)**
- **Reference Point** 002+00.191
- **Detour Length** 1.0 mi
- **Lanes** On 2 Under 2
- **ADT** 5500 Year 2007
- **HCADT** 165 ADTT 3%
- **Functional Class** 16 - Urban - Minor Arterial

### RDWY DIMENSIONS

- **If Divided**
  - NB-EB
  - SB-WB
- **Roadway Width**
  - NB: 29.50 ft
  - EB: 29.50 ft
  - SB: 29.50 ft
  - WB: 29.50 ft
- **Vertical Clearance**
  - NB: ft
  - EB: ft
  - SB: ft
  - WB: ft
- **Max. Vert. Clear.**
  - NB: ft
  - EB: ft
  - SB: ft
  - WB: ft
- **Horizontal Clear.**
  - NB: ft
  - EB: ft
  - SB: ft
  - WB: ft
- **Lateral Clearances**
  - NB: ft
  - EB: ft
  - SB: ft
  - WB: ft
- **Appr. Surface Width** 30.0 ft
- **Bridge roadway Width** 29.5 ft
- **Median Width On Bridge** 0 ft

### MISC. BRIDGE DATA

- **Structure Flared** 0 - No flare
- **Parallel Structure** R - Right structure (North or East)
- **Field Conn. ID** 5 - Huck Bolt
- **Abutment Foundation** 1 - CONC
- **Material/Type** 3 - FTG PILE
- **Pier Foundation** 3 - STEEL
- **Material/Type** 2 - SPRD ROCK
- **Historic Status** 5 - Not eligible

### PAINT

- **Year Painted** 1970
- **Unsound Paint %** 15
- **Painted Area** 23617 sq. ft
- **Primer Type** 1 - Lead - non 3309
- **Finish Type** F - Phenolic Resin Alum

### BRIDGE SIGNS

- **Posted Load** 0 - Not Required
- **Traffic** 0 - Not Required
- **Horizontal** 1 - Object Markers
- **Vertical** 0 - Not Required

### STRUCTURE

<table>
<thead>
<tr>
<th>Service On</th>
<th>Service Under</th>
<th>Main Span Type</th>
<th>Main Span Detail</th>
<th>Appr. Span Type</th>
<th>Appr. Span Detail</th>
<th>Skew</th>
<th>Culvert Type</th>
<th>Barrel Length</th>
<th>Cantilever ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Highway</td>
<td>1 - Highway, w/ or w/out ped.</td>
<td>4 - Steel Continuous</td>
<td>01 - Beam Span</td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

### NUMBER OF SPANS

- **Main:** 3
- **Appr.:** 0
- **Total:** 3

- **Main Span Length** 130.0 ft
- **Structure Length** 317.5 ft
- **Deck Width (Out-to-Out)** 33.7 ft
- **Deck Material** 1 - Concrete Cast-in-Place
- **Wear Surf Type** 4 - Low slump Concrete
- **Wear Surf Install Year** 1982
- **Wear Course/Fill Depth** 0.17 ft
- **Deck Membrane** 0 - None
- **Deck Rebars** 0 - None
- **Deck Rebars Install Year**
- **Structure Area (Out-to-Out)** 10700 sq. ft
- **Roadway Area (Curb-to-Curb)** 10699 sq. ft
- **Sidewalk Width** Lt 0.70 ft Rt 0.70 ft
- **Curb Height** Lt 0.50 ft Rt 0.50 ft
- **Rail Type** Lt 03 Rt 03

### ROADWAY SIGNS

- **Posted Load**
  - 0 - Not Required
- **Traffic**
  - 0 - Not Required
- **Horizontal**
  - 1 - Object Markers
- **Vertical**
  - 0 - Not Required

### SAFE FEATURES

- **Bridge Railing**
  - 1 - MEETS STANDARDS
- **GR Transition**
  - 0 - SUBSTANDARD
- **GR Guardrail**
  - 1 - MEETS STANDARDS
- **GR Termini**
  - 1 - MEETS STANDARDS

### WATERWAY

- **Drainage Area (sq. mi.)**
- **Waterway Opening** sq. ft
- **Navigation Control** N - Not applicable, no water
- **Pier Protection**
  - Nav. Clr. (ft.)
  - Vert. (ft.)
  - Horiz. (ft.)
- **Nav. Vert. Lift Bridge Clear. (ft.)**
- **MN Scour Code** A - NON WATER
- **Year**

### CAPACITY RATINGS

- **Design Load** 6 - HS 20+MOD
- **Operating Rating**
  - 1 - LF (LF)
  - HS 46.8
- **Inventory Rating**
  - 1 - LF (LF)
  - HS 28.1
- **Posting VEH:**
  - SEMI: DBL:
- **Rating Date** 1/15/1997
- **MnDOT Permit Codes**
  - A: 1 - No Restriction
  - B: 1 - No Restriction
  - C: 1 - No Restriction

### NBI APPRAISAL RATINGS

- **Structure Evaluation** 5
- **Deck Geometry** 3
- **Underclearances** 4
- **Water Adequacy** N - Not Applicable
- **Approach Alignment** 8 - Equal to present desirability

### SAFETY FEATURES

- **Bridge Railing**
  - 1 - MEETS STANDARDS
- **GR Transition**
  - 0 - SUBSTANDARD
- **GR Guardrail**
  - 1 - MEETS STANDARDS
- **GR Termini**
  - 1 - MEETS STANDARDS

### IN DEPTH INSPE.

- **Y/N**
  - Frac. Critical:
  - Y
  - N
- **Freq**
  - Date:
  - mo.
  - 04/30/2015
- **Date: 04/30/2015**
- **Spec.Feat.**
- **WATERWAY**

### MISC. BRIDGE DATA

- **Structure Flared**
  - 0 - No flare
- **Parallel Structure**
  - R - Right structure (North or East)
- **Field Conn. ID**
  - 5 - Huck Bolt
- **Abutment Foundation**
  - 1 - CONC
- **Material/Type**
  - 3 - FTG PILE
- **Pier Foundation**
  - 3 - STEEL
- **Material/Type**
  - 2 - SPRD ROCK
- **Historic Status**
  - 5 - Not eligible

### GENERAL

- **Unofficial Structurally Deficient** N
- **Unofficial Functionally Obsolete** Y
- **Unofficial Sufficienty Rating** 66.2
- **Routine Inspection Date**
  - 04/30/2015
- **Routine Inspection Frequency** 12
- **Inspection Name**
  - Bridge Office FC Unit
- **Status**
  - A - Open

### NBI CONDITION RATINGS

- **Structure Evaluation**
  - 5
- **Deck**
  - 5 - Fair Condition
- **Unsound Deck %**
- **Superstructure**
  - 5 - Fair Condition
- **Substructure**
  - 7 - Good Condition
- **Channel**
  - N - Not Applicable
- **Culvert**
  - N - Not Applicable

### NBI APPRAISAL RATINGS

- **Structure Evaluation** 5
- **Deck Geometry** 3
- **Underclearances** 4
- **Water Adequacy** N - Not Applicable
- **Approach Alignment** 8 - Equal to present desirability

### SAFETY FEATURES

- **Bridge Railing**
  - 1 - MEETS STANDARDS
- **GR Transition**
  - 0 - SUBSTANDARD
- **GR Guardrail**
  - 1 - MEETS STANDARDS
- **GR Termini**
  - 1 - MEETS STANDARDS

### IN DEPTH INSPE.

- **Y/N**
  - Frac. Critical:
  - Y
  - N
- **Freq**
  - Date:
  - mo.
  - 04/30/2015
- **Date: 04/30/2015**
- **Spec.Feat.**

### WATERWAY

- **Drainage Area (sq. mi.)**
- **Waterway Opening** sq. ft
- **Navigation Control** N - Not applicable, no water
- **Pier Protection**
  - Nav. Clr. (ft.)
  - Vert. (ft.)
  - Horiz. (ft.)
- **Nav. Vert. Lift Bridge Clear. (ft.)**
- **MN Scour Code** A - NON WATER
- **Year**

### CAPACITY RATINGS

- **Design Load** 6 - HS 20+MOD
- **Operating Rating**
  - 1 - LF (LF)
  - HS 46.8
- **Inventory Rating**
  - 1 - LF (LF)
  - HS 28.1
- **Posting VEH:**
  - SEMI: DBL:
- **Rating Date** 1/15/1997
- **MnDOT Permit Codes**
  - A: 1 - No Restriction
  - B: 1 - No Restriction
  - C: 1 - No Restriction
Appendix B: 7 Day FC Report
# 7 Day Fracture Critical Report

(Report Date: 06/16/2015)

Disclaimer: The condition ratings in this report are only suggested. It is the responsibility of the Bridge Owner to approve inspection data in SIMS.

- **Bridge #:** 69839
- **Facility Carried:** NB MICHIGAN ST
- **Facility Intersected:** TH 194 SB
- **Bridge Owner:** State Highway Agency
- **Inspection Date(s):** - 04/30/2015
- **Primary Inspector:** Carter, Rodney
- **Other Inspector(s):** Fishbein, Joseph; Theisen, Scott
- **Method of Access:** A-62, Other - Confined Space Entry procedures and equipment where required for the 2 Fracture Critical Piers.
- **Traffic Control:** A right lane closure was required on the bridge (Layout B1) and a right lane closure on the roadway below (Layout 39). The traffic control was provided by D1 Carton bridge crew.

## Scope of Inspection
- **Routine and Fracture Critical**
- **Critical Structural Deficiencies (Yes/No):** No
- **New Load Rating Recommended (Yes/No):** No
- **Traffic Safety Hazard (Yes/No):** No
- **Structural Analysis Recommended (Yes/No):** No

### NBI Condition Ratings

<table>
<thead>
<tr>
<th>Item</th>
<th>Current</th>
<th>Suggested</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck</td>
<td>5</td>
<td>5</td>
<td>(2014) No change. [2015 F/C inspection] No change in condition from previous inspection. Concrete deck wearing surface has unsealed cracks with moderate size and density. Underside of deck slab has very heavy spalling on overhangs with rust. Some may be over traffic lanes below. There are transverse cracks in the underside of slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed.</td>
</tr>
<tr>
<td>Superstructure</td>
<td>5</td>
<td>5</td>
<td>11/16/2011 G. Elmquist changed the NBI rating to correspond with 04/07/2011 F/C inspection report.(2014) no change. [2015 F/C inspection] No change in condition from previous inspection. The bridge concrete railings have delams and spalling, with some over traffic lanes below.</td>
</tr>
<tr>
<td>Substructure</td>
<td>7</td>
<td>7</td>
<td>[2015 F/C inspection] No change in condition from previous inspection.</td>
</tr>
<tr>
<td>Channel</td>
<td>N</td>
<td>N</td>
<td></td>
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</table>

### Suggested Element Condition Rating Changes in RED

<table>
<thead>
<tr>
<th>#</th>
<th>Element Description</th>
<th>Quantity</th>
<th>Element Condition Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>022</td>
<td>Low Slump O/L (Concrete Deck with Uncoated Rebar)</td>
<td>10,700 SF</td>
<td>10,700</td>
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<tr>
<td>107</td>
<td>Painted Steel Girder or Beam</td>
<td>1,268 LF</td>
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<tr>
<td>202</td>
<td>Painted Steel Column</td>
<td>2 EA</td>
<td>0</td>
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<tr>
<td>215</td>
<td>Reinforced Concrete Abutment</td>
<td>67 LF</td>
<td>0</td>
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<tr>
<td>220</td>
<td>Reinforced Concrete Footing</td>
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<tr>
<td>300</td>
<td>Strip Seal Deck Joint</td>
<td>67 LF</td>
<td>59</td>
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<td>301</td>
<td>Poured Deck Joint</td>
<td>380 LF</td>
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<td>311</td>
<td>Expansion Bearing</td>
<td>8 EA</td>
<td>3</td>
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<td>320</td>
<td>Concrete Approach Slab-Bituminous Wearing Surface</td>
<td>2 EA</td>
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<td>331</td>
<td>Reinforced Concrete Bridge Railing</td>
<td>634 LF</td>
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<td>Quantity</td>
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<td>356</td>
<td>Fatigue Cracking Smart Flag</td>
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<td>Underside of Concrete Deck Smart Flag</td>
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<td>Section Loss Smart Flag</td>
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<td>Secondary Structural Elements</td>
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<td>Reinforced Concrete Wingwall</td>
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<tr>
<td>409</td>
<td>Chain Link Fence</td>
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<tr>
<td>422</td>
<td>Painted Beam Ends</td>
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<tr>
<td>427</td>
<td>Painted Steel Pier Cap</td>
<td>67 LF</td>
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<tr>
<td>964</td>
<td>Critical Finding Smart Flag</td>
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<tr>
<td>966</td>
<td>Fracture Critical Smart Flag</td>
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<td>981</td>
<td>Signing</td>
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<td>982</td>
<td>Approach Guardrail</td>
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<td>984</td>
<td>Deck &amp; Approach Drainage</td>
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<tr>
<td>985</td>
<td>Slopes &amp; Slope Protection</td>
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<tr>
<td>986</td>
<td>Curb &amp; Sidewalk</td>
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</tr>
<tr>
<td>988</td>
<td>Miscellaneous Items</td>
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</table>

Element Rating Notes:

ELEMENT #022: [2007-2013] 14 ft. wide transverse crack up to 1/8 in. wide in left lane of span 2 should be sealed. (2014) No changes. [2015 F/C Inspection] No change. Concrete deck (low slump overlay) has no areas of spalls, delaminations or temporary patches.

ELEMENT #107: 10/10/08 Rust is starting on new paint job. Freckled rust on all webs and starting on the columns except the outside fascia. Rust forming in splice plates. (12-28-2010 post inspection note by G. Elmquist - 2009 F/C inspection report noted: Some flaking rust (minor section loss) is present at the fascia girder splices. Adjusted NBI and CS rating accordingly.) [2012-2013] All girders have light freckling. (2014) No changes. [2015 F/C Inspection] Some flaking rust (minor section loss) is present at the fascia girder splices (CS3).

ELEMENT #202: Scrape to bare metal on column #1. 2007: Steel column interiors have heavy pigeon debris which is a safety hazard and pier columns have strong odor. (2012 - Spall has been repaired - Base of pier 2 has spall with exposed reinforcements. 4 ft x 3 ft.) [2012-2013] The interior of the column should be cleaned before next f/c inspection. (2014) Anchor bolt ends and nuts beginning to rust.

[2015 F/C inspection] No change (Photo 48).


ELEMENT #300: 10/10/08 Northeast cover plate is gone. Concrete under plate is scaled away and spalled. Northeast end strip-seal cut to short so water and dirt are draining over onto bridge seat. 2007: Strip seals are partially clogged with debris. 2008: South strip-seal 1' torn along fog line. [2013] West Strip Seal open 2 1/4" at 26 degrees. East Strip Seal open 1 3/4" at 26 degrees. (2014) W. open 1 3/4" E. open 1 1/4" at 27 deg. [2015 F/C Inspection] Both strip seals are filled with dirt. There is a 3' hole in Strip seal at SW fog line in the right lane (CS3). There is a 3' hole in Strip seal at NW fog line in the left lane (CS3) (Photos 7-8). The following measurements taken at fog lines for West strip seal (SW is open 2", NW is open 1 1/2") at 60 deg. The following measurements taken at
the fog lines for the East strip seal (SE is open 1 1/8", NE is open 1 1/4") at 60 deg.

ELEMENT #301: [11/16/2011-2013] G. Elmquist changed CSI rating to correspond with 04/07/2011 F/C inspection report. (11/16/2011 G. Elmquist changed CSI rating and added notes to correspond with 04/07/2011 F/C inspection report. This element quantity should include the end block joints, as well as the longitudinal joint running down the centerline of the deck. The centerline joint (from the 1982 overlay) does not appear to be sealed - there is leaking on the underside of the deck below.) (2014) No change. [2015 F/C Inspection] No change (Photo 21).


ELEMENT #320: (12/28/2010 G. Elmquist changed element number and CS rating to match 2009 F/C report.) (11/16/2011 G. Elmquist added notes to correspond with 04/07/2011 F/C inspection report. East abutment has bituminous patching. The west approach is breaking up at the joint with the bridge.) (2013) the West approach has settled 1/2". (2014) No change. [2015 F/C Inspection] There is spalling & cracking at West approach headblock for the entire length. There is a 2' x 5' spall at East approach headblock.

ELEMENT #331: [11/16/2011-2013] G. Elmquist changed CSI rating and added notes to correspond with 04/07/2011 F/C inspection report. About 50% of concrete railing has moderate cracking and spalling while the other 50% has heavy spalling with exposed an/or corroding rebar. (2014) No change. [2015 F/C inspection] About 60% of concrete railing has extensive cracking, delamination and spalling - with exposed rusted rebar (Photos 11, 19). The other 40% of concrete railing has moderate cracking and spalling. Two 8 LF. areas on the South rail have been removed during this inspection. These areas are located above the traffic lanes below the bridge. There is 160 LF. of chain link fence attached to the concrete rail posts on the South side of the bridge.

ELEMENT #356: (11/16/2011 G. Elmquist added element, notes and rating to correspond with 04/07/2011 F/C inspection report. Add this element to track the 1/2 in. crack found during 2011 FC inspection at the connection of Girder C to the NE face of Pier Cap 2 [See Photos 1-2]. A special NDT follow-up inspection is to be performed by the MnDOT Bridge Office as soon as time and equipment will allow. The Bridge Office will then immediately assess whether to instruct grinding out the current crack at Pier 2 Girder C. The Bridge Office further recommends that these locations - Steel Pier Cap to Girder at both Piers 1 and 2 and both Girders B and C - be monitored during all future routine inspections by way of visual inspection and magnetic particle non-destructive testing. See Plan of Action e-mail attached for additional details.) (2013) MT testing done on the crack and all similar details on both piers. No changes were observed in the crack and no further cracks were located. (2014) No change. [2015 F/C inspection] No changes were observed in the crack and no further cracks were located.

ELEMENT #358: Cracks sealed in (09) with 2501 [2012] Needs crack sealing [2013] There are moderate cracks throughout the deck with failed sealing material. (2014) Average spacing of transverse cracks is 5'. [2015 F/C Inspection] Concrete deck has unsealed cracks with moderate size and density (Photo 20). Cracks are spaced about every 5’ throughout deck. Construction joint in center of deck is unsealed (Photo 21).

ELEMENT #359: [2007-2013] Slab has very heavy spalling on underside of overhangs with rust. There are transverse cracks in the slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed. 2007: In span 3 with map cracking and efflorescence the full length of the span.

[2015 F/C Inspection] Underside of deck slab has very heavy spalling on overhangs with rust. There are transverse cracks in the underside of slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed.


ELEMENT #387: Southeast wing has spall on top. [2013] All wingwalls have random leaching cracks with efflorescence. (2014) No change. [2015 F/C Inspection] No change.

ELEMENT #409: Use this element to rate the chain link fence on the south west approach rail. [2011-2013] The majority of the chain link fence has minor coating failure with surface rust present. fence on SW corner is in poor condition with torn holes and loose pipe in fencing. (2014) No change. [2015 F/C Inspection] No change.

ELEMENT #422: [2013] The beams at the approaches have 1% paint failure. [2015 F/C Inspection] No change.
ELEMENT #427: 2007: Interior paint is lost on bottom flange of cap due to heavy pigeon droppings.
(2009 UB62 inspection - nothing found) (11/16/2011 G. Elmquist added element, ratings and notes to correspond with 04/07/2011 F/C inspection report. Painted steel pier caps have minor deterioration with spotted areas of chalking and/or peeling paint. A crack was first noted during [2011-2013] FC inspection at the connection of Girder C to the NE face of Pier Cap 2 and is to be closely monitored during future inspection cycles (see Element # 356 notes). 8 LF of CS3 has been added due to the distressed connection area on both sides of Girders C and B where the one crack was found.) [2013] The interior of the cap is starting to corrode on the floor in the interior of Pier 1 near Girders B & C. (2014) no change. [2015 F/C Inspection] No change.

ELEMENT #964: 11/16/2011 G. Elmquist added note to correspond with 04/07/2011 F/C inspection report. [2013] No critical findings observed during the inspection. [2015 F/C Inspection] No critical findings were observed during this inspection.

ELEMENT #966: Do Not Remove. See in-depth report for location of F/C members. [2012-2013] Inspected Pier 2 cap found cracking N Side of cap. Nothing on south side. Cracks are longitudinal on Girder B,C (See Photos) [2015 F/C Inspection] No significant issues noted with fracture-critical elements.

ELEMENT #981: [2013] Add This element as the structure inventory recommends object markers because the roadway width narrows at the south end. Rate CS-3; there are no object markers installed at this time (Photo 29). (2014) No change. [2015 F/C Inspection] No change.


ELEMENT #985: The bituminous treated aggregate slope has been driven on. The surface needs to be redressed and new bituminous should be sprayed on the slopes. The tops of the slopes need polyguard treatment. (2013) No change. (2014) No change. [2015 F/C Inspection] No change.

ELEMENT #986: 10/11/08 Spall on the west side with rusting rebar. 4.5 ft x 6 in. & 3 ft. x 6 in. west curb. [2013] There is spalling along the curb throughout the bridge. (2014) No change. [2015 F/C Inspection] Curb has settled at Southwest approach 1 1/2", and at Northwest approach 2". Northwest curb is filled with bituminous. No change in spalling of curb on bridge.

ELEMENT #988: 11/16/2011 G. Elmquist added element, notes and CSI rating to correspond with 04/07/2011 F/C inspection report. Under-deck lighting is in good condition. 2012 - Heavy pigeon waste needs flushing on all girders and columns. Steel column interiors should be cleaned. See note for element 202. [2015 F/C Inspection] All deck cracks need to be sealed. All the drains and deck surface need to be flushed or cleaned. Heavy pigeon waste needs flushing on all girders and columns. The Steel column interiors should be cleaned. The bridge delams and spalling in the concrete railings and deck underside should be monitored for hazards located over traffic lanes below. Any hazards should be removed when necessary.

General Notes:
02/24/2007 Routine & Fracture Critical report done by PB Americas: Thomas Moorer; Cedric Saintvil; Benny Louis; Anthony Gervaise.
06/02/2009 Fracture Critical Inspection: P. Wilson/ J. Johnson/ D. Rychalk
07/06/2009 Annual Inspection: D. Rychlak/ T. Janke
04/19/2010 Inspection: S. Gries.
04/16/2010 UB62 G. Wright/ F. Anderson
2010 Dow Rychlak raised the NBI substructure to 7 due to repair (04/07/2011 inspection was performed by the fracture critical team. Primary inspector was Pete Wilson, Scott Theisen, and David Hedeen assistant. Gary Wright assisted from D1. Findings noted in the F/C inspection were entered into SIMS by Gary Elmquist on 11/17/2011.)
04/09/2012 inspection R. Carter / J. Loons
08-27-2012 Snooper inspection D.Rychlak/Chris Smith (Didn't get over road.)
04-14-2014 Inspection K. Rohling/L Schatz
09/15/2014 A-62 inspection, Pier caps only: M.Chell/J. Benson
2015 F/C Inspection: R. Carter/ S. Theisen/ J. Fishbein

Inventory Item Notes:
P. Collins - Planned for FC pier cap retrofit and redeck in 2017.
K. Rohling - Planned for interior columns cleaned and painted in 2015.
58. Deck NBI:  
(2014) No change. [2015 F/C inspection] No change in condition from previous inspection. Concrete deck wearing surface has unsealed cracks with moderate size and density. Underside of deck slab has very heavy spalling on overhangs with rust. Some may be over traffic lanes below. There are transverse cracks in the underside of slab at 3 to 4 foot intervals. Some of the cracks leak water. Centerline is water soaked due to construction joint not being sealed.

36A. Brdg Railings NBI:

36B. Transitions NBI:

36C. Appr Guardrail NBI:

36D. Appr Guardrail Terminal NBI:

59. Superstructure NBI:  
11/16/2011 G. Elmquist changed the NBI rating to correspond with 04/07/2011 F/C inspection report. 
(2014) no change. 
[2015 F/C inspection] No change in condition from previous inspection. The bridge concrete railings have delams and spalling, with some over traffic lanes below.

60. Substructure NBI:  
[2015 F/C inspection] No change in condition from previous inspection.

61. Channel NBI:

62. Culvert NBI:

71. Waterway Adeq NBI:

72. Appr Roadway Alignment NBI:
Appendix C: Structural Assessment Report - FC
PURPOSE:
This report is a structural assessment of the structure and its ability to carry loads based on conditions identified in the attached bridge inspection report. The assessment is only a cursory review intended to provide guidance as to the relative hazards for structural conditions and deficiencies identified. This report is mandatory for all fracture critical bridges and is completed by the MnDOT Bridge Office upon receipt of the 7 Day FC Report; however, it is an OPTIONAL tool for agencies to utilize at their discretion for all other inspection types.

BRIDGE NO.: 69839
DATE INSPECTED: 04/30/2015
FACILITY CARRIED: NB MICHIGAN ST
BRIDGE OWNER: State Highway Agency
STRUCTURE TYPE: Steel Continuous
Stringer/Multi-beam or Girder
FEATURES INTERSECTED: TH 194 SB

TYPE OF INSPECTION:  
☐ ROUTINE
☒ FRACTURE CRITICAL
☐ PINNED ASSEMBLY:
☐ SPECIAL:
☐ DAMAGE:
☐ OTHER:

Check all that apply:
Redundancy:  ☐ Load Path
☐ Structural
☐ Internal
Connection Type:  ☐ Riveted
☒ Bolted
☒ Welded
☐ Other:

1. Was a critical finding identified during this inspection or upon structural review?  ☐ Yes  ☒ No
   a) If selected "Yes" above, state briefly the finding(s):

2. If a critical finding was identified, what is the current status?  ☐ Pending
   ☐ Resolved
   ✔ N/A
   a) Briefly state actions taken:

3. Does the condition of any bridge component indicate impaired function? Examples of bridge components with impaired function include elements that are: frozen or immoveable, out-of-plumb or misaligned, distorted or structurally deformed, excessively deteriorated, cracked, broken, eroded or scoured.  ☐ Yes  ☒ No
The 1997 load rating did not include integral pier cap in the analysis. A new load rating should be performed to consider the pier cap in the analysis. This is noticed in 3013 report, too.

4. Does the overall condition of the bridge, or any of its components mentioned in Question 3, suggest the need for detailed structural analysis and/or a revised load rating?

a) If selected "Yes", state the reason for this recommendation and indicate a proposed timeframe in accordance with State of Minnesota Rule 8810.9500 (Subpart 2):

   The 1997 load rating did not include integral pier cap in the analysis. A new load rating should be performed to consider the pier cap in the analysis. This is noticed in 3013 report, too.

5. Based on the structural assessment of these findings, recommendations include:

   ☑ Repair/Maintenance ☑ Monitoring Plan
   ☐ Other ☐ Increased Inspection Frequency

Explain recommended actions:
Continue monitoring the crack at the connection of Girder C to the NE face of Pier Cap 2 and the similar details on Pier Cap 1.
Continue monitoring rust conditions of the superstructure, especially fascia girders. Clean the steel column interiors.
Seal the 14’ wide transverse crack and leaking joints of the deck.
Continue monitoring and maintaining the heavily deteriorated posts and concrete railings and overhangs, and remove loose concrete whenever needed.
Clean and grease the rusted bearings as soon as possible.

6. Other comments:
Remove pigeon excrement on the interior of both pier column and lateral bracket gusset plates.
Flush and examine the strip seals for tear and pull-out, and replace the joint entirely if the leak is not repairable.
Clean catch basins.
Fill the settlement at approaches.

Bridge Office Reviewer                Jihshya J. Lin
5/31/2015
Appendix D: 1997 Load Rating
MINNESOTA DEPARTMENT OF TRANSPORTATION
BRIDGE RATING and LOAD POSTING REPORT

BRIDGE LOCATION and DESCRIPTION

Bridge No. 109839
T.H. No. 194 Under
Ref. Point 170.11
Year Built 1969
Year Remodeled
County 69
Type 401
Description 3 Spans 2940" Rdwy
        Michigan St over
        AT Jet 17 35

DATA FOR BASIS OF REPORT
(check appropriate boxes)

☑ Bridge Inventory File
☑ Bridge Plans
☐ Computer Analysis
☐ Current Bridge Rating & Load Posting Report
☐ Manual Analysis

WEARING COURSE

□ CONC
Type
Thickness
as of Date

METHOD OF RATING
(check appropriate box)

☑ 1 Load Factor (LF)
☐ 2 Allowable Stress (AS)
☐ 3 Load & Resistance Factor (LRFD)
☐ 4 Load Testing
☐ 5 No Rating Analysis performed

G69021
GROUP LD. & NUMBER

DESIGN LOAD = 4820
(Live load category for which
the bridge was designed)

PERMIT CODES
(For overload permits)

A | B | C | D
1 | 1 | 1 | 1

SUMMARY OF RATING and LOAD POSTING ANALYSIS

<table>
<thead>
<tr>
<th>INVENTORY RATING</th>
<th>OPERATING RATING</th>
<th>POSTING REQUIRED</th>
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<td></td>
<td></td>
<td>Truck-Full Trailer</td>
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<td></td>
<td></td>
<td></td>
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LOAD POSTING LIMITS
(Complete when load posting is required)

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<tr>
<th>Vehicle</th>
<th>Semi-Trailer</th>
<th>Truck-Full Trailer</th>
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CERTIFICATION

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

Signed

Date

Rated by

Checked by

Reg. No.

Date

Revised

MN DOT 22167 (9/95)
STEEL BEAM - COMPOSITE & NON-COMPOSITE LOAD FACTOR

BRIDGE LOCATION AND DESCRIPTION

Bridge No. 69839
T. H. No. 194 - Order
Mile Point 170.016
Year Built 1969
Year Remodeled

Location AT Jct TH35

Type 401
Description 3 Spans, Michigan St over

SUMMARY OF RATING AND LOAD POSTING

Structure: Group I/D & No. 669021

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<tr>
<th>INVENTORY RATING</th>
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<th>LOAD POSTING REQUIRED?</th>
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<th>Semi-Trailer Comb.</th>
<th>Truck &amp; Full Trailer</th>
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<td>Yes</td>
<td>Type M3</td>
<td>Type M32</td>
<td>Type M3-3</td>
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</tbody>
</table>

|                  |                  |                        | Weight = 24T | Weight = 36T       | Weight = 40T        |
|                  |                  |                        | Tons        | Tons               | Tons                |

ANALYSIS DATA

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<td>Moment Available for Unfactored Live Load per Lane</td>
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DESCRIPTION OF SECTION

Span Length 91'-3", 136'-5", 91'-3"
Impact 19.6 psi

Roadway Width 29'-4"
Slab Thickness 7"-1" = 6.5"
W. C. Thickness 2" CONC

Beams Size: 9"x3'-0"x12" Ctrs: 9'-2"
Sec. Mod. for Live Load 1999 psi

Beam Types: 11x10x27, 11x10x17, 12x10x27 14B, 3 16x24T, 16x134B

Design: W.C. = 234 psi, C&R = 144 psi, Dia = 12 psi