

# **INVESTIGATIVE REPORT TO JOINT COMMITTEE TO INVESTIGATE THE I-35W BRIDGE COLLAPSE**

**APPENDIX: Volume IV**

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MAY 2008

## APPENDIX Volume IV

### Bridge Inspection Reports

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GP:2370950 v1

**Minnesota State Legislature**  
**Joint Committee on Bridge Collapse**

**Bridge Inspection Reports**



19 71 BRIDGE INSPECTION REPORT

Prepare 4 copies:  
 Original to District Engineer  
 First copy to Area Maintenance Engineer  
 Second & Third copies to Central Operations

Bridge No. <b>9340</b>	Check One: <input type="checkbox"/> annual inspection <input checked="" type="checkbox"/> special inspection	Date <b>8-27-71</b>	Year Built <b>1967</b>
Maintenance Area <b>5</b>	T. H. No. <b>35W</b>	Mile Post <b>18.43</b>	Location <b>In Mpls. &amp; River</b>
Type <b>8 U.S. 3 Slab Spans</b>	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under <b>River &amp; R.R. Adj.</b>	Bridge Posted For	Tons

I	ITEM	RAT-ING	COMMENTS AND SKETCHES <i>Refer to item number in comments and sketches Use additional sheets if necessary</i>
	Substructure		
1	Footing		<p>15. Many pop outs some deep entire surface. Transverse deck cracks? We arrive with a 50,000 L.F. figure. Length X Width + Number of cracks (every 4' of deck)  <math>= \frac{2000 \times 100}{4} = 50,000 \text{ L.F.}</math></p> <p>18. Must be 200 wine bottles &amp; clothing, bedding etc. under Co. Abut. (Hippies Haven)</p>
2	Abutments	9	
3	Wing Walls	9	
4	Piers	9	
5	Bridge Seats	9	
	Superstructure		
6	Trusses	9	
7	Girders	9	
8	Floor Beams	9	
9	Stringers	9	
10	Bearing Devices	9	
11	Paint (Yr. Ptd. )	6	
	Decks		
12	Expansion Details	8	
13	Railing	8	
14	Structural Slab	8	
15	Wearing Surface	7	
16	Curb & Walk	8	
17	Drains	8	
	Channel & Protection		
18	Area Under Bridge	8	
19	Stream Bed	8	
20	Slope Protection	9	
	Culverts		
21	Barrel & Floor		
22	Apron Wing Wall		
23	Retaining Wall		
24	Approaches		
25	Signs		
26			
27			

Condition rating from 9 (very good) to 0 (very poor) for conditions noted  
 Rating of 9 ---- new condition  
 Rating of 8 ---- good condition - no repair necessary  
 Rating of 7 ---- minor items in need of repair by maintenance forces  
 Rating of 6 ---- major items in need of repair by maintenance forces  
 Rating of 5 ---- major repair contract needs to be let  
 Rating of 4 ---- minimum adequacy to tolerate present traffic - immediate rehabilitation necessary to keep open  
 Rating of 3 ---- inadequacy to tolerate present heavy load - warrants closing bridge to trucks  
 Rating of 2 ---- inadequacy to tolerate any live load - warrants closing bridge to all traffic  
 Rating of 1 ---- bridge repairable, if desirable to reopen to traffic  
 Rating of 0 ---- bridge conditions beyond repair - danger of immediate collapse  
 Place dash where item is not rated

Inspected by	Date: <b>8-27-71</b>
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CONDITION:	Material	Condition Analysis	Condition Rating
Substructure			9
Superstructure			8
Deck		Deck Cracks	7
Channel & Channel Protection			9
Culvert & Retaining Walls			
Estimated Remaining Life		50 years	
Permit Capacity		Normal	
Approach Alignment		Good	
Rated Loading		HS-20	

Use Rating Numbers at bottom of page for terms below this line.

APPRAISAL	Deficiencies	Adequacy Rating
Structural Condition	Deck Cracks	8
Deck Geometry		8
Underclearances - Vert. & Lateral		8
Safe Load Capacity		8
Waterway Adequacy		8
Approach Alignment		8

PROPOSED IMPROVEMENTS		
Year Needed	Completed	Describe
Type of Service		
Type of Work		
Improvement Length		
Design Loading		
Roadway Width		
Number of Lanes		
ADT	Year	
Prop. Rdwy. Improvement - Year		
Prop. Rdwy. Improvement - Type		

COST OF IMPROVEMENTS

Remarks (comparison with last report, outline of recommended repairs, etc.)  
 Evidently this is first report since traffic has been put on - Only problem appears to be the numerous deck cracks.  
 Recommend cracks be sealed as soon as possible.

ESTIMATED COST OF REPAIRS	Quantities	Amount
Kind of Work		
Labor	Crew at 300.00 days - 5 days	1500.00
Material	Sealant	500.00
Equipment	Trans.	150.00
Other		
<b>TOTAL</b>		<b>\$2150.00</b>

Adequacy rating from 9 (adequate) to 0 (deficient) for deficiency noted

- Rating of 9 conditions superior to present desirable criteria
- Rating of 8 condition equal to present desirable criteria
- Rating of 7 condition better than present minimum criteria
- Rating of 6 condition equal to present minimum criteria
- Rating of 5 condition somewhat better than minimum adequacy to tolerate being left in place as is
- Rating of 4 condition meeting minimum tolerable limits to be left in place as is
- Rating of 3 basically intolerable condition requiring high priority of repair
- Rating of 2 basically intolerable condition requiring high priority in replacement
- Rating of 1 immediate repair necessary to put back in service
- Rating of 0 immediate replacement necessary to put back in service

Reviewed By: \_\_\_\_\_ Date 7-24-72  
 Engineer \_\_\_\_\_



1972 BRIDGE INSPECTION REPORT

Prepare 4 copies:  
 Original to District Engineer  
 First copy to Area Maintenance Engineer  
 Second & Third copies to Central Operations

Bridge No. 9340	Check One: <input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection	Date 11-29-72	Year Built 1967
Maintenance Area 5A	T. H. No. 35W	Mile Post 18.43	Location 2 Mi. N. of I94
Type B.S. & 3 Slab Spans	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under Miss. Rv. & Rwy.	Bridge Posted For Tons	

I	ITEM	RATING	COMMENTS AND SKETCHES <i>Refer to item number in comments and sketches Use additional sheets if necessary</i>
	Substructure	8	(10) The south expansion hinge should be checked for excessive expansion at 90° or higher. (11) Light rusting under the open hinge joints. (12) The joints at the cover plates are leaking. 500 L.F. of the 1" median joint has fallen out. (14 & 15) N.B.L. has been sealed but 800 L.F. of add'l cracks should be sealed and 8,000 L.F. of leaking transverse cracks in the S.B.L. should be sealed. (17) Drains over the south bank are plugged and need cleaning. (Sand gets trapped in the horiz. troughs.
1	Footing		
2	Abutments	8	
3	Wing Walls	8	
4	Piers	8	
5	Bridge Seats	8	
	Superstructure	7	
6	Trusses	8	
7	Girders	8	
8	Floor Beams	8	
9	Stringers	8	
10	Bearing Devices	8	Condition rating from 9 (very good) to 0 (very poor) for conditions noted Rating of 9 ---- new condition Rating of 8 ---- good condition - no repair necessary Rating of 7 ---- minor items in need of repair by maintenance forces Rating of 6 ---- major items in need of repair by maintenance forces Rating of 5 ---- major repair contract needs to be let Rating of 4 ---- minimum adequacy to tolerate present traffic - immediate rehabilitation necessary to keep open Rating of 3 ---- inadequacy to tolerate present heavy load - warrants closing bridge to trucks Rating of 2 ---- inadequacy to tolerate any live load - warrants closing bridge to all traffic Rating of 1 ---- bridge repairable, if desirable to reopen to traffic Rating of 0 ---- bridge conditions beyond repair - danger of immediate collapse Place dash where item is not rated
11	Paint (Yr. Ptd. 1968 )	7	
	Decks	7	
12	Expansion Joints	7	
13	Railing	8	
14	Structural Slab		
15	Wearing Surface		
16	Curb & Walk		
	Drains	7	
	Channel & Protection	8	
18	Area Under Bridge	8	
19	Stream Bed		
20	Slope Protection	8	
	Culverts		
21	Barrel & Floor		
22	Apron Wing Wall		
23	Retaining Wall		
24			
25			
26			
27			
Inspection		Date: 11-29-72	

CONDITION:	Material	Condition Analysis	Condition Rating
Substructure			8
Superstructure			7
Deck			7
Channel & Channel Protection			8
Culvert & Retaining Walls			
Estimated Remaining Life		49 yrs	
Operating Rating			
Approach Alignment			
Inventory Rating			

Use Rating Numbers at bottom of page for terms below this line.

APPRAISAL	Deficiencies	Adequacy Rating
Structural Condition		8
Deck Geometry		8
Underclearances - Vert. & Lateral		8
Safe Load Capacity		8
Waterway Adequacy		8
Approach Alignment		8

PROPOSED IMPROVEMENTS		
Year Needed	Completed	Describe
Type of Service		
Type of Work		
Improvement Length		
Design Loading		
Roadway Width		
Number of Lanes		
ADT	Year	
Prop. Rdwy. Improvement - Year		
Prop. Rdwy. Improvement - Type		

**COST OF IMPROVEMENTS**

Remarks (comparison with last report, outline of recommended repairs, etc.) Last report 8-27-71  
Estimate of the number of cracks in deck on last report (50,000 L.F.)  
may have been exaggerated. Irregardless cracks should all be sealed.  
Another reccurring problem is the plugging of the down spouts with  
sand and debri. Should be flushed periodically or changed.

ESTIMATED COST OF REPAIRS	Quantities	Amount
Kind of Work		
Labor	Crew 4 days @ 300.00 / day	1200.00
Material	Sealer	300.00
Equipment	Trans.	200.00
Other		
<b>TOTAL</b>		<b>1700.00</b>

- Adequacy rating from 9 (adequate) to 0 (deficient) for deficiency noted
- Rating of 9 conditions superior to present desirable criteria
- Rating of 8 condition equal to present desirable criteria
- Rating of 7 condition better than present minimum criteria
- Rating of 6 condition equal to present minimum criteria
- Rating of 5 condition somewhat better than minimum adequacy to tolerate being left in place as is
- Rating of 4 condition meeting minimum tolerable limits to be left in place as is
- Rating of 3 basically intolerable condition requiring high priority of repair
- Rating of 2 basically intolerable condition requiring high priority in replacement
- Rating of 1 immediate repair necessary to put back in service
- Rating of 0 immediate replacement necessary to put back in service

Reviewed By:	Date
Engineer	3-15-73



Prepare 4 copies:  
 Original to District Engineer  
 First copy to Area Maintenance Engineer  
 Second & Third copies to Central Operations

19 73 BRIDGE INSPECTION REPORT

Bridge No. <u>9340</u>	Check One: <input type="checkbox"/> annual inspection <input checked="" type="checkbox"/> special inspection	Date <u>3-28-73</u>	Year Built <u>1967</u>
Maintenance Area <u>5</u>	T. H. No. <u>35W</u>	Mile Post <u>18.43</u>	Location <u>0.4 Mi.S. of Jct. T.H.47</u>
Type <u>S. Deck Truss</u>	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	Miss. R. and R.R. Bridge Posted For _____ Tons	

I	ITEM	RAT-ING	COMMENTS AND SKETCHES <i>Refer to item number in comments and sketches Use additional sheets if necessary</i>
	Substructure		<p>(14 &amp; 15) Consider sealing transverse cracks and sawing relief joints for the south approach spans before opening any more sections of 35W. Traffic is light now and can probably be confined to one lane.</p>
1	Footing		
2	Abutments		
3	Wing Walls		
4	Piers		
5	Bridge Seats		
	Superstructure		
6	Trusses		
7	Girders		
8	Floor Beams		
9	Stringers		
10	Bearing Devices		
11	Paint (Yr. Ptd. )		
	Decks		
12			
13	Railing		
14	Structural Slab	7	
15	Wearing Surface	7	
16	Curb & Walk		
	Drains		
	Channel & Protection		
18	Area Under Bridge		
19	Stream Bed		
20	Slope Protection		
	Culverts		
21	Barrel & Floor		
22	Apron Wing Wall		
23	Retaining Wall		
24			
25			
26			
27			

Condition rating from 9 (very good) to 0 (very poor) for conditions noted  
 Rating of 9 ---- new condition  
 Rating of 8 ---- good condition - no repair necessary  
 Rating of 7 ---- minor items in need of repair by maintenance forces  
 Rating of 6 ---- major items in need of repair by maintenance forces  
 Rating of 5 ---- major repair contract needs to be let  
 Rating of 4 ---- minimum adequacy to tolerate present traffic - immediate rehabilitation necessary to keep open  
 Rating of 3 ---- inadequacy to tolerate present heavy load - warrants closing bridge to trucks  
 Rating of 2 ---- inadequacy to tolerate any live load - warrants closing bridge to all traffic  
 Rating of 1 ---- bridge repairable, if desirable to reopen to traffic  
 Rating of 0 ---- bridge conditions beyond repair - danger of immediate collapse  
 Place dash where item is not rated

Inspected by: [REDACTED] Date: 3-28-73

CONDITION:	Material	Condition Analysis	Condition Rating
Substructure	_____	_____	_____
Superstructure	_____	_____	_____
Deck	_____	_____	_____
Channel & Channel Protection	_____	_____	_____
Culvert & Retaining Walls	_____	_____	_____
Estimated Remaining Life	_____	_____	_____
Operating Rating	_____	_____	_____
Approach Alignment	_____	_____	_____
Inventory Rating	_____	_____	_____

Use Rating Numbers at bottom of page for terms below this line.

APPRAISAL	Deficiencies	Adequacy Rating
Structural Condition	_____	_____
Deck Geometry	_____	_____
Underclearances - Vert. & Lateral	_____	_____
Safe Load Capacity	_____	_____
Waterway Adequacy	_____	_____
Approach Alignment	_____	_____

PROPOSED IMPROVEMENTS		
Year Needed _____	Completed _____	Describe _____
Type of Service _____	_____	_____
Type of Work _____	_____	_____
Improvement Length _____	_____	_____
Design Loading _____	_____	_____
Roadway Width _____	_____	_____
Number of Lanes _____	_____	_____
ADT _____ Year _____	_____	_____
Prop. Rdwy. Improvement - Year _____	_____	_____
Prop. Rdwy. Improvement - Type _____	_____	_____

**COST OF IMPROVEMENTS** \_\_\_\_\_

Remarks (comparison with last report, outline of recommended repairs, etc.)  
Special inspection - Deck surface appears to be starting to spall in many areas on S.B. roadway - Recommend sealing all cracks in S.B. Roadway (N.B. roadway has been sealed and looks fairly good) - May be too late to seal cracks but nothing ventured, nothing gained.

ESTIMATED COST OF REPAIRS	Quantities	Amount
Kind of Work		
Labor <u>Seal cracks with penetrant epoxy</u>		
Material <u>Sealer</u>		
Equipment <u>Approx. 8,000 L.F. @ .12/L.F.</u>		1,000.00
Other _____		
<b>TOTAL</b>		<b>\$1,000.00</b>

- Adequacy rating from 9 (adequate) to 0 (deficient) for deficiency noted
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- Rating of 4 condition meeting minimum tolerable limits to be left in place as is
- Rating of 3 basically intolerable condition requiring high priority of repair
- Rating of 2 basically intolerable condition requiring high priority in replacement
- Rating of 1 immediate repair necessary to put back in service
- Rating of 0 immediate replacement necessary to put back in service

Reviewed By: \_\_\_\_\_ Date 11-9-73  
 Engineer 

Prepare 4 copies:  
 Original to District Engineer  
 First copy to Area Maintenance Engineer  
 Second & Third copies to Central Operations

19 73 BRIDGE INSPECTION REPORT

Bridge No. 9340	Check One: <input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection	Date 12-27-73	Year Built 1967
Maintenance Area 5	T. H. No. 35W	Mile Post 18.43	Location 0.4 mi. s. of jct. T.H. 47
Type cont. steel and cont. deck truss	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	Rwy. & Miss. River	Bridge Posted For Tons

I	ITEM	RAT- ING	COMMENTS AND SKETCHES <i>Refer to item number in comments and sketches Use additional sheets if necessary</i>
	Substructure	7	<p>(4) Pier #9 has 20 S.F. of shallow scratched and spalled area on the east end due to rwy. collision damage.</p> <p>(10) The south expansion hinge should be checked at 90° or higher.</p> <p>(11 &amp; 12) Light rusting under the open hinge joints and over 500 L.F. of the median joint has fallen out (consider relief joints).</p> <p>(1, 4 &amp; 15) The transverse cracks in the N.B.L. have been sealed but 15,000 L.F. need sealing and 450 S.F. of hollow delamination was found with the chain sweep. The S.B.L. has 29,800 L.F. of transverse cracks and 500 S.F. of delamination.</p>
1	Footing	--	
2	Abutments	8	
3	Wing Walls	8	
4	Piers	7	
5	Bridge Seats	8	
	Superstructure	8	
6	Trusses	8	
7	Girders	8	
8	Floor Beams	8	
9	Stringers	8	
10	Bearing Devices	8	
11	Paint (Yr. Ptd. )	8	
	Decks	7	
12	Expansion Details	8	
13	Railing	8	
14	Structural Slab	8	
15	Wearing Surface	7	
16	Curb & Walk	8	
17	Drains	8	
	Channel & Protection	8	
18	Area Under Bridge	8	
19	Stream Bed	8	
20	Slope Protection	8	
	Culverts		
21	Barrel & Floor		
22	Apron Wing Wall		
23	Retaining Wall		
24	Approaches		
25	Signs		
26			
27			

Condition rating from 9 (very good) to 0 (very poor) for conditions noted  
 Rating of 9 ---- new condition  
 Rating of 8 ---- good condition - no repair necessary  
 Rating of 7 ---- minor items in need of repair by maintenance forces  
 Rating of 6 ---- major items in need of repair by maintenance forces  
 Rating of 5 ---- major repair contract needs to be let  
 Rating of 4 ---- minimum adequacy to tolerate present traffic - immediate rehabilitation necessary to keep open  
 Rating of 3 ---- inadequacy to tolerate present heavy load - warrants closing bridge to trucks  
 Rating of 2 ---- inadequacy to tolerate any live load - warrants closing bridge to all traffic  
 Rating of 1 ---- bridge repairable, if desirable to reopen to traffic  
 Rating of 0 ---- bridge conditions beyond repair - danger of immediate collapse  
 Place dash where item is not rated

Inspected: [Redacted] Date: 3-13-74

CONDITION:	Material	Condition Analysis	Condition Rating
Substructure			7
Superstructure			8
Deck			7
Channel & Channel Protection			8
Culvert & Retaining Walls			
Estimated Remaining Life		43 yrs.	
Operating Rating			
Approach Alignment			
Inventory Rating			

Use Rating Numbers at bottom of page for terms below this line.

APPRAISAL	Deficiencies	Adequacy Rating
Structural Condition		8
Deck Geometry		8
Underclearances - Vert. & Lateral		8
Safe Load Capacity		8
Waterway Adequacy		8
Approach Alignment		8

PROPOSED IMPROVEMENTS		
Year Needed	Completed	Describe
Type of Service		
Type of Work		
Improvement Length		
Design Loading		
Roadway Width		
Number of Lanes		
ADT	Year	
Prop. Rdwy. Improvement - Year		
Prop. Rdwy. Improvement - Type		

**COST OF IMPROVEMENTS**

Remarks (comparison with last report, outline of recommended repairs, etc.)  
 Last report 3-28-73.  
 Traffic has been opened to entire structure since last report. Cracks have multiplied considerably and laminated areas are numerous - recommend cracks be sealed.

ESTIMATED COST OF REPAIRS	Quantities	Amount
Kind of Work		
Labor	Seal 45,000 L.F. of cracks @ .10/L.F.	\$4,500.00
Material	Patch 1000 S.F. of spalled areas @ 30.00/S.F.	30,000.00
Equipment		
Other		
<b>TOTAL</b>		<b>\$34,500.00</b>

Adequacy rating from 9 (adequate) to 0 (deficient) for deficiency noted

- Rating of 9 conditions superior to present desirable criteria
- Rating of 8 condition equal to present desirable criteria
- Rating of 7 condition better than present minimum criteria
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- Rating of 3 basically intolerable condition requiring high priority of repair
- Rating of 2 basically intolerable condition requiring high priority in replacement
- Rating of 1 immediate repair necessary to put back in service
- Rating of 0 immediate replacement necessary to put back in service

Reviewed \_\_\_\_\_  
 Engineer \_\_\_\_\_ 1-15-74



Minnesota Department of Highways  
BRIDGE INSPECTION REPORT

- Original to Area Maintenance Engineer
- First copy to Bridge Maint. Superv.
- Second copy to Bridge Inventory Group

Bridge No. <b>9340</b>	T.H. No. <b>35W</b>	Mile Post <b>18.43</b>	Location <b>0.4 Mi. So. of Jct. T.H. 47</b>	Maintenance Area <b>5</b>
Type <b>Cont. Steel &amp; Cont. Deck Truss</b>		<input checked="" type="checkbox"/> Over <b>Rwy. &amp; Miss. River</b> <input type="checkbox"/> Under		Posted Limit in Tons
				<input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection

I	ITEM	RATING	COMMENTS AND SKETCHES Refer to item number in comments and sketches Use additional sheets if necessary
SUBSTRUCTURE			
1	Abutments	8	
2	Piers	6	2. Approx. 15' Long Vertical crack on River side of Pier 7 (west) column. - smaller crack on opposite side. (2)
SUPERSTRUCTURE			
3	Trusses	8	
4	Girders	8	
5	Floor Beams	8	
6	Stringers or Beams	8	
7	Bearing Devices	8	
DECKS			
8	Expansion Joints	7	8. Flanges in deck exp. @ 1st hinge Jt. for so. have only from 1/2 to 3/4" of exp. remaining @ Temp 81°F. Bottom flanges of west beams at this Jt. are making contact. Br. Assys. so. Abut. are about 1/2" in contraction. Clean out & reseal Jt. at No. cover plate - About 110 L.F.
9	Railing	8	
10	Structural Slab	8	
11	Wearing Surface	7	
12	Curb & Walk	8	
AREA UNDER BRIDGE			
13	Channel & Protection	8	11. About 15,000 L.F. of transverse cracks & also 5000 L.F. of spalling & hollow core. in N.B.R. About 39,000 L.F. of transverse cracks & 6000 L.F. of spalling & hollow conc. in S.B.R. About 15% cracks are Leaching thru.
14	Roadway, Railway, Other	8	
15	Slopes & Berms	8	
CULVERTS			
16	Barrel & Floor		
17	Apron & Wings		
OTHER			
18	Retaining Wall	7	
19	Approaches	8	
20	Signing	7	20. Temporary signing at S.B.R. approaches
21	Paint (yr. ptd.)	8	
22	Drainage	7	22. Clean & flush deck drains. some are completely plugged. (3)
23	Guard Rail	8	
24			
25			
Inspected	<div style="background-color: black; width: 100px; height: 20px;"></div>	Date <b>6-27-74</b>	
		Date	
		Date	

ESTIMATED COST OF REPAIR				REVIEWED
Labor	Material	Equipment	Total	By Engineer
			<b>\$8570.00</b>	<b>JK</b>

BRIDGE INSPECTION REPORT

- Original to Area Maintenance Engineer
- First copy to Bridge Maint. Superv.
- Second copy to Bridge Inventory Group

Bridge No. <b>9340</b>	T.H. No. <b>35W</b>	Mile Post <b>18.43</b>	Location <b>0.4 MI. So. of Jct T.H. 47</b>	Maintenance Area <b>15</b>
Type <b>CONT. Steel &amp; Cast Deck Truss</b>		<input checked="" type="checkbox"/> Over <b>Miss. River</b> <input type="checkbox"/> Under		Posted Limit in Tons
				<input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection

I	ITEM	RATING			COMMENTS AND SKETCHES
					Refer to item number in comments and sketches Use additional sheets if necessary
<b>SUBSTRUCTURE</b>					
1	Abutments	8	8	8	① Approx. 15' long vertical crack on riverside of pier 7 (west) column - smaller crack on opposite side. ②
2	Piers	6	6	6	
<b>SUPERSTRUCTURE</b>					
3	Trusses	9	8	7	② fingers in deck exp. @ 1 <sup>st</sup> hinge ft. from so. have only 1/2 to 3/4 of exp. remaining at 80° F. Bottom of flanges of west beams at this ft. are almost making contact. bearing Assy. @ so. abut are about 1/2" in contraction. ③ clean and rescal ft at No. coverplate 110 L.F.
4	Girders	9	7	7	
5	Floor Beams	8	7	7	
6	Stringers or Beams	8	7	7	
7	Bearing Devices	8	8	7	
<b>DECKS</b>					
8	Expansion Joints	7	7	7	
9	Railing	2	2	2	
10	Structural Slab	8	8	7	
11	Wearing Surface	7	7	7	
12	Curb & Walk	8	8	8	
<b>AREA UNDER BRIDGE</b>					
13	Channel & Protection	8	8	8	③ drop off at relief ft. cut at so. end of bridge (1/8 to 1/8") joint is 2 1/2" wide. ④
14	Roadway, Railway, Other	8	8	7	
15	Slopes & Berms	8	8	8	
<b>CULVERTS</b>					
16	Barrel & Floor				⑤ few transverse members below deck jts. peeling and rusting. ⑥
17	Apron & Wings				
<b>OTHER</b>					
18	Retaining Wall				⑦ clean and flush deck drains. drain on No. end is plugged. ⑧
19	Approaches	8	7	7	
20	Signing	8	8	8	
21	Paint (yr. ptd.)	8	7	7	
22	Drainage	7	7	7	
23	Guard Rail	8	8	7	
24	<b>Nav. Lights</b>		7	7	
25					

ESTIMATED COST OF REPAIR				REVIEWED
Labor	Material	Equipment	Total	By Engineer
			\$570 <sup>00</sup>	
			\$9725 <sup>00</sup>	
			\$10,600 <sup>00</sup>	

Inspected	Date	6-27-74		
	Date	12-22-75		
	Date	6-28-76		
	Date			

Indicate a condition rating from 9 (very good) to 0 (very poor) for conditions noted

Rating of 9 ----- new condition

Rating of 8 ----- good condition, no repair necessary

Rating of 7 ----- non-structural items in need of repair.

Rating of 6 ----- structural items in need of minor repair

Rating of 5 ----- structural items in need of major repair

Rating of 4 ----- minimum adequacy to tolerate present traffic -  
immediate rehabilitation necessary to keep open

Rating of 3 ----- inadequacy to tolerate present heavy load -  
warrants closing bridge to trucks

Rating of 2 ----- inadequacy to tolerate any live load - warrants  
closing bridge to all traffic

Rating of 1 ----- bridge repairable, if desirable to reopen to traffic

Rating of 0 ----- bridge conditions beyond repair - danger of  
immediate collapse

Place dash where item is not rated

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REMARKS AND SKETCHES



BRIDGE INSPECTION REPORT

- Original to Area Maintenance Engineer
- First copy to Bridge Maint. Superv.
- Second copy to Bridge Inventory Group

Bridge No. <b>9340</b>	T.H. No. <b>35W</b>	Mile Post <b>18.43</b>	Location <b>0.4 mi. SO of Jct T.H. 47</b>	Maintenance Area <b>5</b>
Type <b>CONT. STEEL &amp; CANT. DECK TRUSS 404</b>		<input checked="" type="checkbox"/> Over RDWY & MISSISSIPPI <input type="checkbox"/> Under RIVER		Posted Limit in Tons
				<input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection

I	ITEM	RATING	COMMENTS AND SKETCHES <small>Refer to item number in comments and sketches Use additional sheets if necessary</small>
<b>SUBSTRUCTURE</b>			
1	Abutments	8	3/ 15' LOVL. VERTICAL CRACK ON SOUTH SIDE OF PIER 7 WEST COLUMN. SMALL CRACK ON OPPOSITE SIDE. (4) PIER 11 HAS RUSTY CRACKS, SPALLING & REBAR POP OUTS. IT IS AT AN EXPANSION JOINT (2)
2	Piers	6	
<b>SUPERSTRUCTURE</b>			
3	Trusses	8	4/ BRGS AT SO. ABUT ARE 1/2" IN CONTRACTION AT 80° (4) 5/ FINGERS IN DECK EXP JT HAVE ONLY 1/2" TO 3/4" EXPANSION REMAINING AT 80°, SIDES OF FINGERS ARE IN CONTACT. BOTTOM FLANGES OF WEST FACIAS ARE IN CONTACT, OTHER BEAMS CLOSE, (4) 6/ FINGER JTS ARE FILLED WITH DIRT, OTHERS NEED CLEANING & SEALING (2) 7/ RAIL POSTS STAINING, GETTING RE-BAR POPOUTS (3) 8/ SOUTH BOUND RDWY - 15000 LF OF TRANSVERSE CRACKS 2%-4% SPALLED & HOLLOW (2) 9/ NORTH BOUND RDWY - 9,000 LF OF TRANSVERSE CRACKS, 1%-2% SPALLED & HOLLOW (2) 10/ 1" DROP OFF AT RELIEF JOINT AT SO END OF NIB RDWY - PART IS TAPPED WITH BITUMENOUS. JT IS 2 1/2" WIDE. (3) 11/ 100 SQ FT OF LIGHT TO HEAVY RUST ON TRANSVERSE MEMBERS UNDER JOINTS (3) 12/ DECK DRAINS OVER LAND PLUGGED. DRAINS OVER RIVER ARE OPEN (2) 13/ 1" CONDUIT AT NORTH END IS ALL BENT UP, TIED TO BRIDGE WITH ROPES (3)
4	Girders	8	
5	Floor Beams	8	
6	Stringers or Beams	8	
7	Bearing Devices	8	
<b>DECKS</b>			
8	Expansion Joints	7	
9	Railing	7	
10	Structural Slab	8	
11	Wearing Surface	7	
12	Curb & Walk	8	
<b>AREA UNDER BRIDGE</b>			
13	Channel & Protection	8	
14	Roadway, Railway, Other	8	
15	Slopes & Berms	8	
<b>CULVERTS</b>			
16	Barrel & Floor	-	
17	Apron & Wings	-	
<b>OTHER</b>			
18	Retaining Wall	-	
19	Approaches	7	
20	Signing	8	
21	Paint (yr. pst.)	7	
22	Drainage	7	
23	Guard Rail	8	
24	ELECTRICAL	7	
25			

ESTIMATED COST OF REPAIR				REVIEWED
Labor	Material	Equipment	Total	By Engineer
				<i>[Signature]</i>

Inspected by: [REDACTED] Date: **5-24-77**

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Indicate a condition rating from 9 (very good) to 0 (very poor) for conditions noted

- Rating of 9 ----- new condition
- Rating of 8 ----- good condition, no repair necessary
- Rating of 7 ----- non-structural items in need of repair.
- Rating of 6 ----- structural items in need of minor repair
- Rating of 5 ----- structural items in need of major repair
- Rating of 4 ----- minimum adequacy to tolerate present traffic -  
immediate rehabilitation necessary to keep open
- Rating of 3 ----- inadequacy to tolerate present heavy load -  
warrants closing bridge to trucks
- Rating of 2 ----- inadequacy to tolerate any live load - warrants  
closing bridge to all traffic
- Rating of 1 ----- bridge repairable, if desirable to reopen to traffic
- Rating of 0 ----- bridge conditions beyond repair - danger of  
immediate collapse

Place dash where item is not rated

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REMARKS AND SKETCHES



BRIDGE INSPECTION REPORT

First copy to Bridge Maint. Superv.  
 Second copy to Bridge Inventory Cont.

Bridge No. <u>7810</u>	T.H. No. <u>35W</u>	Mile Post <u>16.43</u>	Location <u>Am. 50.00</u> <u>727.74, 27</u>	Maintenance Area <u>1</u>
Type <u>CONCRETE &amp; CANT</u> <u>BECK TRUSS ASD</u>	<input checked="" type="checkbox"/> Over <u>RAMP &amp; MISS</u> <input type="checkbox"/> Under <u>UNDER</u>	Posted Limit in Tons	<input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection	

I	ITEM	-RATING				COMMENTS AND SKETCHES Refer to item number in comments and sketches Use additional sheets if necessary
		(7)	(6)	(5)	(4)	
<b>SUBSTRUCTURE</b>						
1	Abutments	7	7	7	7	(1) SOME CRACKING & SPALLING ON SO. ABUT. @ SEAT. (2)
2	Piers	7	6	6	6	(2) SAME (3)
<b>SUPERSTRUCTURE</b>						
3	Trusses	7	7	7	7	(7) BEARINGS @ SO. ABUT. APPROX 1" SO. THRU @ JOINT (3)
4	Girders	5	N	N	N	(3)
5	Floor Beams	4	7	7	7	(4) (4)
6	Stringers or Beams	2	8	8	8	(11 FT) REINFORCING SLIP OVERLAY
7	Bearing Devices	7	7	7	7	(2) AREAS UNDER JOINTS BEING PAINTED
<b>DECKS</b>						
8	Expansion Joints	7	8	8	8	(1) FUTURE RWS EXPAN. AT JOINTS. CANTILET LOGS OK. (3)
9	Railing	7	7	6	6	
10	Structural Slab	7	8	8	8	
11	Wearing Surface	9	7	7	7	
12	Curb & Walk	5	8	8	8	
<b>AREA UNDER BRIDGE</b>						
13	Channel & Protection	6	8	8	8	1) SAME AS (1) ABOVE (4) 2) PIER 7 (FIXED PIER, NO. BANK OF RIVER), WEST COLUMN IS CRACKED VERTICALLY AND IT APPEARS THAT THIS CRACK GOES ALL THE WAY THROUGH THE COLUMN. (4)
14	Roadway, Railway, Other	1	8	8	8	3) SMALL AREA OF SEVERE COLLISION ON LOWER THIRD (WEST) JUST SOUTH OF PIER 8. (3)
15	Slopes & Berms	4	8	8	8	5) SOME COLLISION SCOURING ON TRUSS MEMBER MAKING UP THE FLOOR BEAMS, DIRECTLY UNDER THE MENTAN OPENING - (3)
<b>CULVERTS</b>						
16	Barrel & Floor		N	N	N	1) QUITE A BIT OF STONES DIRT & DEBRIS AROUND AND UNDER EXPANSION ROLLER EXTS. (3)
17	Apron & Wings		N	N	N	2) EXPANSION ROLLER BASE STARTING TO CRACK IN SECT. (4)
<b>OTHER</b>						
18	Retaining Wall			N	N	11) APPROX. 2500 L.F. OF TRANSVERSE JOINTS IN LOW SECTOR OFFICIN. (4)
19	Approaches	9	8	8	8	22) BRACK OVER PIER 6 APPEARS TO BE HYDRATED. (3)
20	Signing	7	8	7	7	23) DOWN PIER 22 HELD UP WITH JOINTS (3)
21	Paint (yr. ptd.)	3	8	8	7	
22	Drainage	7	7	7	7	
23	Guard Rail	5	8	8	8	
24		7	7	7	7	

Inspected by <u>[REDACTED]</u>	Date <u>1/1/74</u>	ESTIMATED COST OF REPAIR (OVER)				REVIEWED
	Date <u>1/2/74</u>	Labor	Material	Equipment	Total	By Engineer
Date <u>3/2/74</u>						
Date <u>11/1/74</u>						

Indicate a condition rating from 9 (very good) to 0 (very poor) for conditions noted

- Rating of 9 ----- new condition
- Rating of 8 ----- good condition, no repair necessary
- Rating of 7 ----- non-structural items in need of repair.
- Rating of 6 ----- structural items in need of minor repair
- Rating of 5 ----- structural items in need of major repair
- Rating of 4 ----- minimum adequacy to tolerate present traffic -  
immediate rehabilitation necessary to keep open
- Rating of 3 ----- inadequacy to tolerate present heavy load -  
warrants closing bridge to trucks
- Rating of 2 ----- inadequacy to tolerate any live load - warrants  
closing bridge to all traffic
- Rating of 1 ----- bridge repairable, if desirable to reopen to traffic
- Rating of 0 ----- bridge conditions beyond repair - danger of  
immediate collapse

Place dash where item is not rated

### REMARKS AND SKETCHES

- 1980
- ① SAME AS 1978 ④
  - ② SAME AS 1979 ALSO 3RD PIER FROM NORTH END (THAT SUPPORTS  
END OF STEEL AND ALSO CONCRETE SLAB SPAN) IS STARTING  
TO SPALL SERIOUSLY - BOTTOM OF ONE SIDE ③
  - ③ SAME AS 1979 ③
  - ④ " " " ③
  - ⑤ MANY OF THE CONCRETE RAIL BASE POSTS ARE SPALLING  
SERIOUSLY ESPECIALLY ON EAST SIDE. ③
  - ⑥ MANY, MANY TRANSVERSE CRACKS IN THE LOW SLUMP CONCRETE  
OVERLAY - SOME APPROX 1/32" OPEN AT 30" F. ③
  - ⑦ NO HAZARD SIGNIFERS ABOVE OR BELOW ①
  - ⑧ APPARS LIKE DRAIN PIPES ARE FLOZE UP. ④
  - ⑨ SAME AS 1979 ALSO CONDUIT IN THE MEDIAN AREA UNDER  
BRIDGE AT THE HIKKE JOINT FURTHERST SOUTH HAS PULLED  
APART AT ONE OF THE COUPLINGS. - WIRES EXPOSED.  
ALSO NORTH END WEST SIDE MINOR DAMAGE TO BRIDGE & ELECTRICAL CONDUCT  
MISSING FROM LIGHT FROM BRIDGE BEING HIT BY HIGH LOAD. (W. B. LANE)

- 1981
- 1) 2) 3) 5) 7) 9) 11) 20) NO CHANGE
  - 2A) 1980 REMARKS CORRECTED - 1979 NO CHANGE -
  - 2) 3RD PIER FROM NORTH APPEARS TO BE SPALLING MORE -



Original to Area Maintenance Engineer  
 First copy to Bridge Maint. Supervisor  
 Second copy to Bridge Inventory Group

Bridge No. 9340 & 9340A	T.H. No. 35W	Mile Post 18.54	Location 0.5 MI. NO. OF JCT. T.H. 12	Maintenance Area SA
Type (404) 11 APPR. SPANS 3 CONT. ST. DK. TRUSS	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under MISS. RIVER	Posted Limit in Tons	<input checked="" type="checkbox"/> annual inspection <input type="checkbox"/> special inspection	

I	ITEM	RATING				COMMENTS AND SKETCHES Refer to item number in comments and sketches Use additional sheets if necessary
<b>SUBSTRUCTURE</b>						
1	Abutments	7	7	7	7	1) SA. ABUT. BRIDGE SEAT - CRACKING AND DISCOLORED. 2) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST COLUMN IS CRACKED VERTICALLY COMPLETELY THROUGH COLUMN.
2	Piers	6	6	6	6	
<b>SUPERSTRUCTURE</b>						
3	Trusses	7	7	7	7	3) SMALL AREAS OF SEVERE CORROSION OCCURRING ESPECIALLY UNDER MEDIAN JOINT. AND A SMALL AMOUNT OF CORROSION ON LOWER CHORD (EAST) JUST SOUTH OF PIER 8 5) SEE 3) ABOVE - 6) SOME OF THE JOINTS TOO TIGHT. 7) DIRT & DEBRIS UNDER ROLLER BEARINGS - NO INDICATION THAT BRGS ARE MOVING AS MUCH AS DESIGNED TO MOVE. 9) 15-20% OF CONC. RAIL BASE IS UNSOUND. 11) 200-300 L.F. OF TRANSVERSE TRACKS IN LOW SLUMP OVERLAY - 12) FACE OF CURB STARTING TO SPALL IN SPOTS. 19) SEE 8) ABOVE - MAY BE A PAVEMENT PRESSURE PROBLEM. 20) NO HAZARD MARKERS 21) 4-5% PAINT UNSOUND 22) DRAINS PERENNIALY PLUGGED. - A83
4	Girders	N	N	N	N	
5	Floor Beams	7	7	7	7	
6	Stringers or Beams	8	8	8	8	
7	Bearing Devices	7	7	7	7	
<b>DECKS</b>						
8	Expansion Joints	7	7	7	7	
9	Railing 000E 12	6	6	6	6	
10	Structural Slab	8	7	6	6	
11	Wearing Surface	7	7	7	7	
12	Curb & Walk	7	7	7	7	
<b>AREA UNDER BRIDGE</b>						
13	Channel & Protection	8	8	8	8	
14	Roadway, Railway, Other	8	8	8	8	
15	Slopes & Berms	8	8	8	8	
<b>CULVERTS</b>						
16	Barrel & Floor	N	N	N	N	
17	Apron & Wings	N	N	N	N	
<b>OTHER</b>						
18	Retaining Wall	N	N	N	N	1) 3) 5) 7) 9) 11) 12) 19) 20) 21) 22) NO CHANGE. 2) SEE 2) ABOVE. SOME OF THE PIER CAPS AT THE NORTH END OF THE BRIDGE - ASSOCIATED WITH THE SLAB SPANS ARE MODERATELY DETERIORATED - 8) SEE 8) ABOVE. - ALSO STRIP SEAL GLAND IS COMING OUT OF THE RETAINING SLOT IN SEVERAL PLACES (NORTH END OF BRIDGE) 10) BOTTOM OF SLAB, CHORD, & MEDIAN DETERIORATING IN MANY PLACES - ESPECIALLY NORTH END
19	Approaches	7	7	7	7	
20	Signing	7	7	7	7	
21	Paint (yr. ptd.) 1968	7	7	7	7	
22	Drainage	7	7	6	6	
23	Guard Rail #5	8	8	8	8	
24	CONDUIT	8	8	8	8	
25						
Inspected by [redacted] Date 6/14/83 Date 5/17/83 Date 5/17/84 Date 11/7/85						
ESTIMATED COST OF REPAIR (OVER)					REVIEWED	
Labor	Material	Equipment	Total	By Engineer		
				[Signature]		
				[Signature]		

Indicate a condition rating from 9 (very good) to 0 (very poor) for conditions noted

- Rating of 9 ..... new condition
- Rating of 8 ..... good condition, no repair necessary
- Rating of 7 ..... non-structural items in need of repair.
- Rating of 6 ..... structural items in need of minor repair
- Rating of 5 ..... structural items in need of major repair
- Rating of 4 ..... minimum adequacy to tolerate present traffic -  
immediate rehabilitation necessary to keep open
- Rating of 3 ..... inadequacy to tolerate present heavy load -  
warrants closing bridge to trucks
- Rating of 2 ..... inadequacy to tolerate any live load - warrants  
closing bridge to all traffic
- Rating of 1 ..... bridge repairable, if desirable to reopen to traffic
- Rating of 0 ..... bridge conditions beyond repair - danger of  
immediate collapse

Place dash where item is not rated

#### REMARKS AND SKETCHES

1984

- 1) 3) 5) 8) 9) 11) 12) 19) 20) 21) NOT MUCH CHANGE.
- 2) PIERS AT THE NORTH END OF BRIDGE ARE STARTING TO SPALL ON CAPS - SEE 2) 1982
- 7) WEST EXP. BRK ON THE PIER THAT SETS ON THE SOUTH BANK OF THE RIVER IS BEING CONTINUOUSLY BATHED WITH SALT WATER FROM THE PLUGGED DRAIN ABOVE - THE EFFECTS ARE PLAIN TO SEE. - SEE ALSO 7) 1982
- 10) NOTED A CONSIDERABLE AMOUNT OF LOOSE CONCRETE UNDER THE MEDIAN AREA - FULL LENGTH OF THE BRIDGE AND BOTTOM OF SLAB SPANS @ NORTH END OF BRIDGE. - PROBABLY SHOULD BE REMOVED AT LEAST IN THOSE AREAS WHERE CARS ARE PARKED.
- 22) SEE 7) ABOVE. -

1985

- NO CHANGE - WITH THE EXCEPTION OF
- 2) A CONSIDERABLE AMOUNT OF CONCRETE HAS BEEN REMOVED (SURFACE CONCRETE) FROM THE PIERS AT THE NORTH END OF THE BRIDGE (APPROACH SPANS) AND ALSO FROM THE BOTTOM OF SLAB. - AND
- 8) THE METAL TROUGH UNDER THE SOUTH EXP. HINGE JOINT IS BREAKING LOOSE FROM ITS SUPPORT AT THE EAST END OF THE JOINT. -
- 10) THE NOTE ABOVE HAS, FOR THE MOST PART, BEEN TAKEN CARE OF BUT. LOOSE CONCRETE OVER PARKED CARS AT THE SOUTH END OF BRIDGE STILL EXISTS -
- 3) PIN CONNECTIONS ON THE DIAGONAL (LONGITUDINAL) STRUTS FROM FLOOR BEAM TO STRINGERS ARE LOOSE AND TURNING IN SOME PLACES.



Minnesota Department of Transportation  
Office of Bridges and Structures  
**BRIDGE INSPECTION REPORT**

- Original to Area Maintenance Engineer
- First copy to Bridge Maint. Superv.
- Second copy to Bridge Inventory Group

|  |   |                           |  |                               |
|--|---|---------------------------|--|-------------------------------|
| Bridge No.<br><i>9340 = 9340A</i>                                | T.H. No.<br><i>35W</i>  | Mile Post<br><i>18.54</i> | Location <i>25 MI. NO. OF CT. T.H. 12</i>  | Maintenance Area<br><i>5A</i> |
| Type <i>(ADD) 11 APPROACH SP. &amp; CONCR. ST. DR. TRUSS SP.</i> | <input checked="" type="checkbox"/> Over<br><input type="checkbox"/> Under <i>MISSISSIPPI RIVER</i> | Posted Limit in Tons      | <input checked="" type="checkbox"/> annual inspection<br><input type="checkbox"/> special inspection |                               |

| I                        | ITEM                             | RATING |   | COMMENTS AND SKETCHES<br>Refer to item number in comments and sketches<br>Use additional sheets if necessary  |
|--------------------------|----------------------------------|--------|---|---|
|                          |                                  |        |   |   |
| <b>SUBSTRUCTURE</b>      |                                  | 6      | 6 | <p><i>1986</i></p> <p>1) SO. ABUT. BRIDGE SEAT CRACKED &amp; DISCOLORED</p> <p>2) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST COLUMN IS CRACKED VERTICALLY THROUGH COLUMN.</p> <p>3) SMALL AREAS OF SEVERE CORROSION ESPECIALLY UNDER LEAKING MEDIAN JOINT. - ALSO ISOLATED SPOTS ON THE LOWER CHORDS. -</p> <p>5) SEE 3) ABOVE - CORROSION DIRECTLY BELOW MEDIAN JOINT. -</p> <p>7) NO EVIDENCE THAT THE MAIN ROCKER BRGS ARE MOVING AS THEY SHOULD - DEBRI UNDER THE ROLLERS IS UNOCCUPATEDLY RESTRICTING THE MOVEMENT.</p> <p>8) SOME OF THE EXP. JOINTS APPEAR TO BE EXCESSIVELY TIGHT. - STRIP-SEAL GLANDS ARE COMING OUT IN A FEW ISOLATED SPOTS. -</p> <p>9) 25% ± CONCRETE RAIL BASE UNSOUND.</p> <p>10) STRUCTURAL SLAB UNDER THE MEDIAN OVERHANGS (AND OUTSIDE OVERHANGS) IS SPALLING AWAY -</p> <p>11) 300' L.F. ± OF LIGHT TO MODERATE TRANSVERSE CRACKS.</p> <p>12) CURBS STARTING TO SPALL ALSO. -</p> <p>13) &amp; 5) 7) DRAINAGE TROUGH UNDER HINGE JOINT ON THE SOUTH END OF THE MAIN TRUSS BROKE LOOSE FROM ITS SUPPORTS AND WAS PLUGGED MOST OF THE TIME. ALSO BRGS AND RELATED STRUCTURAL SYSTEM CREATED STRESSES THAT CRACKED STIFFENERS ALONG THE FLOOR BEAM IN THAT AREA. - MAINTENANCE CREWS ARE IN THE PROCESS OF CORRECTING THIS PROBLEM NOW.</p> <p style="text-align: right;"><i>OVER</i></p> |
| 1                        | Abutments                        | 7      | 7 |   |
| 2                        | Piers                            | 6      | 6 |   |
| <b>SUPERSTRUCTURE</b>    |                                  | 7      | 7 |   |
| 3                        | Trusses                          | 7      | 7 |   |
| 4                        | Girders                          | N      | N |   |
| 5                        | Floor Beams                      | 7      | 7 |   |
| 6                        | Stringers or Beams               | 8      | 8 |   |
| 7                        | Bearing Devices                  | 7      | 7 |   |
| <b>DECKS</b>             |                                  | 6      | 6 |   |
| 8                        | Expansion Joints                 | 7      | 7 |   |
| 9                        | Railing                          | 6      | 6 |   |
| 10                       | Structural Slab                  | 6      | 6 |   |
| 11                       | Wearing Surface                  | 7      | 7 |   |
| 12                       | Curb & Walk                      | 7      | 7 |   |
| 13                       | Bridge Deck Drains               | 7      | 7 |   |
| <b>AREA UNDER BRIDGE</b> |                                  | 8      | 8 |   |
| 14                       | Channel & Protection             | 8      | 8 |   |
| 15                       | Roadway, Railway, Other          | 8      | 8 |   |
| 16                       | Slopes & Berms                   | 8      | 8 |   |
| <b>CULVERTS</b>          |                                  | N      | N |   |
| 17                       | Barrel & Floor                   | N      | N |   |
| 18                       | Apron & Wings                    | N      | N |   |
| <b>OTHER</b>             |                                  | 6      | 6 |   |
| 19                       | Retaining Wall                   | N      | N |   |
| 20                       | Approaches                       | 7      | 7 |   |
| 21                       | Signing                          | 7      | 7 |   |
| 22                       | Paint (year painted) <i>1968</i> | 6      | 7 |   |
| 23                       | Drainage                         | 6      | 6 |   |
| 24                       | Guard Rail                       | 8      | 8 |   |
| 25                       |                                  |        |   |   |

| ESTIMATED COST OF REPAIR |          |           |       | REVIEWED    |
|--------------------------|----------|-----------|-------|-------------|
| Labor                    | Material | Equipment | Total | By Engineer |
|                          |          |           |       |             |
|                          |          |           |       |             |
|                          |          |           |       |             |

Inspected by: \_\_\_\_\_ Date: *11/4/86*

\_\_\_\_\_ Date: *7-7-87*

\_\_\_\_\_ Date: \_\_\_\_\_



Minnesota Department of Transportation  
Office of Bridges and Structures  
BRIDGE INSPECTION REPORT

|                                       |                                       |                      |                                    |                 |
|---------------------------------------|---------------------------------------|----------------------|------------------------------------|-----------------|
| Bridge No. : 9340                     | T.H. No. : 35W                        | Ref. Point : 018.538 | Location : 1.0 MI NE OF JCT TH 94  | Maint Area : 5A |
| Crew NO. : 2                          | Stru. Cross : DV RR & MISS R & 2ND ST |                      | Posted Limit in Tons : LEGAL       | S Inspection    |
| Bridge Type: RIVETED ST CONT DK TRUSS |                                       |                      | Inspection Date : January 31, 1989 | C. S. : 2783    |
| in. Vert. Clearance : 15.4            | Deck Area (Sq. Ft.) : 205956          |                      | Painted Area (Sq. Ft.) : 490200    |                 |

| NO                        | ITEM                            | COND'T |             | PER- | COMMENTS   |  |
|---------------------------|---------------------------------|--------|-------------|------|--|--|
|                           |                                 | RATING | REPAIR CODE |      |  |  |
| <b>SUBSTRUCTURE</b>       |                                 |        |             |      |  |  |
| 1                         | Abutments                       | 16     | 16          |      | Bridge 9340 Year 89  |  |
| 2                         | Piers                           | 16     | 16          |      | Bridge 9340 Year 88  |  |
| 3                         | Bridge Seats                    | 18     | 18          |      | Bridge 9340 Year 87  |  |
| <b>SUPERSTRUCTURE</b>     |                                 |        |             |      |  |  |
| 4                         | Trusses                         | 17     | 17          |      | 1.) SO. ABUT. BRIDGE SEAT CRACKED & DISCOLORED<br>2.) NORTH APPROACH SPANS PIERS HAVE BEEN PATCHED EXTENSIVELY WITH SHOT-CRETE - BUT OTHER AREAS ARE IN NEED OF PATCHING.<br>2.) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST COLUMN IS CRACKED VERTICALLY THROUGH COLUMN<br>5.&7.) KNEE BRACING ON SOUTH EAST BEARING & BEAM HAS BEEN REPLACE BY BRIDGE CREW AND SEEMS TO BE WORKING WELL.<br>5.&7.) THEIR IS A COATING OF PIGEON DUNG ON STEEL WITH NEST AND HEAVY BUILDUP ON THE INSIDE HOLLOW BOX SECTIONS. MODERATE TO SEVERE RUSTING OF CONNECTIONS UNDER MEDIAN.<br>8.) BEARINGS ON SPAN # 1 CANTILEVR SECTION ARE CLOSE. TIGHT AT 60 DEGREES F.<br>13) STRUCTURAL SLAB UNDER THE MEDIAN OVERHANGS (AND OUTSIDE OVERHANGS) IS SPALLING AWAY WITH NORTH BOUND 2100 SQ. FT. OF SPALL. SOUTH BOUND 1000 SQ FT OF SPALL. 50 S.F. OF LOOSE CONCRETE ON BOTTOM OF MEDIAN OVER NORTH ACCESS ROAD AND PARKING LOT ON SOUTH END OF BRIDGE.<br>14.) 3000 L.F +OR- OF SLIGHT TO MODERATE TRANSVERSE CRACKS<br>15.) CURBS STARTING TO SPALL ALSO.<br>16.) 25% CONCRETE RAILING UNSOUND. SEVERE CRACKING OF WEST RAIL DUE TO TRAFFIC DAMA WHICH HAS BROKEN ONE POST ON WEST SIDE AT SOUTH |  |
| 5                         | Girders                         | 11     | 11          |      |  |  |
| 6                         | Floor Beams                     | 17     | 17          |      |  |  |
| 7                         | Stringers or Beams              | 18     | 18          |      |  |  |
| 8                         | Bearing Devices                 | 17     | 17          |      |  |  |
| 9                         | Arches                          | 11     | 11          |      |  |  |
| 10                        | Fascia Beams                    | 11     | 18          |      |  |  |
| 11                        | Diaphragms                      | 11     | 18          |      |  |  |
| 12                        | Spandrel Columns                | 11     | 18          |      |  |  |
| <b>DECK</b>               |                                 |        |             |      |  |  |
| 13                        | Structural Slab                 | 16     | 16          |      |  |  |
| 14                        | Wearing Surface                 | 17     | 17          |      |  |  |
| 15                        | Curb & Walk                     | 17     | 17          |      |  |  |
| 16                        | Railing                         | 16     | 14          |      |  |  |
| 17                        | Expansion Joints<br>(E.J. Type) | 17     | 16          |      |  |  |
| 18                        | Bridge Deck Drains              | 11     | 16          |      |  |  |
| 19                        | Median                          | 11     | 11          |      |  |  |
| <b>AREA UNDER BRIDGE</b>  |                                 |        |             |      |  |  |
| 20                        | Channel & Protection            | 18     | 18          |      |  |  |
| 21                        | Fenders                         | 11     | 11          |      |  |  |
| 22                        | Roadway, Railway, Other         | 18     | 18          |      |  |  |
| 23                        | Slopes & Berms                  | 18     | 18          |      |  |  |
| <b>CULVERT &amp; WALL</b> |                                 |        |             |      |  |  |
| 24                        | Barrel & Floor                  | 11     | 11          |      |  |  |
| 25                        | Apron, Wingwall, Headwall       | 11     | 11          |      |  |  |
| <b>APPROACH ROADWAY</b>   |                                 |        |             |      |  |  |
| 26                        | Approach Near (S or N)          | 17     | 17          |      |  |  |
| 27                        | Approach Far (N or E)           | 17     | 17          |      |  |  |
| <b>OTHER</b>              |                                 |        |             |      |  |  |
| 28                        | Signing                         | 17     | 18          |      |  |  |
| 29                        | Retaining Wall                  | 11     | 11          |      |  |  |
| 30                        | Guardrail                       | 18     | 18          |      |  |  |
| 31                        | Fence                           | 11     | 18          |      |  |  |
| 32                        | Paint                           | 16     | 16          |      |  |  |
| 33                        | Plow Straps                     | 11     | 11          |      |  |  |
| 34                        | Drainage                        | 11     | 16          |      |  |  |
| 35                        | Miscellaneous                   | 11     | 11          |      |  |  |

| INSPECTOR  | YEAR     | REVIEND BY     |
|------------|----------|----------------|
| [REDACTED] | 07/07/87 |                |
|            | 06/19/88 |                |
|            | 08/05/89 | AUGUST 5, 1989 |
|            | 01/31/89 |                |
|            |          |                |

Signature : \_\_\_\_\_

17.) APPEARS TO BE PAVEMENT THRUST FROM BOTH ENDS OF THE BRIDGE. WHILE RELIEF JOINTS HAVE BEEN CUT IN PAVEMENT THEY ALSO SHOULD BE CUT IN CURBS AND MEDIANS

22. 6-8% PAINT UNSOUND

23.) DRAINAGE SYSTEM WHERE DOWN PIPES ARE USED ARE PLUGGED. MOST OF DRAINAGE DEVICES ON BRIDGE ARE PLUGGED & GROWING VEGETATION.

20 L.F. OF HORZ. CRACKS IN NORTH SLOPE.

34.) DRAINAGE TROUGH UNDER HINGE JOINT ON THE SOUTH END OF THE MAIN TRUSS BROKE LOOSE FROM ITS MOUNTINGS.

NOTE: RELIEF JOINTS ARE NEEDED ON BOTH ENDS OF BRIDGE. IN CURBS AND MEDIAN.



Mn/DOT Office of Bridges and Structures  
BRIDGE INSPECTION REPORT

Bridge No. : 9340      T.H. No. : 35W      Ref. Point : 018.538      Location : 1.0 MI NE OF JCT TH 94      Road System: 5A  
 Crew NO: : 3      Stru. Cross : OV RR & MISS R & 2ND ST      Posted Limit in Tons : LEGAL      A Inspection  
 Bridge Type: RIVETED ST CONT DK TRUSS      Inspection Date : August 5, 1990      C. S. : 2783  
 Min.Vert ( Und./Und. ) 15.2      Deck Area (Sq. Ft.): 203956      Painted Area (Sq. Ft.): 490200  
 Min.Vert ( Over/Over )

| NO                        | ITEM                      | RATING    | REPAIR CODE | %PCT   | QUANT | UNIT | COMMENTS   |
|---------------------------|---------------------------|-----------|-------------|--------|-------|------|--|
| <b>SUBSTRUCTURE</b>       |                           |           |             |        |       |      |  |
| 1                         | Abutments                 | 161616161 |             |        |       |      |  |
| 2                         | Piers                     | 171717171 |             |        |       |      | Bridge 9340 Year 90                                    |
| 3                         | Bridge Seats              | 181818181 |             |        |       |      | Bridge 9340 Year 88                                    |
| <b>SUPERSTRUCTURE</b>     |                           |           |             |        |       |      |  |
| 4                         | Trusses                   | 1N1717141 |             |        |       |      | Bridge 9340 Year 87                                    |
| 5                         | Girders                   | 1N1N1N1N1 |             |        |       |      | 1.) SO. ABUT. BRIDGE SEAT CRACKED & DISCOLORED         |
| 6                         | Floor Beams               | 171717171 |             |        |       |      |  |
| 7                         | Stringers or Beams        | 181818181 |             |        |       |      | 2.) NORTH APPROACH SPANS PIERS HAVE BEEN PATCHED       |
| 8                         | Bearing Devices           | 171717141 |             |        |       |      | EXTENSIVELY WITH SHOT-CRETE - BUT OTHER AREAS ARE      |
| 9                         | Arches                    | 1N1N1N1N1 |             |        |       |      | IN NEED OF PATCHING.                                   |
| 10                        | Fascia Beams              | 181818181 |             |        |       |      |  |
| 11                        | Diaphragms                | 181818181 |             |        |       |      | 2.) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST      |
| 12                        | Spandrel Columns          | 181818181 |             |        |       |      | COLUMN IS CRACKED VERTICALLY THROUGH COLUMN            |
| <b>DECK</b>               |                           |           |             |        |       |      |  |
| 13                        | Structural Slab           | 161616161 |             |        |       |      | 3.) LAST FOUR BEARING PLATES SOUTH ABUTMENT WEST SIDE  |
| 14                        | Wearing Surface           | 171717171 |             |        |       |      | ARE QUITE RUSTY.                                       |
| 15                        | Curb & Walk               | 171717171 |             |        |       |      |  |
| 16                        | Railing                   | 161614141 |             |        |       |      |  |
| 17                        | Expansion Joints          | 171716161 |             |        |       |      | 5.&7.) KNEE BRACING ON SOUTH EAST BEARING & BEAM HAS   |
|                           |                           | 1111111   |             |        |       |      | BEEN REPLACE BY BRIDGE CREW AND SEEMS TO BE            |
|                           |                           | 1616161   |             |        |       |      | WORKING WELL.  |
| 18                        | Bridge Deck Drains        | 1616161   |             |        |       |      |  |
| 19                        | Median                    | 1111111   |             |        |       |      |  |
| <b>AREA UNDER BRIDGE</b>  |                           |           |             |        |       |      |  |
| 20                        | Channel & Protection      | 181818181 |             |        |       |      | 5.&7.) THERE IS A COATING OF PIGEON DUNG ON STEEL      |
| 21                        | Fenders                   | 1111111   |             |        |       |      | WITH NEST AND HEAVY BUILDUP ON THE INSIDE              |
| 22                        | Roadway, Railway, Other   | 181818181 |             |        |       |      | HOLLOW BOX SECTIONS.                                   |
| 23                        | Slopes & Berms            | 181818181 |             |        |       |      | MODERATE TO SEVERE RUSTING OF CONNECTIONS UNDER        |
|                           |                           | 181818181 |             |        |       |      | MEDIAN.  |
| <b>CULVERT &amp; WALL</b> |                           |           |             |        |       |      |  |
| 24                        | Barrel & Floor            | 1N1N1N1N1 |             |        |       |      | 7.) MODERATE TO SEVERE RUST UNDER MEDIAN AND EXPANSION |
| 25                        | Apron, Wingwall, Headwall | 1N1N1N1N1 |             |        |       |      | AREAS ON CONSTRUCTION.                                 |
| <b>APPROACH ROADWAY</b>   |                           |           |             |        |       |      |  |
| 26                        | Approach Near (S or W)    | 171717171 |             |        |       |      | 7.) RUST ON TOP FLANG UNDER DECK CONCRETE SPAN 2, 7,   |
| 27                        | Approach Far (N or E)     | 171717171 |             |        |       |      | 10, 11, 22. PACK RUST ON H-BEAM STRINGER AT SPAN       |
|                           |                           | 161616151 |             |        |       |      | 4.   |
| <b>OTHER</b>              |                           |           |             |        |       |      |  |
| 28                        | Signing                   | 181818181 |             |        |       |      |  |
| 29                        | Retaining Wall            | 1N1N1N1N1 |             |        |       |      | 8.) BEARINGS ON SPAN # 1 CANTILEVER SECTION ARE CLOSED |
| 30                        | Guardrail                 | 181818181 |             |        |       |      | TIGHT AT 60 DEGREES F.                                 |
| 31                        | Fence                     | 181818181 |             |        |       |      |  |
| 32                        | Paint                     | 161616151 | 18          | 490201 |       |      | 8.) BEARING PINS ON TRUSS BEARING ASSEMBLIES AT ENDS   |
| 33                        | Plow Straps               | 1N1N1N1N1 |             |        |       |      | OF TRUSS SHOULD BE REPLACED WITH SLIGHTLY LONGER       |
| 34                        | Drainage                  | 161616161 |             |        |       |      | BOLTS TO ALLOW FOR THERMAL THRUST (ON EVEN             |
| 35                        | Miscellaneous             | 1111111   |             |        |       |      | EXPANSION - DUE TO TEMPERATURE DIFFERENCES BETWEEN     |

| INSPECTOR | YEAR | REVIEWED BY    |
|-----------|------|----------------|
|           | 1988 |                |
|           | 1989 |                |
|           | 1989 | AUGUST 5, 1989 |
|           | 1990 | LARRY LEHRKE   |

Comments Continued for Bridge 9340 Year 90  
GIRDERS AND TRUSS COMPONENTS.)

- 13) STRUCTURAL SLAB UNDER THE MEDIAN OVERHANGS (AND OUTSIDE OVERHANGS) IS SPALLING AWAY WITH NORTH BOUND 2100 SQ. FT. OF SPALL. SOUTH BOUND 1000 SQ FT OF SPALL. 50 S.F. OF LOOSE CONCRETE ON BOTTOM OF MEDIAN OVER NORTH ACCESS ROAD AND PARKING LOT ON SOUTH END OF BRIDGE.
- 14.) 3000 L.F +OR- OF SLIGHT TO MODERATE TRANSVERSE CRACKS
- 15.) CURBS STARTING TO SPALL ALSO.
- 16.) 25% CONCRETE RAILING UNSOUND. SEVERE CRACKING OF WEST RAIL DUE TO TRAFFIC DAMAGE WHICH HAS BROKEN ONE POST ON WEST SIDE AT SOUTH END AND ONE BROKEN POST ON NORTH END EAST SIDE.
- 17.) APPEARS TO BE PAVEMENT THRUST FROM BOTH ENDS OF THE BRIDGE. WHILE RELIEF JOINTS HAVE BEEN CUT IN PAVEMENT THEY ALSO SHOULD BE CUT IN CURBS AND MEDIANS
22. 6-8% PAINT UNSOUND
- 23.) DRAINAGE SYSTEM WHERE DOWN PIPES ARE USED ARE PLUGGED. MOST OF DRAINAGE DEVICES ON BRIDGE ARE PLUGGED & GROWING VEGETATION. 20 L.F. OF HORZ. CRACKS IN NORTH SLOPE.
- 31.) WIRE FENCE DOWN AT SOUTH ABUTMENT ON BOTH SIDES.
- 32.) PAINT IS 20% UNSOUND.
- 32.) PAINT UNDER MEDIAN JOINT IS IN POOR CONDITION WITH SMALL AREAS OF PACKRUST. THESE AREAS SHOULD BE CLEANED AND REPAINTED.
- 34.) DRAINAGE TROUGH UNDER HINGE JOINT ON THE SOUTH END OF THE MAIN TRUSS BROKE LOOSE FROM ITS MOUNTINGS.
- 35.) LIGHT BASE ON P.G. GROUT ERODED, SHOULD BE REPAIRED. LIGHT BASE COVERS MISSING AND WIRES EXPOSED.

NOTE: RELIEF JOINTS ARE NEEDED ON BOTH ENDS OF BRIDGE.  
IN CURBS AND MEDIAN.

NOTE: LIGHT BASE ON P.G. GROUT ERODED. THIS SHOULD BE REPAIRED.

NOTE: LIGHT BASE COVERS MISSING AND WIRES EXPOSED.

NOTE: MODERATE TO SEVERE RUST UNDER MEDIAN AND EXPANSION AREAS ON CROSS TRUSSES.

NOTE: DRAIN OVER THE RIVER IS PLUGGED.

NOTE: RUBBER GLAND AT SOME EXP. JOINTS STARTING TO LET LOOSE AND LEAK.



Mn/DOT OFFICE OF BRIDGES AND STRUCTURES

Bridge No.: 9340 Bridge Inspection Report Oct 18, 1993 Sheet 1 of 6

Road System: 01 Isth County: 27 HENNEPIN Location: 1.0 MI NE OF JCT TH 94  
 Road Number: 35W Load Posting(Tons) : LEGAL Feature Crossed: OV RR & MISS R & 2ND ST  
 City: Reference Point : 018.538 Bridge Type : RIVETED ST CONT DK. TRUSS  
 Township: Deck Area (Sq.Ft.) : 205956 Min. Vert (Und/Und) : 15.2  
 Maint. Area / District: 5A Painted Area (Sq.Ft.) : 490200 Min. Vert (Over/Over) :  
 Control Section : 2783 Crew No. : 2 Inspection Classification : A

| NO                        | ITEM                      | RATINGS   | %PCT | QUANT    | UNIT | COMMENTS   |
|---------------------------|---------------------------|-----------|------|----------|------|--|
| <b>SUBSTRUCTURE</b>       |                           |           |      |          |      |  |
|                           |                           | 6 6 6 6 6 |      |          |      | BRIDGE 9340 YEAR '93   |
| 1                         | Abutments                 | 7 7 7 7 7 |      |          |      | Bridge 9340 Year 92  |
| 2                         | Piers                     | 6 6 6 6 6 |      |          |      | Bridge 9340 Year 90  |
| 3                         | Bridge Seats              | 8 8 8 8 8 |      |          |      | Bridge 9340 Year 88  |
| <b>SUPERSTRUCTURE</b>     |                           |           |      |          |      |  |
| 4                         | Trusses                   | 4 4 4 4 4 |      |          |      | Bridge 9340 Year 87  |
| 5                         | Girders                   | 7 7 7 7 7 |      |          |      | 62 SNOOPER INSPECTION 9/21/91  |
| 6                         | Floor Beams               | N N N N N |      |          |      | 7.) SO. ABUT. BRIDGE SEAT CRACKED & DISCOLORED   |
| 7                         | Stringers or Beams        | 7 7 6 6 6 |      |          |      | 41, 58   |
| 8                         | Bearing Devices           | 8 8 8 8 8 |      |          |      | 7.) NORTH APPROACH SPANS PIERS HAVE BEEN PATCHED EXTENSIVELY WITH SHOT-CRETE - BUT OTHER AREAS ARE IN NEED OF PATCHING.  |
| 9                         | Arches                    | 4 4 4 4 4 |      |          |      | 58   |
| 10                        | Fascia Beams              | 8 8 8 8 8 |      |          |      | 7.) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST COLUMN IS CRACKED VERTICALLY THROUGH COLUMN  |
| 11                        | Diaphragms                | 8 8 8 8 8 |      |          |      | 62   |
| 12                        | Spandrel Columns          | 8 8 8 8 8 |      |          |      | 7.) LAST FOUR BEARING PLATES SOUTH ABUTMENT WEST SIDE ARE QUITE RUSTY.   |
| <b>DECK</b>               |                           |           |      |          |      |  |
| 13                        | Structural Slab           | 6 6 6 6 6 |      | 1 2059.  | sqft | 7.)  |
| 14                        | Wearing Surface           | 7 7 7 7 7 |      |          |      | 20   |
| 15                        | Curb & Walk               | 7 7 7 7 7 |      |          |      | 1)   |
| 16                        | Railing                   | 4 4 4 4 4 |      |          |      | NO. END OF WEST TRUSS CONNECTION TO FLOOR BEAM EXTENSIVE CORROSION UNDER JOINT - NEEDS SPOT BLAST AND PAINT OR SEVERE CORROSION WILL RESULT WITHIN 5 YEARS (BY 1997).    |
| 17                        | Expansion Joints          | 6 6 6 6 6 |      |          |      | 20   |
| 18                        | Bridge Deck Drains        | 6 6 6 6 6 |      |          |      | 1)   |
| 19                        | Median                    | 8 8 8 8 8 |      |          |      | WEST MAIN TRUSS, LOWER CHORD 2 FLOOR TRUSSES SO. OF PIER 1 - 1/8 IN. L OF S.   |
| <b>AREA UNDER BRIDGE</b>  |                           |           |      |          |      |  |
| 20                        | Channel & Protection      | 8 8 8 8 8 |      |          |      | 20   |
| 21                        | Fenders                   | 8 8 8 8 8 |      |          |      | 1)   |
| 22                        | Roadway, Railway, Other   | 8 8 8 8 8 |      |          |      | 20   |
| 23                        | Slopes & Berms            | 8 8 8 8 8 |      |          |      | 1)   |
| <b>CULVERT &amp; WALL</b> |                           |           |      |          |      |  |
| 24                        | Barrel & Floor            | N N N N N |      |          |      | WEST TOP CHORD OVER NO. PIER - TACK WELD TRANS. TO TOP FLG OF CHORD HOLDING FILL PLT. (BAD SITUATION BUT NO CRACKS).   |
| 25                        | Apron, Wingwall, Headwall | N N N N N |      |          |      | 79, 8  |
| <b>APPROACH ROADWAY</b>   |                           |           |      |          |      |  |
| 26                        | Approach Near (S or W)    | 7 7 7 7 7 |      |          |      | 7.81.) KNEE BRACING ON SOUTH EAST BEARING & BEAM HAS BEEN REPLACE BY BRIDGE CREW AND SEEMS TO BE WORKING WELL.   |
| 27                        | Approach Far (N or E)     | 7 7 7 7 7 |      |          |      | 8, 79  |
| <b>OTHER</b>              |                           |           |      |          |      |  |
| 28                        | Signing                   | 8 8 8 8 8 |      |          |      | 7.81.) THERE IS A COATING OF PIGEON DUNG ON STEEL WITH NEST AND HEAVY BUILDUP ON THE INSIDE HOLLOW BOX SECTIONS. MODERATE TO SEVERE RUSTING OF CONNECTIONS UNDER MEDIAN. |
| 29                        | Retaining Wall            | N N N N N |      |          |      | 33   |
| 30                        | Guardrail                 | 8 8 8 8 8 |      |          |      | 1)   |
| 31                        | Fence                     | 8 8 8 8 8 |      |          |      | FIRST SPAN   |
| 32                        | Paint                     | 5 5 5 5 5 |      | 8 39216. | sqft | FLOOR TRUSS #3 - CENTER BAD WELD UNDERCUT IN   |
| 33                        | Plow Straps               | N N N N N |      |          |      |  |
| 34                        | Drainage                  | 6 6 6 6 6 |      |          |      |  |
| 35                        | Miscellaneous             | 6 6 6 6 6 |      |          |      |  |

| INSPECTOR                  | YEAR | REVIEWED BY   |
|----------------------------|------|---------------|
| CHESTER MARTIN             | 1991 | LARRY LEHRKE  |
| CHAS. MARTIN & J. ANDERSON | 1991 | LARRY LEHRKE  |
| MORAVEC, MARTIN & ALMANN   | 1993 |               |
| MORAVEC, MARTIN & WAKS     | 1993 | TERRY MORAVEC |

FLANGE.  
FLOOR TRUSS #4 - TOP CORD TACK WELD  
CRACKED.

SECOND SPAN

FLOOR TRUSS #5 - TOP CORD AT CENTER HAS PLATE  
WELDED TO BOTTOM FLANGE - LONGITUDINAL.  
FLOOR TRUSS #6 - AT TOP OF CORD CENTER THERE IS  
A FOUR WAY DIAGONAL MEMBER THAT ARE WELDED  
TRANSVERSE TO BOTTOM FLANGE.  
FLOOR TRUSS #10,11,12 - AT TOP OF CORD, CENTER  
DIAGONAL STIFFENER PLATE HAS A WELD TRANSVERSE  
TO BOTTOM FLANGE.  
FLOOR TRUSS #13 - SAME AS ABOVE TRANSVERSE AND  
HEAVY RUST AT MEDIAN, AT END OF BOTTOM FLANGE  
IS A LOSS OF SECTION OF 25% FROM PACK RUST ON  
DIAGONAL PLATE AT CENTER TOP CORD.

THIRD SPAN

FLOOR TRUSS #1 - TOP CORD AT CENTER PLATE TO  
DIAGONALS HAS A TRANSVERSE TACK WELD TO BOTTOM  
FLANGE.  
FLOOR TRUSS #2 - HEAVY PACK RUST WITH LOSS OF  
SECTION ON TOP AND BOTTOM CORD AT CENTER AND  
PLATE TO DIAGONAL.  
FLOOR TRUSS #3 - AT CENTER TOP CORD EIGHTH  
STRINGER BOLT HEAD BROKE OFF AT BEARING AND  
WELD AT DIAGONAL PLATE TO BOTTOM FLANGE TRANS.

33  
7)  
1992 INSPECTION  
CONNECTION FLOOR BEAM(MULTI TO TRUSS) NORTH END  
CRACK IN STIFFENER WHERE TRUSS PASSES THROUGH  
FLOOR BEAM. DRILLED OUT  
CONNECTION FLOOR BEAM, SOUTH END  
CRACK IN WEB AT WEST CONNCTION. GROUND OUT

7  
7)  
MODERATE TO SEVERE RUST UNDER MEDIAN AND  
EXPANSION AREAS ON CONSTRUCTION.

7.  
7.) RUST ON TOP FLANG UNDER DECK CONCRETE SPAN 2, 7,  
10, 11, 22. PACK RUST ON H-BEAM STRINGER AT SPAN  
4.

7) 1ST MULTI-BEAM SPAN NO. OF TRUSS - GOUGES IN  
BTM OF ALL BEAMS OVER ROUDWAY.

? 8.) BEARINGS ON SPAN # 1 CANTILÉVER SECTION ARE CLOSED  
TIGHT AT 60 DEGREES F.

? 8.) BEARING PINS ON TRUSS BEARING ASSEMBLIES AT ENDS  
OF TRUSS SHOULD BE REPLACED WITH SLIGHTLY LONGER  
BOLTS TO ALLOW FOR THERMAL THRUST (ON EVEN  
EXPANSION - DUE TO TEMPERATURE DIFFERENCES BETWEEN  
GIRDERS AND TRUSS COMPONENTS.)

157  
1/3) STRUCTURAL SLAB UNDER THE MEDIAN OVERHANGS (AND  
OUTSIDE OVERHANGS) IS SPALLING AWAY WITH  
NORTH BOUND 2100 SQ. FT. OF SPALL. SOUTH BOUND  
1000 SQ FT OF SPALL. 50 S.F. OF LOOSE CONCRETE  
ON BOTTOM OF MEDIAN OVER NORTH ACCESS ROAD AND  
PARKING LOT ON SOUTH END OF BRIDGE.

159  
1/3) LOOSE CONCRETE AT CENTER MEDIAN OVER DUMP AREA  
AND ROAD ALONG RIVER - NORTH BANK (S.E. MPLS  
SIDE)

158  
14.) 3000 L.F +OR- OF SLIGHT TO MODERATE TRANSVERSE  
CRACKS. 25 SF OF CRACKED AND DELAM. NORTH BOUND  
EAST TWO LANES, REMOVED AND PATCHED. 122

14) 122  
136  
15.) 3 S.F. SPALL S.B. LEFT CENTER LANE NEAR NO.  
FINGER JOINT.

15.) CURBS STARTING TO SPALL ALSO.

104  
16.) 25% CONCRETE RAILING UNSOUND.  
SEVERE CRACKING OF WEST RAIL DUE TO TRAFFIC DAMAGE  
WHICH HAS BROKEN ONE POST ON WEST SIDE AT SOUTH  
END AND ONE BROKEN POST ON NORTH END EAST SIDE.

90  
17.) APPEARS TO BE PAVEMENT THRUST FROM BOTH ENDS OF  
THE BRIDGE. WHILE RELIEF JOINTS HAVE BEEN CUT IN  
PAVEMENT THEY ALSO SHOULD BE CUT IN CURBS AND

MEDIANS. NORTH BOUND ALL EXPANSION JOINTS ARE STARTING TO PULL OUT.

822. 6-8% PAINT UNSOUND Approach Spans

184  
23.) DRAINAGE SYSTEM WHERE DOWN PIPES ARE USED ARE PLUGGED. MOST OF DRAINAGE DEVICES ON BRIDGE ARE PLUGGED & GROWING VEGETATION.

20 L.F. OF HORZ. CRACKS IN NORTH SLOPE. 185

188  
31.) WIRE FENCE DOWN AT SOUTH ABUTMENT ON BOTH SIDES.

20  
32.) PAINT IS 20% UNSOUND.

20  
32.) PAINT UNDER MEDIAN JOINT IS IN POOR CONDITION WITH SMALL AREAS OF PACKRUST. THESE AREAS SHOULD BE CLEANED AND REPAINTED.

184  
34.) DRAINAGE TROUGH UNDER HINGE JOINT ON THE SOUTH END OF THE MAIN TRUSS BROKE LOOSE FROM ITS MOUNTINGS.

188  
35.) LIGHT BASE ON P.G. GROUT ERODED, SHOULD BE REPAIRED. LIGHT BASE COVERS MISSING AND WIRES EXPOSED.

NOTE: RELIEF JOINTS ARE NEEDED ON BOTH ENDS OF BRIDGE. IN CURBS AND MEDIAN.

NOTE: LIGHT BASE ON P.G. GROUT ERODED. THIS SHOULD BE REPAIRED.

NOTE: LIGHT BASE COVERS MISSING AND WIRES EXPOSED.

NOTE: MODERATE TO SEVERE RUST UNDER MEDIAN AND EXPANSION AREAS ON CROSS TRUSSES.

NOTE: DRAIN OVER THE RIVER IS PLUGGED.

NOTE: RUBBER GLAND AT SOME EXP. JOINTS STARTING TO LET

LOOSE AND LEAK.

WESTSIDE:

LOOSE BOLT 2ND INTERIOR STRINGER BEARING AT V18

NICK ON BOTTOM OF DIAGONAL L15 - 14

NICK ON BOTTOM OF LOWER CORD L15 - 14

2 NICKS IN DIAGONAL L15 - V12

NICK IN BOTTOM OF TOP CORD L10 - V8

NICK IN BOTTOM OF H SECTION TOP OF FLOOR BEAM V6

NICK IN TOP OF H SECTION BOTTOM FLOOR BEAM V6

-----  
ADDITIONAL COMMENTS FROM OCTOBER 13-18, 1993 SNOOPER INSPECTION.

20  
4) DOWNSTREAM TRUSS AT L11 INSIDE GUSSET PLATE HAS LOSS OF SECTION  
18" LONG AND UP TO 3/16" DEEP (ORIGINAL THICKNESS = 1/2").

DOWNSTREAM TRUSS AT L13 THE LOWER HORIZ. BRACE BETWEEN THE TRUSSES  
HAS 3/16" SECTION LOSS AT RIVETED ANGLE.

TOP CORD OF UPSTREAM TRUSS JUST NO. OF NORTH RIVER PIER - POSSIBLE  
CRACKS IN WELD OF WEST BAFFLE GUSSET TO TOP FLANGE. CAN'T GET TO  
IT. CHECK AT NEXT IN DEPTH INSPECTION, POSSIBLE ULTRA-SONIC  
INSPECTION.

33) AT FLOOR TRUSS #11 AT STRINGER #11 THERE IS A CRACK IN THE WELD  
FROM THE BEARING BLOCK TO THE TOP FLANGE OF THE FLOOR TRUSS.

AT FLOOR BEAM U7 UPSTREAM SIDE DIAGONAL TO THE NORTH HAS EXCESSIVE  
PLAY & MOVEMENT AT UPPER PIN - PIN SHOWS LIGHT WEAR, 1/8" GAP.

FLOOR TRUSS #1 - COTTER PIN MISSING ON PIN HOLDING SWAY BRACE TO  
LOWER CHORD.

4TH FLOOR TRUSS FROM NORTH - COTTER PIN MISSING IN PIN CONNECTING THE BRACE TO THE BOTTOM CHORD OF THE FLOOR TRUSS.

FLOOR TRUSS OVER NORTH RIVER PIER - 4 BOLTS CONNECTING FLOOR BEAMS #'S 4 & 5 TO THE FLOOR TRUSS WERE MISSING AND REPLACE THIS SPRING DURING THE BRIDGE WASHING; 2 WITH 3/4" BOLTS AND 2 WITH 3/4" REDI-ROD. THE REDI-ROD SHOULD BE REPLACE WITH BOLTS.

97) AT (U5)(U10) WELD AT TOP FLANGE TO STRINGER BEARING BLOCK NEEDS CRACK GRIND OFF SOUTH SIDE. AT (5)(U11) WELDS AT BOTTOM FLANGE OF TOP CHORD OF FLOOR TRUSS #5 TO BEARING BLOCK TO TOP CHORD OF EAST MAIN TRUSS NEED CRACKS AT WELDS GRIND OUT.

CRACKED WELD AT BOTTOM FLANGE OF STRINGER #9 TO PINNED DIAGONAL BETWEEN FLOORTRUSSES #'S 8 & 9.

AT (5)(U3) 3 - 7/8" X 8" BOLTS MISSING FROM BEARING BLOCK.

96  
8) MULTI-GRIDGE AREA AT SO. END - CANT. HINGES ARE IN FULL EXPANSION AND NOT WORKING. GRIDGER ENDS ARE IN CONTACT.

PIER #4 - EXPANSION BEARINGS APPEAR TO BE FROZEN.

184  
18) DRAIN OVER HUNCH IS PLUGGED.

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Crew Number: 7627  
 Inspector: INSPECTOR

### Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 09-26-1994**

|                                       |  |  |
|---------------------------------------|--|--|
| County: HENNEPIN                      | Location: 1.0 MI NE OF JCT TH 94         | Length: 1,907.0 ft                         |
| City: MINNEAPOLIS                     | Route: I 35W Ref. Pt.: 018+00.538        | Deck Width: 113.3 ft (Varies)              |
| Township:                             | Control Section: 2783 Maint. Area: METRO | Rdwy. Area / Pct. Unsnd: 201,511 sq ft     |
| Section: 25 Township: 029N Range: 24W | Local Agency Bridge Nbr:                 | Paint Area / Pct. Unsnd: 490,200 sq ft 8 % |

Span Type: CSTL BEAM SPAN

NBI Deck: 6 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN

Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate:

Required Bridge Signs - Load Posting: NOT REQUIRED 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 |
|---|----------------------|-----|------------|------------|----------|----------|----------|----------|----------|
| 22  | LS O/L (CONC DECK)   | 2   | 09-26-1994 | 219,086 SF | 219,089  | 0        | 0        | 0        | 0        |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 300   | STRIP SEAL JOINT     | 2   | 09-26-1994 | 262 LF     | 262      | 0        | 0        | N/A      | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 301   | POURED DECK JOINT    | 2   | 09-26-1994 | 566 LF     | 566      | 0        | 0        | N/A      | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 321   | CONC APPROACH SLAB   | 2   | 09-26-1994 | 2 EA       | 2        | 0        | 0        | 0        | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 41) NORTH APPROACH SPANS PIERS HAVE BEEN PATCHED EXTENSIVELY WITH SHOT-CRETE - BUT OTHER AREAS ARE IN NEED OF PATCHING.   |                      |     |            |            |          |          |          |          |          |
| 333   | RAILING - OTHER      | 2   | 09-26-1994 | 5,630 LF   | 2,815    | 2,815    | 0        | N/A      | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 107   | PAINTED STEEL GIRDER | 2   | 09-26-1994 | 10,538 LF  | 8,430    | 2,108    | 0        | 0        | 0        |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 113   | PAINT STEEL STRINGER | 2   | 09-26-1994 | 14,900 LF  | 14,900   | 0        | 0        | 0        | 0        |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 131   | PAINT STL DECK TRUSS | 2   | 09-26-1994 | 2,128 LF   | 2,128    | 0        | 0        | 0        | 0        |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 152   | PAINT STL FLOORBEAM  | 2   | 09-26-1994 | 2,100 LF   | 2,100    | 0        | 0        | 0        | 0        |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 33) NO. END OF WEST TRUSS CONNECTION TO FLOOR BEAM EXTENSIVE CORROSION UNDER JOINT - NEEDS SPOT BLAST AND PAINT OR SEVERE CORROSION WILL RESULT WITHIN 5 YEARS (BY 1997). |                      |     |            |            |          |          |          |          |          |
| 311   | EXPANSION BEARING    | 2   | 09-26-1994 | 141 EA     | 141      | 0        | 0        | N/A      | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |
| 313   | FIXED BEARING        | 2   | 09-26-1994 | 41 EA      | 41       | 0        | 0        | N/A      | N/A      |
| Notes:  |                      |     |            |            |          |          |          |          |          |

Crew Number: 7627

Inspector: INSPECTOR

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 09-26-1994**

|   |                     |   |            |        |     |   |   |     |     |
|---|---------------------|---|------------|--------|-----|---|---|-----|-----|
| 205   | CONCRETE COLUMN     | 2 | 09-26-1994 | 42 EA  | 42  | 0 | 0 | 0   | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 58) PIER 7 (FIXED PIER ON NO. EDGE OF RIVER) WEST COLUMN IS CRACKED VERTICALLY THROUGH COLUMN |                     |   |            |        |     |   |   |     |     |
| 210   | CONCRETE PIER WALL  | 2 | 09-26-1994 | 168 LF | 168 | 0 | 0 | 0   | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 215   | CONCRETE ABUTMENT   | 2 | 09-26-1994 | 245 LF | 245 | 0 | 0 | 0   | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 62) SO. ABUT. BRIDGE SEAT CRACKED & DISCOLORED  |                     |   |            |        |     |   |   |     |     |
| 234   | CONCRETE CAP        | 2 | 09-26-1994 | 964 LF | 964 | 0 | 0 | 0   | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 356   | FATIGUE CRACKING    | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 358   | CONC DECK CRACKING  | 2 | 09-26-1994 | 1 EA   | 0   | 1 | 0 | 0   | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 359   | CONC DECK UNDERSIDE | 2 | 09-26-1994 | 1 EA   | 0   | 1 | 0 | 0   | 0   |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 360   | SETTLEMENT          | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 361   | SCOUR               | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 362   | TRAFFIC IMPACT      | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 981   | SIGNING             | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | 0   | 0   |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 982   | GUARDRAIL           | 2 | 09-26-1994 | 1 EA   | 0   | 1 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 984   | DRAINAGE            | 2 | 09-26-1994 | 1 EA   | 0   | 1 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 985   | SLOPES              | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |
| 986   | CURB & SIDEWALK     | 2 | 09-26-1994 | 1 EA   | 1   | 0 | 0 | N/A | N/A |
| Notes:  |                     |   |            |        |     |   |   |     |     |

02/28/2008

Crew Number: 7627

# Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

**BRIDGE 9340**

**I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 09-26-1994**

General Notes: \* SNOOPER INSPECTION 9/21/1991 PAINT IS 20% UNSOUND.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date



**REPORT**  
**of the**  
**1994 ANNUAL**  
**FRACTURE CRITICAL INSPECTION**  
**for the**  
**BRIDGE NO. 9340**  
**I-35W over the Mississippi River,**  
**2nd Street & Railroad**  
**performed**  
**September 28 - 29, 1994**

BRIDGE 9340: I 35W Over Railroad, Mississippi River, 2nd Street.

ANNUAL FRACTURE CRITICAL BRIDGE INSPECTION: Sept. 26 - 29, 1994

Inspection By: Terry Moravec  
Kurt Fuhrman  
Pete Wilson

Report Prepared By: Kurt Fuhrman

Reviewed & Edited By: Terry Moravec, P.E. - Dated: Feb. 22, '95

RECOMMENDATIONS:

- Repair of the hinged joint in Span #2, allowing expansion.
- Replacement of broken and/or bolts connection stringers to floorbeams.

| Locations: | Direction | Span | Panel Point |
|------------|-----------|------|-------------|
|            | No. B'nd. | 6    | U8          |
|            |           | 7    | U8'         |
|            |           | 8    | U6' & U5'   |
|            | So. B'nd. | 8    | U6' & U8'   |
|            |           | 7    | U11         |
- Replace bolts in connection between Girder #3 and the Floorbeam in Span #9, South Bound.
- Replace the finger joints with modular joins and rework the deck drains to make them operable.
- Rebuild the copings, both at the outboard edges and at the median. Seal the median and replace the median railing with "J - barrier".
- Paint the bridge. This will require a complete cleaning of the pigeon droppings from the interior of the box beams, after which the openings in these members should be screened. Between cleaning and painting an "In-Depth" inspection should be performed and all cracked tack-welds ground out.
- Replace W 5/3 L light pole located South Bound, Span #7, Panel Point U10'.
- Replace cotter pin in the lower connection pin of the vertical brace at Panel Point U1 in Span #6 (over Pier #5).

**GENERAL NOTES:**

**DESCRIPTION:** The south approach spans have 14 steel beams, (span 1 - span 5). The truss is numbered south to north (floor truss), west to east (stringer), (span 6 - span 8). The north approach spans widen to accommodate on and off ramps to University Avenue. (15 - 18 steel beams, span 9 - span 11) and (span 12 - span 14, are voided deck slab).

**SUPERSTRUCTURE:**

**GIRDERS:** The paint may be chalking, some peeling and a moderate amount of surface rust.

**DECK TRUSS:** The paint is covered with pigeon manure, a major amount of surface rust, with section loss, pitting and pack rust.

**FLOOR BEAM TRUSS:** The paint is covered with pigeon manure, a moderate amount of surface rust, with section loss, pitting and pack rust.

**STRINGERS:** The paint may be chalking, and a moderate amount of surface rust.

**BEARING ASSEMBLIES:** Corrosion on most bearing, some debris buildup.

**SUBSTRUCTURE:**

**ABUTMENTS:** Minor cracks, concrete is discolored.

**PIERS:** The north approach span piers have had shot-crete applied to repair spalled areas. Vertical crack through west column at pier 7.

**BRIDGE DECK:**

**CONCRETE DECK, SPAN 1 - SPAN 11:** Full depth deck repairs, 10% of the deck are visible underneath. Most of the coping has the bottom mat of rebar exposed in the median, random at the outside railing.

**CONCRETE SLAB, SPAN 12 - SPAN 14:** Most of the coping, some of the slab underneath is spalled with exposed rebar.

**WEARING SURFACE:** Minor concrete spalls at expansion joints.

**EXPANSION JOINTS:** Three finger joints, several strip seal joints.

**RAILING:** Concrete railing is delaminated, spalls with exposed rebar at most post locations. Conduit under metal railing, east side.

**OTHER ELEMENTS:**

**APPROACH PANELS:** Some relief joints need to be cut and resealed. One transverse crack in each panel, minor spalling at the ends next to the joints.

**CHANNEL AND PROTECTION:**

**SIGNING:** Hazard markers missing, south end.

**GUARDRAIL:** Plate beam guardrail at the median, length of bridge. Minor traffic impact to plate beam guardrail, (1 post broken, SE quadrant) expansion plate damage at end block, right lane both directions, south end.

**DRAINAGE:** Deck drains and downspouts are plugged.

**SLOPE PROTECTION:** Concrete panels at each abutment.

**CURB AND WALK:** Concrete curb along the outside railing is delaminated, with some scaling and spalling.

**MISCELLANEOUS:** Rail mounted overhead signs and lighting. One impact attenuator, north bound, at exit ramp to University Avenue. Navigation and under deck lighting. Parking lots under bridge, span 1 - span 4, span 11 - span 13 . Stock piling sand under span 8.

**SPECIFIC DEFICIENCIES:**

**INSPECTION IN THE NORTH BOUND LANE**

**SOUTH ABUTMENT:** Bridge seat cracked and discolored. Bearing plates #1, #2, #3 and #4 are rusted, west side. Expansion bearing assemblies.

**SPAN 1:**

**PIER 1:** Four concrete columns and cap, lower strut between columns except in median area. Ten fixed and four expansion bearing assemblies.

**SPAN 2:** Typical at this expansion joint. See picture #1, #2, #3, #4. The hinged expansion bearings are inoperative. They have expanded beyond their design limit and are unable to move apart. The ends of the beams are in contact allowing no additional expansion. These two situations combine with the result of a completely frozen joint.

The web depth of the steel multi beams (33") increase to (48") up to the truss at the hinge. Hinge 12' south of pier 2. Fourteen expansion bearing assemblies @ hinge. The bottom flange on all beams have severe corrosion, because of the finger joint in the deck above the hinge.

**PIER 2:** Four concrete columns and cap, lower strut between columns except in median area. Expansion bearings.

**SPAN 3:**

**PIER 3:** Four concrete columns and cap. Ten fixed and four expansion bearing assemblies.

**SPAN 4:**

**PIER 4:** Four concrete columns and cap. Expansion bearings.

**SPAN 5:** First 71' steel multi-beam, last 38' deck truss. Repair work at the north floor beam, end of the steel multi-beam span, south end of the bridge. See picture #5. Two corroded rocker bearings support the multi beam span on to the truss. Patches in the overlay at the finger joint.

#### BEGINNING OF DECK TRUSS

**PANEL POINT U0:** Finger joint in the deck. Floor beam rusty. Rusty gusset plate, deck truss #2. See picture #6.

**PANEL POINT U1, PIER 5:** Picture of the moveable bearing, deck truss #2. See picture #7. Picture of the floor beam truss. See picture #8.

The pier has two concrete columns, with upper strut. Downspout from the deck drain at U0.

**SPAN 6:**

**PANEL POINT U2:**

**PANEL POINT U3:** Center floor truss, bad weld, undercut in flange.

**PANEL POINT U4:** Floor truss, top chord, tack weld cracked. Strip seal joint in the deck.

**PANEL POINT U5:** Tack weld cracked, floor truss, top chord.

**PANEL POINT U6:** Top flange of upper floor beam truss and stringer #10, cracked tack weld at gusset plate. See picture #9.

**PANEL POINT U7:**

**PANEL POINT U8, PIER 6:** Stringer #10 and upper floor beam truss, bolt missing. See picture #10. Bolt broken off, upper floor beam truss and stringer #11. See picture #11. Bolt broken off, upper floor beam truss and stringer #13, and the block rotated. See picture #12.

This pier has a concrete pier wall base, with two columns in the Mississippi river. It has rusty expansion bearing assemblies. Strip seal joint in the deck. Drain downspout, may be plugged.

**SPAN 7:**

**PANEL POINT U9:**

**PANEL POINT U10:** Navigation light (blue).

**PANEL POINT U11:** Section loss at gusset plate, bottom chord, truss #2.

**PANEL POINT U12:** Floor truss, top chord at center has plate welded to bottom flange, longitudinal.

**PANEL POINT U13:** Section loss at gusset plate, bottom chord, truss #2. Floor truss, top chord at center, there is a four way diagonal member that are welded transverse to the bottom flange.

**PANEL POINT U14:** Strip seal joint in the deck. Sway frame rusty. Pictures of chipped concrete coping at the median (midspan). See picture #13, #14.

**PANEL POINT U13' (15):** Bad detail, 2" - 2 1/2" tack welds in maximum tension area, floor beam truss over the main truss. See picture #15, interior #16, exterior. (typical)

**PANEL POINT U12' (16):** Top and bottom chord of floor beam truss rusty in median area.

**PANEL POINT U11' (17):** Floor truss, at top of chord, center diagonal stiffener plate has a weld transverse to the bottom flange. Top and bottom chord of floor beam truss rusty in median area.

**PANEL POINT U10' (18):** Floor truss, at top of chord, center diagonal stiffener plate has a weld transverse to the bottom flange.

W 5/3 L light pole, traffic impact (wing), split seam vertical 6 inches.

**PANEL POINT U9' (19):** Floor truss, at top of chord, center diagonal stiffener plate has a weld transverse to the bottom flange. Deck drains, has rusted sway frame.

**PANEL POINT U8' (20), PIER 7:** Condition of the paint under the median, bottom chord of floor beam truss, over pier. See picture #17. Strip seal in the deck. Floor truss, at top of chord, center diagonal stiffener plate has a weld transverse to the bottom flange. Severe rust on floor beam truss at the median. Redi-rod installed to replace broken bolts, stringer #11 and upper floor beam truss, missing nut and washer. See picture #18. Redi-rod installed to replace broken bolts, stringer #10 and upper floor beam truss. See picture #19.

This pier has a concrete pier wall base, with two columns in the Mississippi river. It has fixed bearing assemblies. Red navigation light.

**SPAN 8:** Condition of the paint under the median, top chord of the floor truss to diagonal bracing connection. (typical) See picture #20.

**PANEL POINT U7' (21):** Floor truss top chord at center plate to diagonals has a transverse tack weld to bottom flange.

**PANEL POINT U6' (22):** Heavy rust on floor truss with loss of section on top and bottom chord at median and plate to diagonal. Condition of paint, (typical) See picture #21. Bolt from stringer #11 to top chord of floor truss are working. Looks like they are near failure. See picture #22.

**PANEL POINT U5' (23):** Floor truss top chord, stringer #8, bolt head broke off at bearing and weld at diagonal plate to bottom flange transverse. Heavy rust on floor truss at the median.

**PANEL POINT U4' (24):** Heavy rust on floor truss, and sway frame at the median. Strip seal joint in the deck.

**PANEL POINT U3' (25):** Incomplete weld, reinforcement plate to the top flange of the floor truss, stringer #11. See picture #23.

**PANEL POINT U2' (26):** Overhead sign, full width of bridge.

**PANEL POINT U1' (27), PIER 8:** Pin rotating in east vertical, angle brace connection to the bottom chord of floor truss. See picture #24.

The pier has two concrete columns, with upper strut, moveable bearings. Concrete repair to the base of columns, increased the diameter by 1 foot. Drain downspout from U0' (28).

**SPAN 9:** First 38' deck truss, last 130' steel multi-beam, (15 beam). There are four train tracks under this span.

**PANEL POINT U0' (28):** Two rocker bearings support the multi beam span on to the truss. Finger joint in the deck.

#### END OF DECK TRUSS

Pictures of floor beam and girder #12 connection, the rocker at the end of truss #2 underneath, (fatigue crack with ends drilled out). See picture #25, #26, #27.

**PIER 9:** This pier has 4 columns with lower strut (except in the median) and cap. Thirteen fixed and four expansion bearing assemblies.

**SPAN 10:** This span has 17 beams.

**PIER 10:** This pier has 5 columns with lower strut (except in the median) and cap. Eighteen expansion bearing assemblies.

**SPAN 11:** This span has 18 beams.

**PIER 11:** This pier has 6 columns and cap. The cap has been repaired with shot-crete. 10 SF spalled and exposed rebar, east side of cap. Eighteen expansion bearing assemblies (steel multi-beam, south side). Fifteen expansion bearing assemblies (slab span, north side). Strip seal in the deck.

**SPAN 12:** Concrete deck slab span. Delaminated, spalled with exposed rebar in median and outside coping.

**PIER 12:** This pier has 6 columns, with no cap. (The deck thickness increases by 1 foot for about 6 feet, where a pier cap normally is.) No bearing assemblies, pier poured with the deck.

**SPAN 13:** Concrete deck slab span. Delaminated, spalled with exposed rebar in median and outside coping. 100 SF of spalled concrete with exposed rebar, bottom of slab span.

**PIER 13:** This pier has 6 columns, with no cap. (The deck thickness increases by 1 foot for about 6 feet, where a pier cap normally is.) No bearing assemblies, pier poured with the deck.

**SPAN 14:** Concrete deck slab span. Delaminated, spalled with exposed rebar in median and outside coping. The light cover for a fixture is broken. Sidewalk along north side of roadway underneath.

**NORTH ABUTMENT:** Fourteen expansion bearing assemblies. Strip seal in the deck.

Concrete approach panel, with 24 LF transverse crack.

-----  
**INSPECTION IN THE SOUTH BOUND LANE**

**NORTH ABUTMENT:** Strip seal in the deck.

**SPAN 14:** Continuous voided slab. Concrete slope paving underneath.

**PIER 13:**

**SPAN 13:** Continuous voided slab. Roadway underneath the bridge.

**PIER 12:**

**SPAN 12:** Continuous voided slab. Metal Matic Inc. uses this area under the bridge for a parking lot. (personnel and commercial vehicles)

**PIER 11:** Strip seal in the deck.

**SPAN 11:** Metal Matic Inc. uses this area under the bridge for a parking lot. (personnel and commercial vehicles)

**PIER 10:**

**SPAN 10:** Train tracks to businesses, 2 tracks switches down to one track. (C.G.W. Railway Co.)

**PIER 9:**

**SPAN 9:** 4 train tracks. (C&N.W. Railway Co.) Retaining wall.

Girder #3 and the connection to the floor beam, joint working. Rocker on truss #1 below. See picture #28.

**BEGINNING OF DECK TRUSS**

**PANEL POINT U0' (28):** Finger joint in the deck.

**PANEL POINT U1' (27), PIER 8:** Floor beam truss rusty in the median. Stringer #8, top flange rusty.

Paint is scraped at the expansion bearing assembly, truss #1 (moving).

**SPAN 8:**

**PANEL POINT U2' (26):** Floor beam truss, and sway frame rusty in the median.

**PANEL POINT U3' (25):** Ugly weld at stringer #11 and the top chord of the floor beam truss. See picture #29.

**PANEL POINT U4' (24):** Rotating pin in vertical brace (U10 - L10) of the floor beam truss. See picture #30. Strip seal joint in the deck.

**PANEL POINT U5' (23):** Picture of the paint condition, bottom chord (L7 - L10) of the floor beam truss. See picture #31.

**PANEL POINT U6' (22):** Bolt missing, top chord floor beam truss, stringer #4, plug welds also. See picture #32. General view of sway frame, looking north. See picture #33. Deck truss #1, top chord, 2 rough tack welds, north of U6' (22).

**PANEL POINT U7' (21):** Floor truss rusty in median. Stringer #2; top flange rusty. L7' - U7' vertical, (bad cutout, old paint)

**PANEL POINT U8' (20), PIER 7:** Strip seal joint in the deck. Stringer #4 and upper floor beam truss, broken bolt. See picture #34, #35. Under stringer #2, diagonal brace bent, floor beam truss. On sway frame gusset plates, some rivets are rusty.

**SPAN 7:** 905 LF transverse cracks with efflorescence. Deck drain, both sides U8' - U9'

**PANEL POINT U9' (19):** Sway frame and gusset plate connection, some rivets rusty in the median area. View south under median. See picture #36.

**PANEL POINT U10' (18):** Loose bolt, stringer #2, top chord, floor beam truss (probably never tight). See picture #37.

U18 - U17 (Top Chord) Six inch nicks on exterior, 15' south of U18, truss #1.

**PANEL POINT U11' (17):** Typical views of underside of the deck. See picture #38, #39.

L17 - L16 (Bottom Chord) Nick in bottom chord, truss #1.

**PANEL POINT U12' (16):**

U16 - L15 (Diagonal) Nicks on diagonal, 1 inside, 2 outside.

L16 - L15 (Bottom Chord) Nick in bottom chord, truss #1.

**PANEL POINT U13' (15):** Looking west at downtown Minneapolis. See picture #40.

**PANEL POINT U14:** Stringer #4 top flange rusty. Bad welds at gusset plate and truss #1 bottom chord. Deck drains both sides. Strip seal joint in the deck.

**PANEL POINT U13:** Pack rust at connection, bottom chord truss #1 and sway frame. (rusty rivets, gusset plate).

**PANEL POINT U12:** Bottom chord, floor beam truss rusty in the median.

**PANEL POINT U11:** Bolt broken, stringer #4 (north side). See picture #41. Two bolts broken, stringer #4 (south side). See picture #42. Stringer #4 (south side) has lifted approximately 3/32". See picture #43.

**PANEL POINT U10:** Rusty bottom chord of floor beam truss in median area.

U10 - U9 (Top Chord) 2 spots ground out, truss #1.

**PANEL POINT U9:**

L9 - U8 (Diagonal) One spot ground out, truss #1.

**PANEL POINT U8, PIER 6:** Deck drains both sides, downspout east side. The sway frame is rusty at the two connection points in the median area. Strip seal joint in the deck.

**SPAN 6:** 510 LF transverse cracks with efflorescence.

**PANEL POINT U7:** Pin rotating, vertical brace at the bottom chord of the floor beam truss (U7 - L7). See picture #44.

**PANEL POINT U6:** Gouges from construction, top flange of floor beam truss (U5 - U4). See picture #45. Overhead sign. Three ground out spots on the lower chord floor beam truss.

**PANEL POINT U5:**

**PANEL POINT U4:** Strip seal joint in the deck. Conduit broke at light pole.

**PANEL POINT U3:**

Nick on bottom chord L2 - L3. [1994]

**PANEL POINT U2:**

**PANEL POINT U1, PIER 5:** Cotter pin missing, vertical brace, lower connection to the bottom chord of the floor truss. See picture #46. Downspout from the deck drain at U0.

**PANEL POINT U0:** Finger joint in the deck, some patches in the overlay. Slope paving between U0 and U1.

#### END OF DECK TRUSS

**SPAN 5:** Picture of rocker bearing, on deck truss #1 and the floor beam of the steel multi-span section. See picture #47. Picture of the multi-beams that tie into the floor beam. See picture #48.

**PIER 4:**

**SPAN 4:**

**PIER 3:**

**SPAN 3:**

**PIER 2:**

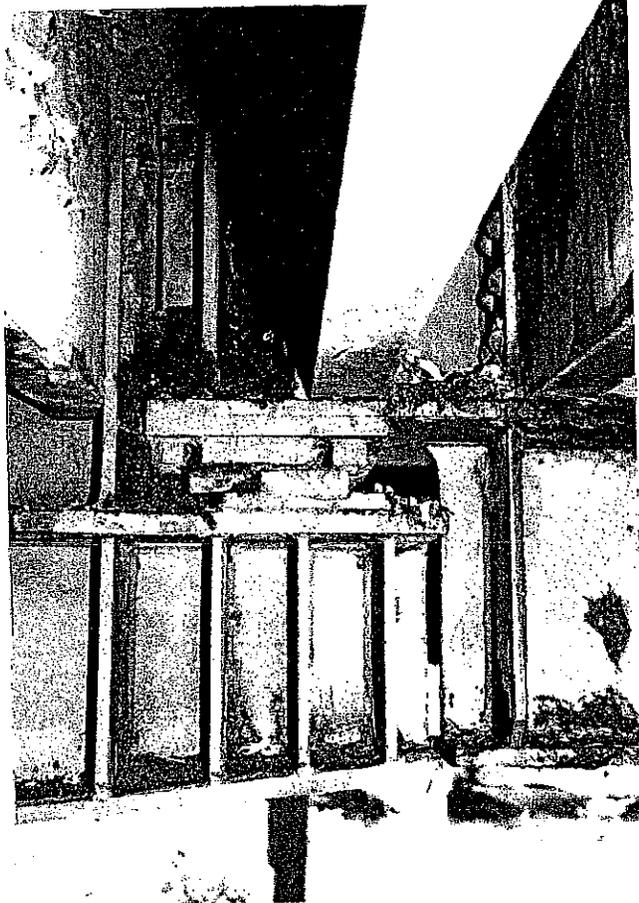
**SPAN 2:** Hinge 12' south of pier #2. The bottom flange of beams #1, #5 were tight. At beam #5, see picture #49. Picture #50, below finger joint at beam #5. At hinge and beam #4, picture of the debris. See picture #51. At hinge and beam #1, outside coping west side, see picture #52. 10 SF of spall in overlay at the finger joint. Expansion plate missing, both sides of south bound.

**PIER 1:**

**SPAN 1:** Concrete slope paving underneath.

**SOUTH ABUTMENT:**

South approach panel is concrete, with one transverse crack in it. Relief joint needs resealing.



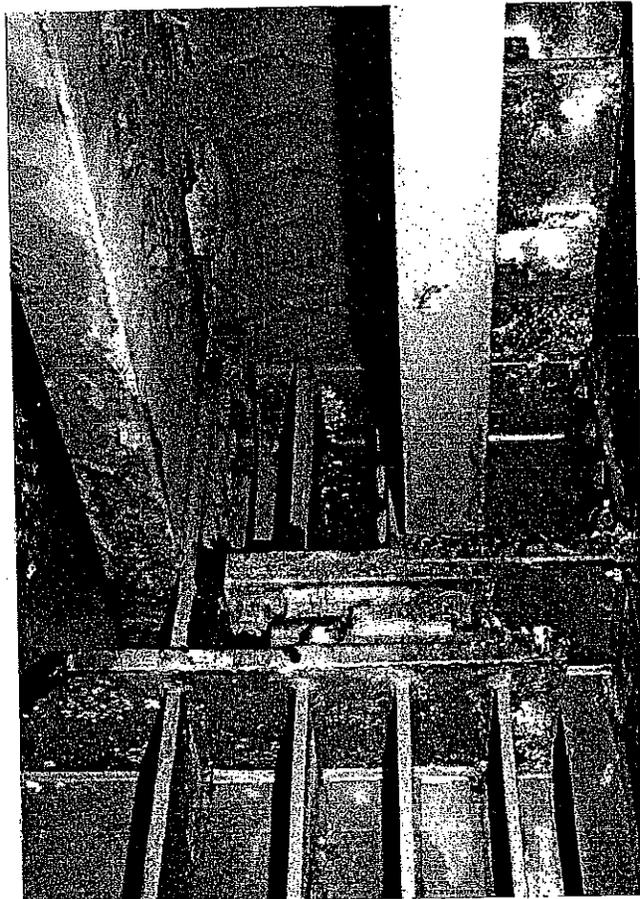
Picture #1  
Hinge @ Span #2  
No. B'nd.



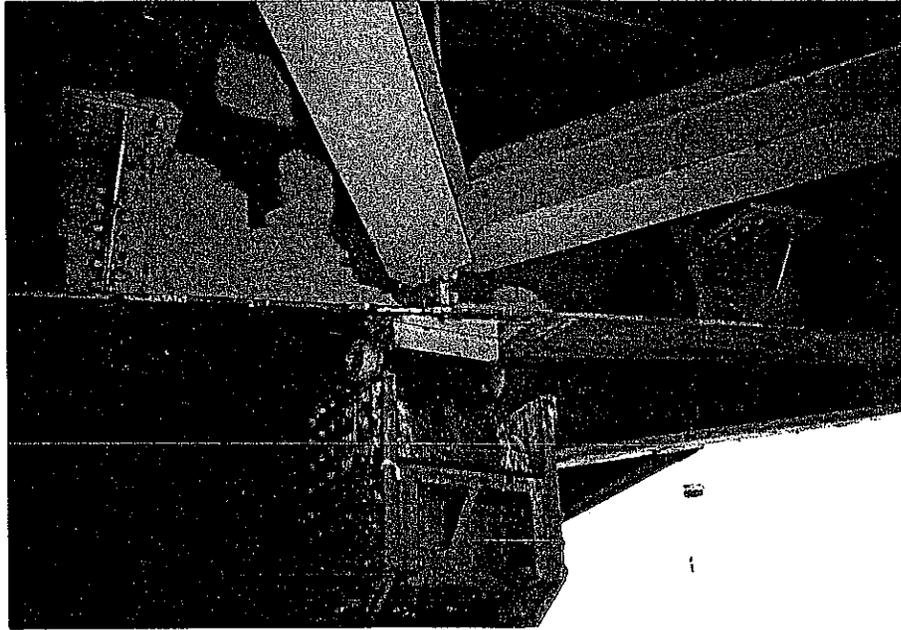
Picture #2  
Hinge @ Span #2  
No. B'nd.



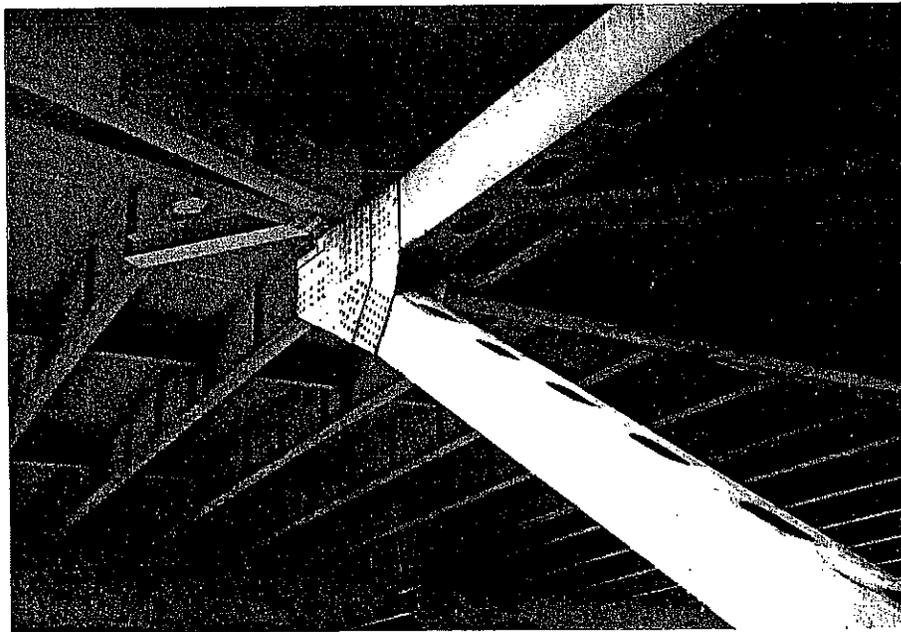
Picture #3  
Hinge @ Span #2  
No. B'nd.



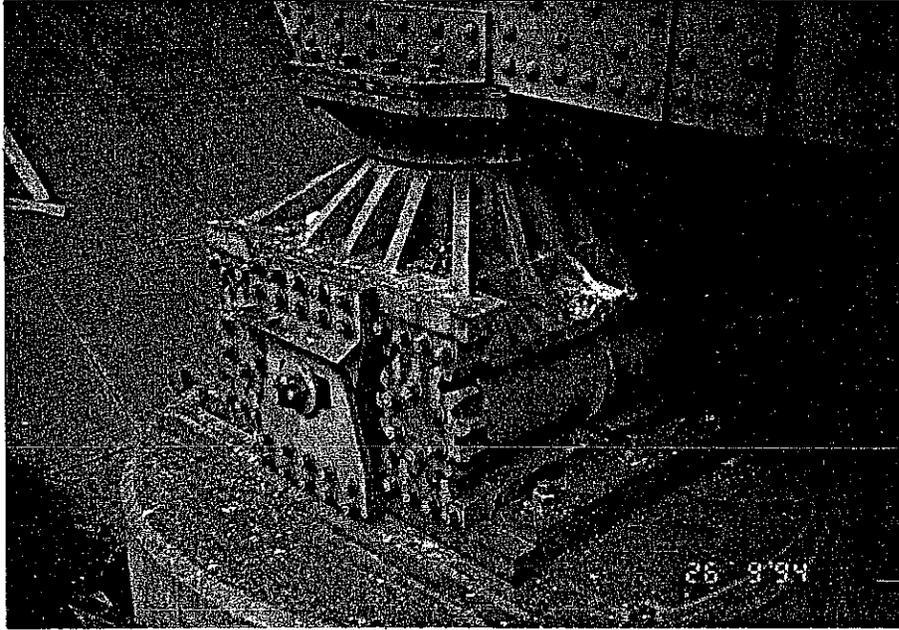
Picture #4  
Hinge @ Span #2  
No. B'nd.



Picture #5  
Repair to Floorbeam @ End of Multi-Beam Span  
No. B'nd., Span #5, Deck Truss #2



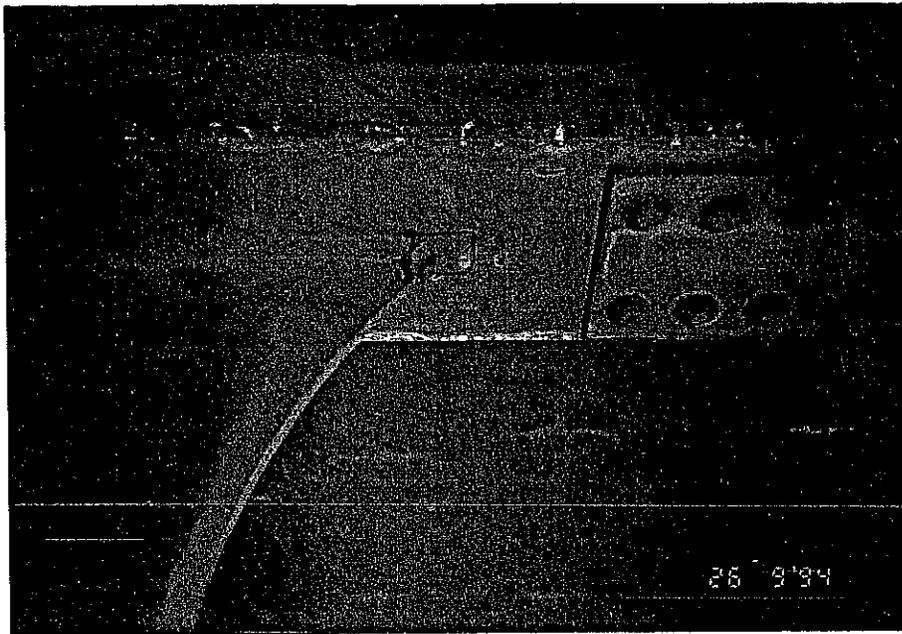
Picture #6  
Deck Truss #2  
Span #4, P/P-U0, No. B'nd.



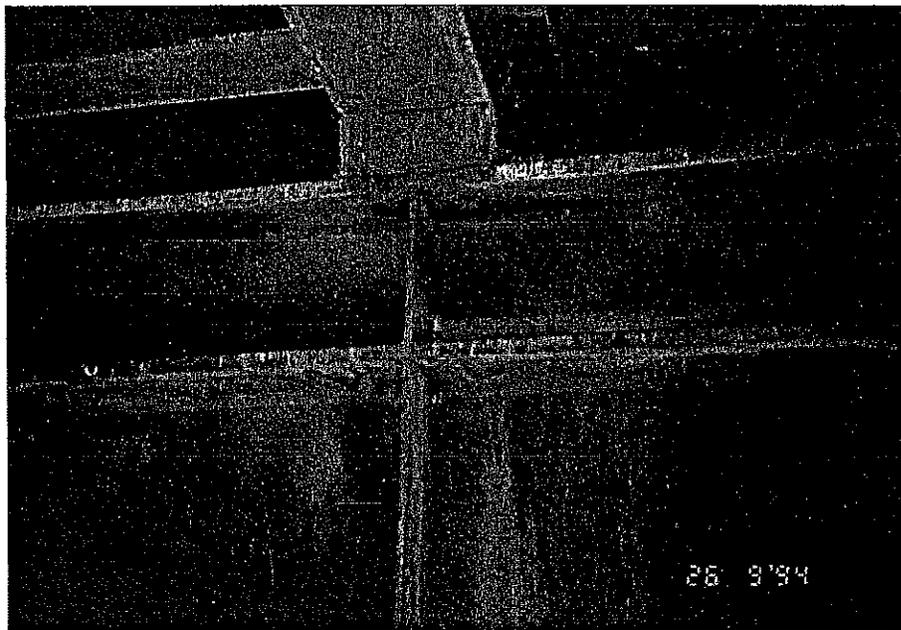
Picture #7  
Expansion Bearing  
Pier #3, No. B'nd.



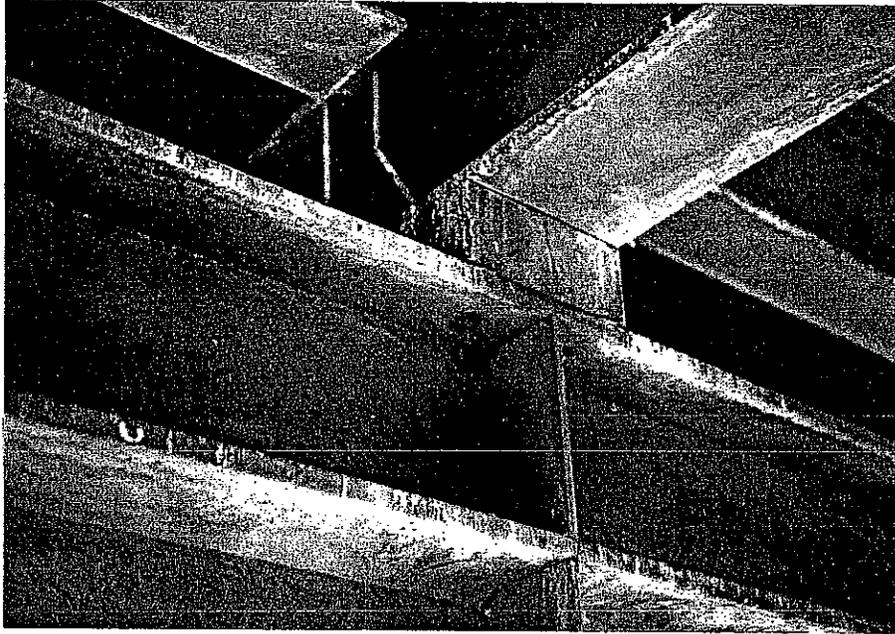
Picture #8  
Floor Beam Truss #1  
Span #5, P/P-U1  
No. B'nd.



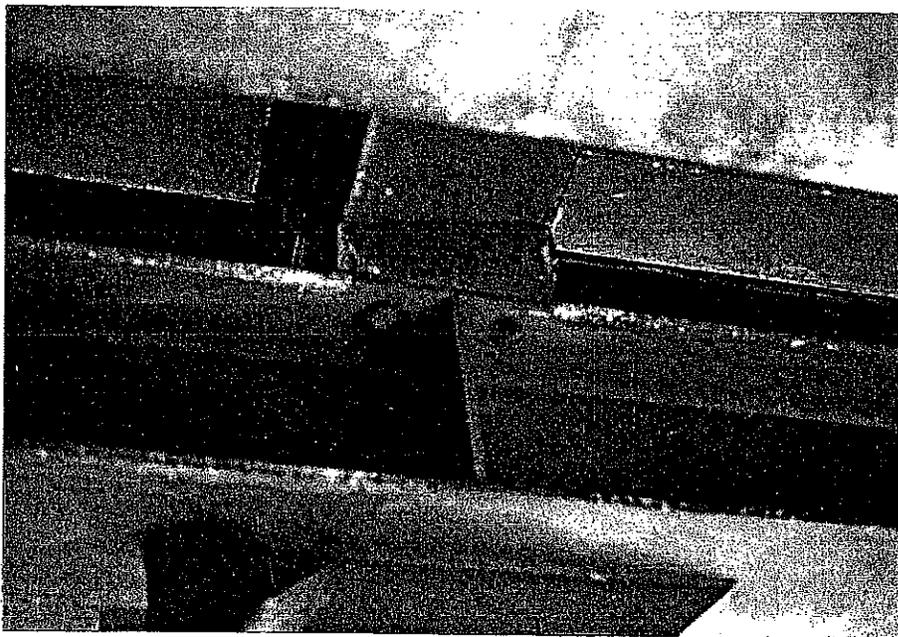
Picture #9  
Cracked Weld  
Span #6, P/P-6, B'nd.



Picture #10  
Missing Bolt @ Stringer #10  
Span #6, P/P-U8, No. B'nd.



Picture #11  
Missing Bolt @ Stringer #11  
Span #6, P/P-U8, No. B'nd.



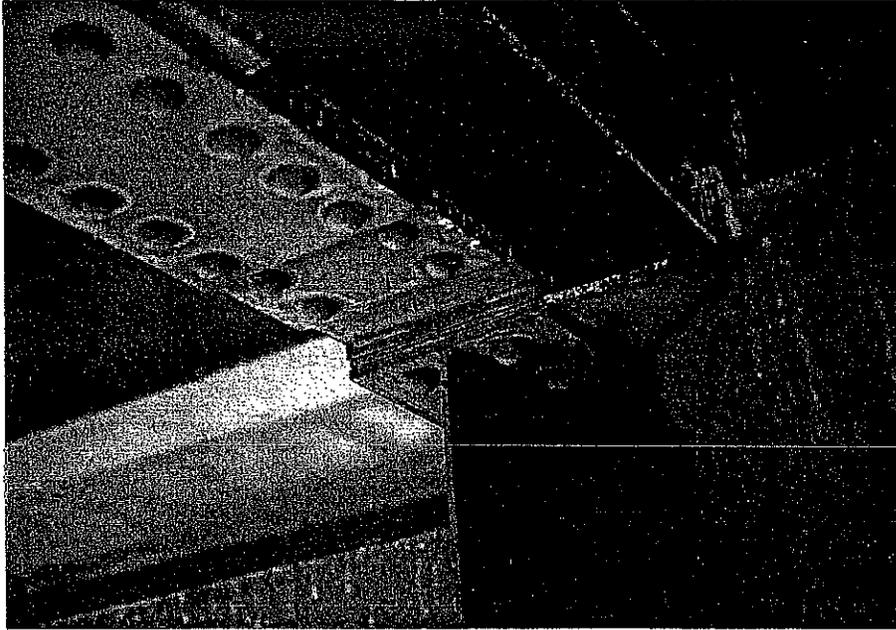
Picture #12  
Missing Bolt @ Stringer #13  
Span #6, P/P-U8, No. B'nd.



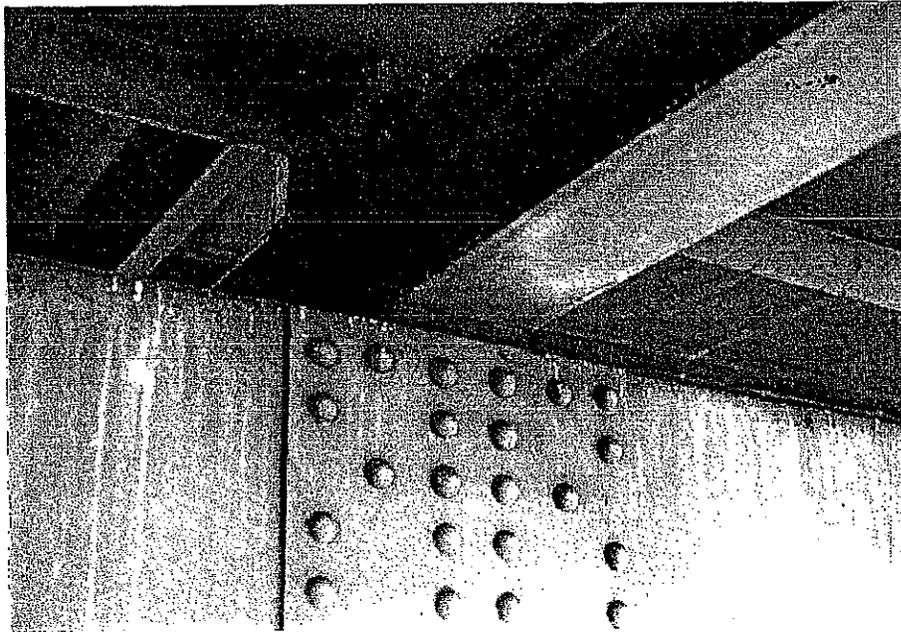
Picture #13  
Chipped Concrete - Underside of Deck @ Median  
Span #7, P/P-U14 (midspan), No. B'nd.



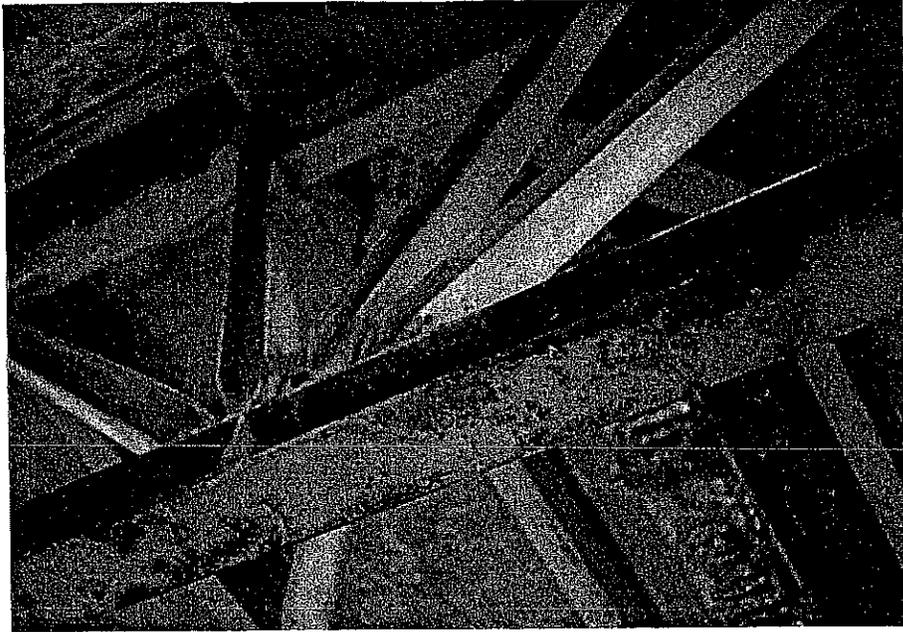
Picture #14  
Chipped Concrete - Underside of Deck @ Median  
Span #7, P/P-U14 (midspan), No. B'nd.



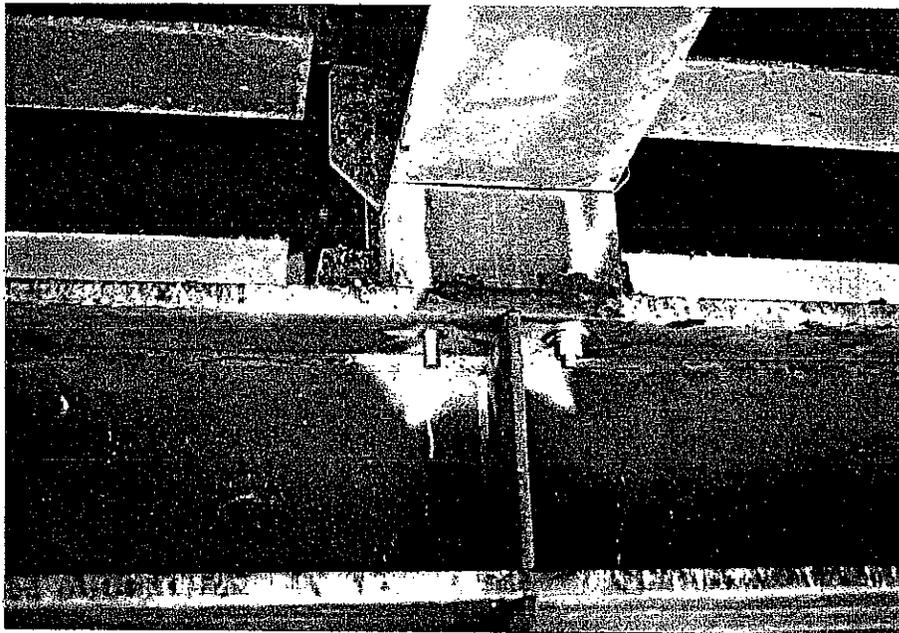
Picture #15  
Bad Detail - 2" to 2 1/2" Tack Welds  
Max. Tension in Floor Truss over Deck Truss  
Span #7, P/P-U13', No. B'nd.



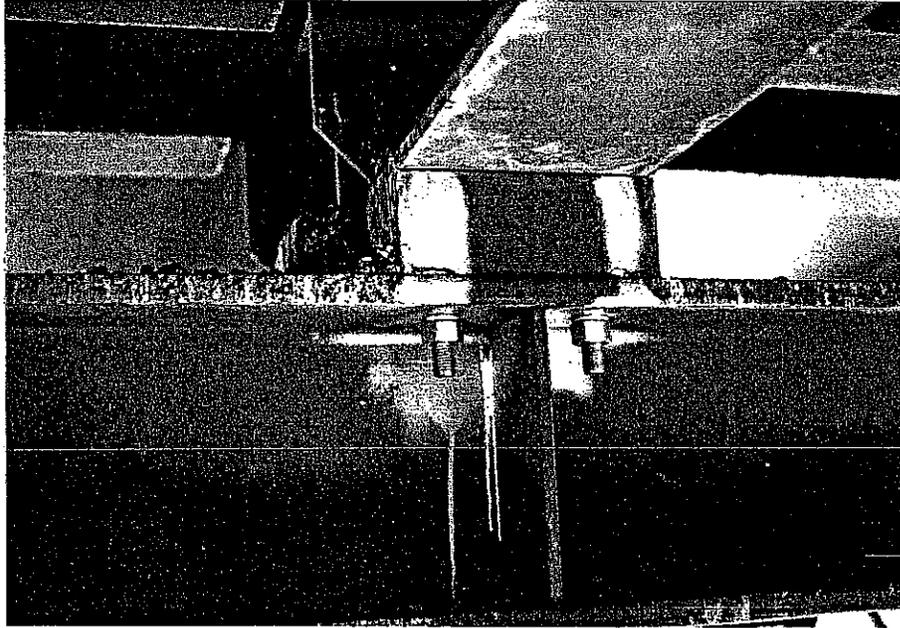
Picture #16  
Bad Detail - 2" to 2 1/2" Tack Welds  
Max. Tension in Floor Truss over Deck Truss  
Span #7, P/P-U13', No. B'nd.



Picture #17  
Condition of Paint on Floor Truss  
Span #7, P/P-U8', No. B'nd.



Picture #18  
Broken Bolts Repaired with Red-Rod, Nut Missing  
Stringer #11, Span #8, P/P-U8', No. B'nd.



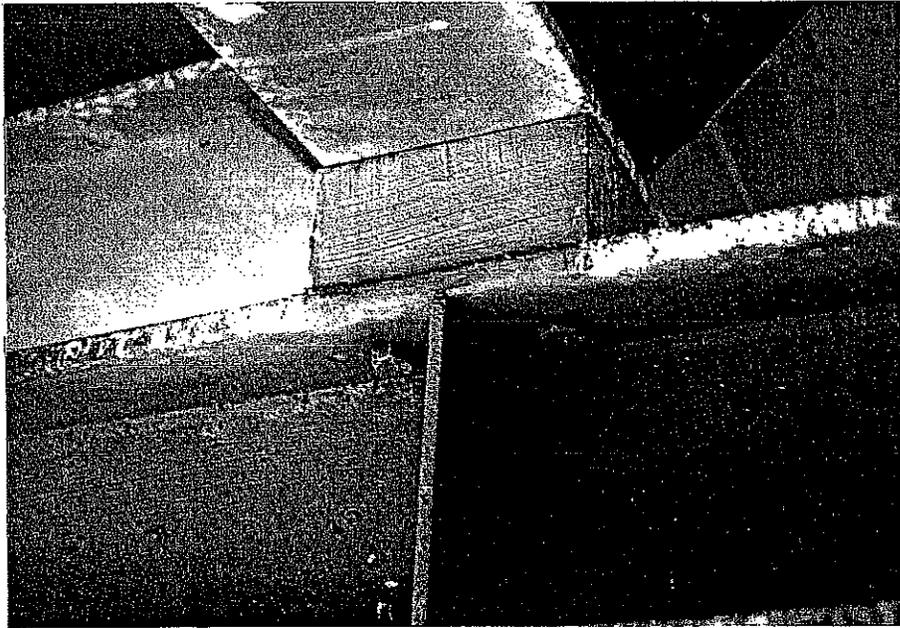
Picture #19  
Broken Bolts Repaired with Red-Rod  
Stringer #10, Span #8, P/P-U8', No. B'nd.



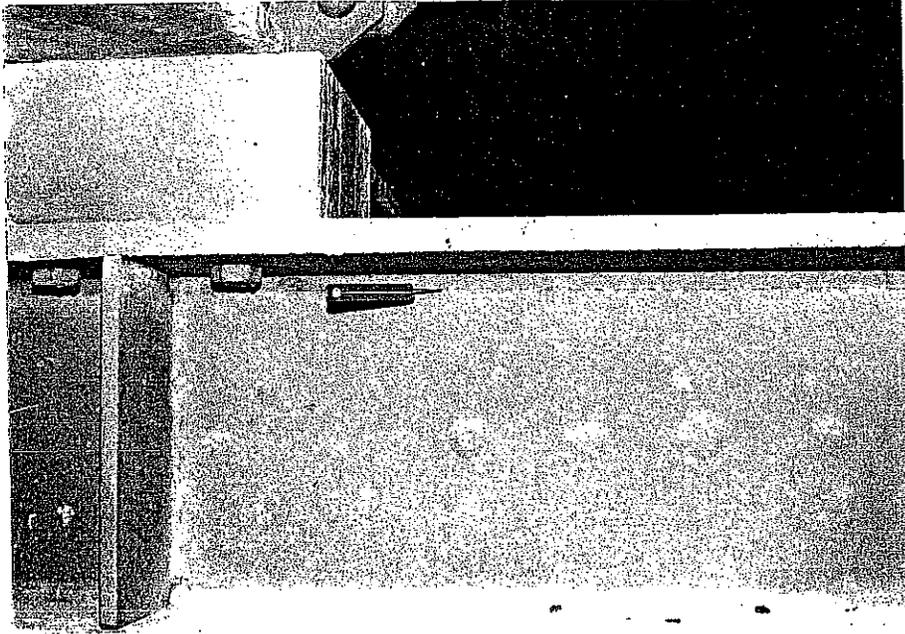
Picture #20  
Typical Condition of Paint Under Median  
Top Chord of Floor Truss to Diagonal Bracing Connection  
Span #8, No. B'nd.



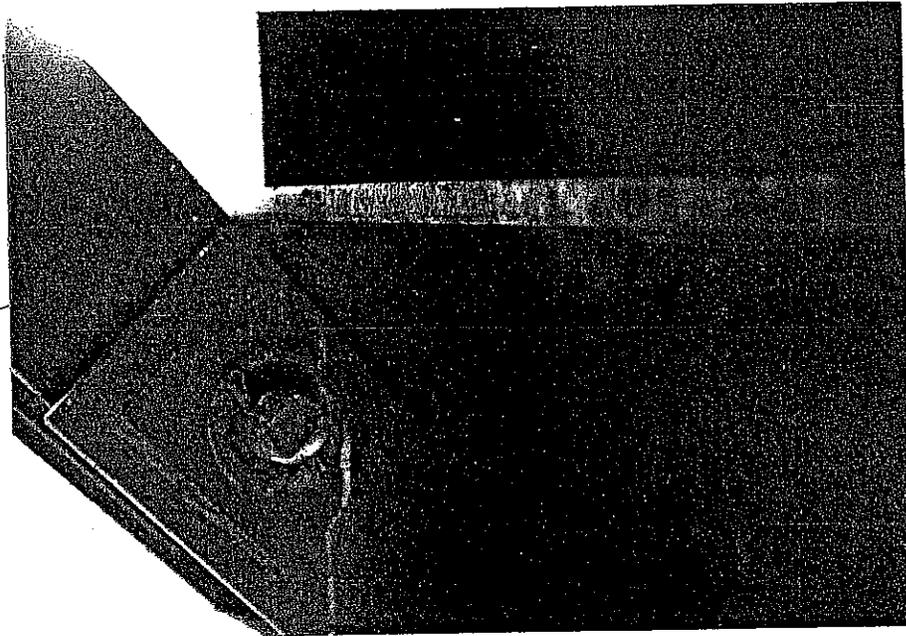
Picture #21  
Heavy Rust on Bottom Chord of Floor Truss Under Median  
Span #8, P/P-U6', No. B'nd.



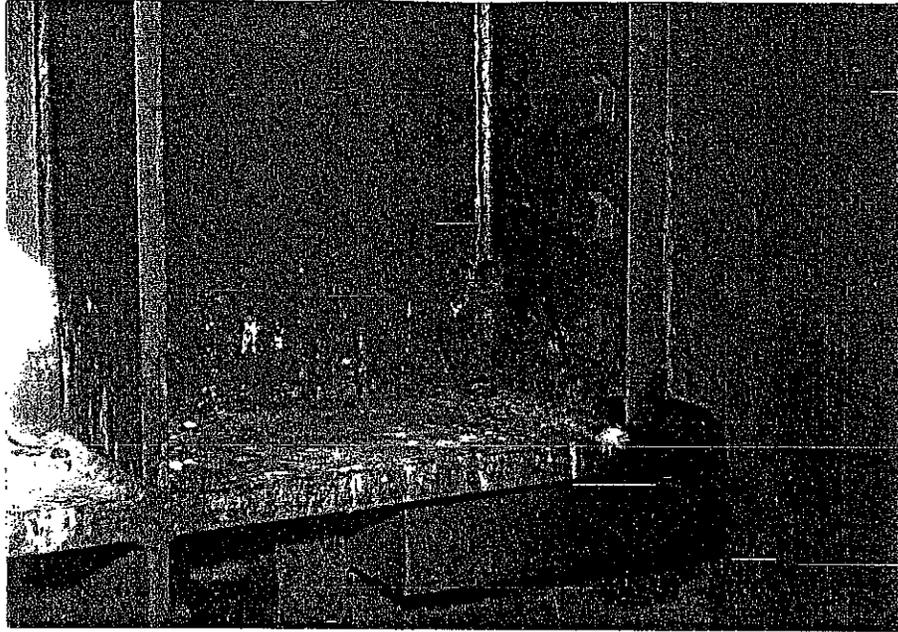
Picture #22  
Bolts Working - Probably Near Failure  
Stringer #11 to Floor Truss Connection  
Span #8, P/P-U6', No. B'nd.



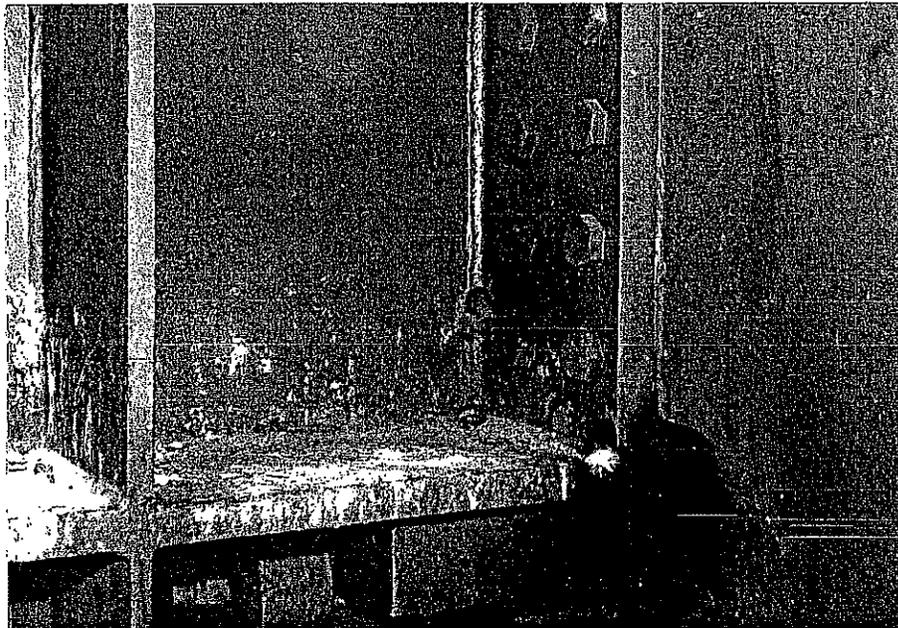
Picture #23  
Incomplete Weld of Reinforcement Plate to Top Flange  
Floor Truss - Span #8, P/P-U3', No. B'nd.



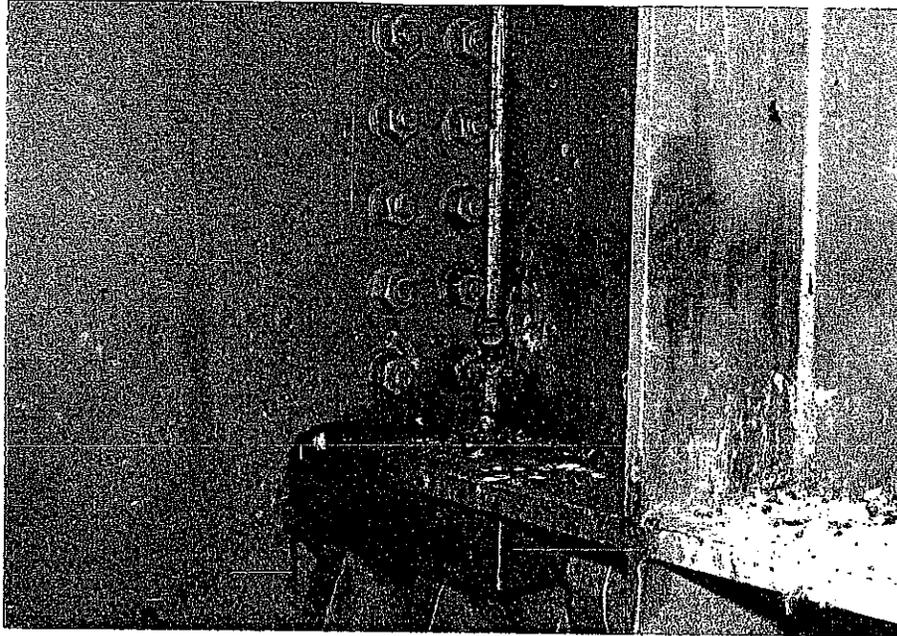
Picture #24  
Pin Rotating Angle Brace to Bottom Chord of Floor Truss  
Span #8, P/P-U1', No. B'nd.



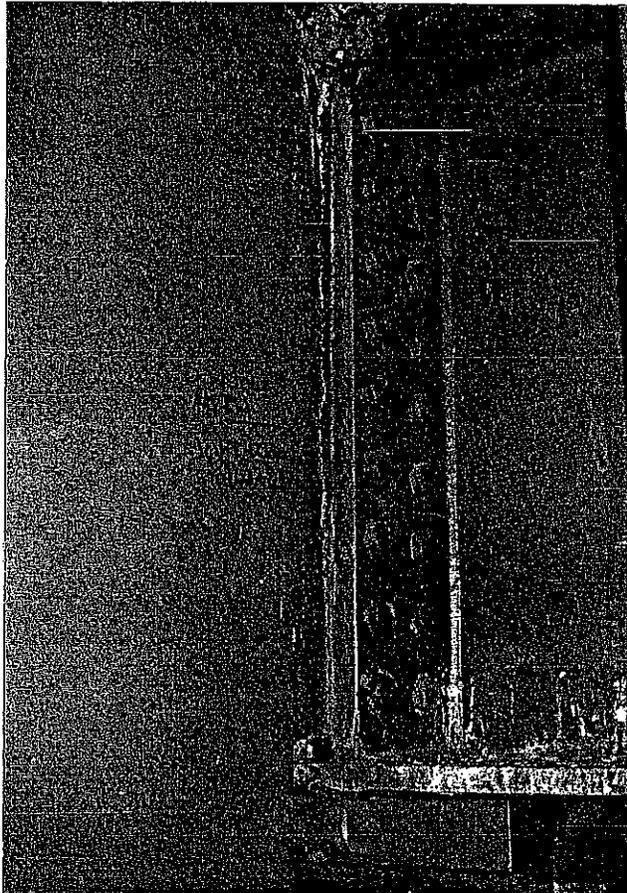
Picture #25  
Fatigue Crack Drilled Out  
Girder #12 to Floor Beam Connection  
Span #9, Deck Truss #2, No. B'nd.



Picture #26  
Fatigue Crack Drilled Out  
Girder #12 to Floor Beam Connection  
Span #9, Deck Truss #2, No. B'nd.



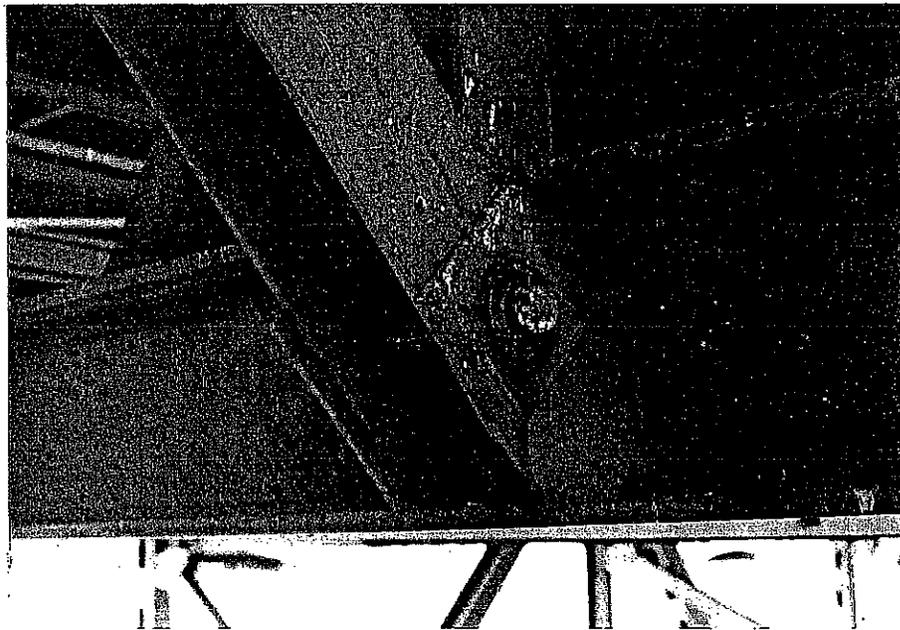
Picture #27  
Fatigue Crack Drilled Out  
Girder #12 to Floor Beam Connection  
Span #9, Deck Truss #2, No. B'nd.



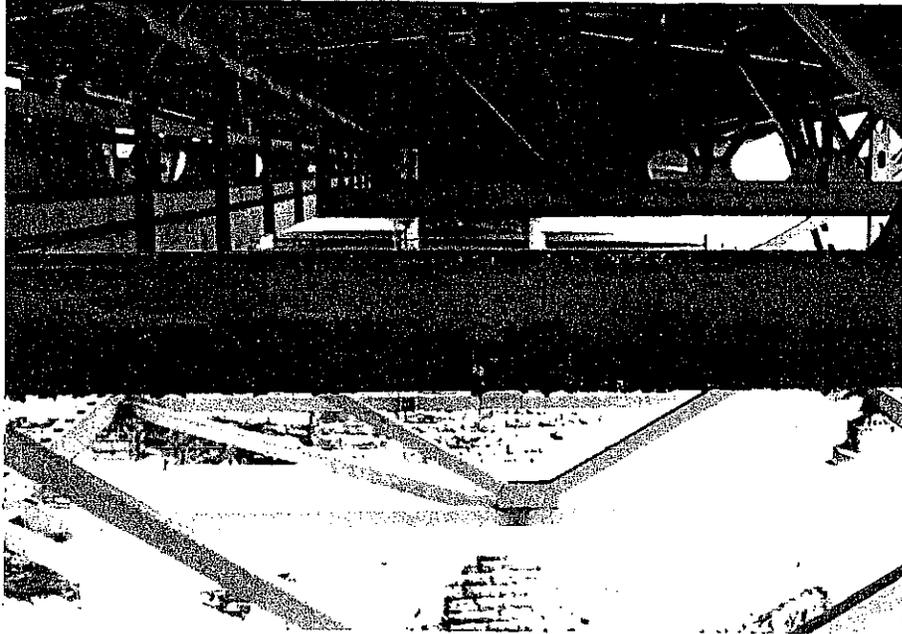
Picture #28  
Connection  
Working  
Girder #3 to  
Floor Beam  
Span #9  
So. B'nd.



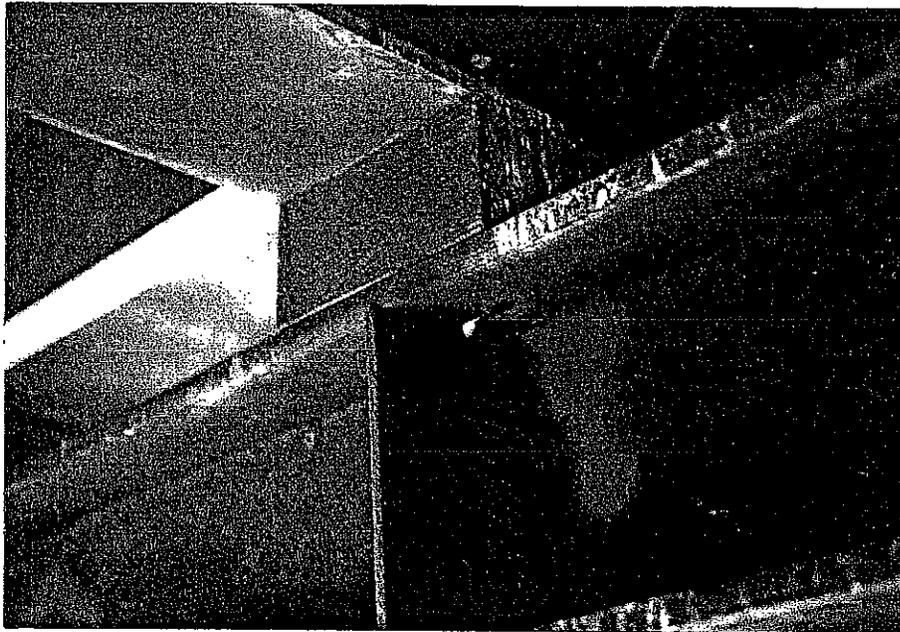
Picture #29  
Ugly Weld @ Stringer #11 to Floor Truss Connection  
Span #8, P/P-U3', So. B'nd.



Picture #30  
Rotating Pin in Vertical Brace (U10-L10) of Floor Truss  
Span #8, P/P-U4', So. B'nd.



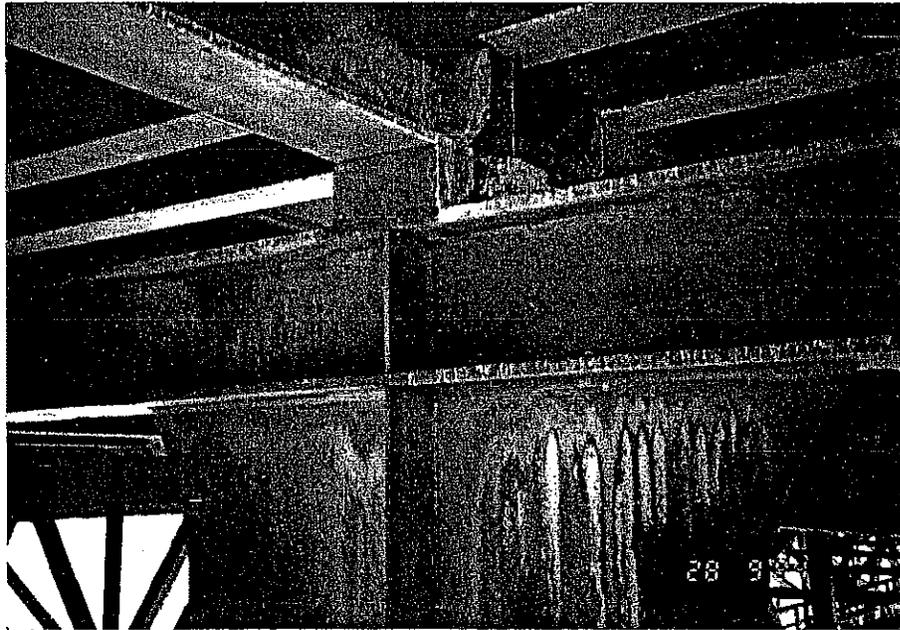
Picture #31  
Paint Condition - Bottom Chord of Floor Truss  
Span #8, P/P-U5', So. B'nd.



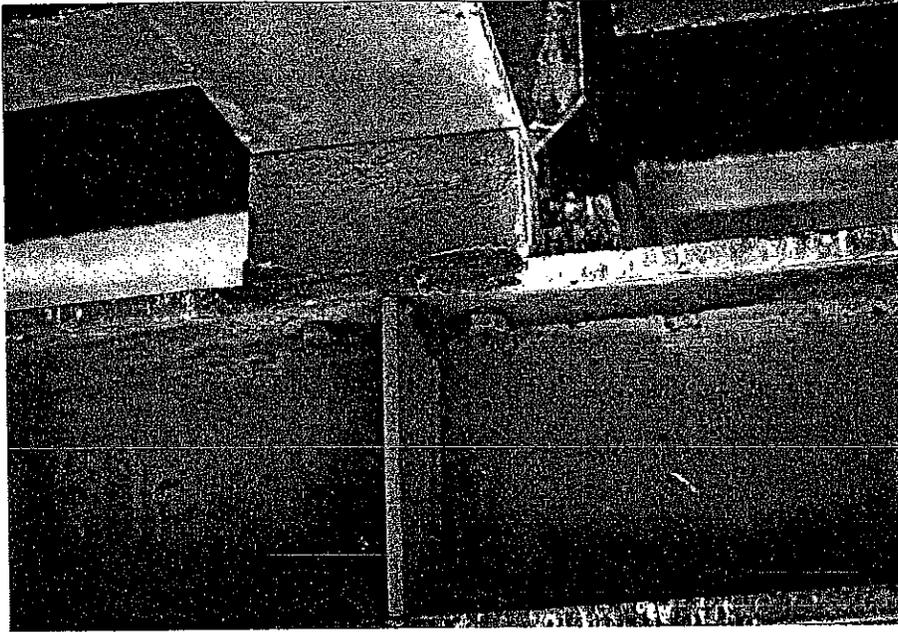
Picture #32  
Broken Bolt - Stringer #4 to Floor Truss  
Span #8, P/P U6', So. B'nd.



Picture #33  
General View of Sway Framing  
Looking North, Span #8, P/P-U6', So. B'nd.



Picture #34  
Broken Bolt - Stringer #4 to Floor Truss  
Span #8, P/P U8', So. B'nd.



Picture #35  
Broken Bolt - Stringer #4 to Floor Truss  
Span #8, P/P U8', So. B'nd.



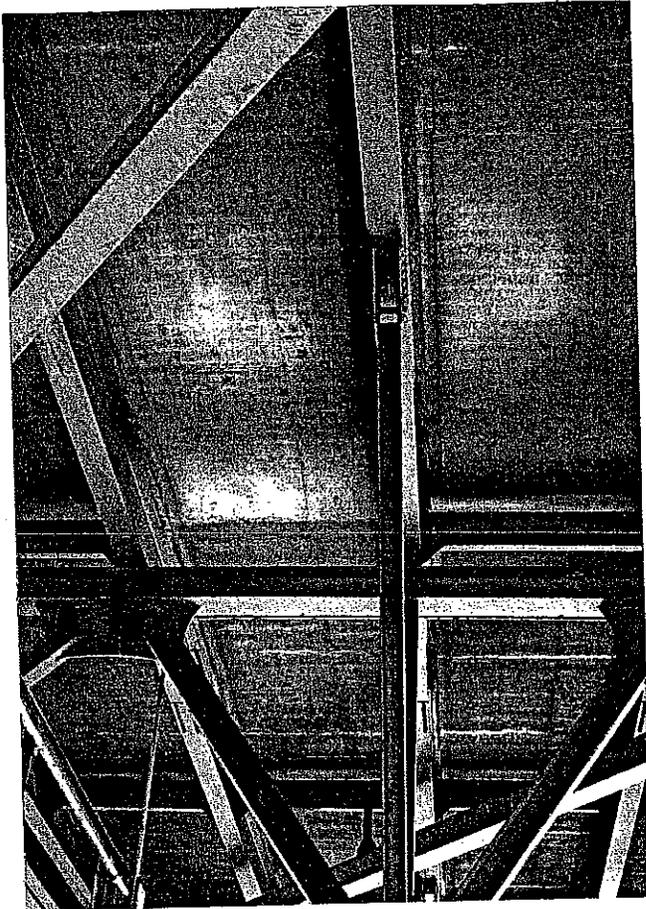
Picture #36  
Looking South  
Under Median  
Span #7, P/P-U9'  
So. B'nd



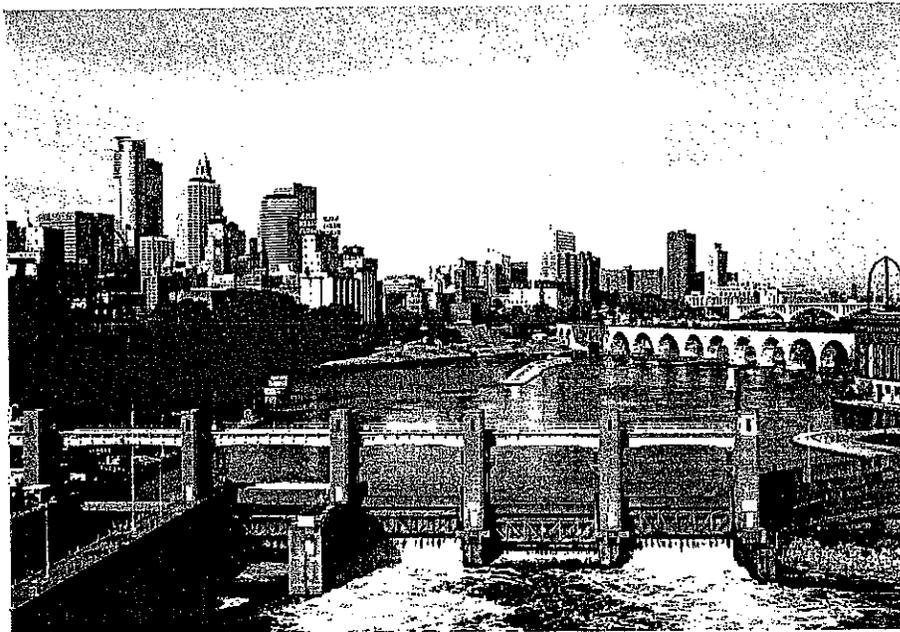
Picture #37  
Loose Bolt - Stringer #2 to Floor Truss Connection  
Span #7, P/P-U10', So. B'nd.



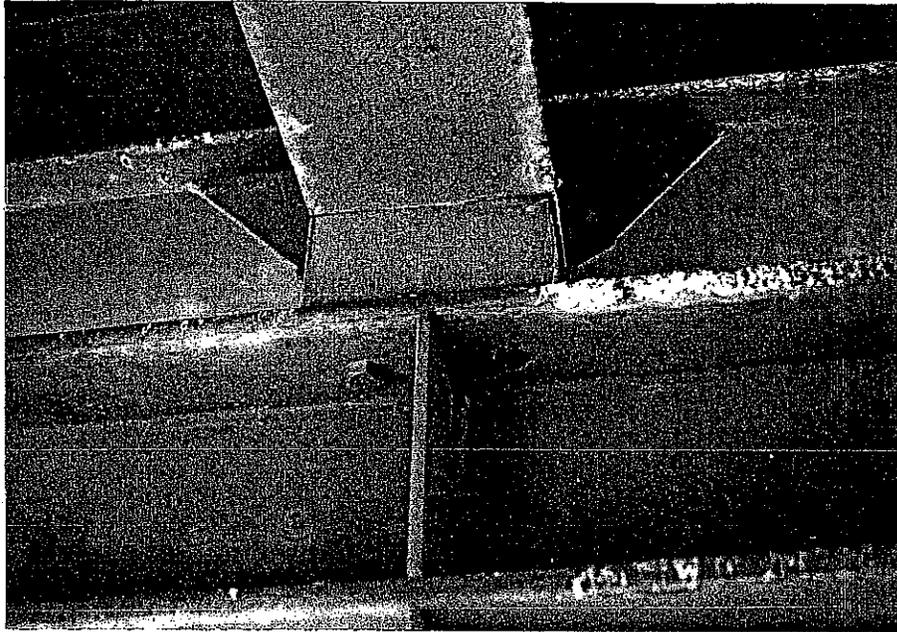
Picture #38  
Typical View of  
Underside of Deck  
Span #7, P/P-11'  
So. B'nd.



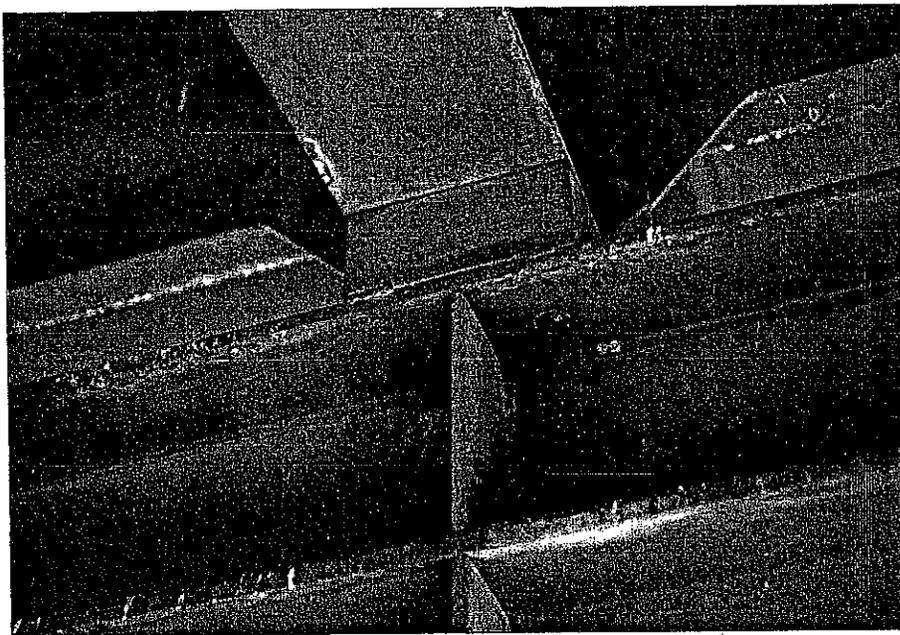
Picture #39  
Typical View of  
Underside of Deck  
Span #7, P/P-11'  
So. B'nd.



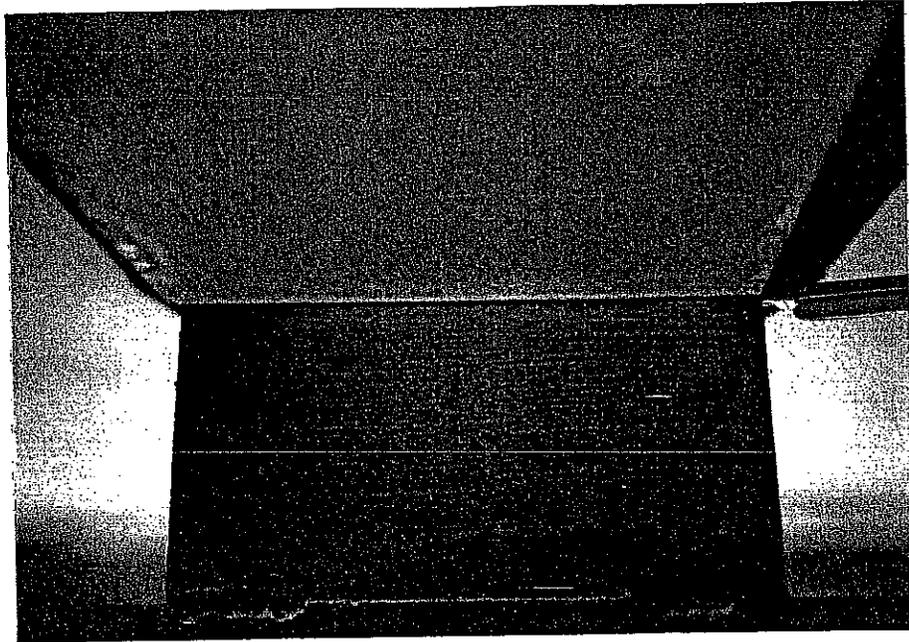
Picture #40  
View from Under the Bridge  
Looking West at Downtown Minneapolis



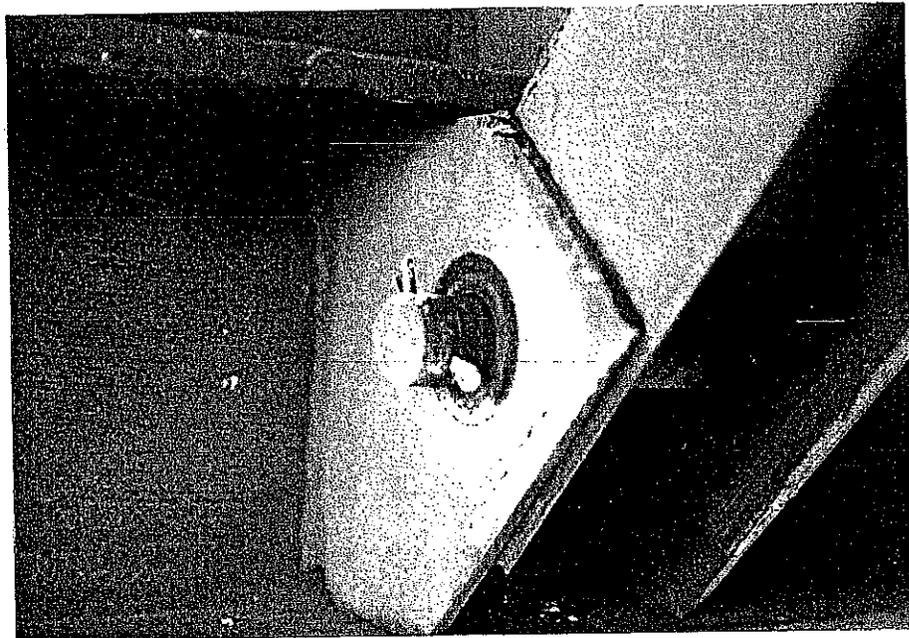
Picture #41  
Broken Bolt - Stringer #4 to Floor Truss  
Span #7, P/P U11, So. B'nd.



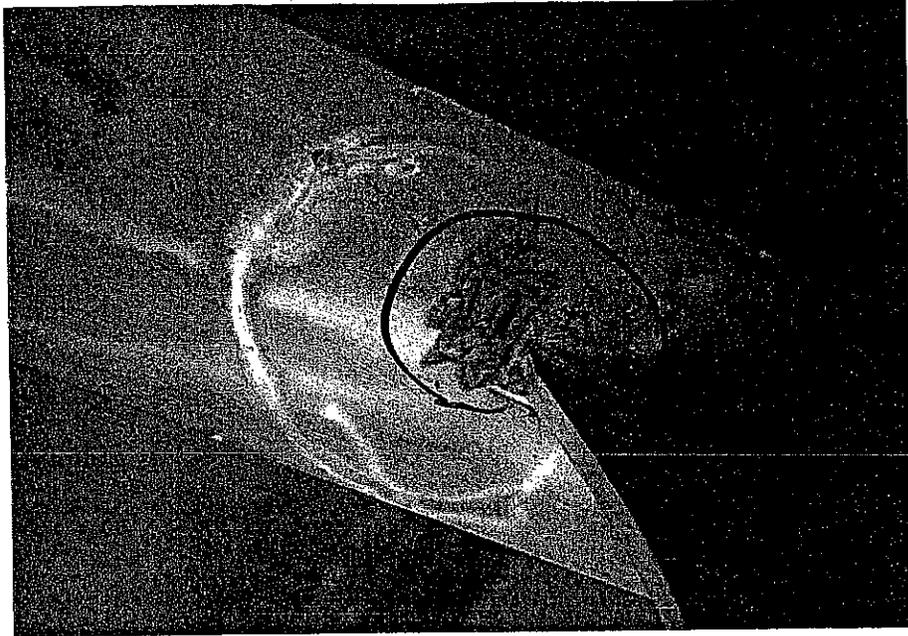
Picture #42  
2 Broken Bolts - Stringer #4 to Floor Truss  
Span #7, P/P U11, So. B'nd.



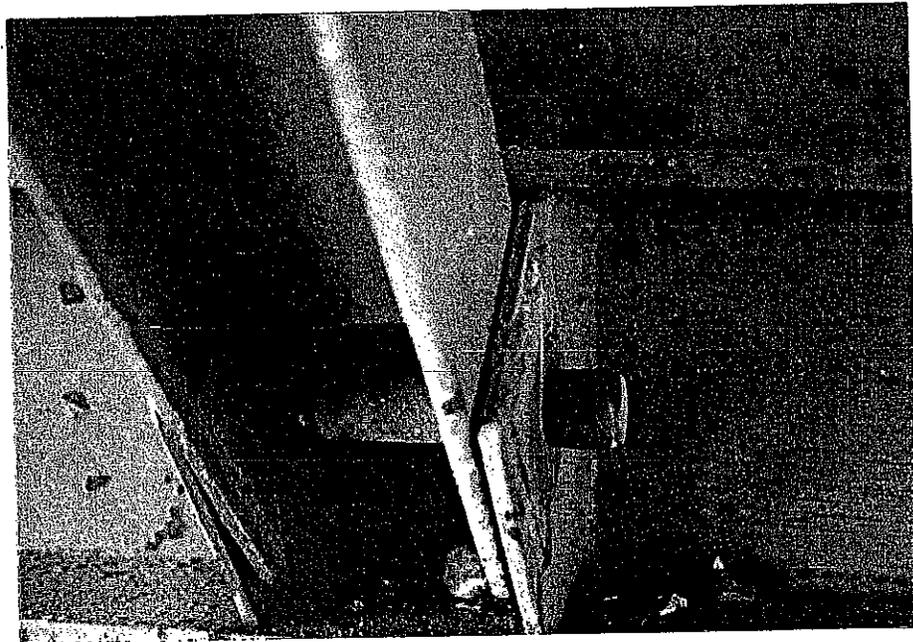
Picture #43  
Stringer #4 Lifted 3/32"  
Span #7, P/P-11, So. B'nd.



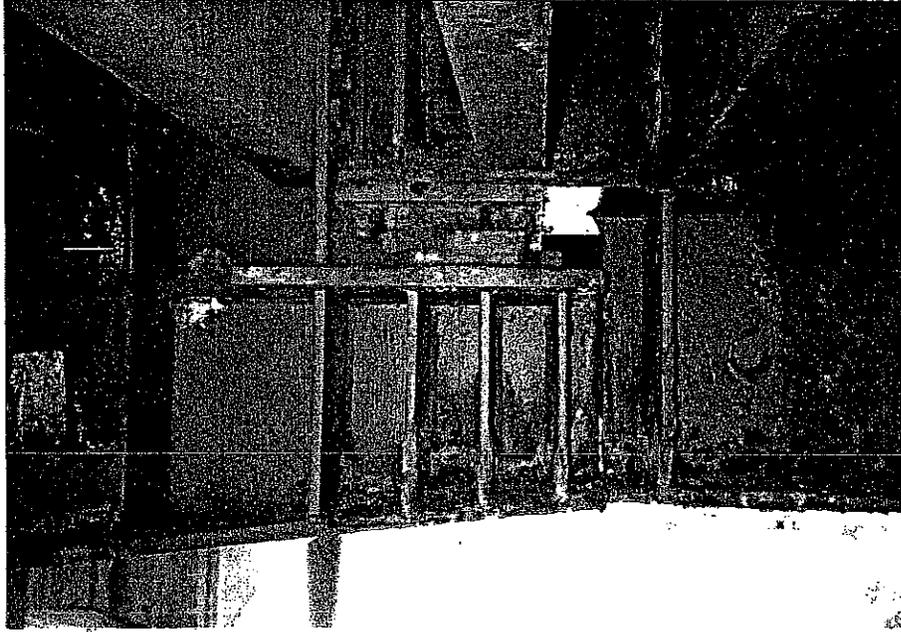
Picture #44  
Pin Rotating - Vertical Brace @ Bottom Chord of Floor Truss  
Span #6, P/P-U7, So. B'nd.



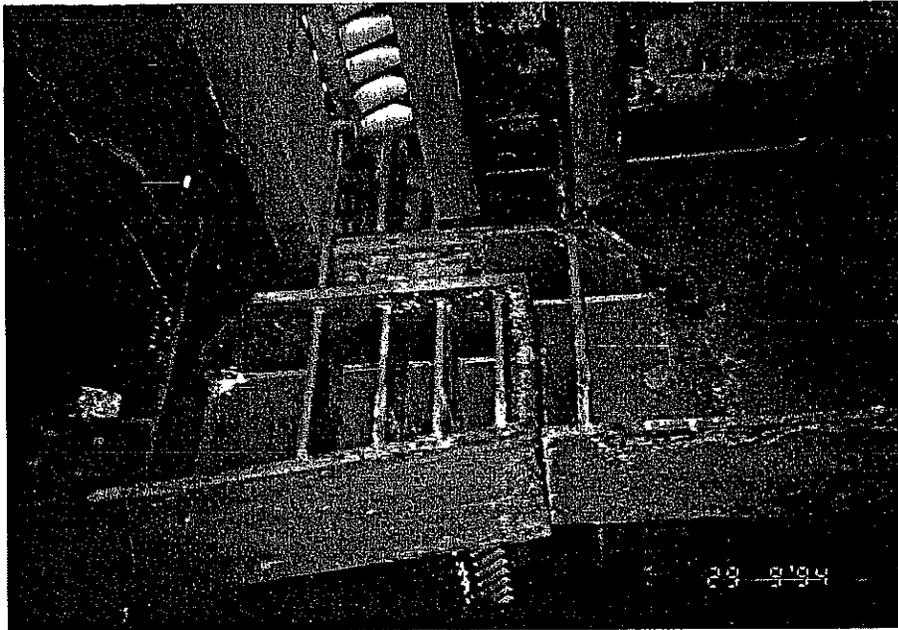
Picture #45  
Gouges in Top Chord of Floor Truss  
Span #6, P/P-U6, So. B'nd.



Picture #46  
Missing Cotter Pin  
Vertical Brace to Lower Chord of Floor Truss  
Span #6, P/P-U1, So. B'nd.



Picture #49  
Hinge in Beam #5 - Ends of Beam Touching  
Span #2, So. B'nd.



Picture #50  
Hinge in Beam #5 - Ends of Beam Touching  
Span #2, So. B'nd.



Picture #51  
Hinge in Beam #4 - Debris Below Finger Joint  
Span #2, So. B'nd.



Picture #52  
Hinge in B'm #1  
Span #2,  
So. B'nd.



Crew Number: 7627

**Mn/DOT BRIDGE INSPECTION REPORT**

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 10-13-1995

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 20 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 6 Super: 4 Sub: 6 Chan: 8 Culv: N Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate:  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|---|----------------------|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|--|
| 22  | LS O/L (CONC DECK)   | 2   | 10-13-1995 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
|   |                      |     | 09-26-1994 | 219,086 SF | 219,089     | 0           | 0           | 0           | 0           |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 300   | STRIP SEAL JOINT     | 2   | 10-13-1995 | 318 LF     | 318         | 0           | 0           | N/A         | N/A         |  |
|   |                      |     | 09-26-1994 | 262 LF     | 262         | 0           | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 301   | POURED DECK JOINT    | 2   | 10-13-1995 | 255 LF     | 255         | 0           | 0           | N/A         | N/A         |  |
|   |                      |     | 09-26-1994 | 566 LF     | 566         | 0           | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 303   | ASSEMBLY DECK JOINT  | 2   | 10-13-1995 | 326 LF     | 326         | 0           | 0           | N/A         | N/A         |  |
|   |                      |     | Notes:     |            |             |             |             |             |             |  |
| 321   | CONC APPROACH SLAB   | 2   | 10-13-1995 | 2 EA       | 2           | 0           | 0           | 0           | N/A         |  |
|   |                      |     | 09-26-1994 | 2 EA       | 2           | 0           | 0           | 0           | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 333   | RAILING - OTHER      | 2   | 10-13-1995 | 3,814 LF   | 0           | 3,318       | 496         | N/A         | N/A         |  |
|   |                      |     | 09-26-1994 | 5,630 LF   | 2,815       | 2,815       | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 334   | METAL RAIL-COATED    | 2   | 10-13-1995 | 3,814 LF   | 3,814       | 0           | 0           | 0           | 0           |  |
|   |                      |     | Notes:     |            |             |             |             |             |             |  |
| 107   | PAINTED STEEL GIRDER | 2   | 10-13-1995 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |  |
|   |                      |     | 09-26-1994 | 10,538 LF  | 8,430       | 2,108       | 0           | 0           | 0           |  |
| Notes:<br>8) THE BEAMS HAVE MINOR CHALKING AND SOME SURFACE RUST THROUGHOUT.<br>THERE IS FLAKING RUST ON THE BOTTOM FLANGE OF THE BEAMS ADJACENT TO<br>THE MEDIAN. THE BEAMS HAVE SEVERE CORROSION AROUND THE HINGES IN SPAN<br>#2. |                      |     |            |            |             |             |             |             |             |  |
| 113   | PAINT STEEL STRINGER | 2   | 10-13-1995 | 14,896 LF  | 0           | 14,747      | 0           | 149         | 0           |  |
|   |                      |     | 09-26-1994 | 14,900 LF  | 14,900      | 0           | 0           | 0           | 0           |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 131   | PAINT STL DECK TRUSS | 2   | 10-13-1995 | 2,127 LF   | 0           | 0           | 1,914       | 213         | 0           |  |
|   |                      |     | 09-26-1994 | 2,128 LF   | 2,128       | 0           | 0           | 0           | 0           |  |

08/02/2007

Page 2 of 3

Crew Number: 7627

## Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 10-13-1995

STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 20) 6-8% PAINT UNSOUND. [1995] THERE IS EXTENSIVE SURFACE RUST ON THE INTERIOR OF THE BUILT-UP TRUSS MEMBERS.   |                     |     |            |          |             |             |             |             |             |
| 152   | PAINT STL FLOORBEAM | 2   | 10-13-1995 | 3,348 LF | 0           | 2,645       | 268         | 435         | 0           |
|   |                     |     | 09-26-1994 | 2,100 LF | 2,100       | 0           | 0           | 0           | 0           |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 33) NO. END OF WEST TRUSS CONNECTION TO FLOOR BEAM EXTENSIVE CORROSION UNDER JOINT - NEEDS SPOT BLAST AND PAINT OR SEVERE CORROSION WILL RESULT WITHIN 5 YEARS (BY 1997). |                     |     |            |          |             |             |             |             |             |
| 373   | STEEL HINGE         | 2   | 10-13-1995 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 380   | SECONDARY ELEMENTS  | 2   | 10-13-1995 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
| Notes: THERE IS CORROSION (WITH PACK RUST AND SURFACE PITTING) AT THE FLOORBEAM AND SWAY BRACE CONNECTIONS.   |                     |     |            |          |             |             |             |             |             |
| 311   | EXPANSION BEARING   | 2   | 10-13-1995 | 125 EA   | 125         | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-1994 | 141 EA   | 141         | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 313   | FIXED BEARING       | 2   | 10-13-1995 | 35 EA    | 35          | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-1994 | 41 EA    | 41          | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 205   | CONCRETE COLUMN     | 2   | 10-13-1995 | 52 EA    | 51          | 1           | 0           | 0           | N/A         |
|   |                     |     | 09-26-1994 | 42 EA    | 42          | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 210   | CONCRETE PIER WALL  | 2   | 10-13-1995 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
|   |                     |     | 09-26-1994 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 215   | CONCRETE ABUTMENT   | 2   | 10-13-1995 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
|   |                     |     | 09-26-1994 | 245 LF   | 245         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 234   | CONCRETE CAP        | 2   | 10-13-1995 | 819 LF   | 680         | 139         | 0           | 0           | N/A         |
|   |                     |     | 09-26-1994 | 964 LF   | 964         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 356   | FATIGUE CRACKING    | 2   | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-1994 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 357   | PACK RUST           | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |

Crew Number: 7827

Inspector: INSPECTOR

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 10-13-1995**

STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 358         | CONC DECK CRACKING  | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 359         | CONC DECK UNDERSIDE | 2   | 10-13-1995 | 1 EA     | 0           | 0           | 0           | 1           | 0           |
|             |                     |     | 09-26-1994 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 361         | SCOUR               | 2   | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 363         | SECTION LOSS        | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |                     |     | Notes:     |          |             |             |             |             |             |
| 981         | SIGNING             | 2   | 10-13-1995 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|             |                     |     | 09-26-1994 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 982         | GUARDRAIL           | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 984         | DRAINAGE            | 2   | 10-13-1995 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 985         | SLOPES              | 2   | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 986         | CURB & SIDEWALK     | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                     |     | 09-26-1994 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 988         | MISCELLANEOUS       | 2   | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                     |     | Notes:     |          |             |             |             |             |             |

General Notes: \* BRIDGE 9340 YEAR 1995

NOTE: SEE FRACTURE CRITICAL REPORT FOR ADDITIONAL INFORMATION.

20,33,79) PAINT IS 20% UNSOUND.

Inspector's Signature

Reviewer's Signature / Date



**REPORT**  
**of the**  
**1995 ANNUAL**  
**FRACTURE CRITICAL INSPECTION**  
**for the**  
**BRIDGE NO. 9340**  
**I-35W over the Mississippi River,**  
**2nd Street & Railroad**  
**performed**  
**October 13 ,1995**

## **BR #9340: I-35W over the Mississippi River**

**FRACTURE CRITICAL INSPECTION:** Oct 13th, 1995

**INSPECTION BY:** Terry Moravec, Matt Lacy, Pete Wilson

**REPORT PREPARED BY:** Pete Wilson

**REVIEWED & EDITED BY:** Terry Moravec, P.E.   **DATED:** January 11, 1996

**ACCESS EQUIPMENT USED:** None

### **RECOMMENDATIONS:**

- **Due to the Dartmouth Bridge (I-94) construction and the resulting change in traffic patterns to and from the University of Minnesota, there was no "snooper" inspection conducted on this bridge in 1995. A "snooper" inspection should therefore be early in 1996.**
- **The "hinge" joint in Span #2 should be repaired - the hinge assemblies have extensive corrosion and are closed beyond tolerable limits (the joint cannot separate). Any effect of this frozen joint on nearby elements of the structure should be investigated.**
- **Several of the bolts connecting the stringers to the floorbeam truss (Main Truss Spans) are missing or broken and need to be replaced.**

|            |                         |                |
|------------|-------------------------|----------------|
| <b>NBL</b> | <b>Panel Point #8</b>   | <b>3 bolts</b> |
| <b>SBL</b> | <b>Panel Point #6'</b>  | <b>1 bolt</b>  |
|            | <b>Panel Point #8'</b>  | <b>1 bolt</b>  |
|            | <b>Panel Point #10'</b> | <b>1 bolt</b>  |
|            | <b>Panel Point #11</b>  | <b>3 bolts</b> |

- **The superstructure below the open finger joints at each end of the truss spans needs to be flushed on a regular basis! The "rocker" hinge assemblies should be cleaned, lubricated and the pins checked with UT.**
- **The bolts at the north "crossbeam" connection to Beam #3 (Span #9, SBL) are "working" and should be replaced.**

## **GENERAL NOTES:**

**DESCRIPTION:** Bridge #9340 carries I-35w over the Mississippi River in downtown Minneapolis. Constructed in 1967, the 1,907 ft. long bridge has 14 spans. The south approach spans (Spans #1 - #5) are steel multi-beam. The main spans (Spans #6 - #8) consist of a steel deck truss. The north approach spans include both steel multi-beam (Spans #9 - #11), and concrete slab span (Spans #12 - #14). There are 3 traffic lanes in both directions, with no shoulders.

**SUPERSTRUCTURE:** Lead-base paint system [1968] - 20% unsound

**DECK TRUSS (Spans #6 - #8):** Due to the cantilever design, the deck truss actually begins in Span #5, and ends in Span #9. The truss is continuous over it's entire length. The main river span (Span #7) is 456 ft. long

**TRUSS MEMBERS:** There are 2 steel deck trusses. Most truss members are comprised of built-up plates (riveted) - some of the diagonal members are rolled I-beams. The connections are riveted. The truss members have numerous poor welding details - including tack welded tabs on the interior stiffener plates. There is corrosion at the floorbeam and sway brace connections, and pack rust is forming between the connection plates. There is extensive surface rust, surface pitting, and severe pigeon debris in the interior of the ox members.

**FLOORBEAMS:** There are 29 floorbeams connecting the trusses. The 2 end floorbeams are welded plate girders, the rest are trusses comprised of rolled H-beams (welded connections). The floorbeams cantilever beyond the main truss on both sides. The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds and welded connection plates located in tension zones. The top and bottom chords have severe flaking rust below the median, and below deck joints. There is pack rust and surface pitting at the main truss connections.

**STRINGERS:** There are 14 steel stringers bearing on the floorbeam trusses - they are continuous except for 5 stringer expansion joints. The bolted connections to the floorbeam trusses are "working" and some of the bolts are missing. The stringers have corrosion at the expansion joints and the stringers adjacent to the median have flaking rust along the bottom flange.

**LATERAL/SWAY BRACING:** The main deck trusses have both upper and lower lateral bracing (horizontal). There is also vertical sway bracing between the main trusses below each floorbeam truss - the sway bracing has corrosion at the center (below the median). Each floorbeam truss has 2 diagonal braces which connect the bottom chord to Stringers #4 & #11. The pinned connections of these braces are "working" and at least one cotter pin is missing.

**TRUSS BEARING ASSEMBLIES:** The truss spans have 6 huge "geared" roller bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion.

**STEEL MULTI-BEAM SPANS (Spans #1 -#5 & #9 - #11):**

**GIRDERS:** Spans #1 - #5 have 14 welded plate girders (riveted connections) - they are continuous except for a hinge joint in Span #2. Spans #9 - #11 widen from 15 to 18 Girders, they are continuous. The beams adjacent to the median have flaking rust along the bottom flange.

**CROSSBEAMS:** At the deck truss transitions (Spans #5 & #9) the girders terminate by framing into a "crossbeam" (welded plate girder). The crossbeams bear on "rocker" assemblies connected to the cantilever ends of the truss. The north crossbeam (Span #9) has both rocker assemblies built into the web. The south crossbeam (Span #5) has a rocker built into the web on the west truss, while the east truss rocker is below the crossbeam. The east end of the south crossbeam was damaged (cracked web stiffeners) due to failure of the rocker assembly. The crossbeam was repaired and reinforced by braces connected to Beams #2 & #3 [1986]. A crack was drilled out in the web stiffener to crossbeam weld at the Beam #12 connection in 1992. Both crossbeams have corrosion due to the open finger joints above.

**HINGE ASSEMBLIES:** There are a total of 18 hinge assemblies - this includes the 4 "rocker" hinge assemblies supporting the crossbeams at the truss ends, and 14 sliding plate assemblies at the expansion joint in Span #2. The east rocker in the south crossbeam (Span #5) had the pin replaced (the assembly had "frozen") - this required closing I-35W and jacking the multi-beam span [1986]. All four of the assemblies have severe corrosion due to the open finger joints above. The sliding plate hinges in Span #2 have severe corrosion and debris from the open finger deck joint. The joint has "closed" excessively due to bridge expansion. At Beams #1 & #5 the girder ends were in contact, and the lower plate at Beam #5 had tipped off it's bearing (possibly preventing the joint from reopening).

**BEARING ASSEMBLIES:** The multi-beam spans have 90 sliding plate bearing assemblies, and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**CONCRETE SLAB (SPANS #12 - 14):** The far north approach spans consist of a continuous "voided" slab span. The slab rests on sliding plate bearings at Pier #11 and the North Abutment ( total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). There is spalling (exposed rebar) along the exterior and median copings. There is spalling above the bearing at Pier #11 (SBL at median).

### **SUBSTRUCTURE:**

**ABUTMENTS:** The North Abutment has stains from the leaking deck joint. Both Abutments have minor cracking.

**PIERS:** Piers #6 & #7 (main river span) consist of 2 concrete columns resting on a pier wall - there is a vertical crack through the west column at Pier #7. Piers #5 & #8 consist of 2 concrete columns connected with an upper strut. The columns of Pier #8 have been encased in a concrete "jacket". The piers in the multi-beam spans (Piers #1 - #5 and #9 - #11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). Pier # 11 has extensive shot-crete repairs, and some recent spalling (an open finger deck joint has been replaced with a strip seal). The far north piers (Piers #12 & #13) consist of concrete columns cast directly into the slab span deck.

### **BRIDGE DECK:**

**STRUCTURAL SLAB:** The undersides of the copings (especially the median coping) have severe spalling (exposed rebar) along the entire length of the bridge. The underside of the deck is in otherwise good condition, with a moderate amount of transverse leaching cracks, and some full depth deck repairs.

**WEARING SURFACE:** Low slump concrete overlay [1978]. The wearing surface is in generally good condition, with some minor spalls and patched areas around the finger joints.

**EXPANSION JOINTS:** There are 3 open finger joints, 8 strip seal joints [1978], plus a number of pourable joints. The strip seal at the North Abutment is pulled out in several locations, and is filled with debris [1995]. There is a possible leak in the strip seal at Pier #11 (SBL at median) [1995].

Some of the curb cover plates are missing, SBL [1994].

**RAILING:** The exterior railing is concrete post & beam - there are spalls (exposed rebar) along the underside of the "beam" and on the face of the railposts. The split median rail is steel plate guardrail, there is minor impact damage in numerous locations.

**OTHER ELEMENTS:**

**APPROACH PANELS:** Both approaches are concrete. There is a transverse crack in each approach, and some minor spalls at the joints. Relief joints should be cut in the curbs and median? The relief joints need to be resealed?

**CHANNEL AND PROTECTION:** Pier #7 is on the east bank of the Mississippi. Due to extreme turbulence (the bridge is directly downstream from the lower St. Anthony Lock), there have been no accurate soundings taken recently.

**SIGNING:** There are no "Type III" hazard markers at the south end.

**GUARDRAIL:** The approach guardrail has minor traffic impact damage at the SE approach [1994].

**DRAINAGE:** The bridge deck drains directly into the river. The drain troughs (under finger joints?) have inadequate slope, and tend to fill up with debris.

**SLOPE PROTECTION:** There is concrete slope paving at both abutments.

**CURB AND WALK:** The concrete curb along the outside railing has a moderate amount of delamination and spalling.

**LIGHTING:** The bridge has rail mounted deck lighting, under deck lighting, and river navigation lighting. A lightpost (SBL - "W 5/3 L") has a 6" vertical split due to traffic impact [1994]. An underdeck light cover in Span #14 is broken.

**MISCELLANEOUS:** The impact attenuator at the northbound off ramp to University Ave. has minor impact damage [1994]. The areas under some approach spans (Spans #3, #4, #11 & #12) are being leased out as parking lots. Material from river dredging is being stockpiled under Span #8.

**NORTHBOUND INSPECTION (includes the east truss and all substructure)**

**SOUTH ABUTMENT:** Strip seal deck joint above. The strip seal has pulled out on the north end (SBL), and is filled with debris. There are 14 sliding plate bearing assemblies - the bearings are in full contraction (Oct. 1995), and many of them have corrosion. The seat area is cracked and discolored.

**SPAN #1 (Steel Multi-beam):** The NB and SB bridges both have 7 beams.

**PIER #1:** There are 10 fixed plate, and 4 sliding plate bearing assemblies. The pier consists of 4 concrete columns and cap, with a strut between column bases.

**SPAN #2 (Steel Multi-beam):** The NB and SB bridges both have 7 beams. the girder depth increases at the hinge joint.

**Hinge Joint (12 ft. south of Pier #2):** There is an open finger deck joint above. There is severe corrosion and debris on the hinge assemblies and beam ends [1994]. The hinge assemblies (particularly SBL) are expanded (joint closed) beyond tolerance. The assembly at Beam #5 is possibly "locked" (the bottom plate has tipped off it's bearing) preventing any opening of the joint [1994].

**PIER #2:** There are 14 sliding plate bearing assemblies. The pier consists of 4 concrete columns and cap, with a strut between the column bases.

**SPAN #3 (Steel Multi-beam):** The NB and SB bridges each have 7 beams.

**PIER #3:** There are 10 fixed plate, and 4 sliding plate bearing assemblies. The pier consists of 4 concrete columns and a cap.

**SPAN #4 (Steel Multi-beam):** The NB and SB bridges each have 7 beams.

**PIER #4:** There are 14 sliding plate expansion bearing assemblies. The pier consists of 4 concrete columns and cap.

**SPAN #5 (Multi-beam/Deck Truss):** The NB and SB bridges each have 7 beams - they terminate by framing into a crossbeam at Panel Point #0.

**PANEL POINT #0 (Beginning of East Truss):** There is an open finger deck joint above. The east end of the "crossbeam" has been repaired (cracked web stiffeners repaired, and bracing added between the crossbeam and Beams #2 & #3), and the east hinge rocker pin was replaced [1986]. The east rocker "hinge" assembly has severe corrosion [1994]. The truss floorbeam and connecting gusset plates have corrosion due to the open joint above [1994].

**PANEL POINT #1, (East Truss, Pier #5):**

**PIER #5:** There are 2 "rollernest" bearing assemblies. The pier consists of 2 concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**SPAN 6 (Deck Truss):** Panel Pt. #1 is at Pier #5, Panel Pt. #8 is at Pier #6

**PANEL POINT #2 (East Truss):**

**PANEL POINT #3 (East Truss):** There is an undercut weld in the flange at the center of the floorbeam truss.

**PANEL POINT #4 (East Truss, Stringer Joint):** There is a strip seal deck joint above. Floorbeam truss, top chord, tack weld cracked.

**PANEL POINT #5 (East Truss):**

**PANEL POINT #6 (East Truss):** The top chord of the floorbeam truss has a cracked weld in the bottom flange at the end of a connection plate [1994].

**PANEL POINT #7 (East Truss):**

**PANEL POINT #8 (East Truss, Pier #6, Stringer Joint):** Strip seal deck joint above. There is a bolt missing from each of the floorbeam truss connections to Stringers #10, #11, & #13 [1994]. The Stringer #13 "bearing block" has rotated [1994]. There is a deck drain downspout.

**PIER #6 (DT side of Mississippi):** There are 2 "rollernest" bearing assemblies, they have light rust. The pier consists of 2 concrete columns with a "pierwall" at the base.

**SPAN 7 (Deck Truss):** Panel Point #8 is at Pier #6, Panel Point #14 is at midspan, and Panel Point #Pier #7

**PANEL POINT #9 (East Truss):**

**PANEL POINT #10 (East Truss):** Navigation light?

**PANEL POINT #11 (East Truss):** Section loss? at gusset plate, bottom chord.

**PANEL POINT #12 (East Truss):** The top chord of the floorbeam truss has a plate welded to the bottom flange, longitudinal?

**PANEL POINT #13 (East Truss):** Section loss at gusset plate, bottom chord. The top chord at the center of the floorbeam truss has a "four way"

diagonal member welded (transverse) on the bottom flange.

**PANEL POINT #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint in the deck. Sway frame rusty.

**PANEL POINT #13' (East Truss):** The top chord of the floorbeam truss has 2" tack welds in the bottom flange on both sides of the main truss connection (maximum tension area). Check to determine if this is typical.

**PANEL POINT #12' (East Truss):**

**PANEL POINT #11' (East Truss):** The top chord of the floorbeam truss has a "center diagonal stiffener plate?" welded transverse to the bottom flange. Check to determine if this is typical.

**PANEL POINT #10' (East Truss):** The top chord of the floorbeam truss has a "center diagonal stiffener plate" welded transverse to the bottom flange.

**PANEL POINT #9' (East Truss):** The top chord of the floorbeam truss has a "center diagonal stiffener plate" welded transverse to the bottom flange. The sway frame is rusty. Deck drains.

**PANEL POINT #8' (East Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. The top chord of the floorbeam truss has a "center diagonal stiffener plate?" welded transverse to the bottom flange. The floorbeam truss has severe rust at the median. The floorbeam truss connections to Stringers #10 & #11 have had missing bolts replaced with "Redi-rod" (one nut missing at Stringer #11). Red navigation light.

**PIER #7 (East bank of Mississippi):** There are 2 fixed bearing assemblies. The pier consists of 2 concrete columns with a "pierwall" at the base.

**SPAN 8 (Deck Truss):**

**PANEL POINT #7' (East Truss):**

**PANEL POINT #6' (East Truss):** The floorbeam truss connection to Stringer #11 is "working", the bolts should be replaced.

**PANEL POINT #5' (East Truss):**

**PANEL POINT #4' (East Truss, Stringer Joint):** Strip seal deck joint above.

**PANEL POINT #3' (East Truss):** The top chord of the floorbeam truss has an "Incomplete" weld along the top edge of the web reinforcement plate.

**PANEL POINT #2' (East Truss):**

**PANEL POINT #1' (East Truss, Pier #8):**

**PIER #8:** There are 2 "rollernest" bearing assemblies, they have light rust. The pier consists of 2 concrete columns connected by an upper strut. The columns have a concrete "jacket" around them (was this done as reinforcement due to excavation?).

**SPAN #9 (Deck Truss/Multi-beam):** The multi-beam spans resume (framed into the crossbeam) with 8 beams in the NB bridge at Panel Point #0'. There are railroad tracks below.

**PANEL POINT #0' (End of East Truss):** There is an open finger deck joint above. The floorbeam, crossbeam, and east hinge rocker assembly have corrosion. A crack has been drilled out in the web stiffener to crossbeam weld at the Beam #12 connection (above the rocker) [1992].

**PIER #9:** There are 13 fixed, and 4 expansion bearing assemblies. The pier consists of 4 columns and cap, with a lower strut.

**SPAN #10 (Steel multi-beam):** The NB bridge has 10 beams, the SB bridge has 7 beams - they transition to a shallow beam. There are railroad tracks below.

**PIER #10:** There are 18 sliding plate expansion bearings. The pier consists of 5 columns and cap with a lower strut.

**SPAN #11 (Steel Multi-beam):** The NB bridge has 11 beams, the SB bridge has 7 beams. There is a parking lot below.

**PIER #11:** There is a strip seal deck joint above, there is a leak near the median (SBL) [1995]. There are 18 sliding plate bearings for the steel beams, and 15 sliding plate bearings for the slab span. The pier consists of 7 columns and a cap. The cap has extensive shot-crete repairs, and 10 sq. ft. of spall (exposed rebar) at the west end. This point is the beginning of the

NB off ramp to University Ave. - Br #9340"A".

**SPAN #12 (Concrete Slab Span):** There is delamination and spall (exposed rebar) along the median and exterior copings. There is a parking lot below.

**PIER #12:** The pier consists of 6 columns, which are integral with the slab span deck (no bearings).

**SPAN #13 (Concrete Slab Span):** There is delamination and spall along the median and exterior copings. 2nd St. passes below.

**PIER #13:** The pier consists of 6 columns, which are integral with the slab span deck (no bearings)

**SPAN #14 (Concrete Slab Span):** There is delamination and spall along the median and exterior copings. An under deck light cover is broken?

**NORTH ABUTMENT:** There is a strip seal deck joint above. There are 14 sliding plate bearing assemblies.

**SOUTHBOUND INSPECTION (West Truss only, See NB notes for approach spans) The stringers are numbered from the west (1 through 14)**

**SPAN #9 (Steel Multi-beam/Deck Truss):** The SB bridge has 7 beams which terminate by framing into the crossbeam at Panel Point #0'.

**PANEL POINT #0' (Beginning of West Truss):** There is a open finger deck joint above. The crossbeam, west hinge rocker assembly, and truss floorbeam have corrosion. The bolted connection between the crossbeam and Beam #3 (above rocker) appears to be "working" [1994]. This should be check for possible replacement of these bolts.

**PANEL POINT #1' (West Truss, Pier #8):**

**PIER #8:** See NB notes

**SPAN 8 (Deck Truss):** Panel Point #1' is at Pier #8, Panel Point #8' is at Pier #7.

**PANEL POINT #2' (West Truss):**

**PANEL POINT #3' (West Truss):** There is an "ugly" weld in the top flange of the upper chord of the floorbeam truss below connection to

Stringer #4.

**PANEL POINT #4' (West Truss, Stringer Joint):** Strip seal deck joint above.

**PANEL POINT #5' (West Truss):**

**PANEL POINT #6' (West Truss):** There is a bolt missing at the Stringer #4 connection to the floorbeam truss.

**PANEL POINT #7' (West Truss):**

**PANEL POINT #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. Stringer #4 has a loose or broken bolt at the floorbeam truss connection [1994]. Below Stringer #2, the diagonal brace between top and bottom chord of the floorbeam truss is bent.

**Pier #7:** See NB notes.

**SPAN 7 (Deck Truss):**

**PANEL POINT #9' (West Truss):** Sway frame and gusset plate connection, some rivets rusty in the median area.

**PANEL POINT #10' (West Truss):** There is a loose or broken bolt at the Stringer #4 connection to the floorbeam truss [1994]. The top chord (U18 - U17) has 6 nicks on the exterior (15' south of U18).

**PANEL POINT #11' (West Truss):** There is a nick in the truss bottom chord (L17 - L16).

**PANEL POINT #12' (West Truss):** The truss diagonal (U16 - L15) has 1 nick inside, 2 outside. The truss bottom chord (L16 - L15) has a nick.

**PANEL POINT #13' (West Truss):**

**PANEL POINT #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains both sides. Stringer #4 top flange rusty. There are "bad" welds at the truss bottom chord gusset plate.

**PANEL POINT #13 (West Truss):** There is pack rust at the truss bottom chord/ sway frame connection.

**PANEL POINT #12 (West Truss):**

**PANEL POINT #11 (West Truss):** At the Stringer #4 floorbeam connection, there is 1 bolt broken on the north, and 2 bolts broken on the south. The stringer has lifted approximately 3/32".

**PANEL POINT #10 (West Truss):** The truss top chord (U10 - U9) has 2 spots ground out.

**PANEL POINT #9 (West Truss):** The truss diagonal (L9 - U8) has a spot ground out.

**PANEL POINT #8 (West Truss, Pier #6, Stringer Joint):** Strip seal deck joint above. Deck drains both sides, downspout east side. The sway frame is rusty at the two connection points in the median area.

**PIER #6:** See NB notes.

**SPAN #6:**

**PANEL POINT #7 (West Truss):**

**PANEL POINT #6 (West Truss):** Overhead sign on deck above. The top chord of the floorbeam truss (U5 - U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out.

**PANEL POINT #5 (West Truss):**

**PANEL POINT #4 (West Truss, Stringer Joint):** Strip seal deck joint.

**PANEL POINT #3 (West Truss):** There is a nick on the truss bottom chord (L2 - L3).

**PANEL POINT #2 (West Truss):**

**PANEL POINT #1 (West truss, Pier #5):** There is a cotter pin missing from the diagonal brace (floorbeam to stringer) at the floorbeam truss connection [1994]. There is a deck drain downspout.

**PIER #5:** See NB notes.

**SPAN #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at

Panel point #0

**PANEL POINT #0 (End of West Truss):** Open finger deck joint above. The truss floorbeam, crossbeam, and west rocker hinge have corrosion from the open finger joint.

**See NB notes for south approach spans**



Crew Number: 7627  
 Inspector: INSPECTOR  
 BRIDGE 9340

### Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 07-12-1996

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pl.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 20 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 6 Super: 4 Sub: 6 Chan: 8 Culv: N Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL; LOW RISK Def. Stat: S.D. Suff. Rate:  
 Required Bridge Signs - Load Posting: NOT REQUIRED 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 |
|----------|----------------------|-----|------------|------------|----------|----------|----------|----------|----------|
| 22       | LS O/L (CONC DECK)   | 2   | 07-12-1996 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |
|          |                      |     | 10-13-1995 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 48       | LS O/L (CONC SLAB)   | 2   | 07-12-1996 | 219,086 SF | 0        | 0        | 0        | 0        | 0        |
|          |                      |     | 10-13-1995 | 219,086 SF | 0        | 0        | 0        | 0        | 0        |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 300      | STRIP SEAL JOINT     | 2   | 07-12-1996 | 315 LF     | 315      | 0        | 0        | N/A      | N/A      |
|          |                      |     | 10-13-1995 | 318 LF     | 318      | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 301      | POURED DECK JOINT    | 2   | 07-12-1996 | 2,924 LF   | 1,023    | 0        | 1,901    | N/A      | N/A      |
|          |                      |     | 10-13-1995 | 255 LF     | 255      | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 303      | ASSEMBLY DECK JOINT  | 2   | 07-12-1996 | 326 LF     | 326      | 0        | 0        | N/A      | N/A      |
|          |                      |     | 10-13-1995 | 326 LF     | 326      | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 321      | CONC APPROACH SLAB   | 2   | 07-12-1996 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |
|          |                      |     | 10-13-1995 | 2 EA       | 2        | 0        | 0        | 0        | N/A      |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 333      | RAILING - OTHER      | 2   | 07-12-1996 | 3,814 LF   | 0        | 3,318    | 496      | N/A      | N/A      |
|          |                      |     | 10-13-1995 | 3,814 LF   | 0        | 3,318    | 496      | N/A      | N/A      |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 334      | METAL RAIL-COATED    | 2   | 07-12-1996 | 3,814 LF   | 3,814    | 0        | 0        | 0        | 0        |
|          |                      |     | 10-13-1995 | 3,814 LF   | 3,814    | 0        | 0        | 0        | 0        |
| Notes:   |                      |     |            |            |          |          |          |          |          |
| 107      | PAINTED STEEL GIRDER | 2   | 07-12-1996 | 10,596 LF  | 0        | 9,113    | 1,377    | 106      | 0        |
|          |                      |     | 10-13-1995 | 10,596 LF  | 0        | 9,113    | 1,377    | 106      | 0        |
| Notes:   |                      |     |            |            |          |          |          |          |          |

8/20/33/79) [1968] BRIDGE PAINTED WITH LEAD BASE SYSTEM. [1995] THE PAINT SYSTEM IS 20% UNSOUND.

8) SPANS #1-5 AND #9-11. [1995] THE BEAMS HAVE MINOR CHALKING THROUGHOUT. THERE IS FLAKING RUST ON THE BOTTOM FLANGE OF THE BEAMS ADJACENT TO THE MEDIAN. THE BEAMS HAVE SEVERE CORROSION AT THE HINGES (SPAN #2). welded cover plates - multi beam spans.

Crew Number: 7627  
 Inspector: INSPECTOR  
 BRIDGE 9340

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 07-12-1996

STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| 113  | PAINT STEEL STRINGER | 2   | 07-12-1996 | 14,896 LF | 0           | 14,747      | 0           | 149         | 0           |
|  |                      |     | 10-13-1995 | 14,896 LF | 0           | 14,747      | 0           | 149         | 0           |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 131  | PAINT STL DECK TRUSS | 2   | 07-12-1996 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
|  |                      |     | 10-13-1995 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 20/157/161) THE TRUSS MEMBERS HAVE NUMEROUS POOR WELDING DETAILS (INCLUDING TACK WELDS ON THE INTERIOR STIFFENER PLATES). [1995] THE INTERIOR OF THE TRUSS MEMBERS HAVE EXTENSIVE SURFACE RUST (SOME PITTING), AND SEVERE PIGEON DEBRIS. THERE IS CORROSION (WITH PACK RUST AND SURFACE PITTING) AT THE FLOORBEAM AND SWAY BRACE CONNECTIONS.  |                      |     |            |           |             |             |             |             |             |
| 152  | PAINT STL FLOORBEAM  | 2   | 07-12-1996 | 3,348 LF  | 0           | 2,645       | 268         | 435         | 0           |
|  |                      |     | 10-13-1995 | 3,348 LF  | 0           | 2,645       | 268         | 435         | 0           |
| Notes: THE FLOORBEAM TRUSSES HAVE NUMEROUS POOR WELDING DETAILS (INCLUDING PLUG WELDED WEB REINFORCEMENT PLATES, AND TACK WELDS & WELDED CONNECTION PLATES IN TENSION ZONES). [1994] THE FLOORBEAM TRUSSES HAVE CHALKING THROUGHOUT, WITH SEVERE FLAKING RUST BELOW THE MEDIAN. [1995] THE END FLOORBEAMS, AND THE "CROSSBEAMS" (BELOW OPEN FINGER JOINTS) HAVE SEVERE CORROSION AND EXTENSIVE DEBRIS (SHOULD BE FLUSHED). [1988] THE SOUTH CROSSBEAM DEVELOPED CRACKS (IN WEB STIFFENER) AT THE EAST ROCKER HINGE (THE HINGE HAD FROZEN) - THE CRACKS WERE DRILLED OUT, AND BRACING WAS ADDED (BEAMS #11 & #12). [1992] THE NORTH CROSSBEAM DEVELOPED A CRACK IN THE WEB STIFFENER WELD (AT EAST ROCKER HINGE) - THIS WAS DRILLED OUT. [1994] AT THE NORTH CROSSBEAM, THE BEAM #3 CONNECTION IS "WORKING" - THE BOLTS SHOULD BE REPLACED. |                      |     |            |           |             |             |             |             |             |
| 373  | STEEL HINGE          | 2   | 07-12-1996 | 1 EA      | 1           | 0           | 0           | 0           | 0           |
|  |                      |     | 10-13-1995 | 1 EA      | 1           | 0           | 0           | 0           | 0           |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 46) [1986] THE HINGE SUPPORTING THE EAST END OF THE SOUTH CROSSBEAM FROZE (DAMAGING THE CROSSBEAM)   |                      |     |            |           |             |             |             |             |             |
| 380  | SECONDARY ELEMENTS   | 2   | 07-12-1996 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|  |                      |     | 10-13-1995 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 311  | EXPANSION BEARING    | 2   | 07-12-1996 | 125 EA    | 83          | 42          | 0           | N/A         | N/A         |
|  |                      |     | 10-13-1995 | 125 EA    | 125         | 0           | 0           | N/A         | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 313  | FIXED BEARING        | 2   | 07-12-1996 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|  |                      |     | 10-13-1995 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 205  | CONCRETE COLUMN      | 2   | 07-12-1996 | 52 EA     | 51          | 1           | 0           | 0           | N/A         |
|  |                      |     | 10-13-1995 | 52 EA     | 51          | 1           | 0           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 41) [1995] PIER #11 HAS EXTENSIVE SHOT-CRETE REPAIRS, WITH 10 SF OF SPALL (EXPOSED REBAR) AT BOTH EAST AND WEST END.   |                      |     |            |           |             |             |             |             |             |
| 210  | CONCRETE PIER WALL   | 2   | 07-12-1996 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|  |                      |     | 10-13-1995 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |

Crew Number: 7627

Inspector: INSPECTOR

BRIDGE 9340

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 07-12-1996

STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 215         | CONCRETE ABUTMENT   | 2   | 07-12-1996 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
|             |                     |     | 10-13-1995 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 234         | CONCRETE CAP        | 2   | 07-12-1996 | 819 LF   | 680         | 131         | 8           | 0           | N/A         |
|             |                     |     | 10-13-1995 | 819 LF   | 680         | 139         | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 356         | FATIGUE CRACKING    | 2   | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 357         | PACK RUST           | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 358         | CONC DECK CRACKING  | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 359         | CONC DECK UNDERSIDE | 2   | 07-12-1996 | 1 EA     | 0           | 0           | 0           | 1           | 0           |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 0           | 0           | 1           | 0           |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 360         | SETTLEMENT          | 2   | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | Notes:     |          |             |             |             |             |             |
| 361         | SCOUR               | 2   | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 363         | SECTION LOSS        | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 981         | SIGNING             | 2   | 07-12-1996 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 982         | GUARDRAIL           | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 984         | DRAINAGE            | 2   | 07-12-1996 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |
| 985         | SLOPES              | 2   | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                     |     | 10-13-1995 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                     |     |            |          |             |             |             |             |             |

08/02/2007

Crew Number: 7627

### Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 07-12-1996

STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME    | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|-----------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 986         | CURB & SIDEWALK | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                 |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |
| 988         | MISCELLANEOUS   | 2   | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                 |     | 10-13-1995 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |

General Notes: \*BRIDGE #9340 YEAR 1996

NOTE: SEE FRACTURE CRITICAL REPORT FOR ADDITIONAL INFORMATION.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date



## **BR #9340: I-35W over the Mississippi River**

**FRACTURE CRITICAL INSPECTION:** July 9th - 12th, 1996

**INSPECTION BY:** Terry Moravec, Kurt Fuhrman, Eric Evens, Pete Wilson

**REPORT PREPARED BY:** Kurt Fuhrman

**BRIDGE CREW:** Spring Lake Park

**ACCESS EQUIPMENT USED:** Reachall UB50, Reachall UB60

### **RECOMMENDATIONS:**

- In Span #2, the "hinge" assemblies have severe corrosion and are closed beyond tolerable limits (the joint cannot separate). It appears that Pier #1 has tilted to the north (also the South Abutment bearings are in full contraction). As this will not be repaired in the near future, this area should be closely inspected!

- Several of the bolts connecting the stringers to the floorbeam truss are "working", loose, broken or missing. Several of these should be replaced.

NBL Panel Point #8: Stringer #10 - one bolt missing  
Stringer #11 - one bolt missing  
Stringer #13 - one bolt missing, one nut missing  
(the bearing block has rotated)

NBL Panel Point #10: Stringer #6 - one bolt missing

NBL Panel Point #8': Stringer #11 - one bolt missing

NBL Panel Point #6': Stringer #11 - two? bolts "working"

SBL Panel Point #6': Stringer #4 - one bolt missing

SBL Panel Point #8': Stringer #4 - one bolt missing

SBL Panel Point #10': Stringer #4 - one bolt loose

SBL Panel Point #11: Stringer #4 - one bolt missing, two bolts broken

- The superstructure below the open finger joints at each end of the truss spans needs to be flushed! The "rocker" hinge assemblies should be cleaned & lubricated, and the pins checked with UT.

- The bolts at the north "crossbeam" connection to Beam #3 (Span #9, SBL) are "working" and need to be replaced (this will require the "Skyjack" snorkel lift).

- The bridge railings should be updated to current standards. The exterior concrete post & beam railings should be filled in. The median railings & copes should be completely replaced, or some attempt should be made to seal the median joint.

- The following strip seals need repair: Pier #11 (possible leak at SB median), Panel point #8 (8 ft pulled out, SB right gutterline). South Abutment (pulled out in numerous locations)

## **GENERAL NOTES:**

**DESCRIPTION:** Bridge #9340 carries I-35w over the Mississippi River in downtown Minneapolis. Constructed in 1967, the 1,907 ft. long bridge has 14 spans. The south approach spans (Spans #1 - #5) are steel multi-beam. The main spans (Spans #6 - #8) consist of a steel deck truss. The north approach spans include both steel multi-beam (Spans #9 - #11), and concrete slab span (Spans #12 - #14). There are 3 traffic lanes in both directions, with no shoulders.

**SUPERSTRUCTURE:** Lead-base paint system [1968] - 20% unsound

**DECK TRUSS (Spans #6 - #8):** Due to the cantilever design, the deck truss actually begins in Span #5, and ends in Span #9. The truss is continuous over its entire length. The main river span (Span #7) is 456 ft. long.

**TRUSS MEMBERS:** There are 2 steel deck trusses. Most truss members are comprised of built-up plates (riveted) - some of the diagonal members are rolled I-beams. The connections are riveted. The truss members have numerous poor welding details - including tack welded tabs on the interior stiffener plates. There is corrosion at the floorbeam and sway brace connections, and pack rust is forming between the connection plates. There is extensive surface rust, surface pitting, and severe pigeon debris in the interior of the box members.

**FLOORBEAMS:** There are 29 floorbeams connecting the trusses. The 2 end floorbeams are welded plate girders, the rest are trusses comprised of rolled H-beams (welded connections). The floorbeams cantilever beyond the main truss on both sides. The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds and welded connection plates located in tension zones. The top and bottom chords have severe flaking rust below the median, and below deck joints. There is pack rust and surface pitting at the main truss connections.

**STRINGERS:** There are 14 steel stringers bearing on the floorbeam trusses - they are continuous except for 5 stringer expansion joints. The bolted connections to the floorbeam trusses are "working" and some of the bolts are missing. The stringers have corrosion at the expansion joints and the stringers adjacent to the median have flaking rust along the bottom flange.

**LATERAL/SWAY BRACING:** The main deck trusses have both upper and lower lateral bracing (horizontal). There is also vertical sway bracing between the main trusses below each floorbeam truss - the sway bracing has corrosion at the center (below the median). Each floorbeam truss has 2 diagonal braces which connect the bottom chord to Stringers #4 & #11. The pinned connections of these braces are "working" and at least one cotter pin is missing.

**TRUSS BEARING ASSEMBLIES:** The truss spans have 6 huge "geared" rollernest

bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion.

**STEEL MULTI-BEAM SPANS (Spans #1 -#5 & #9 - #11):**

**GIRDERS:** Spans #1 - #5 have 14 welded plate girders (riveted connections) - they are continuous except for a hinge joint in Span #2. Spans #9 - #11 widen from 15 to 18 Girders, they are continuous. The beams adjacent to the median have flaking rust along the bottom flange.

**CROSSBEAMS:** At the deck truss transitions (Spans #5 & #9) the girders terminate by framing into a "crossbeam" (welded plate girder). The crossbeams bear on "rocker" assemblies connected to the cantilever ends of the truss. The north crossbeam (Span #9) has both rocker assemblies built into the web. The south crossbeam (Span #5) has a rocker built into the web on the west truss, while the east truss rocker is below the crossbeam. The east end of the south crossbeam was damaged (cracked web stiffeners) due to failure of the rocker assembly. The crossbeam was repaired and reinforced by braces connected to Beams #2 & #3 [1986]. A crack was drilled out in the web stiffener to crossbeam weld at the Beam #12 connection in 1992. Both crossbeams have corrosion due to the open finger joints above.

**HINGE ASSEMBLIES:** There are a total of 18 hinge assemblies - this includes the 4 "rocker" hinge assemblies supporting the crossbeams at the truss ends, and 14 sliding plate assemblies at the expansion joint in Span #2. The east rocker in the south crossbeam (Span #5) had the pin replaced (the assembly had "frozen") - this required closing I-35W and jacking the multi-beam span [1986]. All four of the assemblies have severe corrosion due to the open finger joints above. The sliding plate hinges in Span #2 have severe corrosion and debris from the open finger deck joint. The joint has "closed" excessively due to bridge expansion. At beams #1, #2, #3, #4, #5, #7, #8, #12, #13 the top flange or the top half of the web of the girder ends are in contact, and the lower plate at Beam#5 had tipped off it's bearing (possibly preventing the joint from reopening) 1996.

**BEARING ASSEMBLIES:** The multi-beam spans have 90 sliding plate bearing assemblies, and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**CONCRETE SLAB (SPANS #12 - 14):** The far north approach spans consist of a continuous "voided" slab span. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). There is spalling (exposed rebar) along the exterior and median copes. There is spalling above the bearing at Pier #11 (SBL at median).

**SUBSTRUCTURE:**

**ABUTMENTS:** The North Abutment has stains from the leaking deck joint. Both Abutments have minor cracking.

**PIERS:** Piers #6 & #7 (main river span) consist of 2 concrete columns resting on a pier wall - there is a vertical crack through the west column at Pier #7. Piers #5 & #8 consist of 2 concrete columns connected with an upper strut. The columns of Pier #8 have been encased in a concrete "jacket". The piers in the multi-beam spans (Piers #1 - #5 and #9 - #11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). Pier # 11 has extensive shot-crete repairs, and some recent spalling (an open finger deck joint has been replaced with a strip seal). The far north piers (Piers #12 & #13) consist of concrete columns cast directly into the slab span deck. [1996] Pier #1 has apparently tipped to the north (should be measured with a plumb bob).

#### **BRIDGE DECK:**

**STRUCTURAL SLAB:** The undersides of the copes (especially the median coping) have severe spalling (exposed rebar) along the entire length of the bridge. The underside of the deck is in otherwise good condition, with a moderate amount of transverse leaching cracks, and some full depth deck repairs.

**WEARING SURFACE:** Low slump concrete overlay [1978]. The wearing surface is in generally good condition, with some minor spalls and patched areas around the finger joints.

**EXPANSION JOINTS:** There are 3 open finger joints, 8 strip seal joints [1978], plus a number of pourable joints. [1995] The strip seal at the South Abutment (SBL) is pulled out in several locations. [1995] There is a possible leak in the strip seal at Pier #11 (SBL at median). [1996] The strip seal at Panel Point #8 has 8 ft pulled out (SB right gutterline). [1994] Some of the curb cover plates are missing (SBL).

**RAILING:** The exterior railing is concrete post & beam - there are spalls (exposed rebar) along the underside of the "beam" and on the face of the railposts. The split median rail is steel plate guardrail, there is minor impact damage in numerous locations.

#### **OTHER ELEMENTS:**

**APPROACH PANELS:** All approaches are concrete. There is a transverse crack in each approach, and some minor spalls at the joints. Relief joints should be cut in the curbs and median. The relief joints need to be resealed. The north approach (SBL and on ramp) has no relief joint [1996].

**CHANNEL AND PROTECTION:** Pier #7 is on the east bank of the Mississippi. Due to extreme turbulence (the bridge is directly downstream from the lower St. Anthony Lock), there have been no accurate soundings taken recently.

**SIGNING:** There are no "Type III" hazard markers at the south end.

**GUARDRAIL:** The approach guardrail has minor traffic impact damage at the SE

approach [1994].

**DRAINAGE:** The bridge deck drains directly into the river. The drain troughs (under finger joints) have inadequate slope, and tend to fill up with debris.

**SLOPE PROTECTION:** There is concrete slope paving at both abutments.

**CURB AND WALK:** The concrete curb along the outside railing has a moderate amount of delamination and spalling.

**LIGHTING:** The bridge has rail mounted deck lighting, under deck lighting, and river navigation lighting. A light post (SBL - "W 5/3 L") has a 6" vertical split due to traffic impact [1994]. An underdeck light cover in Span #14 is broken.

**MISCELLANEOUS:** The impact attenuator at the northbound off ramp to University Ave. has minor impact damage [1994]. The areas under some approach spans (Spans #3, #4, #11 & #12) are being leased out as parking lots. Material from river dredging is being stockpiled under Span #8.

#### **NORTHBOUND INSPECTION (includes the east truss and all substructure)**

**SOUTH ABUTMENT:** Strip seal deck joint above. At the north end (SBL), 15 lf of the strip seal has pulled out. There are 14 sliding plate bearing assemblies. [1995] the bearings are in full contraction (see Pier #1 and hinge in Span #2), and many have corrosion. The seat area is cracked and discolored.

**SPAN #1 (Steel Multi-beam):** The NB and SB bridges both have 7 beams.

**PIER #1:** There are 10 fixed plate, and 4 sliding plate bearing assemblies. The pier consists of 4 concrete columns and cap, with a strut between column bases. [1996] The pier has apparently tipped to the north (should be measured with a plumb bob).

**SPAN #2 (Steel Multi-beam):** The NB and SB bridges both have 7 beams. the girder depth increases at the hinge joint. Flaking rust on bottom flange @ girder transitions [1996].

**Hinge Joint (12 ft. south of Pier #2):** There is an open finger deck joint above. There is severe corrosion and debris on the hinge assemblies and beam ends. The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates have extended 1-3/4" beyond the base plates). At Beam #5, the sliding plate is tipped (falling off the base plate), preventing the joint from opening. Several of the beam ends are contacting - The top flange of beams #2,3,4,7,8,12,& 13, and the webs of Beams #4,5,& 7. All of beam 1 is in contact at the hinge. (See pictures #1 & #2).

**PIER #2:** There are 14 sliding plate bearing assemblies. The pier consists of 4 concrete columns

and cap, with a strut between the column bases.

**SPAN #3 (Steel Multi-beam):** The NB and SB bridges each have 7 beams.

**PIER #3:** There are 10 fixed plate, and 4 sliding plate bearing assemblies. The pier consists of 4 concrete columns and a cap.

**SPAN #4 (Steel Multi-beam):** The NB and SB bridges each have 7 beams.

**PIER #4:** There are 14 sliding plate expansion bearing assemblies. The pier consists of 4 concrete columns and cap.

**SPAN #5 (Multi-beam/Deck Truss):** The NB and SB bridges each have 7 beams - they terminate by framing into a crossbeam at Panel Point #0. Four clamps missing from conduit (north bound fascia beam) [1996]. Median girder has impact damage, parking lot below [1996].

**CROSSBEAM [1986]** The east end of the "crossbeam" was damaged due to the rocker pin "freezing" (the web stiffener cracked). The bridge was jacked up (I-35W had to be closed entirely) - the east rocker pin was replaced, cracks in the crossbeam were drilled out, and bracing was added between the crossbeam and Beams #11 & #12. [1996] The crossbeam has severe corrosion and debris - should be flushed.

**PANEL POINT #0 (Beginning of East Truss):** There is an open finger joint above. [1994] The east rocker "hinge" assembly has severe corrosion. [1996] The truss floorbeam and connecting gusset plates have severe corrosion and debris - should be flushed. [1996] the west end of the drain trough is severely bent (welded? to floorbeam stiffeners).

**PANEL POINT #1, (East Truss, Pier #5):**

**PIER #5:** There are 2 "rollernest" bearing assemblies. The pier consists of 2 concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**SPAN 6 (Deck Truss):** Panel Pt. #1 is at Pier #5 - Panel Pt. #8 is at Pier #6

**PANEL POINT #2 (East Truss):**

**PANEL POINT #3 (East Truss):** There is an undercut weld in the flange at the center of the floorbeam truss.

**PANEL POINT #4 (East Truss, Stringer Joint):** There is a strip seal deck joint above. The top chord of the floorbeam truss has a cracked tack weld? [1996] There is an "overlap weld" at the floorbeam truss bottom chord /vertical member connection gusset plate.

**PANEL POINT #5 (East Truss):**

**PANEL POINT #6 (East Truss):** [1994] The top chord of the floorbeam truss has a cracked weld in the bottom flange at the end of a connection plate.

**PANEL POINT #7 (East Truss):**

**PANEL POINT #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. Stringers #10 & #11 each have a bolt missing from the floorbeam truss connection. At Stringer #13, one bolt is missing ( the nut is missing from the other bolt) - the bearing block has rotated (pictures #3,4,& 5).

**PIER #6 (DT side of Mississippi):** There are 2 “rollernest” bearing assemblies, they have light rust. The pier consists of 2 concrete columns with a “pierwall” at the base.

**SPAN 7 (Deck Truss):** Panel Point #8 is at Pier #6, Panel Point #14 is at midspan, and Panel Point #8' is at Pier #7

**PANEL POINT #9 (East Truss):**

**PANEL POINT #10 (East Truss):** Navigation light. [1996] At Stringer #6, there is a bolt missing from the floorbeam truss connection.

**PANEL POINT #11 (East Truss):** Section loss at gusset plate, bottom chord.

**PANEL POINT #12 (East Truss):**

**PANEL POINT #13 (East Truss):** Section loss at gusset plate, bottom chord. The top chord at the center of the floorbeam truss has a “four way” diagonal member welded (transverse) on the bottom flange (is this typical?).

**PANEL POINT #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint in the deck. Sway frame rusty.

**PANEL POINT #13' (East Truss):** [1996] Cracked tack weld in baffle plate bottom chord L13' - L12' (See picture#?).

**PANEL POINT #12' (East Truss):**

**PANEL POINT #11' (East Truss):**

**PANEL POINT #10' (East Truss):**

**PANEL POINT #9' (East Truss):** Deck Drains.

**PANEL POINT #8' (East Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. The floorbeam truss has severe rust at the median. The floorbeam truss connections to Stringers #10 & #11 have had missing bolts replaced with "Redi-rod" (one nut missing at Stringer #11) [1996]. Red navigation light.

**PIER #7 (East bank of Mississippi):** There are 2 fixed bearing assemblies. The pier consists of 2 concrete columns with a "pierwall" at the base.

**SPAN 8 (Deck Truss):**

**PANEL POINT #7' (East Truss):**

**PANEL POINT #6' (East Truss):** [1996] The Stinger #11 connection to the floorbeam truss is "working", the bolts should be replaced.

**PANEL POINT #5' (East Truss):**

**PANEL POINT #4' (East Truss, Stringer Joint):** Strip seal deck joint above.

**PANEL POINT #3' (East Truss):** The top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**PANEL POINT #2' (East Truss):**

**PIER #8:** There are 2 "rollernest" bearing assemblies, they have light rust. The pier consists of 2 concrete columns connected by an upper strut. The columns have a concrete "jacket" around them.

**PANEL POINT #1' (East Truss, Pier #8):**

**PANEL POINT #0' (End of East Truss):** There is an open finger deck joint above. [1996] The floorbeam has severe corrosion and debris (should be flushed).

**CROSSBEAM:** [1996] The crossbeam, and east hinge rocker assembly have severe corrosion and debris - should be flushed. [1992] A crack in the floorbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out.

**SPAN #9 (Deck Truss/Multi-beam):** The multi-beam spans resume (framed into the crossbeam) with 8 beams in the NB bridge at Panel Point #0'. There are railroad tracks below.

**PIER #9:** There are 13 fixed, and 4 expansion bearing assemblies. The pier consists of 4 columns and cap, with a lower strut.

**SPAN #10 (Steel multi-beam):** The NB bridge has 10 beams, the SB bridge has 7 beams - they

transition to a shallow beam. There are railroad tracks below.

**PIER #10:** There are 18 sliding plate expansion bearings. The pier consists of 5 columns and cap with a lower strut.

**SPAN #11 (Steel Multi-beam):** The NB bridge has 11 beams, the SB bridge has 7 beams. There is a parking lot below.

**PIER #11:** Strip seal deck joint above. [1995] The gland is leaking near the median (SBL). There are 18 sliding plate bearings for the steel beams, and 15 sliding plate bearings for the slab span. The pier consists of 7 columns and a cap. The cap has extensive shot-crete repairs, and 10 sq. ft. of spall (exposed rebar) at the west end. This point is the beginning of the NB off ramp to University Ave. - Br #9340"A".

**SPAN #12 (Concrete Slab Span):** There is delamination and spall (exposed rebar) along the median and exterior copes. There is a parking lot below.

**PIER #12:** The pier consists of 6 columns, which are integral with the slab span deck (no bearings).

**SPAN #13 (Concrete Slab Span):** 2nd St. passes below. There is delamination and spall along the median and exterior copes.

**PIER #13:** The pier consists of 6 columns, which are integral with the slab span deck (no bearings).

**SPAN #14 (Concrete Slab Span):** There is delamination and spall along the median and exterior copes. An under deck light cover is broken.

**NORTH ABUTMENT:** There is a strip seal deck joint above. There are 14 sliding plate bearing assemblies.

**SOUTHBOUND INSPECTION (West Truss only, See NB notes for approach spans) The stringers are numbered from the west (1 through 14)**

**SPAN #9 (Steel Multi-beam/Deck Truss):** The SB bridge has 7 beams which terminate by framing into the crossbeam at Panel Point #0'.

**CROSSBEAM** [1994] The bolted connection between the crossbeam and Beam #3 (above rocker) is "working" - the bolts should be replaced (See pictures #6 & #7). We should attempt to reach this from below with the new "Skyjack" snorkel lift when it becomes available (the 50 ft boom truck can't reach). [1996] The crossbeam has severe corrosion and debris - should be flushed. The rocker hinge has severe corrosion.

**PANEL POINT #0' (Beginning of West Truss):** Open finger deck above. The truss floorbeam has severe corrosion and debris - should be flushed. [1996] There is severe corrosion on bolts and nuts at the floorbeam/truss connection (See picture #8).

**PANEL POINT #1' (West Truss, Pier #8):**

**PIER #8:** See NB notes

**SPAN 8 (Deck Truss):** Panel Point #1' is at Pier #8, Panel Point #8' is at Pier #7.

**PANEL POINT #2' (West Truss):**

**PANEL POINT #3' (West Truss):** There is an "ugly" weld in the top flange of the upper chord of the floorbeam truss below connection to Stringer #4.

**PANEL POINT #4' (West Truss, Stringer Joint):** Strip seal deck joint above.

**PANEL POINT #5' (West Truss):**

**PANEL POINT #6' (West Truss):** There is a bolt missing at the Stringer #4 connection to the floorbeam truss [1996].

**PANEL POINT #7' (West Truss):**

**PANEL POINT #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1996] Stringer #4 has a missing bolt at the floorbeam truss connection (See picture #9). Below Stringer #2, the diagonal brace between top and bottom chord of the floorbeam truss is bent???  
**CHECK THIS!!!!!!!**

**Pier #7:** See NB notes.

**SPAN 7 (Deck Truss):**

**PANEL POINT #9' (West Truss):** Sway frame and gusset plate connection, some rivets rusty in the median area.

**PANEL POINT #10' (West Truss):** [1994] At the Stringer #4 connection to the floorbeam truss, there is a loose or broken bolt. The top chord (U10' - U11') has 6 nicks on the exterior (15' south of U10').

**PANEL POINT #11' (West Truss):** There is a nick in the truss bottom chord (L11' - L12').

**PANEL POINT #12' (West Truss):** The truss diagonal (U12' - L13') has 1 nick inside, 2

outside. The truss bottom chord (L12' - L13') has a nick.

**PANEL POINT #13' (West Truss):**

**PANEL POINT #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains both sides. Stringer #4 top flange rusty. [1996] There are tack welds at the sway frame/truss bottom chord gusset plate.

**PANEL POINT #13 (West Truss):** There is pack rust at the truss bottom chord/ sway frame connection. [1996] Member L13 /L14 has a cracked tack weld at the internal stiffener.

**PANEL POINT #12 (West Truss):** [1996] Member L12 / L13 has a cracked tack weld at the internal stiffener [1996].

**PANEL POINT #11 (West Truss):** At the Stringer #4 floorbeam truss connection, there is 1 bolt missing (north), and 2 bolts broken (south) - this means the connection has only 1 of the 4 bolts. The stringer has lifted 3/32".

**PANEL POINT #10 (West Truss):** The truss top chord (U10 - U9) has 2 spots ground out.

**PANEL POINT #9 (West Truss):** The truss diagonal (L9 - U8) has a spot ground out.

**PANEL POINT #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains both sides (downspout east side) - [1996] drains are clogged. The sway frame is rusty at the two connection points in the median area.

**PIER #6:** See NB notes.

**SPAN #6:**

**PANEL POINT #7 (West Truss):**

**PANEL POINT #6 (West Truss):** Overhead sign above. The top chord of the floorbeam truss (U5 - U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out.

**PANEL POINT #5 (West Truss):**

**PANEL POINT #4 (West Truss, Stringer Joint):** Strip seal deck joint. .

**PANEL POINT #3 (West Truss):** There is a nick on the truss bottom chord (L2 - L3).

**PANEL POINT #2 (West Truss):** [1996] The floorbeam truss member L2 / U3 has a

welding flaw (did not appear cracked) (See picture #11).

**PIER #5:** See NB notes.

**PANEL POINT #1 (West truss, Pier #5):** There is a cotter pin missing from the diagonal brace (floorbeam to stringer) at the floorbeam truss connection [1994]. There is a deck drain downspout.

**PANEL POINT #0 (End of West Truss):** Open finger deck joint above. The floorbeam has severe corrosion and debris - should be flushed. [1996] The horizontal portion of drain is leaking, appears plugged.

**CROSSBEAM:** The crossbeam and west rocker hinge have severe corrosion.

**SPAN #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel point #0

See NB notes for south approach spans

1996 BR 9340 Picture list

- Span 2 @ Hinge, Beam 7, picture not in report
- No. 3 Panel Point 8, Stringer 10
- No. 4 Panel Point 8, Stringer 13
- No. 5 Panel Point 8, Stringer 13
- No. 12 Panel Point 13', East Truss, Bottom Chord L13' - L12'
- No. 6 Crossbeam (Multibeam spans @ Panel Point 0'), Beam 3
- No. 7 Crossbeam (Multibeam spans @ Panel Point 0'), Beam 3
- No. 8 Panel Point 0', West Truss Connection
- No. 9 Panel Point 8', Stringer 4
- No. 11 Panel Point 2, West Truss, Diagonal Floorbeam Truss Member L2 - U3
- Span 2 @ Hinge, Beam 1, picture not in report
- Span 2 @ Hinge, Beam 1, picture not in report
- Span 2 @ Hinge, Beam 2, picture not in report
- Span 2 @ Hinge, Beam 3, picture not in report
- Span 2 @ Hinge, Beam 4, picture not in report
- Span 2 @ Hinge, Beam 4, picture not in report
- No. 1 Span 2 @ Hinge, Beam 4
- Span 2 @ Hinge, Beam 5, picture not in report
- Span 2 @ Hinge, Beam 5, picture not in report
- Span 2 @ Hinge, Beam 5, picture not in report
- Span 2 @ Hinge, Beam 5, picture not in report
- No. 2 Span 2 @ Hinge, Beam 5



Crew Number: 7627

Inspector: INSPECTOR

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 08-04-1997**

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 20 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 6 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate:  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

**STRUCTURE UNIT: 0**

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|--|----------------------|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|--|
| 22   | LS O/L (CONC DECK)   | 2   | 08-04-1997 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
|  |                      |     | 07-12-1996 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 48   | LS O/L (CONC SLAB)   | 2   | 08-04-1997 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
|  |                      |     | 07-12-1996 | 219,086 SF | 0           | 0           | 0           | 0           | 0           |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 300  | STRIP SEAL JOINT     | 2   | 08-04-1997 | 946 LF     | 908         | 0           | 38          | N/A         | N/A         |  |
|  |                      |     | 07-12-1996 | 315 LF     | 315         | 0           | 0           | N/A         | N/A         |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 301  | POURED DECK JOINT    | 2   | 08-04-1997 | 2,924 LF   | 1,023       | 0           | 1,901       | N/A         | N/A         |  |
|  |                      |     | 07-12-1996 | 2,924 LF   | 1,023       | 0           | 1,901       | N/A         | N/A         |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 303  | ASSEMBLY DECK JOINT  | 2   | 08-04-1997 | 326 LF     | 326         | 0           | 0           | N/A         | N/A         |  |
|  |                      |     | 07-12-1996 | 326 LF     | 326         | 0           | 0           | N/A         | N/A         |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 321  | CONC APPROACH SLAB   | 2   | 08-04-1997 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
|  |                      |     | 07-12-1996 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 107  | PAINTED STEEL GIRDER | 2   | 08-04-1997 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |  |
|  |                      |     | 07-12-1996 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 8/20/33/79) [1968] BRIDGE PAINTED WITH LEAD BASE SYSTEM. [1995] THE PAINT SYSTEM IS 20% UNSOUND.   |                      |     |            |            |             |             |             |             |             |  |
| 8) SPANS #1-5 & #9-11. WELDED COVER PLATES AT SOUTH END. [1995] BEAMS HAVE MINOR CHALKING THROUGHOUT, WITH FLAKING RUST ON THE BOTTOM FLANGE OF THE BEAMS ADJACENT TO THE MEDIAN. BEAMS HAVE SEVERE CORROSION AT THE HINGES (SPAN #2). |                      |     |            |            |             |             |             |             |             |  |
| 113  | PAINT STEEL STRINGER | 2   | 08-04-1997 | 14,896 LF  | 0           | 14,747      | 0           | 149         | 0           |  |
|  |                      |     | 07-12-1996 | 14,896 LF  | 0           | 14,747      | 0           | 149         | 0           |  |
| Notes:   |                      |     |            |            |             |             |             |             |             |  |
| 131  | PAINT STL DECK TRUSS | 2   | 08-04-1997 | 2,127 LF   | 0           | 0           | 1,914       | 213         | 0           |  |
|  |                      |     | 07-12-1996 | 2,127 LF   | 0           | 0           | 1,914       | 213         | 0           |  |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 08-04-1997

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 20/157/161) TRUSS MEMBERS HAVE NUMEROUS POOR WELDING DETAILS (INCLUDING TACK WELDS ON THE INTERIOR STIFFENER PLATES). [1995] INTERIOR OF THE TRUSS MEMBERS HAVE EXTENSIVE SURFACE RUST (SOME PITTING), AND SEVERE PIGEON DEBRIS. CORROSION (WITH PACK RUST AND SURFACE PITTING) AT THE FLOORBEAM AND SWAY BRACE CONNECTIONS.  |                     |     |            |          |             |             |             |             |             |
| 152   | PAINT STL FLOORBEAM | 2   | 08-04-1997 | 3,348 LF | 0           | 2,645       | 268         | 435         | 0           |
|   |                     |     | 07-12-1996 | 3,348 LF | 0           | 2,645       | 268         | 435         | 0           |
| Notes: FLOORBEAM TRUSSES HAVE NUMEROUS POOR WELDING DETAILS (INCLUDING PLUG WELDED WEB REINFORCEMENT PLATES, AND TACK WELDS & WELDED CONNECTION PLATES IN TENSION ZONES). [1994] FLOORBEAM TRUSSES HAVE CHALKING THROUGHOUT, WITH SEVERE FLAKING RUST BELOW THE MEDIAN. [1995] END FLOORBEAMS & "CROSSBEAMS" (BELOW OPEN FINGER JOINTS) HAVE SEVERE CORROSION AND EXTENSIVE DEBRIS (SHOULD BE FLUSHED). [1986] SOUTH CROSSBEAM DEVELOPED CRACKS (IN WEB STIFFENER) AT THE EAST ROCKER HINGE (THE HINGE HAD FROZEN) - THE CRACKS WERE DRILLED OUT, AND BRACING WAS ADDED (BEAMS #11 & #12). [1992] NORTH CROSSBEAM DEVELOPED A CRACK IN THE WEB STIFFENER WELD (AT EAST ROCKER HINGE) - THIS WAS DRILLED OUT. [1994] AT THE NORTH CROSSBEAM, THE BEAM #3 CONNECTION IS "WORKING" - THE BOLTS SHOULD BE REPLACED. [1997] NORTH CROSSBEAM HAS ADDITIONAL WELD CRACKING BELOW THE EAST ROCKER (NEEDS REPAIR). |                     |     |            |          |             |             |             |             |             |
| 373   | STEEL HINGE         | 2   | 08-04-1997 | 18 EA    | 0           | 0           | 0           | 4           | 14          |
|   |                     |     | 07-12-1996 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes: 46) [1986] HINGE SUPPORTING THE EAST END OF THE SOUTH CROSSBEAM FROZE (DAMAGING THE CROSSBEAM) - PIN WAS REPLACED.   |                     |     |            |          |             |             |             |             |             |
| 380   | SECONDARY ELEMENTS  | 2   | 08-04-1997 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|   |                     |     | 07-12-1996 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 311   | EXPANSION BEARING   | 2   | 08-04-1997 | 125 EA   | 83          | 42          | 0           | N/A         | N/A         |
|   |                     |     | 07-12-1996 | 125 EA   | 83          | 42          | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 313   | FIXED BEARING       | 2   | 08-04-1997 | 35 EA    | 35          | 0           | 0           | N/A         | N/A         |
|   |                     |     | 07-12-1996 | 35 EA    | 35          | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 205   | CONCRETE COLUMN     | 2   | 08-04-1997 | 52 EA    | 51          | 1           | 0           | 0           | N/A         |
|   |                     |     | 07-12-1996 | 52 EA    | 51          | 1           | 0           | 0           | N/A         |
| Notes: 41) [1995] PIER #11 HAS EXTENSIVE SHOT-CRETE REPAIRS, WITH 10 SF OF SPALL (EXPOSED REBAR) AT BOTH EAST AND WEST END.   |                     |     |            |          |             |             |             |             |             |
| 210   | CONCRETE PIER WALL  | 2   | 08-04-1997 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
|   |                     |     | 07-12-1996 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 215   | CONCRETE ABUTMENT   | 2   | 08-04-1997 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
|   |                     |     | 07-12-1996 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 08-04-1997

## STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|-------------|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|--|
| 234         | CONCRETE CAP        | 2   | 08-04-1997 | 819 LF   | 680         | 131         | 8           | 0           | N/A         |  |
|             |                     |     | 07-12-1996 | 819 LF   | 680         | 131         | 8           | 0           | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 356         | FATIGUE CRACKING    | 2   | 08-04-1997 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 357         | PACK RUST           | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 358         | CONC DECK CRACKING  | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 359         | CONC DECK UNDERSIDE | 2   | 08-04-1997 | 1 EA     | 0           | 0           | 0           | 1           | 0           |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 0           | 0           | 1           | 0           |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 360         | SETTLEMENT          | 2   | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 361         | SCOUR               | 2   | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 363         | SECTION LOSS        | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 981         | SIGNING             | 2   | 08-04-1997 | 1 EA     | 0           | 0           | 1           | 0           | 0           |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 0           | 1           | 0           | 0           |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 982         | GUARDRAIL           | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 984         | DRAINAGE            | 2   | 08-04-1997 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 985         | SLOPES              | 2   | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |
| 986         | CURB & SIDEWALK     | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |  |
|             |                     |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |  |
| Notes:      |                     |     |            |          |             |             |             |             |             |  |

Crew Number: 7627

### Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 08-04-1997

**STRUCTURE UNIT: 0**

| ELEM<br>NBR | ELEMENT NAME  | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|---------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 988         | MISCELLANEOUS | 2   | 08-04-1997 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |               |     | 07-12-1996 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |

Notes:

General Notes: \*BRIDGE #9340 YEAR 1997

BRIDGE CONSTRUCTED IN 1967. SEE FRACTURE CRITICAL REPORT FOR ADDITIONAL INFORMATION.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date



# Minnesota Department of Transportation



**Bridge Inspection, Maintenance Operations**

**Metro Division**

1500 W. County Road B2

Roseville, MN 55113

**1997**

## **Fracture Critical Bridge Inspection Report** *In Depth*

**Bridge # 9340**

**I-35W over the Mississippi River (Downtown Minneapolis)**

**Inspection Date:** July 28 - August 4, 1997

**Inspected By:** M. Pribula, T. Moravec, E. Evens, K. Fuhrman, P. Wilson, J. Peterson

**Report Written By:** Pete Wilson

**Reviewed By:** Mark Pribula

**Bridge Maintenance Sub Area:** Spring Lake Park

**Access Equipment Used:** UB50 Reach All (Mn/DOT)

UB60 Reach All (City of St. Paul)

### ***1998 Inspection Schedule***

***Bridge Maintenance Sub Area: Spring Lake Park***

***Date: August 3 - 13***

***Type: Annual***

# Fracture Critical Bridge Inspection Report

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Bridge # 9340

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## **Bridge Inspection Recommendations:**

- 1. Cracks discovered this year in the crossbeam stiffener welds at the NE & SW truss rockers need to be repaired (still waiting for bridge office recommendations). As these cracks are likely related to the rocker bearing, the assemblies should be cleaned & lubricated. The bearing pins should also be examined with UT. The bolts at the north "crossbeam" connection to Beam #3 (Span #9, SBL) are "working" and need to be replaced. This work can all be performed from below using the "Skyjack" snorkel lift - no lane closures on I-35W will be required.**
- 2. The bolts connecting the stringers to the floorbeam truss are "working" loose and breaking - at least 20 bolts need to be replaced. This will now be done as part of the upcoming painting/repair contract.**
- 3. The superstructure below the open finger joints at each end of the truss spans need to be flushed!**
- 4. The following strip seals need repair: Pier #11 (possible leak at SB median), Panel Point #8 (8 ft pulled out, SB right gutterline). South Abutment (pulled out in numerous locations).**
- 5. Main truss bearings should be monitored for movement!**
- 6. Long-term recommendations include: The exterior and median copings should be replaced, and the bridge railings should be updated to current standards. The bridge should be repainted (lead system removed). The open finger joints should be replaced with sealed modular joints. The hinge joint in Span #2 should be repaired or eliminated.**

## GENERAL NOTES:

**Description:** Bridge #9340 carries I-35W over the Mississippi River in downtown Minneapolis. Constructed in 1967, the 1,907 ft. long bridge has 14 spans. The south approach spans (Spans #1 - #5) are steel multi-beam. The main spans (Spans #6 - #8) consist of a steel deck truss. The north approach spans include both steel multi-beam (Spans #9 - #11), and concrete slab span (Spans #12 - #14). There are 3 traffic lanes in both directions, with no shoulders.

**SUPERSTRUCTURE:** Lead-base paint system [1968] - 20% unsound.

**Deck Truss (Spans #6 - #8):** Due to the cantilever design, the deck truss begins in Span #5, and ends in Span #9. The truss is continuous over its entire length. The main river span (Span #7) is 456 ft. long.

**Truss Members:** There are 2 steel deck trusses. Most truss members are comprised of built-up plates (riveted) - some of the diagonal & vertical members are rolled I-beams. The connections include both rivets and bolts. The truss members have numerous poor welding details - including tack welded tabs on the interior stiffener plates. There is corrosion at the floorbeam and sway brace connections, and pack rust is forming between the connection plates. There is extensive surface rust, surface pitting, and severe pigeon debris in the interior of the box members.

**Floorbeams:** There are 29 floorbeams connecting the trusses. The 2 end floorbeams are welded plate girders, the rest are trusses comprised of rolled H-beams (welded connections). The floorbeams cantilever beyond the main truss on both sides. The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds and welded connection plates located in tension zones. The top and bottom chords have severe flaking rust below the median, and below deck joints. There is pack rust and surface pitting at the main truss connections.

**Stringers:** There are 14 steel stringers bearing on the floorbeam trusses - they are continuous except for 5 stringer expansion joints. The bolted connections to the floorbeam trusses are "working" and some of the bolts are missing. The stringers have corrosion at the expansion joints and the stringers adjacent to the median have flaking rust along the bottom flange.

**Lateral/Sway Bracing:** The main deck trusses have both upper and lower lateral bracing (horizontal). There is also vertical sway bracing between the main trusses below each floorbeam truss - the sway bracing has corrosion at the center (below the median). Each floorbeam truss has 2 diagonal braces which connect the bottom chord to Stringers #4 & #11. The pinned connections of these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have 6 huge "geared" rollernest bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion.

## **STEEL MULTI-BEAM SPANS: (Spans #1 -#5 & #9 - #11)**

**Girders:** Spans #1 - #5 have 14 welded plate girders (riveted connections) - they are continuous except for a hinge joint in Span #2. Spans #9 - #11 widen from 15 to 18 Girders, they are continuous. The fascia beams & beams adjacent to the median have flaking rust along the bottom flange.

**Crossbeams:** At east end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam" (welded plate girder). The crossbeams bear on "rocker" assemblies bearing upon the cantilever ends of the truss. Of these four connections, three have the rocker assemblies built into the crossbeam web - the southeast rocker connects to the bottom flange of the crossbeam. In 1986 the SE rocker bearing "froze", resulting in damage to the east end of the south crossbeam (cracked web stiffeners). The crossbeam was repaired and reinforced by braces connected to Beams #2 & #3. In 1992, a crack was discovered in the north crossbeam stiffener weld above the east rocker (drilled out). In 1997, additional cracks were discovered at this location in the stiffener welds, and a crack was found at the end of a stiffener near the SW rocker. Both crossbeams have corrosion (flaking rust & surface pitting) due to the open finger joints above.

**Hinge Assemblies:** There are a total of 18 hinge assemblies - this includes the 4 "rocker" hinge assemblies supporting the crossbeams at the truss ends, and 14 sliding plate assemblies at the expansion joint in Span #2. In 1986, the SE rocker pin was replaced (the assembly had "frozen") - this required closing I-35W and jacking the multi-beam span. All four of the assemblies have severe corrosion due to the open finger joints above. The sliding plate hinges in Span #2 have severe corrosion and debris from the open finger deck joint. [1996] The Span #2 joint is "closed" beyond tolerable limits (possibly due to substructure movement & pavement thrust). Virtually all of the beam ends are in contact, and some of the lower slide plates have tipped (preventing the joint from reopening).

**Bearing Assemblies:** The multi-beam spans have 90 sliding plate bearing assemblies, and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Concrete Voided Slab (Spans #12 - 14):** The far north approach spans consist of a continuous "voided" slab span. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). There is spalling (exposed rebar) along the exterior and median copes. There is spalling above the bearing at Pier #11 (SBL at median).

## **SUBSTRUCTURE:**

**Abutments:** The North Abutment has stains from the leaking deck joint. Both Abutments have minor cracking.

**Piers:** Piers #6 & #7 (main river span) consist of 2 concrete columns resting on a pier wall - there is a vertical crack through the west column at Pier #7. Piers #5 & #8 consist of 2 concrete columns connected with an upper strut. The columns of Pier #8 have been encased in a concrete "jacket". The piers in the multi-beam spans (Piers #1 - #5 and #9 - #11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). Pier # 11 has extensive shot-crete repairs, and some recent spalling (an open finger deck joint has been replaced with a strip seal). The far north piers (Piers #12 & #13) consist of concrete columns cast directly into the slab span deck. [1996] Pier #1 has apparently tipped to the north (should be measured with a plumb bob).

## **BRIDGE DECK:**

**Structural Slab:** The undersides of the copings (especially the median coping) have severe spalling (exposed rebar) along the entire length of the bridge. The underside of the deck is in otherwise good condition, with a moderate amount of transverse leaching cracks, and some full depth deck repairs.

**Wearing Surface:** Low slump concrete overlay [1978]. The wearing surface is in generally good condition, with some minor spalls and patched areas around the finger joints.

**Expansion Joints:** There are 3 open finger joints, 8 strip seal joints [1978], plus a number of pourable joints. [1995] The strip seal at the South Abutment (SBL) is pulled out in several locations. [1995] There is a possible leak in the strip seal at Pier #11 (SBL at median). [1996] The strip seal at Panel Point #8 has 8 ft pulled out (SB right gutterline). [1994] Some of the curb cover plates are missing (SBL).

**Railing:** The exterior railing is concrete post & beam - there are spalls (exposed rebar) along the underside of the "beam" and on the face of the railposts. The split median rail is steel plate guardrail, there is minor impact damage in numerous locations.

## **OTHER BRIDGE ELEMENTS:**

**Approach Panels:** All approaches are concrete. There is a transverse crack in each approach, and some minor spalls at the joints. Relief joints should be cut in the curbs and median. The relief joints need to be resealed. The north approach (SBL and on ramp) has no relief joint [1996].

**Channel & Protection:** Pier #7 is on the east bank of the Mississippi. Due to extreme turbulence (the bridge is directly downstream from the lower St. Anthony Lock), there have been no accurate soundings taken recently.

**Signing:** There are no "Type III" hazard markers at the south end.

**Guardrail:** The approach guardrail has minor traffic impact damage at the SE approach [1994].

**Drainage:** The bridge deck drains directly into the river. The drain troughs (under finger joints) have inadequate slope, and tend to fill up with debris.

**Slope Protection:** There is concrete slope paving at both abutments.

**Curb & Walk:** The concrete curb along the outside railing has a moderate amount of delamination and spalling.

**Lighting:** The bridge has rail mounted deck lighting, under deck lighting, and river navigation lighting. A light post (SBL - "W 5/3 L") has a 6" vertical split due to traffic impact [1994]. An underdeck light cover in Span #14 is broken.

**Miscellaneous:** The impact attenuator at the northbound off ramp to University Ave. has minor impact damage [1994]. The areas under some approach spans (Spans #3, #4, #11 & #12) are being leased out as parking lots. Material from river dredging is being stockpiled under Span #8.

**NORTHBOUND INSPECTION: (Includes the East Truss and All Substructure). Beams and stringers are numbered from the east (from original plans).**

**South Abutment:** Strip seal deck joint above. At the north end (SBL) ,15 lf of the strip seal has pulled out. There are 14 sliding plate bearing assemblies. [1995] The bearings are in full contraction (see Pier #1 and hinge in Span #2), and many have corrosion. The seat area is cracked and discolored.

**Span #1 (Steel Multi-beam):** 14 beams. The beams have welded cover plates. [1996] East fascia beam has flaking rust. The 3 west bays have some full depth deck patches.

**Pier #1:** 10 fixed plate, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a strut between column bases. [1996] The pier has apparently tipped to the north (should be measured with a plumb bob).

**Span #2 (Steel Multi-beam):** 14 beams, the girder depth increases at the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. Some full depth deck repairs.

**Hinge Joint (12 ft. South of Pier #2):** Open finger joint above. Severe corrosion and debris on the hinge assemblies and beam ends. The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate is tipped (falling off the base plate) preventing the joint from opening. Several of the beam ends are contacting at the top flange or at the web.

**Pier #2:** 14 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a strut between the column bases. [1997] Bearings have corrosion, east end of cap has 4 SF of delamination.

**Span #3 (Steel Multi-beam):** 14 beams. The 3 west bays have some full depth deck patches.

**Pier #3:** 10 fixed plate, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and a cap.

**Span #4 (Steel Multi-beam):** 14 beams. [1997] The 2nd bay from the east has 20 SF of leaching map cracks. There is 200 SF of spall (exposed rebar) below a pourable joint (full width of deck).

**Pier #4:** 14 sliding plate expansion bearing assemblies. [1997] Flaking rust on bearings. Pier consists of 4 concrete columns and cap.

**Span #5 (Multi-beam/Deck Truss):** 14 beams - they terminate by framing into a crossbeam at Panel Point #0. [1996] Four conduit clamps missing (north bound fascia beam). Median girder has impact damage (parking lot below). The 2 west bays have some full depth deck patches. [1997] Deck leaching near the finger joint.

**Crossbeam:** [1986] The SE rocker "froze", damaging the east end of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W was closed to traffic) - the SE rocker pin was replaced, cracks in the crossbeam were drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1996] The crossbeam has severe corrosion and debris - should be flushed. [1997] Rocker shows 1/2" movement from 1996.

**Panel Point #0 (Beginning of East Truss):** There is an open finger joint above. [1994] The east rocker "hinge" assembly has severe corrosion. [1996] The truss floorbeam and connecting gusset plates have severe corrosion and debris - should be flushed. [1996] the west end of the drain trough is severely bent (welded? to floorbeam stiffeners).

**Panel Point #1, (East Truss, Pier #5):**

**Pier #5:** 2 "rollernest" bearing assemblies. Pier consists of 2 concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**Span #6 (Deck Truss):** [1997] Roadway under construction below bridge.

**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):** Floorbeam truss (near center) has an undercut weld in the flange.

**Panel Point #4 (East Truss, Stringer Joint):** Strip seal deck joint above. [1996] There is an "weld overlap" at the floorbeam truss bottom chord /vertical member connection gusset plate.

**Panel Point #5 (East Truss):** [1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal.

**Panel Point #6 (East Truss):** [1994] Top chord of the floorbeam truss has a cracked weld in the bottom flange at the end of a connection plate.

**Panel Point #7 (East Truss):**

**Panel Point #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. Stringer #4 has a bolt missing from the south floorbeam truss connection. At Stringer #2 (south side), one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated.

**Pier #6 (Downtown side of Mississippi):** 2 "rollernest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement. Pier consists of 2 concrete columns with a "pierwall" at the base. [1997] The drain pipes are clogged (top & bottom).

**Span 7 (Deck Truss):**

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):** Navigation light.

**Panel Point #11 (East Truss):** Section loss at gusset plate, bottom chord.

**Panel Point #12 (East Truss):**

**Panel Point #13 (East Truss):** Section loss at gusset plate, bottom chord. The top chord at the center of the floorbeam truss has a "four way" diagonal member welded (transverse) on the bottom flange (is this typical?).

**Panel Point #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint above. Sway frame rusty.

**Panel Point #13' (East Truss):** [1996] The truss bottom chord L13'/L12' has cracked tack weld in the "baffle plate". The floorbeam truss top chord has a ground out spot near Stringer #4.

**Panel Point #12' (East Truss):**

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):** Deck Drains.

**Panel Point #8' (East Truss, Pier #7, Stringer Joint):** Red navigation light. Strip seal deck joint above. The floorbeam truss has severe rust at the median. [1997] Bolts at the Stringer #4 & 5 connections (north side) were replaced with "redi-rod". [1997] At Stringer #4, a nut is missing from one of the "redi-rod" bolts.

**Pier #7 (East bank of Mississippi):** 2 fixed bearing assemblies. Pier consists of 2 concrete columns with a "pierwall" at the base. [1997] West column has a full height leaching crack on the south face.

**Span #8 (Deck Truss):**

**Panel Point #7' (East Truss):**

**Panel Point #6' (East Truss):** [1996] The Stinger #4 connection to the floorbeam truss is "working", the bolts should be replaced.

**Panel Point #5' (East Truss):**

**Panel Point #4' (East Truss, Stringer Joint):** Strip seal deck joint above.

**Panel Point #3' (East Truss):** Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate. [1997] Stringer #4 has a loose bolt at the north floorbeam connection.

**Panel Point #2' (East Truss):**

**Pier #8:** 2 "rollernest" bearing assemblies, they have light rust. Pier consists of 2 concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss, Pier #8):**

**Panel Point #0' (End of East Truss):** Open finger joint above. [1996] Floorbeam has severe corrosion and debris (should be flushed). [1997] North side of floorbeam (below finger joint) has sever flaking rust, with section loss on the web stiffeners (pictures taken of holes at base of stiffener).

**Crossbeam:** [1996] Crossbeam, and east hinge rocker assembly have severe corrosion (moderate section loss) and debris - should be flushed. [1992] A crack in the floorbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997] **Cracks were found in the crossbeam stiffener weld located directly above the rocker, and at both ends of the horizontal stiffener (should be drilled out).**

**Span #9 (Deck Truss/Multi-beam):** The multi-beam spans resume (framed into the crossbeam)

with 8 beams in the NB bridge at Panel Point #0'. Railroad tracks below.

**Pier #9:** 13 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 columns and cap, with a lower strut. The east column has minor scrapes and spalls (damaged by train derailment) - the downspout had to be reconnected.

**Span #10 (Steel multi-beam):** NB bridge has 10 beams, SB bridge has 7 beams - they transition to a shallow beam. Railroad tracks below.

**Pier #10:** 18 sliding plate expansion bearings. Pier consists of 5 columns and cap with a lower strut.

**Span #11 (Steel Multi-beam):** NB bridge has 11 beams, SB bridge has 7 beams. Parking lot below.

**Pier #11:** Beginning of the NB off ramp to University Ave. - Br. #9340"A". Strip seal deck joint above. [1995] Gland is leaking near the median (SBL). 18 sliding plate bearings for the steel beams, and 15 sliding plate bearings for the slab span. Pier consists of 7 columns and a cap. [1994] Cap has extensive shot-crete repairs, and 10 SF of spall (exposed rebar) at the west end. [1997] 10 LF of the "bearing stool" is spalled and loose.

**Span #12 (Concrete Voided Slab Span):** Delamination and spall (exposed rebar) along the median and exterior copings. [1997] Underside of slab has 30 SF of spall (exposed rebar) adjacent to the median. Parking lot below.

**Pier #12:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #13 (Concrete Voided Slab Span):** 2nd St. passes below. Delamination and spall along the median and exterior copings. [1997] Underside of slab has 40 SF of spall (exposed rebar) adjacent to the median.

**Pier #13:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #14 (Concrete Slab Span):** Delamination and spall along the median and exterior copings.

**North Abutment:** Strip seal deck joint above. 14 sliding plate bearing assemblies.

**SOUTHBOUND INSPECTION: (West Truss Spans only). Beams and stringers are numbered from the east (from original plans).**

**Span #9 (Steel Multi-beam/Deck Truss):** SB bridge has 7 beams which terminate by framing into the crossbeam at Panel Point #0'. [1997] The conduit hangers along the west coping have failed (coping spalled away) and the conduits are now hanging loose in several locations (pictures taken).

**Crossbeam:** [1994] The bolted connection between the crossbeam and Beam #12 (above rocker) is "working" - the bolts should be replaced. [1996] The crossbeam has severe corrosion and

debris - should be flushed. The rocker hinge has severe corrosion. [1997] Rocker bearing marked to check for movement.

**Panel Point #0' (Beginning of West Truss):** Open finger deck above. The north face of the floorbeam has severe corrosion (section loss on stiffeners) and debris - should be flushed. [1996] There is severe corrosion (surface pitting on plates & bolts) at the floorbeam/truss connection. [1997] The conduit running along the catwalk is hanging loose and has pulled out where it meets the floorbeam (photo).

**Panel Point #1' (West Truss, Pier #8):**

**Pier #8:** See NB notes

**Span #8 (Deck Truss):**

**Panel Point #2' (West Truss):**

**Panel Point #3' (West Truss):** The floorbeam truss (top flange of upper chord) has an "ugly" weld below the connection to Stringer #11.

**Panel Point #4' (West Truss, Stringer Joint):** Strip seal deck joint above.

**Panel Point #5' (West Truss):**

**Panel Point #6' (West Truss):** [1996] Bolt missing at the Stringer #11 connection to the floorbeam truss. [1997] Two other bolts are loose at the Stringer #11 connection - only 1 of the 4 bolts is sound. [1997] Two bolts are loose at the Stringer #10 connection (south side).

**Panel Point #7' (West Truss):** [1997] Cracked tack weld on the interior of the top chord/floorbeam truss connection.

**Panel Point #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1996] Stringer #11 has a missing bolt at the floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction).

**Pier #7:** See NB notes.

**Span #7 (Deck Truss):**

**Panel Point #9' (West Truss):** Sway frame and gusset plate connection, some rivets rusty in the median area.

**Panel Point #10' (West Truss):** [1994] Loose bolt at the Stringer #13 connection to the floorbeam truss. Top chord (U10'/U11') has 6 nicks on the exterior (15' south of U10').

**Panel Point #11' (West Truss):** Nick in the truss bottom chord (L11' /L12').

**Panel Point #12' (West Truss):** The truss diagonal (U12' /L13') has 1 nick inside, 2 outside. The truss bottom chord (L12' - L13') has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains both sides. [1994] Stringer #11 has flaking rust near the joint. [1996] Tack welds at the sway frame/truss bottom chord gusset plate.

**Panel Point #13 (West Truss):** There is pack rust at the truss bottom chord/sway frame connection. [1996] Member L13 /L14 has a cracked tack weld at the internal stiffener.

**Panel Point #12 (West Truss):** [1996] Member L12 / L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):** At the Stringer #11 floorbeam truss connection, there is 1 bolt missing (north), and 2 bolts missing (south) - the connection has only 1 of the 4 bolts. The stringer has lifted 3/32".

**Panel Point #10 (West Truss):** The truss top chord (U10 - U9) has 2 spots ground out. [1996] At Stringer #9, there is a bolt missing from the floorbeam truss connection.

**Panel Point #9 (West Truss):** The truss diagonal (L9 - U8) has a spot ground out.

**Panel Point #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains both sides (downspout east side) - [1996] drains are clogged. The sway frame is rusty at the two connection points in the median area.

**Pier #6:** See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

**Panel Point #6 (West Truss):** Overhead sign above. The top chord of the floorbeam truss (U5/ U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out.

**Panel Point #5 (West Truss):**

**Panel Point #4 (West Truss, Stringer Joint):** Strip seal deck joint. [1997] Stringer #10 has a broken bolt at the floorbeam connection. [1997] Conduit hanging from wire at light pole.

**Panel Point #3 (West Truss):** Nick on the truss bottom chord (L2/ L3).

**Panel Point #2 (West Truss):** [1996] The floorbeam truss member L2 / U3 has a welding flaw (no crack, MT 1997).

**Pier #5:** See NB notes.

**Panel Point #1 (West truss, Pier #5):** [1994] There is a cotter pin missing from the diagonal brace (floorbeam to stringer) at the floorbeam truss connection. There is a deck drain downspout (drains into storm sewer).

**Panel Point #0 (End of West Truss):** Open finger deck joint above. The floorbeam has severe corrosion and debris - should be flushed. [1997] The floorbeam horizontal stiffener is bent down directly above (photo). [1996] The horizontal portion of drain is plugged & leaking.

**Crossbeam:** [1994] The crossbeam and west rocker hinge have severe corrosion. [1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out).

**Span #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel Point #0.

See NB Notes for South Approach Spans

#### **PREVIOUS SNOOPER INSPECTIONS:**

|             |  |
|-------------|--|
| <b>1996</b> | Terry Moravec, Kurt Fuhrman, Eric Evens, Pete Wilson |
| <b>1994</b> | Terry Moravec, Kurt Fuhrman, Pete Wilson             |

Mn/DOT OFFICE OF BRIDGES AND STRUCTURES

Bridge No.: 9340

Bridge Inspection Report

Aug 04, 1997

Sheet 1 of 4

County:27 HENNEPIN  
Control Section:2783  
City:2585 MINNEAPOLIS  
Township:

Road System:01 Isth  
Road Number:35W  
Ref. Point :018.538  
Local Bridge Num.:  
Crew Number:3  
Inspection Class:A

Crosses:MISS RIVER, RR, & 2ND ST  
Location:1.0 MI NE OF JCT TH 94  
Load Posting(Tons):LEGAL  
Length: 1907 Width:113.3  
Min. Vert. (Under):15.2  
Min. Vert. (Over):  
Deck Area (s.f.):205956 %Unsd: 5  
Paint Area (s.f.):490200 %Unsd: 20

Maint. Area / District:5A  
Sec: 25 Twp: 029 Rge: 24W  
Bridge Type:404 STEEL DECK TRUSS & 401/210 APPROACH  
NBI: Deck 6 Super 4 Sub 6 Culv N

CONDITIONS

| NO  | ELEMENT/QTY       | Env | Yr | 1    | 2     | 3    | 4   | 5  | COMMENTS                          |
|-----|-------------------|-----|----|------|-------|------|-----|----|-----------------------------------|
| 8   | Girder/Beam Pnt B | 4   | 96 |      | 9113  | 1377 | 106 |    | *BRIDGE #9340 YEAR 1997           |
|     | 10596 LF          |     | 97 |      | 9113  | 1377 | 106 |    |                                   |
| 20  | Deck Truss PaintB | 4   | 96 |      |       | 1914 | 213 |    | BRIDGE CONSTRUCTED IN 1967. SEE   |
|     | 2127 LF           |     | 97 |      |       | 1914 | 213 |    | FRACTURE CRITICAL REPORT FOR      |
| 33  | Stl Floor Beam'B' | 4   | 96 |      | 2645  | 268  | 435 |    | ADDITIONAL INFORMATION.           |
|     | 3348 LF           |     | 97 |      | 2645  | 268  | 435 |    |                                   |
| 41  | Rein Conc PierCap | 4   | 96 | 680  | 131   | 8    |     |    | 8/20/33/79) [1968] BRIDGE PAINTED |
|     | 819 LF            |     | 97 | 680  | 131   | 8    |     |    | WITH LEAD BASE SYSTEM. [1995]     |
| 46  | Steel Hinge       | 4   | 96 |      |       |      | 4   | 14 | THE PAINT SYSTEM IS 20%           |
|     | 18 EA             |     | 97 |      |       |      | 4   | 14 | UNSOUND.                          |
| 50  | Secondary Members | 4   | 96 |      |       | 1    |     |    | 8) SPANS #1-5 & #9-11. WELDED     |
|     | 1 EA              |     | 97 |      |       | 1    |     |    | COVER PLATES AT SOUTH END.        |
| 58  | Reinf Conc Column | 4   | 96 | 51   | 1     |      |     |    | [1995] BEAMS HAVE MINOR           |
|     | 52 EA             |     | 97 | 51   | 1     |      |     |    | CHALKING THROUGHOUT, WITH         |
| 60  | ReinConc PierWall | 4   | 96 | 168  |       |      |     |    | FLAKING RUST ON THE BOTTOM        |
|     | 168 LF            |     | 97 | 168  |       |      |     |    | FLANGE OF THE BEAMS ADJACENT TO   |
| 62  | ReinConc Abutment | 4   | 96 | 255  |       |      |     |    | THE MEDIAN. BEAMS HAVE SEVERE     |
|     | 255 LF            |     | 97 | 255  |       |      |     |    | CORROSION AT THE HINGES (SPAN     |
| 79  | Stl Stringr Pnt B | 4   | 96 |      | 14747 |      | 149 |    | #2).                              |
|     | 14896 LF          |     | 97 |      | 14747 |      | 149 |    |                                   |
| 90  | Strip Seal Exp Jt | 4   | 96 | 908  |       | 38   |     |    | 20/157/161) TRUSS MEMBERS HAVE    |
|     | 946 LF            |     | 97 | 908  |       | 38   |     |    | NUMEROUS POOR WELDING DETAILS     |
| 91  | Pourable Joint    | 4   | 96 | 1023 |       | 1901 |     |    | (INCLUDING TACK WELDS ON THE      |
|     | 2924 LF           |     | 97 | 1023 |       | 1901 |     |    | INTERIOR STIFFENER PLATES).       |
| 93  | Assembly Joint    | 4   | 96 | 326  |       |      |     |    | [1995] INTERIOR OF THE TRUSS      |
|     | 326 LF            |     | 97 | 326  |       |      |     |    | MEMBERS HAVE EXTENSIVE SURFACE    |
| 96  | Movable Bearing   | 4   | 96 | 83   | 42    |      |     |    | RUST (SOME PITTING), AND SEVERE   |
|     | 125 EA            |     | 97 | 83   | 42    |      |     |    | PIGEON DEBRIS. CORROSION (WITH    |
| 98  | Fixed Bearing     | 4   | 96 | 35   |       |      |     |    | PACK RUST AND SURFACE PITTING)    |
|     | 35 EA             |     | 97 | 35   |       |      |     |    | AT THE FLOORBEAM AND SWAY BRACE   |
| 100 | Conc Appr Panel   | 4   | 96 |      | 4     |      |     |    | CONNECTIONS.                      |
|     | 4 EA              |     | 97 |      | 4     |      |     |    |                                   |
| 101 | Steel Railing     | 4   | 96 |      | 3814  |      |     |    | 33/156) REFERS TO FLOORBEAM       |
|     | 3814 LF           |     | 97 |      | 3814  |      |     |    | TRUSSES, TRUSS END FLOORBEAMS,    |
| 104 | Combination Rail  | 4   | 96 |      | 3318  | 496  |     |    | AND THE "CROSSBEAMS" SUPPORTING   |
|     | 3814 LF           |     | 97 |      | 2861  | 954  |     |    | THE ENDS OF THE MULTI-BEAM        |
| 122 | Conc Deck &RigOL  | 4   | 96 |      | 1     |      |     |    | SPANS. FLOORBEAM TRUSSES HAVE     |
|     | 1 EA              |     | 97 |      | 1     |      |     |    | NUMEROUS POOR WELDING DETAILS     |
| 148 | Conc Slab &Rig OL | 4   | 96 |      | 1     |      |     |    | (INCLUDING PLUG WELDED WEB        |
|     | 1 EA              |     | 97 |      | 1     |      |     |    |                                   |

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Bridge No.: 9340

Bridge Inspection Report

Aug 04, 1997

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| OTHER ITEMS              | 96 | 97 | SMART FLAGS          | 96 | 97 |
|--------------------------|----|----|----------------------|----|----|
| 180 Channel & Protection | 8  | 8  | 108 Scour            | 1  | 1  |
| 181 Signing              | 3  | 3  | 109 Traffic Impact   | N  | N  |
| 182 Guardrail            | 2  | 2  | 156 Fatigue Cracking | 1  | 3  |
| 183 Plowstraps           | N  | N  | 157 Pack Rust        | 2  | 2  |
| 184 Drainage             | 3  | 3  | 158 Deck Cracking    | 2  | 2  |
| 185 Slope Protection     | 1  | 1  | 159 Under Deck       | 4  | 4  |
| 186 Curb & Walk          | 2  | 2  | 160 Substruct Movmnt | 1  | 1  |
| 187 Roadway Over         | N  | N  | 161 Section Loss     | 2  | 2  |
| 188 Miscellaneous        | 2  | 2  |                      |    |    |

| INSPECTOR              | YEAR | REVIEWED BY          |
|------------------------|------|----------------------|
| MORAVEC/FUHRMAN/WILSON | 1996 | ROGER SCHULTZ JAN 97 |
| PRIBULA/FUHRMAN/WILSON | 1997 | MARK PRIBULA         |

REINFORCEMENT PLATES, AND TACK WELDS & WELDED CONNECTION PLATES IN TENSION ZONES). [1994] FLOORBEAM TRUSSES HAVE CHALKING THROUGHOUT, WITH SEVERE FLAKING RUST BELOW THE MEDIAN. [1995] END FLOORBEAMS & "CROSSBEAMS" (BELOW OPEN FINGER JOINTS) HAVE SEVERE CORROSION AND EXTENSIVE DEBRIS (SHOULD BE FLUSHED). [1986] SOUTH CROSSBEAM DEVELOPED CRACKS (IN WEB STIFFENER) AT THE EAST ROCKER HINGE (THE HINGE HAD FROZEN) - THE CRACKS WERE DRILLED OUT, AND BRACING WAS ADDED (BEAMS #11 & #12). [1992] NORTH CROSSBEAM DEVELOPED A CRACK IN THE WEB STIFFENER WELD (AT EAST ROCKER HINGE) - THIS WAS DRILLED OUT. [1994] AT THE NORTH CROSSBEAM, THE BEAM #3 CONNECTION IS "WORKING" - THE BOLTS SHOULD BE REPLACED. [1997] NORTH CROSSBEAM HAS ADDITIONAL WELD CRACKING BELOW THE EAST ROCKER (NEEDS REPAIR!).

41) [1995] PIER #11 HAS EXTENSIVE SHOT-CRETE REPAIRS, WITH 10 SF OF SPALL (EXPOSED REBAR) AT BOTH EAST AND WEST END.

46) [1986] HINGE SUPPORTING THE EAST END OF THE SOUTH CROSSBEAM FROZE (DAMAGING THE CROSSBEAM) - PIN WAS REPLACED. [1995] HINGES IN SPAN #2 HAVE SEVERE CORROSION AND DEBRIS AND ARE CLOSED BEYOND TOLERABLE LIMITS (THE JOINT IS NOT FUNCTIONING). [1994] "ROCKER" HINGES AT EACH END OF THE TRUSS SPAN HAVE SEVERE CORROSION AND SHOULD BE CLEANED AND LUBRICATED.

50) [1995] PINNED BRACES RUNNING BETWEEN THE FLOORBEAM TRUSS AND THE STRINGERS ARE "WORKING" AND ONE COTTER PIN IS MISSING.

58/160) PIER #8: COLUMNS HAVE BEEN ENCASED WITH A CONCRETE "JACKET". PIER #7: WEST COLUMN HAS A VERTICAL CRACK. [1996] PIER #2 HAS TIPPED TO THE NORTH (SHOULD BE MEASURED WITH PLUMB BOB) - THIS HAS CAUSED THE HINGE IN SPAN #2 TO CLOSE TIGHTLY (THE ABUTMENT BEARINGS ARE IN FULL CONTRACTION). THIS MOVEMENT MIGHT BE DUE TO PAVEMENT THRUST?

62) BOTH ABUTMENTS HAVE MINOR CRACKING. SOUTH ABUTMENT SEAT AREA IS CRACKED AND DISCOLORED. THE NORTH ABUTMENT IS STAINED.

79) [1995] STRINGERS HAVE CORROSION AT THE STRINGER EXPANSION JOINTS. STRINGERS ADJACENT TO THE MEDAIN HAVE FLAKING RUST ALONG THE BOTTOM FLANGE. BOLTED CONNECTIONS TO THE FLOORBEAM TRUSSES ARE "WORKING" AND SOME OF THE BOLTS ARE MISSING (WILL BE REPLACED AS PART OF THE

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REPAIR/PAINTING CONTRACT).

90) [1995] STRIP SEAL AT THE SOUTH ABUTMENT (SBL) HAS PULLED OUT IN SEVERAL LOCATIONS. STRIP SEAL AT PIER #11 (SBL @ MEDIAN) HAS A LEAK. [1996] STRIP SEAL AT PIER #6 (SBL) HAS 8 LF PULLED OUT.

91) THERE ARE 1,017 LF? (PLEASE ATTEMPT TO VERIFY) OF TRANSVERSE POURABLE DECK JOINTS, AND A 1,907 LF POURABLE JOINT ALONG THE SPLIT MEDIAN. [1994] MEDIAN JOINT IS LEAKING (SHOULD BE RESEALED).

96) THE FOUR WEST BEARINGS AT THE SOUTH ABUTMENT ARE RUSTY. [1996] THE SOUTH ABUTMENT BEARINGS ARE IN EXTREME CONTRACTION (DUE TO PIER #1 TIPPING NORTHWARD). [1994] TRUSS BEARINGS HAVE MODERATE CORROSION.

100) TRANSVERSE CRACKS IN ALL FOUR APPROACHES. THERE APPEARS TO BE PAVEMENT THRUST AT BOTH ENDS OF THE BRIDGE (WHILE SOME RELIEF JOINTS HAVE BEEN CUT IN THE ROADWAY, THEY DO NOT EXTEND THROUGH THE CURBS OR MEDIANS). ALL OF THE RELIEF JOINTS SHOULD BE RESEALED. [1996] THERE ARE NO RELIEF JOINTS IN THE NORTH APPROACH (SBL & RAMP).

101) [1997] STEEL MEDIAN GUARDRAIL HAS IMPACT DAMAGE THROUGHOUT.

104) EXTERIOR RAIL: CODE #12. [1995] CONCRETE RAIL BASE HAS EXTENSIVE SPALLING ON THE UNDERSIDE OF THE "BEAMS", AND MAP CRACKING ON THE POSTS.

108) DUE TO EXTREME TURBULENCE, NO RECENT SOUNDINGS HAVE BEEN MADE OF THE RIVER BOTTOM AT PIER #7.

122) [1978] LOW SLUMP OVERLAY. [1995] MINOR SPALLS AND PATCHED AREAS AT THE FINGER JOINTS.

148) SPANS #12-14 HAVE A CONCRETE VOIDED SLAB.

158) OVERLAY HAS 3,000 LF OF TRANSVERSE CRACKS.

159) [1995] UNDERSIDE OF DECK HAS A MODERATE AMOUNT OF TRANSVERSE LEACHING CRACKS, WITH SOME FULL DEPTH REPAIRS. [1995] COPINGS HAVE SEVERE SPALLING (EXPOSED REBAR) ALONG THE ENTIRE LENGTH OF THE BRIDGE (MORE SEVERE ON THE MEDIAN COPINGS). [1994] LOOSE CONCRETE WAS REMOVED FROM THE COPINGS ABOVE THE PARKING LOT (SOUTH APPROACH SPANS).

181) NO HAZARD MARKERS AT THE SOUTH END.

182) SOUTH APPROACH GUARDRAIL HAS MINOR IMPACT DAMAGE. [1994] AN IMPACT ATTENUATOR (NB RAMP TO UNIVERSITY) HAS MINOR IMPACT DAMAGE.

184) DRAINAGE SYSTEM BELOW THE FINGER JOINTS HAS INADEQUATE SLOPE AND CONSTANTLY FILLS WITH DEBRIS (FREQUENT FLUSHING IS REQUIRED).

185) NORTH ABUTMENT SLOPE PAVING HAS 20 LF OF HORIZONTAL CRACKS.

186) [1995] CURB ALONG EXTERIOR RAILING IS CRACKED AND DELAMINATED. [1994] SOME CURB EXPANSION JOINT COVER PLATES ARE MISSING (SBL).

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188) RAIL MOUNTED DECK LIGHTING, UNDER DECK LIGHTING, AND RIVER NAVIGATION LIGHTS. [1994] A LIGHT POST (SBL - "W5/3 L") HAS A 6" VERTICAL SPLIT (IMPACT DAMAGE). AN UNDERDECK LIGHT COVER IN SPAN #14 IS BROKEN.



Crew Number: 7627  
 Inspector: INSPECTOR

### Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 09-11-1998**

|  |  |   |
|--|--|---|
| County: HENNEPIN                                   | Location: 1.0 MI NE OF JCT TH 94         | Length: 1,907.0 ft                          |
| City: MINNEAPOLIS                                  | Route: Isth 35W Ref. Pt.: 018+00.538     | Deck Width: 113.3 ft (Varies)               |
| Township:  | Control Section: 2783 Maint. Area: METRO | Rdwy. Area / Pct. Unsnd: 201,511 sq ft      |
| Section: 25 Township: 029N Range: 24W              | Local Agency Bridge Nbr:                 | Paint Area / Pct. Unsnd: 490,200 sq ft 20 % |
| Span Type: CSTL BEAM SPAN                          |  |   |
| NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N        | Open, Posted, Closed: OPEN               |   |
| Appraisal Ratings - Approach: 8 Waterway: 8        | MN Scour Code: L-STBL;LOW RISK           | Def. Stat: S.D. Suff. Rate:                 |
| Required Bridge Signs - Load Posting: NOT REQUIRED | 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 |  |
|--|----------------------|-----|------------|------------|----------|----------|----------|----------|----------|--|
| 22   | LS O/L (CONC DECK)   | 2   | 09-11-1998 | 219,086 SF | 0        | 0        | 219,089  | 0        | 0        |  |
|  |                      |     | 08-04-1997 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 48   | LS O/L (CONC SLAB)   | 2   | 09-11-1998 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |  |
|  |                      |     | 08-04-1997 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 300  | STRIP SEAL JOINT     | 2   | 09-11-1998 | 946 LF     | 908      | 38       | 0        | N/A      | N/A      |  |
|  |                      |     | 08-04-1997 | 946 LF     | 908      | 0        | 38       | N/A      | N/A      |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 301  | POURED DECK JOINT    | 2   | 09-11-1998 | 1,017 LF   | 0        | 356      | 661      | N/A      | N/A      |  |
|  |                      |     | 08-04-1997 | 2,924 LF   | 1,023    | 0        | 1,901    | N/A      | N/A      |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 303  | ASSEMBLY DECK JOINT  | 2   | 09-11-1998 | 326 LF     | 218      | 108      | 0        | N/A      | N/A      |  |
|  |                      |     | 08-04-1997 | 326 LF     | 326      | 0        | 0        | N/A      | N/A      |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 321  | CONC APPROACH SLAB   | 2   | 09-11-1998 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |  |
|  |                      |     | 08-04-1997 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 331  | CONCRETE RAILING     | 2   | 09-11-1998 | 7,628 LF   | 7,628    | 0        | 0        | 0        | N/A      |  |
|  |                      |     | 08-04-1997 | 7,628 LF   | 7,628    | 0        | 0        | 0        | N/A      |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 107  | PAINTED STEEL GIRDER | 2   | 09-11-1998 | 10,596 LF  | 0        | 9,113    | 1,377    | 106      | 0        |  |
|  |                      |     | 08-04-1997 | 10,596 LF  | 0        | 9,113    | 1,377    | 106      | 0        |  |
| Notes: [1968] BRIDGE PAINTED WITH LEAD BASE SYSTEM. [1995] PAINT SYSTEM IS 20% UNSOUND. SPOT PAINTING CONTRACT PLANNED FOR 1999. APPROACH SPANS HAVE 48" DEEP WEDLED BEAMS TRANSITIONING TO 33" DEEP ROLLED BEAMS (RIVETED CONNECTIONS, SPANS #1 & 2 HAVE WELDED COVER PLATES - STRAIGHT ENDS). [1995] BEAMS HAVE MINOR CHALKING THROUGHOUT, BEAMS ADJACENT TO MEDIAN HAVE FLAKING RUST ALONG BOTTOM FLANGE, ALL BEAMS HAVE SEVERE CORROSION AT HINGE (SPAN #2). |                      |     |            |            |          |          |          |          |          |  |
| 113  | PAINT STEEL STRINGER | 2   | 09-11-1998 | 14,896 LF  | 0        | 14,747   | 0        | 149      | 0        |  |
|  |                      |     | 08-04-1997 | 14,896 LF  | 0        | 14,747   | 0        | 149      | 0        |  |
| Notes:   |                      |     |            |            |          |          |          |          |          |  |
| 131  | PAINT STL DECK TRUSS | 2   | 09-11-1998 | 2,127 LF   | 0        | 0        | 1,914    | 213      | 0        |  |
|  |                      |     | 08-04-1997 | 2,127 LF   | 0        | 0        | 1,914    | 213      | 0        |  |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 09-11-1998

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 20/157/161) TRUSS MEMBERS HAVE NUMEROUS POOR WELDING DETAILS (TACK WELDS ON INTERIOR STIFFENER PLATES). [1995] INTERIOR OF TRUSS MEMBERS HAVE EXTENSIVE SURFACE RUST (SOME PITTING), AND SEVERE PIGEON DEBRIS. CORROSION (WITH PACK RUST AND SURFACE PITTING) AT FLOORBEAM AND SWAY BRACE CONNECTIONS.  |                     |     |            |          |             |             |             |             |             |
| 152   | PAINT STL FLOORBEAM | 2   | 09-11-1998 | 3,348 LF | 0           | 2,645       | 268         | 435         | 0           |
|   |                     |     | 08-04-1997 | 3,348 LF | 0           | 2,645       | 268         | 435         | 0           |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 33/161) FLOORBEAM TRUSSES HAVE NUMEROUS POOR WELDING DETAILS (PLUG WELDS & TACK WELDS IN TENSION ZONES). [1994] FLOORBEAM TRUSSES HAVE CHALKING THROUGHOUT, WITH SEVERE FLAKING RUST BELOW THE MEDIAN. [1998] END FLOORBEAMS & "CROSSBEAMS" REPAINTED (MODERATE SECTION LOSS - PITTING & HOLES IN STIFFENERS).  |                     |     |            |          |             |             |             |             |             |
| 33/156) [1986] SOUTH CROSSBEAM WEB STIFFENER CRACKED AT EAST ROCKER HINGE (HINGE HAD FROZEN) - CRACKS WERE DRILLED OUT, AND BRACING ADDED (BEAMS #11 & #12). [1992/98] NORTH CROSSBEAM & END FLOORBEAM: SEVERAL CRACKS DEVELOPED AT EAST ROCKER HINGE - SOME CRACKS HAVE BEEN DRILLED OUT, BRACING ADDED. [1994] NORTH CROSSBEAM: BEAM #3 CONNECTION IS "WORKING" (BOLTS RETENSIONED IN 1998?). |                     |     |            |          |             |             |             |             |             |
| 373   | STEEL HINGE         | 2   | 09-11-1998 | 18 EA    | 0           | 0           | 0           | 4           | 14          |
|   |                     |     | 08-04-1997 | 18 EA    | 0           | 0           | 0           | 4           | 14          |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 46) [1986] SE CROSSBEAM HINGE FROZE (PIN REPLACED). [1994] ALL 4 CROSSBEAM HINGES HAVE SEVERE CORROSION   |                     |     |            |          |             |             |             |             |             |
| 380   | SECONDARY ELEMENTS  | 2   | 09-11-1998 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 311   | EXPANSION BEARING   | 2   | 09-11-1998 | 125 EA   | 83          | 42          | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 125 EA   | 83          | 42          | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 313   | FIXED BEARING       | 2   | 09-11-1998 | 35 EA    | 35          | 0           | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 35 EA    | 35          | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 205   | CONCRETE COLUMN     | 2   | 09-11-1998 | 52 EA    | 50          | 2           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 52 EA    | 51          | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 41) PIER #11: [1997/98] CAP HAS EXTENSIVE GUNNITE REPAIRS.  |                     |     |            |          |             |             |             |             |             |
| 210   | CONCRETE PIER WALL  | 2   | 09-11-1998 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 168 LF   | 168         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 215   | CONCRETE ABUTMENT   | 2   | 09-11-1998 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |

Crew Number: 7627

## Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 09-11-1998

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 234   | CONCRETE CAP        | 2   | 09-11-1998 | 819 LF   | 680         | 139         | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 819 LF   | 680         | 131         | 8           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 356   | FATIGUE CRACKING    | 2   | 09-11-1998 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 8/156) [1998] APPROACH SPANS: NUMEROUS FATIGUE CRACKS FOUND IN BEAM WEBS AT NEGATIVE MOMENT DIAPHRAGM CONNECTIONS. IN SPAN #9, ONE BEAM WEB WAS COMPLETELY FRACTURED (REPAIRED WITH BOLTED PLATES), SMALLER CRACKS WERE DRILLED OUT (SOME CRACKS STILL REQUIRE DRILLING). |                     |     |            |          |             |             |             |             |             |
| 357   | PACK RUST           | 2   | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 358   | CONC DECK CRACKING  | 2   | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 359   | CONC DECK UNDERSIDE | 2   | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 0           | 0           | 1           | 0           |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 360   | SETTLEMENT          | 2   | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 361   | SCOUR               | 2   | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 363   | SECTION LOSS        | 2   | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 981   | SIGNING             | 2   | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 982   | GUARDRAIL           | 2   | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 984   | DRAINAGE            | 2   | 09-11-1998 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 985   | SLOPES              | 2   | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 08-04-1997 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |

08/02/2007

Crew Number: 7627

### Mn/DOT BRIDGE INSPECTION REPORT

Inspector: INSPECTOR

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 09-11-1998

**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 |
|----------|-----------------|-----|------------|----------|----------|----------|----------|----------|----------|
| 986      | CURB & SIDEWALK | 2   | 09-11-1998 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
|          |                 |     | 08-04-1997 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
| Notes:   |                 |     |            |          |          |          |          |          |          |
| 988      | MISCELLANEOUS   | 2   | 09-11-1998 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
|          |                 |     | 08-04-1997 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
| Notes:   |                 |     |            |          |          |          |          |          |          |

General Notes: \*BRIDGE #9340, YEAR 1998

BRIDGE CONSTRUCTED IN 1967.

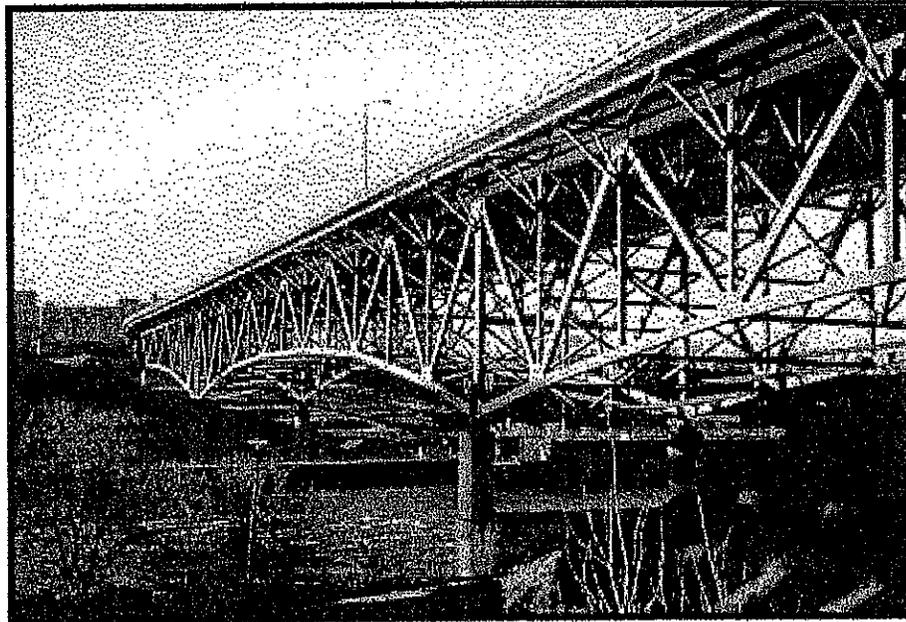
SEE FRACTURE CRITICAL REPORT FOR ADDITIONAL INFORMATION.

Inspector's Signature

Reviewer's Signature / Date



# *Fracture Critical Bridge Inspection Report*



*Bridge # 9340  
I-35W over the Mississippi River  
(Downtown Minneapolis)*

*September 1998*



*Minnesota Department of Transportation  
Bridge Inspection, Maintenance Operations  
Metro Division*

# **Fracture Critical Bridge Inspection Report**

For

**Bridge # 9340  
I-35W over the Mississippi River (Downtown Minneapolis)**

Prepared by

**Bridge Inspection, Maintenance Operations  
Metro Division  
1500 W. County Road B2  
Roseville, MN 55113**

**Inspection Date: Northbound September 8-9, 1998**

**Southbound September 10-11, 1998**

**Inspected By: M. Pribula, T. Moravec, E. Evens, K. Fuhrman, P. Wilson,  
J. Anderson**

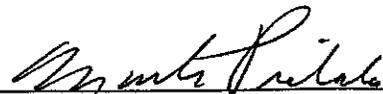
**Report Written By: Pete Wilson**

**Bridge Maintenance Sub Area: Spring Lake Park**

**Access Equipment Used: UB50 Reach All (Mn/DOT)**

**UB60 Reach All (City of St. Paul)**

*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*



Mark Pribula

Reg. No. 21102

2/9/99

Date

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## **Executive Summary & Bridge Inspection Recommendations:**

This report evaluates the annual bridge inspection of bridge # 9340, which carries I-35W over the Mississippi River in downtown Minneapolis. Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The bridge has three traffic lanes in both directions, with no shoulders. The main spans consist of a continuous steel deck truss which cantilevers beyond the end piers (the truss begins in Span #5, and ends in Span #9). Span #7, is the main river span and is 456 ft. long.

The south approach spans (Spans #1-5) are steel multi-beam. The south approach spans cross over Bush St., a contract parking lot, the West River Parkway & Trail, and the Upper St. Anthony Lock & Dam access road.

The north approach spans are steel multi-beam (Spans #9-11), and concrete voided slab span (Spans #12-14). The north approach spans cross over an access road, a river dredging stockpile, a rail yard (Minnesota Commercial Railroad: 646-2010), a parking lot (Metal Matic Inc.), and 2<sup>nd</sup> St.

The following is a list of specific areas where fatigue cracks or other types of deficiencies were found during the 1998 annual bridge inspection. Bridge Inspection lists the fatigue cracks or other types of deficiencies in the highest priority first.

- 1). *During the 1998 inspection - numerous fatigue cracks were found in beams in Spans #3-5 (south approach spans), and Spans #(north approach spans). These spans have welded beams (not fracture critical). The cracks were located in negative moment regions at the top of the diaphragm connections (at one location the web had cracked through entirely). These cracks were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange (tight fit). All existing cracks were drilled out (the fractured beam was reinforced with bolted plates). Due to the widespread cracking - these areas should be inspected on a regular basis. These areas are above a parking lot and Minnesota Commercial rail yard (due to deck width - must be accessed from below).*
- 2). *During the 1998 replacement of the median copings, the underside of the deck in the adjacent bay was damaged (areas accessible from below were repaired by the contractor). The "stool" concrete along the top flange of the stringer (or beam) has spalled off in some locations. In some locations the spalling extends to the underside of the deck (exposed rebar) and to the area above the top flange.*
- 3). *A spot painting contract is programmed for 1999. The contract should be reviewed to insure all areas needing painting are covered!*
- 4). *Long-term recommendations include: The overlay has extensive delamination (may require repair, overlay, or a complete re-decking). The hinge joint in Span #2 should be repaired or eliminated.*

- 5). *The main truss bearings, and the 4 truss end rocker bearings should be cleaned & lubricated (the bearing pins should also be examined with UT).*
  
- 6). *Several strip seals which were to be replaced during the 1998 repair contract could not be replaced due to corrosion damage to the steel portion of the expansion device. Instead, a new product (from ??) was used (steel mesh with hot pour - the final product looks similar to a strip seal gland). This product was used at the following locations: Pier #11? (possible leak at SB median), Panel Point #8? (8 ft pulled out, SB right gutterline). South Abutment (SBL pulled out in numerous locations). We should monitor these joints to see how well this new joint repair performs.*

For more detailed information and recommendations, please refer to the appropriate sections in the text of the report.

### **General Notes:**

**Description:** Bridge #9340 carries I-35W over the Mississippi River in downtown Minneapolis. Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. There are 3 traffic lanes in both directions, with no shoulders. The main spans consist of a continuous steel deck truss which cantilevers beyond the end piers (the truss begins in Span #5, and ends in Span #9). The main river span (Span #7) is 456 ft. long.

The south approach spans (Spans #1-5) are steel multi-beam. The south approach spans cross over Bush St., a contract parking lot, the West River Parkway & trail, and the Upper St. Anthony Lock & Dam access road.

The north approach spans are steel multi-beam (Spans #9-11), and concrete voided slab span (Spans #12-14). The north approach spans cross over an access road, a river dredging stockpile, a rail yard (Minnesota Commercial Railroad: 646-2010), a parking lot (Metal Matic Inc.), and 2<sup>nd</sup> St.

**Superstructure:** NBI Condition Code: 4

**Paint System:** [1968] Lead-base paint system. [1995] Paint system is 20% unsound.

**Truss Members (Spans #6 - #8):** There are 2 steel deck trusses. Most truss members are comprised of built-up plates (riveted) - some of the diagonal & vertical members are rolled I-beams. The connections include both rivets and bolts. The truss members have numerous poor welding details - including tack welded tabs on the interior stiffener plates. There is corrosion at the floorbeam and sway brace connections, and pack rust is forming between the connection plates. There is extensive surface rust, surface pitting, and severe pigeon debris in the interior of the box members.

**Floorbeam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses - these trusses are comprised of rolled H-beams (welded connections). The floorbeam trusses cantilever beyond the main truss on both sides. The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds and welded connection plates located in tension zones. The top and bottom chords have severe flaking rust below the median, and below deck joints. There is pack rust and surface pitting at the main truss connections.

**End Floorbeams:** The 2 end floorbeams are welded plate girders. [1997] The end floorbeams have severe corrosion below the open finger joints (surface pitting at the base of the web, and section loss on the base of the vertical stiffeners. [1998] Cracks were found in two stiffener welds directly above the main truss end (NE corner). [1998] Cracks drilled out by contractor.

**Stringers:** There are 14 steel stringers (27" deep rolled beams) bearing on the floorbeam trusses - they are continuous except for 5 stringer expansion joints. The bolted connections to the floorbeam trusses are "working" and some of the bolts are missing. The stringers have corrosion at the expansion joints and the stringers adjacent to the median have flaking rust along the bottom flange.

**Lateral/Sway Bracing:** The main deck trusses have both upper and lower lateral bracing (horizontal). There is also vertical sway bracing between the main trusses below each floorbeam truss - the sway bracing has corrosion at the center (below the median). Each floorbeam truss has 2 diagonal braces which connect the bottom chord to Stringers #4 & #11. The pinned connections of these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have 6 huge "geared" roller bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion.

**Steel Beams (Spans #1-5 & #9-11):** The approach spans adjacent to each end of the main truss spans are steel multi-beam. The beams are 48" deep welded plate beams, which transition into 33" deep rolled steel beams (connections are riveted). Spans #1 - #5 have 14 beams - they are continuous except for a hinge joint in Span #2. Spans #9 - #11 widen from 15 to 18 Girders - they are continuous. [1994] The fascia beams & beams adjacent to the median have flaking rust along the bottom flange. [1998] Fatigue cracks were found in several beams in Spans #4 & 5- these cracks were located in negative moment regions at the top of the diaphragm connections.

**Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam" (welded plate girder). The crossbeams bear on "rocker" assemblies bearing upon the cantilever ends of the truss. Of these four connections, three have the rocker assemblies built into the crossbeam web - the southeast rocker connects to the bottom flange of the crossbeam. [1986] The SE rocker bearing froze, resulting in damage to the east end of the south crossbeam (2 cracked vertical web stiffeners). The crossbeam was repaired - the stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. The connection was also reinforced by braces connected between the crossbeam and Beams #2 & #3. [1992] A crack was discovered in a stiffener weld above NE rocker (drilled out). [1997/98] At the same location, a weld

between a vertical & horizontal stiffener cracked through entirely - strain gauges were placed nearby to analyze stresses, and the crossbeam is now being reinforced with bolted angle plates (part of 1998 repair contract). [1994] Both crossbeams have corrosion (flaking rust & surface pitting) due to the open finger joints above. [1997/98] Cracks have also been found at the end of horizontal stiffeners near the NE & SW rockers. [1998] The face of the crossbeams facing the finger joints were repainted (rubber skirts will be installed by contractor).

**Crossbeam Rocker Bearings:** There are 4 "rocker" hinge assemblies supporting the crossbeams at the truss ends. [1986] The SE rocker pin was replaced (the assembly had "frozen") - this required closing I-35W and jacking the multi-beam span. [1994] All four rocker assemblies have severe corrosion due to the open finger joints above. [1998] Despite the corrosion, all bearings appear to be functioning (obvious signs of movement).

**Hinge Assemblies (Span #2):** There are 14 sliding plate hinge assemblies at the expansion joint in Span #2. [1994] The hinge assemblies ave severe corrosion and debris from the open finger deck joint. [1996] The joint is "closed" beyond tolerable limits (possibly due to substructure movement & pavement thrust). Virtually all of the beam ends are in contact, and some of the lower slide plates have tipped (preventing the joint from reopening).

**Bearing Assemblies:** The multi-beam spans have 90 sliding plate bearing assemblies, and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Concrete Voided Slab (Spans #12 - 14):** The far north approach spans consist of a continuous "voided" slab span. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). [1998] The exterior and median copings were repaired with shot-crete.

**Substructure:** NBI Condition Code: 6

**Abutments:** The North Abutment has stains from the leaking deck joint. Both Abutments have minor cracking.

**Piers:** Piers #6 & #7 (main river span) consist of 2 concrete columns resting on a pier wall - there is a vertical crack through the west column at Pier #7. Piers #5 & #8 consist of 2 concrete columns connected with an upper strut. The columns of Pier #8 have been encased in a concrete "jacket". The piers in the multi-beam spans (Piers #1 - #5 and #9 - #11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). Pier # 11 has extensive shot-crete repairs (the open finger deck joint has been replaced with a strip seal). The far north piers (Piers #12 & #13) consist of concrete columns cast directly into the slab span deck. [1996] Pier #1 has tipped slightly to the north (measured with a plumb bob).

## **Bridge Deck:** NBI Condition Code: 6 (reduce to 5?)

**Structural Slab:** [1978] Low slump concrete overlay & numerous full depth deck repairs. [1997] The underside of the deck is in otherwise good condition, with a moderate amount of transverse leaching cracks. [1998] The median coping overhangs were replaced (steel stay-in-place forms), and the exterior copings were repaired with "gunnite", the bay just east of the median was damaged by the slab removal. The "stool" concrete along the top flange of the stringer (or beam) has spalled off in some locations (some loose concrete over recreation trail). In some locations the spalling extends to the underside of the deck (exposed rebar) and to the area above the top flange.

**Wearing Surface:** [19??] The overlay has some minor spalls and patched areas around the finger joints. [19??] \_\_\_\_\_ LF? of transverse cracks (sealed in 1998). [1998] Chaining found extensive delamination (\_\_\_\_%?).

**Open Finger Joints:** There are 3 open finger joints - these are located at each end of the truss spans and above the hinge joint in Span #2? [1998] Rubber "skirts" will be placed below the 2 finger joints at the ends of the truss spans (drain troughs were removed).

**Strip Seal Joints:** [1978] Strip seals were installed in 8 locations - at the abutments and at 5 stringer expansion joints - there are also a number of pourable joints. [1995] The strip seal at the South Abutment (SBL) is pulled out in several locations, and the strip seal at Pier #11 has a possible leak (SBL at median). [1996] The strip seal at Panel Point #8 has 8 ft pulled out (SB right gutterline). [1998] Strip seal repairs by contractor.

**Exterior Railing:** The exterior railing is Code #12. [1997] There are extensive spalls (exposed rebar) along the underside of the "beam" and on the face of the railposts. [1998] Exterior rail was retrofit - 32" high concrete face placed in front of existing rail - horizontal steel rails were removed. The curb along the exterior railing has moderate delamination and spalling.

**Median Railing:** [1998] New split median rail installed (Code #22) - north portion of the rail has removable precast caps.

## **Other Bridge Elements:**

**Approach Panels:** All approaches are concrete. There is a transverse crack in each approach, and some minor spalls at the joints. Relief joints should be cut in the curbs and median. The relief joints need to be resealed. [1996] The north approach (SBL and on ramp) has no relief joint.

**Channel & Protection:** Pier #7 is on the east bank of the Mississippi. Due to extreme turbulence (the bridge is directly downstream from the lower St. Anthony Lock), there have been no accurate soundings taken recently.

**Signaling:** There are no "Type III" hazard markers at the south end.

**Guardrail:** [1998] Approach guardrails repaired (impact attenuator at the northbound off ramp to University Ave. replaced).

**Drainage:** The bridge deck drains directly into the river. The drain troughs at Pier #6 have inadequate slope, and tend to fill up with debris. [1998] Drain troughs below finger joints at ends of the arch spans were removed (detached from downspouts).

**Slope Protection:** There is concrete slope paving at both abutments.

**Lighting:** The bridge has rail mounted deck lighting, under deck lighting, and river navigation lighting. [1994] A light post (SBL - "W 5/3 L") has a 6" vertical split due to traffic impact. An underdeck light cover in Span #14 is broken.

**Miscellaneous:** The areas under some approach spans (Spans #3, #4, #11 & #12) are being leased out as parking lots. Material from river dredging is being stockpiled under Span #8.

### **Northbound Inspection: Includes the East Truss and All Substructure.**

**\*\* Beams are numbered from the east (from original plans).**

**South Abutment:** Strip seal deck joint above. At the north end (SBL), 15 lf of the strip seal has pulled out. There are 14 sliding plate bearing assemblies. [1995] The bearings are in full contraction (see Pier #1 and hinge in Span #2), and many have corrosion. The seat area is cracked and discolored.

**Span #1 (Steel Multi-beam):** 14 beams (33" deep rolled beams with welded cover plates). [1996] East fascia beam has flaking rust. The 3 west bays have some full depth deck patches. [1998] "Stool" concrete spalling off adjacent to median beams.

**Pier #1:** 10 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a strut between column bases. [1996] The pier has apparently tipped to the north (should be measured with a plumb bob).

**Span #2 (Steel Multi-beam):** 14 beams (33" deep rolled beam with welded cover plates) - the beams transition to 48" deep welded beams south of the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. Some full depth deck repairs. [1998] "Stool" concrete spalling off adjacent to median beams.

**Hinge Joint (12 ft. South of Pier #2):** Open finger joint above. Severe corrosion and debris on the hinge assemblies and beam ends. The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate is

tipped (falling off the base plate) preventing the joint from opening. Several of the beam ends are contacting at the top flange or at the web.

**Pier #2:** 14 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a strut between the column bases. [1997] Bearings have corrosion, east end of cap has 4 SF of delamination.

**Span #3 (Steel Multi-beam):** 14 beams (48" deep welded plate beams). The 3 west bays have some full depth deck patches. [1997] 2nd bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete spalling off (some loose concrete) adjacent to median beams. [1998] Fatigue cracks were found in several beams at the diaphragm line just south of Pier #3 (negative moment). Cracks were found at the top of the connections at Beams #2,3,4,5,6,7,12, & 14 (cracks were drilled out).

**Pier #3:** 10 fixed plate, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and a cap.

**Span #4 (Steel Multi-beam):** 14 beams (48" deep welded plate beams). [1998] Underside of deck has some full depth deck repairs (2<sup>nd</sup> & 3<sup>rd</sup> bays from the east), 200 LF of transverse leaching cracks, and 200 SF of spall (exposed rebar) below a transverse pourable joint (full width of deck). [1998] Fatigue cracks were found in several beams at the diaphragm line just north of Pier #3 (negative moment). Cracks were found at the top of the connections at Beams #3,4,7,11,12,13, & 14 (cracks were drilled out).

**Pier #4:** 14 sliding plate expansion bearing assemblies. [1997] Minor rust on bearings. Pier consists of 4 concrete columns and cap.

**Span #5 (Multi-beam/Deck Truss):** 14 beams (48" deep welded plate beams) - they terminate by framing into a crossbeam at Panel Point #0. [1996] Four conduit clamps missing (north bound fascia beam). Median girder has impact damage (parking lot below). [1997] Underside of deck has some full depth patches (2 west bays). [1997] Deck leaching near the finger joint. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked (photo). [1998] Fatigue cracks were found in several beams at the diaphragm line just north of Pier #4 (negative moment). Cracks were found at the top of the connections at Beams #3,4,7,10,12, & 13 (cracks were drilled out).

**Crossbeam:** [1986] The SE rocker "froze", damaging the east end of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W closed to traffic) - the SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1994] The east rocker "hinge" assembly has severe corrosion. [1998] Crossbeam repainted (side facing finger joint).

\*\* [1998] Gap between crossbeam & floorbeam (east end) measured at 16-5/8"

**Panel Point #0 (Beginning of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1998] End floorbeam repainted (side facing finger joint) - there is section loss at the base

of the stiffeners. [1996] The truss connections (north side of floorbeam) have severe flaking rust.

**Panel Point #1, (East Truss, Pier #5):**

**Pier #5:** 2 "rollernest" bearing assemblies. Pier consists of 2 concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**Span #6 (Deck Truss):** [1997] Roadway under construction below bridge.

**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):** Floorbeam truss (near center) has an undercut weld in the flange.

**Panel Point #4 (East Truss, Stringer Joint):** Strip seal deck joint above. [1996] There is an "weld overlap" at the floorbeam truss bottom chord /vertical member connection gusset plate.

**Panel Point #5 (East Truss):** [1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal.

**Panel Point #6 (East Truss):** [1994] Top chord of the floorbeam truss has a cracked weld in the bottom flange at the end of a connection plate.

**Panel Point #7 (East Truss):**

**Panel Point #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. Stringer #4 has a bolt missing from the south floorbeam truss connection. At Stringer #2 (south side), one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated.

**Pier #6 (Downtown side of Mississippi):** 2 "rollernest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement. Pier consists of 2 concrete columns with a "pier wall" at the base. [1997] The drain pipes are clogged (top & bottom).

**Span 7 (Deck Truss):**

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):** Navigation light.

**Panel Point #11 (East Truss):** Section loss at gusset plate, bottom chord.

**Panel Point #12 (East Truss):**

**Panel Point #13 (East Truss):** Section loss at gusset plate, bottom chord. The top chord at the center of the floorbeam truss has a "four way" diagonal member welded (transverse) on the bottom flange (is this typical?).

**Panel Point #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint above. Sway frame rusty.

**Panel Point #13' (East Truss):** [1996] The truss bottom chord L13'/L12' has cracked tack weld in the "baffle plate". The floorbeam truss top chord has a ground out spot near Stringer #4.

**Panel Point #12' (East Truss):**

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):** Deck Drains.

**Panel Point #8' (East Truss, Pier #7, Stringer Joint):** Red navigation light. Strip seal deck joint above. The floorbeam truss has severe rust at the median. [199?] Bolts at the Stringer #4 & 5 connections (north side) were replaced with "redi-rod". [1997] At Stringer #4, a nut is missing from one of the "redi-rod" bolts.

**Pier #7 (East bank of Mississippi):** 2 fixed bearing assemblies. Pier consists of 2 concrete columns with a "pier wall" at the base. [1997] West column has a full height leaching crack on the south face.

**Span #8 (Deck Truss):**

**Panel Point #7' (East Truss):**

**Panel Point #6' (East Truss):** [1996] The Stinger #4 connection to the floorbeam truss is "working", the bolts should be replaced.

**Panel Point #5' (East Truss):**

**Panel Point #4' (East Truss, Stringer Joint):** Strip seal deck joint above.

**Panel Point #3' (East Truss):** Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate. [1997] Stringer #4 has a loose bolt at the north floorbeam connection.

**Panel Point #2' (East Truss):**

**Pier #8:** 2 "rollernest" bearing assemblies, they have light rust. Pier consists of 2 concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss, Pier #8):**

**Panel Point #0' (End of East Truss):** Open finger joint above. [1997] North side of floorbeam (below finger joint) has section loss (holes) on the web stiffeners (photo). [1998] Side of floorbeam facing finger joint repainted. [1998] Cracked welds (two locations above truss end) between horizontal & vertical stiffeners drilled out?

**Crossbeam:** [1996] Crossbeam has moderate section loss (pitting), the east hinge rocker assembly has severe corrosion and debris - should be flushed. [1992] A crack in the floorbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997/98] A cracked weld (between the horizontal & vertical stiffeners), and cracks at both ends of the horizontal stiffener were drilled out. [1998] Side of floorbeam facing finger joint repainted. [1998] Bracing installed between crossbeam (above east rocker) and Beams #3 & 5.

**Span #9 (Deck Truss/Multi-beam):** The multi-beam spans resume (framed into the crossbeam) with 8 beams in the NB bridge at Panel Point #0'. Two railroad tracks below. [1998] Fatigue cracks were found in several beams at the first line of diaphragms south of Pier #9. Beam #2 (see framing plan) was fractured through the entire web (web reinforced with bolted plates). Cracks were also found in Beams #4,8,9,11, & 12 (will be drilled out).

**Pier #9:** 13 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 columns and cap, with a lower strut. [1969] East column damaged by train derailment - the column has minor scrapes and spalls (downspout had to be reconnected).

**Span #10 (Steel multi-beam):** NB bridge has 10 beams, SB bridge has 7 beams - they transition to a shallow beam. Railroad tracks below (one track splits into two). [1998] Fatigue cracks were found in several beams at the first line of diaphragms north of Pier #9. Cracks were found (see framing plan) in Beams #4,5,9,10,11, & 12 (will be drilled out).

**Pier #10:** 18 sliding plate expansion bearings. Pier consists of 5 columns and cap with a lower strut.

**Span #11 (Steel Multi-beam):** NB bridge has 11 beams, SB bridge has 7 beams. Parking lot below.

**Pier #11:** Beginning of the NB off ramp to University Ave. - **Br. #9340"A"**. Strip seal deck joint above. [1995] Gland is leaking near the median (SBL). 18 sliding plate bearings for the steel beams, and 15 sliding plate bearings for the slab span. Pier consists of 7 columns and a cap. [199\_?/98 ] Extensive shot-crete repairs on cap.

**Span #12 (Concrete Voided Slab Span):** Parking lot below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #12:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #13 (Concrete Voided Slab Span):** 2nd St. passes below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #13:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #14 (Concrete Slab Span):** [1998] Shot-crete repairs along the median and exterior copings.

**North Abutment:** Strip seal deck joint above. 14 sliding plate bearing assemblies.

**Southbound Inspection: (West Truss Spans only).**

**\*\*Beams and stringers are numbered from the east (from original plans).**

**Span #9 (Steel Multi-beam/Deck Truss):** SB bridge has 7 beams which terminate by framing into the crossbeam at Panel Point #0'. [1997] The conduit hangers along the west coping have failed (coping spalled away) and the conduits are now hanging loose in several locations (pictures taken).

**Crossbeam:** [1994] The bolted connection between the crossbeam and Beam #12 (above rocker) is "working" - the bolts should be replaced. [1996] The crossbeam has severe corrosion and debris - should be flushed. The rocker hinge has severe corrosion. [1997] Rocker bearing marked to check for movement.

**Panel Point #0' (Beginning of West Truss):** Open finger deck above. The north face of the floorbeam has severe corrosion (section loss on stiffeners) and debris - should be flushed. [1996] There is severe corrosion (surface pitting on plates & bolts) at the floorbeam/truss connection. [1997] The conduit running along the catwalk is hanging loose and has pulled out where it meets the floorbeam (photo).

**Panel Point #1' (West Truss, Pier #8):**

**Pier #8:** See NB notes

**Span #8 (Deck Truss):**

**Panel Point #2' (West Truss):**

**Panel Point #3' (West Truss):** The floorbeam truss (top flange of upper chord) has an "ugly" weld below the connection to Stringer #11.

**Panel Point #4' (West Truss, Stringer Joint):** Strip seal deck joint above.

**Panel Point #5' (West Truss):**

**Panel Point #6' (West Truss):** [1996] Bolt missing at the Stringer #11 connection to the floorbeam truss. [1997] Two other bolts are loose at the Stringer #11 connection - only 1 of the 4 bolts is sound. [1997] Two bolts are loose at the Stringer #10 connection (south side).

**Panel Point #7' (West Truss):** [1997] Cracked tack weld on the interior of the top chord/floorbeam truss connection.

**Panel Point #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1996] Stringer #11 has a missing bolt at the floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction).

**Pier #7:** See NB notes.

**Span #7 (Deck Truss):**

**Panel Point #9' (West Truss):** Sway frame and gusset plate connection, some rivets rusty in the median area.

**Panel Point #10' (West Truss):** [1994] Loose bolt at the Stringer #13 connection to the floorbeam truss. Top chord (U10'/U11') has 6 nicks on the exterior (15' south of U10').

**Panel Point #11' (West Truss):** Nick in the truss bottom chord (L11' /L12').

**Panel Point #12' (West Truss):** The truss diagonal (U12' /L13') has 1 nick inside, 2 outside. The truss bottom chord (L12' - L13') has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains both sides. [1994] Stringer #11 has flaking rust near the joint. [1996] Tack welds at the sway frame/truss bottom chord gusset plate.

**Panel Point #13 (West Truss):** There is pack rust at the truss bottom chord/sway frame connection. [1996] Member L13 /L14 has a cracked tack weld at the internal stiffener.

**Panel Point #12 (West Truss):** [1996] Member L12 / L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):** At the Stringer #11 floorbeam truss connection, there is 1 bolt missing (north), and 2 bolts missing (south) - the connection has only 1 of the 4 bolts. The stringer has lifted 3/32".

**Panel Point #10 (West Truss):** The truss top chord (U10 - U9) has 2 spots ground out. [1996] At Stringer #9, there is a bolt missing from the floorbeam truss connection.

**Panel Point #9 (West Truss):** The truss diagonal (L9 - U8) has a spot ground out.

**Panel Point #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains both sides (downspout east side) - [1996] drains are clogged. The sway frame is rusty at the two connection points in the median area.

**Pier #6:** See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

**Panel Point #6 (West Truss):** Overhead sign above. The top chord of the floorbeam truss (U5/U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out.

**Panel Point #5 (West Truss):**

**Panel Point #4 (West Truss, Stringer Joint):** Strip seal deck joint. [1997] Stringer #10 has a broken bolt at the floorbeam connection. [1997] Conduit hanging from wire at light pole.

**Panel Point #3 (West Truss):** Nick on the truss bottom chord (L2/ L3).

**Panel Point #2 (West Truss):** [1996] The floorbeam truss member L2/U3 has a welding flaw (no crack, MT 1997).

**Pier #5:** See NB notes.

**Panel Point #1 (West truss, Pier #5):** [1994] There is a cotter pin missing from the diagonal brace (floorbeam to stringer) at the floorbeam truss connection. There is a deck drain downspout (drains into storm sewer).

**Panel Point #0 (End of West Truss):** Open finger deck joint above. [1997] The floorbeam horizontal stiffener is bent down directly above the rocker bearing (photo). [1998] Side of floorbeam facing finger joint repainted (drain trough removed).

**Crossbeam:** [1994] Crossbeam and west rocker hinge have severe corrosion. [1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out). [1998] Side of crossbeam facing finger joint repainted (drain trough removed).

**Span #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel Point #0.

**See NB Notes for South Approach Spans**

**Previous Snooper Inspections:**

1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson  
1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson  
1994 Terry Moravec, Kurt Fuhrman, Pete Wilson  
1993 Terry Moravec, Chas Martin, Tom Waks  
1991 Chester Martin, Chas Martin, Jerry Anderson  
1988 Chester Martin

**\* Previous In Depth Inspection**



Crew Number: 7627

Inspector: INSPECTOR

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 04-05-1999**

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 15 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate:  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

**STRUCTURE UNIT: 0**

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|---|----------------------|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|--|
| 22  | LS O/L (CONC DECK)   | 2   | 04-05-1999 | 219,086 SF | 0           | 0           | 219,089     | 0           | 0           |  |
|   |                      |     | 09-11-1998 | 219,086 SF | 0           | 0           | 219,089     | 0           | 0           |  |
| Notes: 122) 3 lanes + on/off ramp each direction (2 ft. shoulders). [1978] Low slump overlay (extensive full-depth repairs). [1993] Minor spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound. |                      |     |            |            |             |             |             |             |             |  |
| 48  | LS O/L (CONC SLAB)   | 2   | 04-05-1999 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
|   |                      |     | 09-11-1998 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 300   | STRIP SEAL JOINT     | 2   | 04-05-1999 | 946 LF     | 908         | 38          | 0           | N/A         | N/A         |  |
|   |                      |     | 09-11-1998 | 946 LF     | 908         | 38          | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 301   | POURED DECK JOINT    | 2   | 04-05-1999 | 1,017 LF   | 0           | 356         | 661         | N/A         | N/A         |  |
|   |                      |     | 09-11-1998 | 1,017 LF   | 0           | 356         | 661         | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 303   | ASSEMBLY DECK JOINT  | 2   | 04-05-1999 | 326 LF     | 218         | 108         | 0           | N/A         | N/A         |  |
|   |                      |     | 09-11-1998 | 326 LF     | 218         | 108         | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 321   | CONC APPROACH SLAB   | 2   | 04-05-1999 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
|   |                      |     | 09-11-1998 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 331   | CONCRETE RAILING     | 2   | 04-05-1999 | 7,628 LF   | 7,628       | 0           | 0           | 0           | N/A         |  |
|   |                      |     | 09-11-1998 | 7,628 LF   | 7,628       | 0           | 0           | 0           | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 333   | RAILING - OTHER      | 2   | 04-05-1999 | 3 LF       | 3           | 0           | 0           | N/A         | N/A         |  |
|   |                      |     | 09-11-1998 | 3 LF       | 3           | 0           | 0           | N/A         | N/A         |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 334   | METAL RAIL-COATED    | 2   | 04-05-1999 | 3,814 LF   | 3,814       | 0           | 0           | 0           | 0           |  |
|   |                      |     | 09-11-1998 | 3,814 LF   | 3,814       | 0           | 0           | 0           | 0           |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |
| 107   | PAINTED STEEL GIRDER | 2   | 04-05-1999 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |  |
|   |                      |     | 09-11-1998 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |  |
| Notes:  |                      |     |            |            |             |             |             |             |             |  |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 04-05-1999

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 8/20/33/79) [1968] BRIDGE PAINTED WITH LEAD BASE SYSTEM. [1999] SPOT PAINTING CONTRACT (TRUSS END FLOORBEAMS, AND AREAS BELOW MEDIAN), [1999] PAINT SYSTEM IS 15% UNSOUND.  |                      |     |            |           |             |             |             |             |             |
| 8/156) APPROACH SPANS HAVE 48" DEEP WEDGED BEAMS TRANSITIONING TO 33" DEEP ROLLED BEAMS (RIVETED CONNECTIONS, SPANS #1 & 2 HAVE WELDED COVER PLATES - STRAIGHT ENDS). [1995] BEAMS HAVE MINOR CHALKING THROUGHOUT, BEAMS ADJACENT TO MEDIAN HAVE FLAKING RUST ALONG BOTTOM FLANGE, ALL BEAMS HAVE SEVERE CORROSION AT HINGE (SPAN #2).  |                      |     |            |           |             |             |             |             |             |
| 113   | PAINT STEEL STRINGER | 2   | 04-05-1999 | 14,896 LF | 0           | 14,747      | 0           | 149         | 0           |
|   |                      |     | 09-11-1998 | 14,896 LF | 0           | 14,747      | 0           | 149         | 0           |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 131   | PAINT STL DECK TRUSS | 2   | 04-05-1999 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
|   |                      |     | 09-11-1998 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 152   | PAINT STL FLOORBEAM  | 2   | 04-05-1999 | 3,348 LF  | 0           | 2,645       | 703         | 0           | 0           |
|   |                      |     | 09-11-1998 | 3,348 LF  | 0           | 2,645       | 268         | 435         | 0           |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 33/161) FLOORBEAM TRUSSES HAVE NUMEROUS POOR WELDING DETAILS (PLUG WELDS & TACK WELDS IN TENSION ZONES). [1994] FLOORBEAM TRUSSES HAVE CHALKING THROUGHOUT, WITH SEVERE FLAKING RUST BELOW THE MEDIAN. [1998/99] END FLOORBEAMS & "CROSSBEAMS" REPAINTED (MODERATE SECTION LOSS - PITTING & HOLES IN STIFFENERS).   |                      |     |            |           |             |             |             |             |             |
| 33/156) [1986] SOUTH CROSSBEAM WEB STIFFENER CRACKED AT EAST ROCKER HINGE (HINGE HAD FROZEN) - CRACKS WERE DRILLED OUT, AND BRACING ADDED (BEAMS #11 & #12). [1992/98] NORTH CROSSBEAM & END FLOORBEAM: SEVERAL CRACKS DEVELOPED AT EAST ROCKER HINGE - SOME CRACKS HAVE BEEN DRILLED OUT, BRACING ADDED. [1994] NORTH CROSSBEAM: BEAM #3 CONNECTION IS "WORKING" (BOLTS RE-TENSIONED IN 1998). |                      |     |            |           |             |             |             |             |             |
| 373   | STEEL HINGE          | 2   | 04-05-1999 | 18 EA     | 0           | 0           | 0           | 4           | 14          |
|   |                      |     | 09-11-1998 | 18 EA     | 0           | 0           | 0           | 4           | 14          |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 46) [1986] SE CROSSBEAM HINGE FROZE (PIN REPLACED).   |                      |     |            |           |             |             |             |             |             |
| 380   | SECONDARY ELEMENTS   | 2   | 04-05-1999 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|   |                      |     | 09-11-1998 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 311   | EXPANSION BEARING    | 2   | 04-05-1999 | 125 EA    | 83          | 42          | 0           | N/A         | N/A         |
|   |                      |     | 09-11-1998 | 125 EA    | 83          | 42          | 0           | N/A         | N/A         |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 313   | FIXED BEARING        | 2   | 04-05-1999 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|   |                      |     | 09-11-1998 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 205   | CONCRETE COLUMN      | 2   | 04-05-1999 | 52 EA     | 50          | 2           | 0           | 0           | N/A         |
|   |                      |     | 09-11-1998 | 52 EA     | 50          | 2           | 0           | 0           | N/A         |
| Notes:  |                      |     |            |           |             |             |             |             |             |
| 210   | CONCRETE PIER WALL   | 2   | 04-05-1999 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|   |                      |     | 09-11-1998 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
| Notes:  |                      |     |            |           |             |             |             |             |             |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 04-05-1999

## STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 215  | CONCRETE ABUTMENT   | 2   | 04-05-1999 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
|  |                     |     | 09-11-1998 | 255 LF   | 255         | 0           | 0           | 0           | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 234  | CONCRETE CAP        | 2   | 04-05-1999 | 819 LF   | 680         | 139         | 0           | 0           | N/A         |
|  |                     |     | 09-11-1998 | 819 LF   | 680         | 139         | 0           | 0           | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 356  | FATIGUE CRACKING    | 2   | 04-05-1999 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 8/156) [1998] APPROCAH SPANS: NUMEROUS FATIGUE CRACKS FOUND IN BEAM WEBS AT NEGATIVE MOMENT DIAPHRAGM CONNECTIONS. IN SPAN #9, ONE BEAM WEB WAS COMPLETELY FRACTURED (REPAIRED WITH BOLTED PLATES), SMALLER CRACKS WERE DRILLED OUT (SOME CRACKS STILL REQUIRE DRILLING).                              |                     |     |            |          |             |             |             |             |             |
| 20/157/161) TRUSS MEMBERS HAVE NUMEROUS POOR WELDING DETAILS (TACK WELDS ON INTERIOR STIFFENER PLATES). [1995] INTERIOR OF TRUSS MEMBERS HAVE EXTENSIVE SURFACE RUST (SOME PITTING), AND SEVERE PIGEON DEBRIS. CORROSION (WITH PACK RUST AND SURFACE PITTING) AT FLOORBEAM AND SWAY BRACE CONNECTIONS. |                     |     |            |          |             |             |             |             |             |
| 357  | PACK RUST           | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 358  | CONC DECK CRACKING  | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 359  | CONC DECK UNDERSIDE | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 360  | SETTLEMENT          | 2   | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 361  | SCOUR               | 2   | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 363  | SECTION LOSS        | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 981  | SIGNING             | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
|  |                     |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 982  | GUARDRAIL           | 2   | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |

Crew Number: 7627

**Mn/DOT BRIDGE INSPECTION REPORT**

Inspector: INSPECTOR

**BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 04-05-1999****STRUCTURE UNIT: 0**

| ELEM<br>NBR | ELEMENT NAME    | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|-----------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 984         | DRAINAGE        | 2   | 04-05-1999 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|             |                 |     | 09-11-1998 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |
| 985         | SLOPES          | 2   | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |                 |     | 09-11-1998 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |
| 986         | CURB & SIDEWALK | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                 |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |
| 988         | MISCELLANEOUS   | 2   | 04-05-1999 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |                 |     | 09-11-1998 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes:      |                 |     |            |          |             |             |             |             |             |

General Notes: \*BRIDGE #9340, YEAR 1999

BRIDGE CONSTRUCTED IN 1967.

SEE FRACTURE CRITICAL REPORT FOR ADDITIONAL INFORMATION.

\_\_\_\_\_  
Inspector's Signature\_\_\_\_\_  
Reviewer's Signature / Date



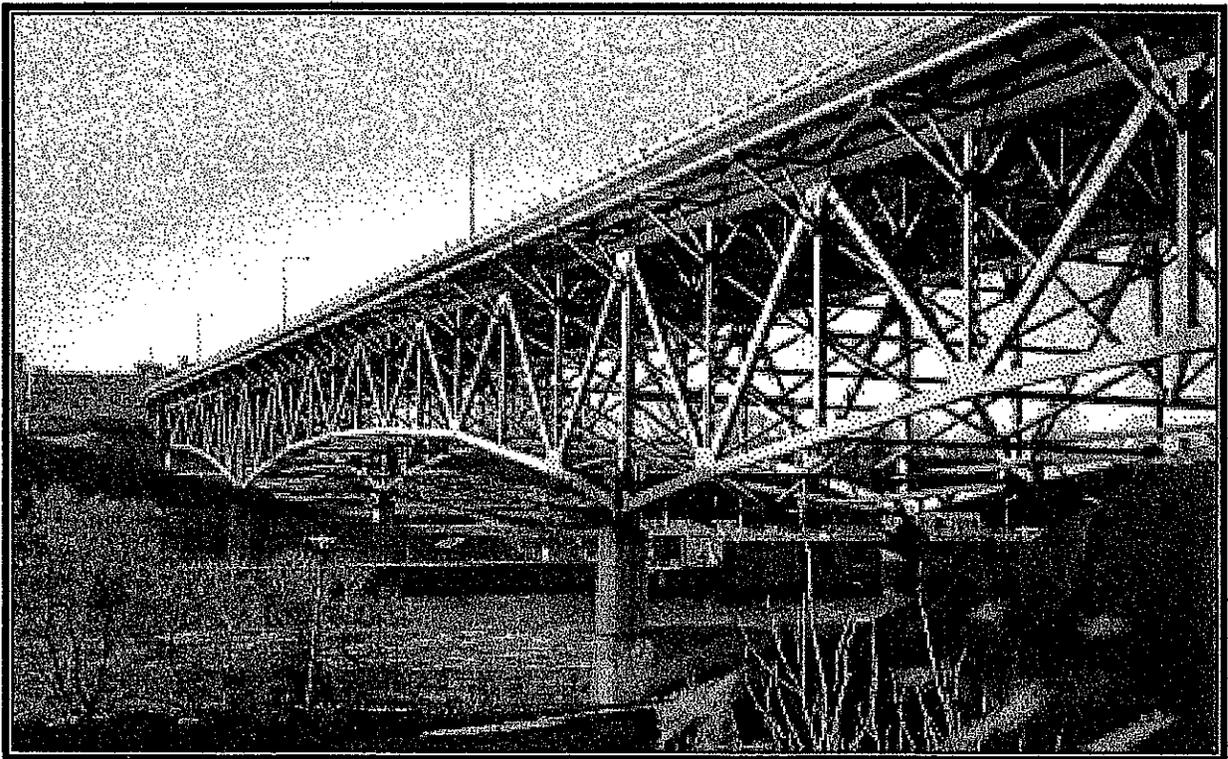


Minnesota Department of Transportation  
Bridge Inspection, Maintenance Operations  
Metro Division

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# Fracture Critical Bridge Inspection Report

## Annual & In - Depth April 1999



**Bridge # 9340**  
*I-35W over the Mississippi River at Minneapolis, Mn*

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# Fracture Critical Bridge Inspection Report Annual & In-Depth

**Bridge # 9340**

**I-35W over the Mississippi River at Minneapolis, MN**

*Prepared by*

**Bridge Inspection, Maintenance Operations  
Metro Division  
1500 W. County Road B2  
Roseville, MN 55113**

*Inspection Date: Main Truss Spans: April 5-9, 1999*

*Steel Approach Spans: March 22-24, 1999*

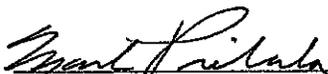
*Inspected By: Kurt Fuhrman, Pete Wilson, Bill Nelson, Ken Rand, Mike Schadegg*

*Report Written By: Pete Wilson*

*Bridge Maintenance Sub Area: Maplewood*

*Access Equipment Used: UB50 Reach All (Mn/DOT), UB60 Reach All (City of St.  
Paul) "Skyjack" Snorkel Lift*

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

  
Mark Pribula

*A 21102*  
Reg. No. 21102

*3/31/00*  
Date

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## Executive Summary

This report evaluates the annual inspection of the main truss spans and the in-depth inspection of the approach spans of bridge # 9340, which carries I-35W over the Mississippi River at Minneapolis, Mn. Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. There are three traffic lanes and an acceleration/deceleration lane in both directions, with no shoulders.

The approach spans adjacent to each end of the main truss spans are continuous steel multi-beam (Spans 1 - 5 & 9 - 11). The beams are 48" deep welded plate beams, which transition into 33" deep rolled steel beams (connections are riveted). Spans 1 - 5 have 14 beams (with a hinge joint in Span 2), in Spans 9 - 11 the deck widens from 15 to 18 beams.

There are two main steel deck trusses (Spans-6 - 8), they are comprised of built-up welded members. Connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded H beams.

There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams and welded connections. The floorbeam trusses cantilever beyond the main truss on both sides and are connected to the main truss, vertical members with bolts & rivets. The two end floorbeams are welded plate girders.

During the 1999 annual/in-depth inspection, the following areas are of major concern

- During the 1998 inspection - numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9 & 10). These spans have welded beams (not fracture critical). The cracks were located in negative moment regions at the top of the diaphragm connections (at one location the web had cracked through entirely). These cracks were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange (tight fit). Some existing cracks were drilled out (the fractured beam was reinforced with bolted plates). To reduce the stress levels at these locations, the diaphragms were lowered as part of the 1999 painting contract. Due to the widespread cracking - these areas will now be inspected on 6-month intervals (access from below with "Skyjack" Snorkel Lift). The area below includes a contract parking lot and the Minnesota Commercial Railroad (646-2010).
- A partial deck chaining in 1998 found extensive delamination (along with several spalls & bituminous patches). This deck should have a ground penetrating radar survey, and will eventually require overlay repair, a new overlay, or a complete re-decking.
- In 1998, the median copings were replaced (by contractor). During the removals, the adjacent deck bay was damaged (areas accessible from below were repaired by the contractor). The "stool" concrete along the top flange of the stringer (or beam) has spalled off in some locations. In some locations the spalling extends to the underside of the deck (exposed rebar) and to the area above the top flange. These areas should be examined during future inspections.
- The 1998 repair contract included gland replacement at leaking strip seal joints. Due to corrosion damage to the steel portion of the expansion joints, the gland could not be replaced. Instead, a new product was used (steel mesh with hot pour) - the final product looks similar to a strip seal gland. This product was used at the South Abutment (SBL), and possibly at some other locations. We should monitor these joints to see how well this new gland repair performs.

## Bridge Inspection Recommendations

This recommendation listing refers to specific areas where member section loss, corrosion damage, corroded & damaged bearing assemblies and other deficiencies were located during the 1999 inspection. Bridge inspection lists these deficiencies in the highest priority first.

- 1) During the 1998 inspection - numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9 & 10). These spans have welded beams (not fracture critical). The cracks were located in negative moment regions at the top of the diaphragm connections (at one location the web had cracked through entirely). These cracks were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange (tight fit). Some existing cracks were drilled out (the fractured beam was reinforced with bolted plates). To reduce the stress levels at these locations, the diaphragms were lowered as part of the 1999 painting contract. Due to the widespread cracking - these areas will now be inspected on 6-month intervals (access from below with "Skyjack" Snorkel Lift). The area below includes a contract parking lot and the Minnesota Commercial Railroad (646-2010).
- 2) A partial deck chaining in 1998 found extensive delamination (along with several spalls & bituminous patches). This deck should have a ground penetrating radar survey, and will eventually require overlay repair, a new overlay, or a complete re-decking.
- 3) The hinge joint in Span #2 should be repaired or eliminated.
- 4) Any missing or loose stringer bolts should be documented & replaced.
- 5) The main truss bearings, and the four truss end rocker bearings should be cleaned & lubricated (the bearing pins should also be examined with UT).
- 6) In 1998, the median copings were replaced (by contractor). During the removals, the adjacent deck bay was damaged (areas accessible from below were repaired by the contractor). The "stool" concrete along the top flange of the stringer (or beam) has spalled off in some locations. In some locations the spalling extends to the underside of the deck (exposed rebar) and to the area above the top flange. These areas should be examined during future inspections.
- 7) The 1998 repair contract included gland replacement at leaking strip seal joints.
- 8) Due to corrosion damage to the steel portion of the expansion joints, the gland could not be replaced. Instead, a new product was used (steel mesh with hot pour) - the final product looks similar to a strip seal gland. This product was used at the South Abutment (SBL), and possibly at some other locations. We should monitor these joints to see how well this new gland repair performs.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## Bridge Description

Bridge #9340 carries I-35W over the Mississippi River at Minneapolis, MN. The bridge has 14 spans, with a total length of 1,907 feet. Constructed in 1967 there are three traffic lanes and an acceleration/deceleration lane in both directions, with no shoulders.

The approach spans adjacent to each end of the main truss spans are continuous steel multi-beam (Spans 1 - 5 & 9 - 11). The beams are 48" deep welded plate beams, which transition into 33" deep rolled steel beams (connections are riveted). Spans 1 - 5 have 14 beams (with a hinge joint in Span 2), in Spans 9 - 11 the deck widens from 15 to 18 beams. The far north approach spans (Spans 12 - 14): is a continuous "voided" slab span design.

There are two main steel deck trusses (Spans-6 - 8), they are comprised of built-up welded members. Connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded H beams.

There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams and welded connections. The floorbeam trusses cantilever beyond the main truss on both sides and are connected to the main truss, vertical members with bolts & rivets. The two end floorbeams are welded plate girders.

## Bridge Inspection General Notes

### Bridge Superstructure NBI Condition Code 4

**Paint System:** [1968] Lead-base paint system. [1995] Paint system is 20% unsound. [1999] Spot painting contract was let to paint (floorbeams at truss ends and median portions of floorbeams & sway bracing).

**Main Truss Members:** There are two steel deck trusses, they are comprised of built-up welded members - connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded H beams. The truss members have numerous poor weld details. The vertical H beam truss members have transverse welds at the floorbeam connections. The box beam truss members have welded interior stiffeners - some of these have tack welded tabs (many of these tack welds have cracked). Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have corrosion at the floorbeam and sway frame connections (pack rust is forming between the connection plates), there is paint failure, surface rust, and flaking rust is scattered locations. The interiors of the box members have severe pigeon debris. [1999] Screens placed over openings to prevent pigeon access.

**Floorbeam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams (welded connections). The floorbeam trusses cantilever beyond the main truss on both sides (connected to the main truss, vertical members with bolts & rivets). The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. The floorbeam trusses have severe flaking rust below the median, and below deck joints. There is pack rust and surface pitting at the main truss connections. [1999] Median portions of floorbeam trusses repainted - some areas have section loss (holes).

**End Floorbeams:** The two end floorbeams are welded plate girders. [1997] The end floorbeams have severe corrosion below the open finger joints (surface pitting at the base of the web, and section loss on the base of the vertical stiffeners. [1998/99] End floorbeams re-painted. [1998] Cracks were found in two stiffener welds directly above the main truss end (NE corner).

**Stringers:** There are 14 steel stringers (27" deep rolled beams) bearing on the floorbeam trusses - they are continuous except for five stringer expansion joints. [1993] The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing. [1998] Some bolts replaced. [1994] The stringers have corrosion at the expansion joints and the stringers adjacent to the median have flaking rust along the bottom flange.

**Lateral/Sway Bracing:** The main deck trusses have both upper and lower diagonal bracing (horizontal). There is also a vertical sway frame running below each floorbeam truss. [1994] The sway frames have flaking rust below the median. [1999] Median area repainted – some areas have section loss (holes). [1998] There is pack rust at some bottom chord connections. Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to Stringers #4, & #11. [1993] The pinned connections of these braces are “working” and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six huge “geared” rollernest bearing assemblies, and two fixed bearing assemblies. [1997/98] The truss bearings have moderate corrosion, the bearings at Piers #3 & 8 are functioning properly (checked during each annual inspection), but the bearings at Pier #6 show no obvious signs of movement (difficult to reach with snooperscope).

**Steel Multi-Beam Approach Spans (Spans #1-5 & #9-11):** The approach spans adjacent to each end of the main truss spans are continuous steel multi-beam. The beams are 48" deep welded plate beams, which transition into 33" deep rolled steel beams (connections are riveted). Spans #1 - #5 have 14 beams (with a hinge joint in Span #2), in Spans #9 - #11 the deck widens from 15 to 18 beams. [1994] The fascia beams & beams adjacent to the median have flaking rust along the bottom flange. [1998] Fatigue cracks were found in several beam webs (Spans #3,4,5,9 & 10). The cracks were located in negative moment regions at the top of the diaphragm connections (at one location the web had cracked through entirely). These cracks were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange (tight fit). Some existing cracks were drilled out (the fractured beam was reinforced with bolted plates). Due to the widespread cracking - these areas will now be inspected on 6-month intervals. These areas are above a parking lot and Minnesota Commercial Railroad (due to deck width they must be accessed from below).

**Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a “crossbeam” (welded plate girder). The crossbeams bear on “rocker” assemblies bearing upon the cantilever ends of the truss. Of these four connections, three have the rocker assemblies built into the crossbeam web - the southeast rocker connects to the bottom flange of the crossbeam.

[1986] The SE rocker bearing froze, resulting in damage to the East End of the south crossbeam (2 cracked vertical web stiffeners). The crossbeam was repaired - the stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. The connection was also reinforced by braces connected between the crossbeam and Beams #2 & #3. [1992] A crack was discovered in a stiffener weld above NE rocker (drilled out). [1997/98] At the same location, a weld between a vertical & horizontal stiffener cracked through entirely - strain gauges were placed nearby to analyze stresses, and the crossbeam was reinforced with bracing connected to the stringers. [1997/98] Cracks were also found at the end of horizontal stiffeners near the NE & SW rockers.

[1994] Both crossbeams have severe corrosion below the open finger joints (surface pitting at the base of the web, and section loss on the base of the vertical stiffeners). [1998] The faces exposed to the finger joints were repainted.

**Crossbeam Rocker Bearings:** There are 4 "rocker" hinge assemblies supporting the crossbeams at the truss ends. [1986] The SE rocker pin was replaced (the assembly had frozen) - this required closing I-35W and jacking the multi-beam span. [1994] All four rocker assemblies have severe corrosion due to the open finger joints above. [1998] Despite the corrosion, all bearings appear to be functioning (obvious signs of movement).

**Hinge Assemblies (Span #2):** There are 14 sliding plate hinge assemblies at the expansion joint in Span #2. [1994] Hinge bearing assemblies have severe corrosion and debris from the open finger, deck joint. [1996] Hinge joint is closed beyond tolerable limits (possibly due to substructure movement & pavement thrust). Most of the beam-ends are in contact, and some of the lower slide plates have tipped (preventing the joint from reopening).

**Bearing Assemblies:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies, and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 -14):** The far north approach spans consist of a continuous "voided" slab span. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). [1998] Exterior and median copings repaired with shot-crete.

## Bridge Substructure NBI Condition Code 6

**Abutments:** The North Abutment has stains from the leaking deck joint. Both Abutments have minor cracking.

**Piers:** Piers #6 & #7 (main river span) consist of two concrete columns resting on a pier wall - there is a vertical crack through the west column at Pier #7. Piers #5 & #8 consist of 2 concrete columns connected with an upper strut. The columns of Pier #8 have been encased in a concrete jacket. The piers in the multi-beam spans (Piers #1 - #5 and #9 - #11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). Pier # 11 has extensive shot-crete repairs (the open finger deck joint has been replaced with a strip seal). The far north piers (Piers #12 & #13) consist of concrete columns cast directly into the slab span deck. [1996] Pier #1 has tipped slightly to the north (measured with a plumb bob).

## Bridge Deck NBI Condition Code 5

**Structural Slab:** [1978] Numerous full depth deck repairs. [1997/98] The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the south approach spans). [1998] The median coping overhangs were replaced (steel stay-in-place forms), and the exterior copings were repaired with gunnite. The bay just east of the median was damaged by the slab removal. The "stool" concrete along the top flange of the stringer (or beam) has spalled off in some locations (some loose concrete over recreation trail). In some locations the spalling extends to the underside of the deck (exposed rebar) and to the area above the top flange.

**Wearing Surface:** [1978] Low slump concrete overlay. [1993] Overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks (sealed in 1998). [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] SBL has 20 SF of concrete patches, 20 SF of bituminous patches, and 10 SF of spall.

**Open Finger Joints:** There are 3 open finger joints - these are located at each end of the truss spans and above the hinge joint in Span #2. [1999] Rubber "skirts" installed below the 2 finger joints at the ends of the truss spans (drain troughs were removed).

**Strip Seal Joints:** [1978] Strip seals installed at abutments and 5 stringer expansion joints - the deck also has several poured joints. [1995] The strip seal at the South Abutment (SBL) is pulled out in several locations, and the strip seal at Pier #11 has a possible leak (SBL at median). [1996] The strip seal at Panel Point #8 has 8 ft pulled out (SB right gutterline). [1998] Strip seal repairs by contractor.

**Exterior Railing:** The exterior railing is Code #12. [1997] There are extensive spalls (exposed rebar) along the underside of the rail beams and on the face of the rail posts. [1998] Exterior rail was retrofit - 32" high concrete face placed in front of existing rail - horizontal steel rails were removed. The curb along the exterior railing has moderate cracking, delamination and spalling.

**Median Railing:** [1998] New split median rail installed (Code #22) - north portion of the rail has removable precast caps.

## Other Bridge Elements

**Approach Panels:** All approaches are concrete. There is a transverse crack in each approach, and some minor spalls at the joints. Relief joints should be cut in the curbs and median. The relief joints need to be resealed. [1996] The north approach (SBL and on ramp) has no relief joint.

**Channel & Protection:** Pier #7 is on the east bank of the Mississippi. Due to extreme turbulence (the bridge is directly downstream from the lower St. Anthony Lock), there have been no accurate soundings taken recently.

**Signing:** There are no hazard markers at the south end.

**Guardrail:** [1998] Approach guardrails repaired (impact attenuator at the northbound off ramp to University Ave. replaced).

**Drainage:** Several deck drains drop directly into the river. The drain troughs at Pier #6 have inadequate slope, and tend to fill up with debris. [1998] Drain troughs below finger joints at ends of the arch spans were removed (detached from downspouts).

**Slope Protection:** There is concrete slope paving at both abutments.

**Lighting:** The bridge has rail mounted deck lighting, under deck lighting, and river navigation lighting. [1994] A light post (SBL - W 5/3 L ) has a 6" vertical split due to traffic impact. An underdeck light cover in Span #14 is broken (maintained by "Metal Matic Inc.").

**Miscellaneous:** The area under some approach spans (Spans #3, #4, #11 & #12) are being leased out as parking lots. Material from river dredging is being stockpiled under Span #8.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). A control room was constructed at the NW corner.

## Northbound Snooper Inspection

The inspection includes the East Truss and substructure. Beams & stringers are numbered from the east (from original plans).

**South Abutment:** Strip seal deck joint above. At the north end (SBL), 15 LF of the strip seal has pulled out. 14 sliding plate bearing assemblies. [1995] The bearings are in full contraction (see Pier #1 and hinge in Span #2), and many have corrosion. The seat area is cracked and discolored.

**Span #1 (Steel Multi-beam):** 14 beams (33" deep rolled beams with welded cover plates). [1996] East fascia beam has flaking rust. The three west bays have some full depth deck patches. [1998] "Stool" concrete spalling off adjacent to median beams.

**Pier #1:** 10 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a strut between column bases. [1996] The pier has apparently tipped to the north (should be measured with a plumb bob).

**Span #2 (Steel Multi-beam):** 14 beams (33" deep rolled beam with welded cover plates) - the beams transition to 48" deep welded beams south of the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. Some full depth deck repairs. [1998] "Stool" concrete spalling off adjacent to median beams.

**Hinge Joint (12 ft. South of Pier #2):** Open finger joint above. Severe corrosion and debris on the hinge assemblies and beam ends. The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate has tipped (falling off the base plate) and is preventing the joint from opening. Several beam-ends are contacting at the top flange or at the web.

**Pier #2:** 14 sliding plate bearing assemblies. Pier consists of four concrete columns and cap, with a strut between the column bases. [1997] Bearings have corrosion, East End of cap has 4 SF of delamination.

**Span #3 (Steel Multi-beam):** 14 beams (48" deep welded plate beams). The three west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete spalling off (some loose concrete) adjacent to median beams.

**Span #3 (diaphragm line just south of Pier #3):** \*Denotes locations where cracks were found in 1998.

**G1 (East Fascia - NB):** [1999] Possible crack on interior stiffener weld.

**G2 (NB):** \* [1988] Two 2" holes drilled in web.

**G3 (NB):** \* [1988] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds.

**G4 (NB):** \* [1988] Two 2" holes drilled in web.

**G5 (NB):** \* [1988] Two 2" holes drilled in web.

**G6 (NB):** \* [1998] One 2" hole drilled in web (other end of crack may need drilling).

**G7 (NB):** \* [1998] One 2" hole drilled in web (other end of crack may need drilling).

**G8 (SB):**

**G9 (SB):**

**G10 (SB):**

**G11 (SB):**

**G12 (SB):** \* [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole.

**G13 (SB):**

**G14 (West Fascia - SB):** \* [1998] One 2" hole drilled in web (other end of crack may need drilling).

**Pier #3:** 10 fixed plate, and four sliding plate bearing assemblies. Pier consists of four concrete columns and a cap.

**Span #4 (Steel Multi-beam):** 14 beams (48" deep welded plate beams). [1978] Full depth deck repairs (2<sup>nd</sup> & 3<sup>rd</sup> bays from the east). [1998] Underside of deck 200 LF of transverse leaching cracks, and 200 SF of spall (exposed rebar) below a transverse poured joint (full width of deck).

**Span #4 (diaphragm line just north of Pier #3):** [1998] SBL: the five east diaphragms were lowered (strain gauges placed on beams). \*Denotes locations where cracks were found in 1998.

**G1 (East Fascia - NB):**

**G2 (NB):**

**G3 (NB):** \* [1998] Crack in top flange/web weld.

- G4 (NB): \* [1998] Crack in top flange/web weld.
- G5 (NB):
- G6 (NB): [1999] Crack in top of stiffener weld.
- G7 (NB): \* [1998] Crack in top flange/web weld.
- G8 (SB):
- G9 (SB):
- G10 (SB):
- G11 (SB): \* [1988] Two 2" holes drilled in web.
- G12 (SB): \* [1988] Two 2" holes drilled in web.
- G13 (SB): \* [1999] No cracks found (paint cracks only)
- G14 (West Fascia - SB): \* [1988] Two 2" holes drilled in web.

**Pier #4:** 14 sliding plate expansion-bearing assemblies. [1997] Minor rust on bearings. Pier consists of 4 concrete columns and cap.

**Span #5 (Multi-beam/Deck Truss):** 14 beams (48" deep welded plate beams) - they terminate by framing into a crossbeam at Panel Point #0. [1996] Four conduit clamps missing (NB fascia beam). Median girder has impact damage (parking lot below). [1978] Underside of deck has some full depth patches (2 west bays). [1997] Deck leaching near the finger joint. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked (photo).

**Span #5 (diaphragm line just north of Pier #4):** \*Denotes locations where cracks were found in 1998.

- G1 (East Fascia - NB):
- G2 (NB):
- G3 (NB): \* [1988] Two 2" holes drilled in web.
- G4 (NB): \* [1988] Two 2" holes drilled in web.
- G5 (NB):
- G6 (NB):
- G7 (NB): \* [1988] Two 2" holes drilled in web.
- G8 (SB):
- G9 (SB):
- G10 (SB): \* [1988] Two 2" holes drilled in web.
- G11 (SB): [1999] Possible cracks at top of stiffener weld.
- G12 (SB): \* [1988] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld.
- G13 (SB): \* [1999] Possible cracks at top of stiffener weld.
- G14 (West Fascia - SB): [1999] Small crack at top of interior stiffener weld

**Crossbeam:** [1986] The SE rocker froze, damaging the East End of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W closed to traffic) - the SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1994] The east rocker hinge assembly has severe corrosion. [1998] Crossbeam repainted (side facing finger joint).

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Year   | Measurement |
| 1998   | 16-5/8"     |
| 1999   | 17-13/16"   |

**Panel Point #0 (Beginning of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1998] End floorbeam repainted (side facing finger joint) - there is section loss at the base of the stiffeners. [1996] The truss connections (north side of floorbeam) have severe flaking rust.

**Panel Point #1, (East Truss, Pier #5):**

**Pier #5:** Two "rollemest" bearing assemblies. [1999] Bearings show signs of recent movement. Pier consists of two concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

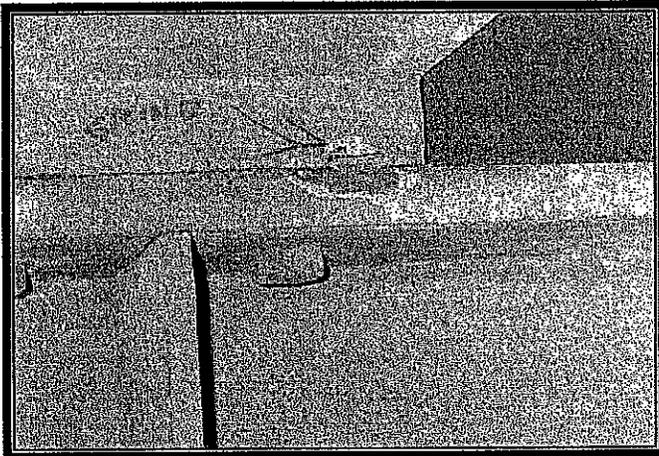
**Span #6 (Deck Truss):** [1997] West River Parkway constructed below bridge.

**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):** Floorbeam truss (near center) has an undercut weld in the flange.

**Panel Point #4 (East Truss, Stringer Joint):** Strip seal deck joint above. [1999] 1 ft. of gland pulled out @ centerline. [1996] There is an weld overlap at the floorbeam truss bottom chord/vertical member connection gusset plate. [1999] Junction box along catwalk has cover missing.

**Panel Point #5 (East Truss):** [1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out @ Stringer #3 (photo), cracked tack welds remain @ Stringer #4 (photo).



Panel Point #6 East Truss Stringer #3

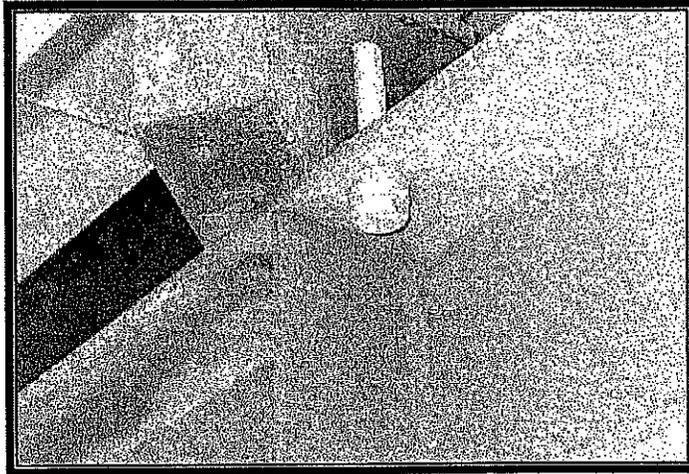


Panel Point #6 East Truss Stringer #4

**Panel Point #6 (East Truss):** [1994] Top chord of floorbeam truss has a cracked weld in the bottom flange at the end of a connection plate. [1999] Cracked tack weld @ Stringer #5 bearing pedestal.

**Panel Point #7 (East Truss):**

**Panel Point #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. [1999] Joint is leaking. [1998] Stringer #4: bolt replaced at south floorbeam connection. [1994] Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated. [1999] Missing bolt replaced (bearing block still rotated) - photo.



Panel Point #8 East Truss Stringer #2

**Pier #6 (Downtown side of Mississippi):** Two "rollest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement (need to check!). Pier consists of two concrete columns with a pier wall at the base. [1997] The drain pipes are clogged (top & bottom @ median).

**Span 7 (Deck Truss):**

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):** Navigation light.

**Panel Point #11 (East Truss):** Section loss at gusset plate, bottom chord.

**Panel Point #12 (East Truss):** [1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener.

**Panel Point #13 (East Truss):** Deck drains (falls directly into river). [1993] Section loss at gusset plate, bottom chord. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners.

**Panel Point #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint above. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener.

**Panel Point #13' (East Truss):** Floorbeam truss top chord has a ground out spot near Stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener.

**Panel Point #12' (East Truss):** [1999] Deck (east bay) has 15 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):** Deck drains (falls directly into river).

**Panel Point #8' (East Truss, Pier #7, Stringer Joint):** Red navigation light. Strip seal deck joint above. Floorbeam truss has severe rust below the median. [1993] North side: bolts replaced with "redi-rod" at Stringer #4, bolts replaced at Stringer #5.

**Pier #7 (East bank of Mississippi):** Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full-height leaching crack on the south face.

**Span #8 (Deck Truss):**

**Panel Point #7' (East Truss):**

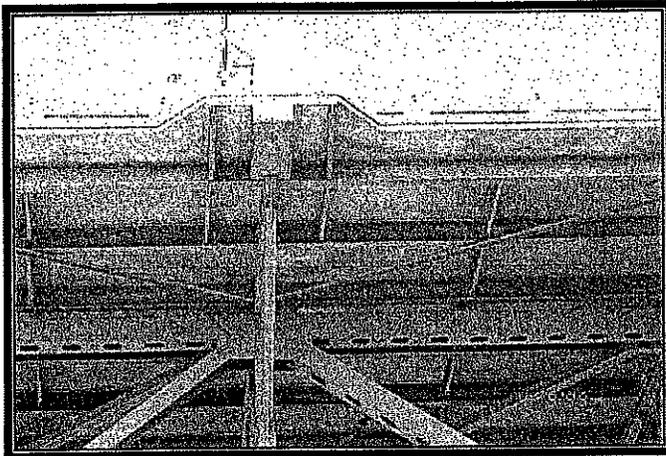
**Panel Point #6' (East Truss):** [1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose.

**Panel Point #5' (East Truss):**

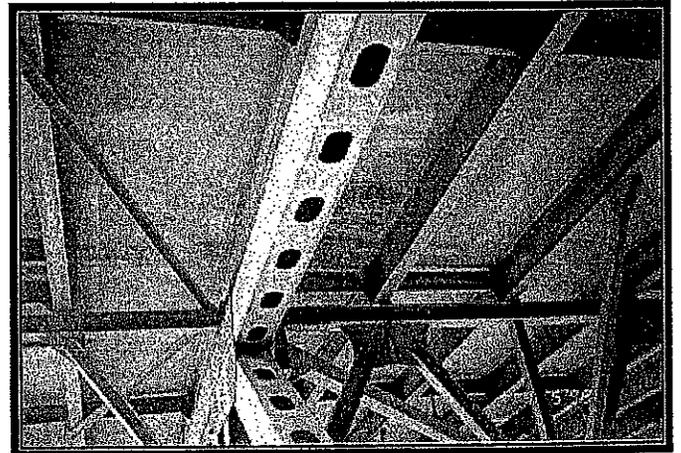
**Panel Point #4' (East Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along the interior edges.

**Panel Point #3' (East Truss):** Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):** Overhead Sign. [1999] Deck in Bay #3 has 100 SF of water saturation (photos).



Deck Deterioration Panel Point #2



Deck Deterioration Panel Point #2

**Pier #8:** 2 "rollemest" bearing assemblies, they have light rust. [1999] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss, Pier #8):**

**Panel Point #0' (End of East Truss):** Open finger joint above. [1997] North side of floorbeam (below finger joint) has section loss (holes in web stiffeners)- photo. [1998] Side of floorbeam facing finger joint repainted. [1998] Two welds (north face) have cracked through (two horizontal welds between stiffener plates directly above the east truss rocker).

**\*\* Measure gap between crossbeam & floorbeam (East End)!**

**Crossbeam:** [1996] Crossbeam has moderate section loss (pitting). The east hinge rocker assembly has severe corrosion and debris - should be flushed. [1998] Side of floorbeam facing finger joint repainted. [1992] A crack in the floorbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997/98] North face: weld above east rocker bearing (between the horizontal & vertical stiffeners) has cracked entirely through (weld end at crossbeam web is partially drilled out (partial depth hole). [1998] Cracks at both ends of the horizontal stiffener were drilled out (two small holes drilled in crossbeam web at each location). [1998] Bracing installed between crossbeam (above east rocker) and Beams #3 & 5.

**Span #9 (Deck Truss/Multi-beam):** The multi-beam spans resume (framed into the crossbeam) with eight beams in the NB bridge at Panel Point #0', two active railroad tracks below.

**Span #9 (diaphragm line just south of Pier #9):** \*Denotes locations where cracks were found in 1998 (no drilling has been done at this location).

**G1 (East Fascia - NB):**

**GC (NB):**

**G2 (NB):** \* [1998] Web severely cracked - web reinforced with bolted plates.

**G3 (NB):**

**G4 (NB):** \* [1998] Crack in top flange/web weld.

**G5 (NB):**

**G6 (NB):**

**G7 (NB):**

**G8 (SB):** \* [1998] Small crack in top flange/web weld.

**G9 (SB):** \* [1998] Crack in top of stiffener weld.

**G10 (SB):**

**G11 (SB):** \* [1998] Crack in top of stiffener weld.

**G12 (SB):** \* [1998] Crack in top of stiffener weld.

**G13 (SB):**

**G14 (West Fascia - SB):**

**Pier #9:** 13 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 columns and cap, with a lower strut. [1969] East column damaged by train derailment - the column has minor scrapes and spalls (downspout had to be reconnected).

**Span #10 (Steel multi-beam):** NB bridge has 10 beams, SB bridge has 7 beams - they transition to a shallow beam. Railroad tracks below (one-track splits into two).

**Span #10 (diaphragm line just north of Pier #9):** \*Denotes locations where cracks were found in 1998 (no drilling has been done at this location).

**G1 (East Fascia - NB):**

**G1B (NB):** Stiffeners are welded to the top flange (positive moment).

**GC (NB):**  
**G1D (NB):** Stiffeners are welded to the top flange (positive moment).  
**G2 (NB):**  
**G3 (NB):**  
**G4 (NB):** \* [1998] 4" crack in top flange/web weld (turning down).  
**G5 (NB):** \* [1998] Cracks in top flange/web weld & top of stiffener weld.  
**G6 (NB):**  
**G7 (NB):**  
**G8 (SB):**  
**G9 (SB):** \* [1998] Cracks in top flange/web weld & top of stiffener weld.  
**G10 (SB):** \* [1998] Cracks in top flange/web weld & top of stiffener weld.  
**G11 (SB):** \* [1998] Cracks in top flange/web weld & top of stiffener weld.  
**G12 (SB):** \* [1998] Cracks in top flange/web weld & top of stiffener weld.  
**G13 (SB):**  
**G14 (West Fascia - SB):**

**Pier #10:** 18 sliding plate expansion bearings. Pier has 5 columns & cap with a lower strut.

**Span #11 (Steel Multi-beam):** NB bridge has 11 beams, SB bridge has 7 beams, parking lot below.

**Pier #11:** Beginning of the NB off ramp to University Ave. (Br. #9340A). Strip seal deck joint above. [1995] Gland is leaking near the median (SBL). 18 sliding plate bearings for the steel beams, and 15 sliding plate bearings for the slab span. Pier consists of 7 columns and a cap. [199\_?/98] Extensive shot-crete repairs on cap.

**Span #12 (Concrete Voided Slab Span):** Parking lot below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #12:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #13 (Concrete Voided Slab Span):** 2nd St. passes below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #13:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #14 (Concrete Slab Span):** [1998] Shot-crete repairs along median and exterior copings.

**North Abutment:** Strip seal deck joint above. 14 sliding plate bearing assemblies.

## Westbound Snooper Inspection

Southbound Inspection (West Truss spans only). Beams and stringers are numbered from the east (from original plans).

**Span #9 (Steel Multi-beam/Deck Truss):** SB bridge has seven beams, which terminate by framing into the crossbeam at Panel Point #0. [1997] The conduit hangers along the west coping

have failed (coping spalled away) and the conduits are now hanging loose in several locations (pictures taken).

**Crossbeam:** [1994] The bolted connection between the crossbeam and Beam #12 (above rocker) is "working" - the bolts should be replaced. [1996] The crossbeam has severe corrosion and debris - should be flushed. The rocker hinge has severe corrosion. [1997] Rocker bearing marked to check for movement.

**\*\* Measure gap between crossbeam & floorbeam (West End)!**

**Panel Point #0' (Beginning of West Truss):** Open finger deck above. The north face of the floorbeam has severe corrosion (section loss on stiffeners) and debris - should be flushed. [1996] There is severe corrosion (surface pitting on plates & bolts) at the floorbeam/truss connection. [1997] Conduit running along the catwalk is hanging loose and has pulled out where it meets the floorbeam (photo).

**Panel Point #1' (West Truss, Pier #8):**

**Pier #8:** See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):**

**Panel Point #2' (West Truss):**

**Panel Point #3' (West Truss):** The floorbeam truss (top flange of upper chord) has an ugly weld below the connection to Stringer #11.

**Panel Point #4' (West Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges.

**Panel Point #5' (West Truss):**

**Panel Point #6' (West Truss):** [1996/98] Stringer #11: one bolt replaced in 1998 at the floorbeam connection, 2 bolts are still loose. [1997] Stringer #10: 2 south bolts are loose at the floorbeam connection. [1999] Stringer #9: one south bolt is loose at the floorbeam connection

**Panel Point #7' (West Truss):** [1997] Cracked tack weld on interior of top chord/floorbeam truss connection. [1999] Wind bracing gusset plate @ Stringer #14 has bolt bolts loose.

**Panel Point #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1998] Stringer #11: one bolt replaced at floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction).

**Pier #7:** See NB notes.

**Span #7 (Deck Truss):**

**Panel Point #9' (West Truss):** Sway frame and gusset plate connection, some rivets rusty in the median area.

**Panel Point #10' (West Truss):** [1994] Stringer #13: Loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior (15' south of U10').

**Panel Point #11' (West Truss):** Nick in the truss bottom chord L11' /L12'.

**Panel Point #12' (West Truss):** Truss diagonal member U12' /L13' has one nick inside, 2 outside. The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains both sides. [1994] Stringer #11 has flaking rust near the joint (gland pulled out above). Tack welds along the sway frame/truss, bottom chord, gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener.

**Panel Point #13 (West Truss):** [1999] Pack rust at the truss bottom chord/sway frame connection (plates are spread 3/4" - photo). [1996/99] Bottom chord member L13 /L14 has cracked tack welds at 2 internal stiffeners.

**Panel Point #12 (West Truss):** [1996] Bottom chord member L12 /L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):** [1998] Stringer #11: 3 bolts replaced at the floorbeam truss connection, the SE bolt is too short (inadequate threads). [19\_\_?] The stringer has lifted 3/32".

**Panel Point #10 (West Truss):** Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):** Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains & horizontal troughs. [1996] Drain clogged at median. [1999] Standing water in east grate. [19\_\_?] The sway frame is rusty below the median.

**Pier #6:** See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

**Panel Point #6 (West Truss):** Overhead sign above. The top chord of the floorbeam truss (U5/U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out.

**Panel Point #5 (West Truss):** Truss top chord member U5/U6 has backer bars along the interior corners.

**Panel Point #4 (West Truss, Stringer Joint):** Strip seal deck joint. Truss top chord member U4/U5 has backer bars along the interior corners. [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [1997] Conduit hanging from wire at light pole.

**Panel Point #3 (West Truss):** Truss diagonal member L3/U4 has backer bars along the interior corners. Truss bottom chord L2/L3 has a nick.

**Panel Point #2 (West Truss):** [1996] Floorbeam truss member L2/U3 has a welding flaw (no crack, MT 1997).

**Pier #5:** See NB notes.

**Panel Point #1 (West truss, Pier #5):** [1994] There is a cotter pin missing from the diagonal brace (floorbeam to stringer) at the floorbeam truss connection. [1998] Deck drain detached from downspout (originally drained into storm sewer).

**Panel Point #0 (End of West Truss):** Open finger deck joint above. [1997] The floorbeam horizontal stiffener is bent down directly above the rocker bearing (photo). [1998] Side of floorbeam facing finger joint repainted (drain trough removed).

**\*\* Measure gap between crossbeam & floorbeam (West End)!**

**Crossbeam:** [1994] Crossbeam and west rocker hinge have severe corrosion. [1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out). [1998] Side of crossbeam facing finger joint repainted (drain trough removed).

**Span #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel Point #0.

**See NB Notes for South Approach Spans**

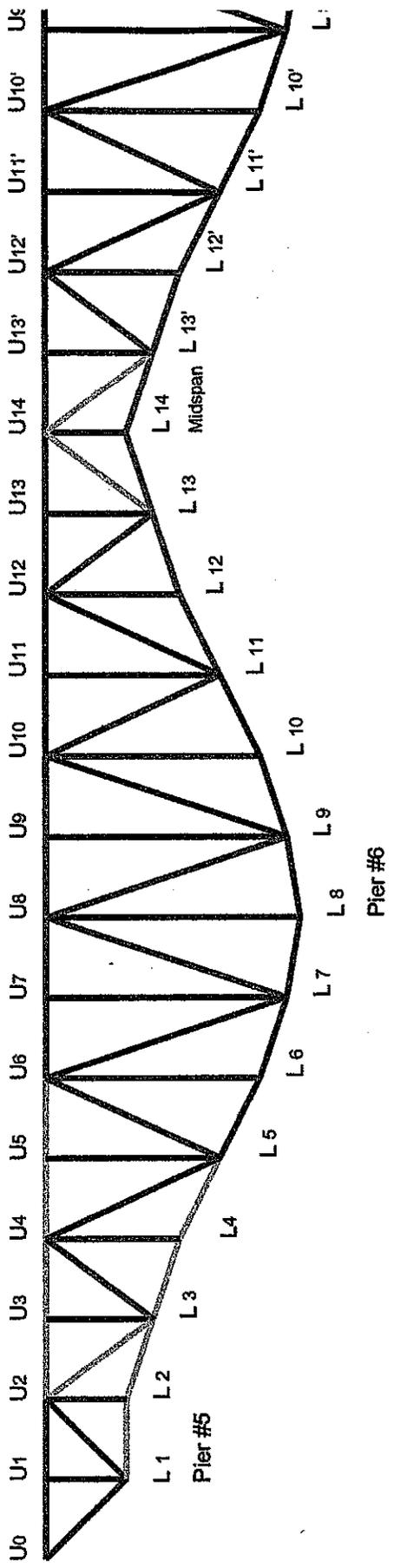
## Previous Snooper Inspections

- 1998 Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson
- 1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson
- 1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994 Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993 Terry Moravec, Chas Martin, Tom Waks
- 1991 Chester Martin, Chas Martin, Jerry Anderson
- 1988 Chester Martin

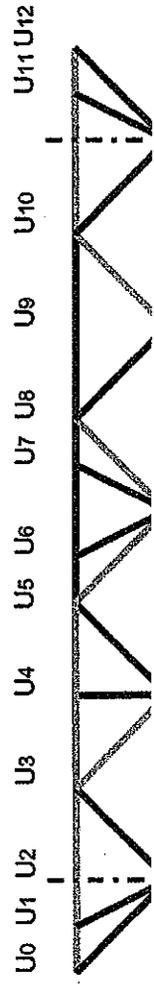
\*Denotes an "In-Depth" Inspection

## Appendix

### Truss Diagram



**Mainspan**







Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 04-03-2000

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsd: 201,511 sq ft  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsd: 490,200 sq ft 15 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate:  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

## STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME   | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|--|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|
| 22          | LS O/L (CONC DECK)   | 2   | 04-03-2000 | 219,086 SF | 0           | 0           | 219,089     | 0           | 0           |
|             |  |     | 04-05-1999 | 219,086 SF | 0           | 0           | 219,089     | 0           | 0           |
|             | Notes: 122) 3 lanes + on/off ramp each direction (2 ft. shoulders). [1978] Low slump overlay (extensive full-depth repairs). [1993] Minor spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.  |     |            |            |             |             |             |             |             |
| 48          | LS O/L (CONC SLAB)   | 2   | 04-03-2000 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |
|             |  |     | 04-05-1999 | 219,086 SF | 0           | 219,089     | 0           | 0           | 0           |
|             | Notes: 148) Spans #12-14 have a 2 ft. deep CIP concrete voided slab (continuous).  |     |            |            |             |             |             |             |             |
| 300         | STRIP SEAL JOINT   | 2   | 04-03-2000 | 946 LF     | 746         | 50          | 150         | N/A         | N/A         |
|             |  |     | 04-05-1999 | 946 LF     | 908         | 38          | 0           | N/A         | N/A         |
|             | Notes: 90) [1978] Strip seals (Type "H") installed at abutments, Pier #11, and stringer expansion joints (7 joints total). [1998] South Abutment joint (SB) repaired with new product (hot pour with steel mesh) - steel extrusion was too corroded to install new gland. [1995/2000] Pier #11 joint has numerous leaks (SB & NB), glands in the stringer joints have pulled out in scattered locations.   |     |            |            |             |             |             |             |             |
| 301         | POURED DECK JOINT  | 2   | 04-03-2000 | 1,017 LF   | 0           | 356         | 661         | N/A         | N/A         |
|             |  |     | 04-05-1999 | 1,017 LF   | 0           | 356         | 661         | N/A         | N/A         |
|             | Notes: 91) Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).  |     |            |            |             |             |             |             |             |
| 303         | ASSEMBLY DECK JOINT  | 2   | 04-03-2000 | 326 LF     | 0           | 326         | 0           | N/A         | N/A         |
|             |  |     | 04-05-1999 | 326 LF     | 218         | 108         | 0           | N/A         | N/A         |
|             | Notes: 93) Open finger joints at truss ends and Span #2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.   |     |            |            |             |             |             |             |             |
| 321         | CONC APPROACH SLAB   | 2   | 04-03-2000 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |
|             |  |     | 04-05-1999 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |
|             | Notes: 100) [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).   |     |            |            |             |             |             |             |             |
| 331         | CONCRETE RAILING   | 2   | 04-03-2000 | 7,628 LF   | 7,628       | 0           | 0           | 0           | N/A         |
|             |  |     | 04-05-1999 | 7,628 LF   | 7,628       | 0           | 0           | 0           | N/A         |
|             | Notes: 102) [1998] Railings re-constructed. Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally Code #12) were retrofit (32" high concrete face added, horizontal steel railings removed).  |     |            |            |             |             |             |             |             |
| 107         | PAINTED STEEL GIRDER   | 2   | 04-03-2000 | 10,596 LF  | 1,272       | 7,947       | 1,377       | 0           | 0           |
|             |  |     | 04-05-1999 | 10,596 LF  | 0           | 9,113       | 1,377       | 106         | 0           |
|             | Notes: [1968] Bridge painted with lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span #9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans #1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have flaking rust along the bottom flange. [1999] Beams along median (and at hinge)-re-painted. Beam ends at hinge have moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with Zinc system. Paint system is 15% unsound. |     |            |            |             |             |             |             |             |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 04-03-2000

## STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| 113  | PAINT STEEL STRINGER | 2   | 04-03-2000 | 14,896 LF | 1,788       | 12,960      | 0           | 149         | 0           |
|  |                      |     | 04-05-1999 | 14,896 LF | 0           | 14,747      | 0           | 149         | 0           |
| Notes: 79) 27" deep rolled stringers (truss spans). [1995] Stringers have corrosion at expansion joints. [1999] Median stringers re-painted. [1991/2000] Stringer/Floorbeam connections are "working" - several bolts are loose or missing.  |                      |     |            |           |             |             |             |             |             |
| 131  | PAINT STL DECK TRUSS | 2   | 04-03-2000 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
|  |                      |     | 04-05-1999 | 2,127 LF  | 0           | 0           | 1,914       | 213         | 0           |
| Notes: 20/156/157/161) Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have severe pigeon debris. [1999] Pigeon screens placed on truss member openings. [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).  |                      |     |            |           |             |             |             |             |             |
| 152  | PAINT STL FLOORBEAM  | 2   | 04-03-2000 | 3,348 LF  | 0           | 2,645       | 703         | 0           | 0           |
|  |                      |     | 04-05-1999 | 3,348 LF  | 0           | 2,645       | 703         | 0           | 0           |
| Notes: 33/156/161) [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen) - cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge - some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted - the face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). 33/50/161) Floorbeam trusses have numerous poor weld details (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted - some areas had severe section loss (holes) |                      |     |            |           |             |             |             |             |             |
| 373  | STEEL HINGE          | 2   | 04-03-2000 | 18 EA     | 0           | 4           | 0           | 0           | 14          |
|  |                      |     | 04-05-1999 | 18 EA     | 0           | 0           | 0           | 4           | 14          |
| Notes: 46) [1986] SE crossbeam rocker hinge pin replaced. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span #2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span #2 hinge bearings re-painted.  |                      |     |            |           |             |             |             |             |             |
| 380  | SECONDARY ELEMENTS   | 2   | 04-03-2000 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|  |                      |     | 04-05-1999 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 311  | EXPANSION BEARING    | 2   | 04-03-2000 | 125 EA    | 81          | 44          | 0           | N/A         | N/A         |
|  |                      |     | 04-05-1999 | 125 EA    | 83          | 42          | 0           | N/A         | N/A         |
| Notes: 96) [1994/2000] Some abutment bearings are rusty (joints leaking). [1996] South Abutment bearings are in full contraction. [1994] Main truss roller bearings have moderate corrosion.   |                      |     |            |           |             |             |             |             |             |
| 313  | FIXED BEARING        | 2   | 04-03-2000 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|  |                      |     | 04-05-1999 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 205  | CONCRETE COLUMN      | 2   | 04-03-2000 | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
|  |                      |     | 04-05-1999 | 52 EA     | 50          | 2           | 0           | 0           | N/A         |
| Notes: 58) [1969] Pier #9: East column damaged by train derailment (minor scrapes & spalls). [1993] Pier #7: west column has a vertical crack. [2000] Pier #11: west column has a minor spall. 58/160) [1996] Pier #1 has tipped slightly northward - likely related to hinge failure in Span #2 (South Abutment bearings are in full contraction).  |                      |     |            |           |             |             |             |             |             |
| 210  | CONCRETE PIER WALL   | 2   | 04-03-2000 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|  |                      |     | 04-05-1999 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 215  | CONCRETE ABUTMENT    | 2   | 04-03-2000 | 255 LF    | 230         | 26          | 0           | 0           | N/A         |
|  |                      |     | 04-05-1999 | 255 LF    | 255         | 0           | 0           | 0           | N/A         |
| Notes: 62) [1991] Both Abutments have minor cracking & staining.   |                      |     |            |           |             |             |             |             |             |
| 234  | CONCRETE CAP         | 2   | 04-03-2000 | 819 LF    | 680         | 139         | 0           | 0           | N/A         |
|  |                      |     | 04-05-1999 | 819 LF    | 680         | 139         | 0           | 0           | N/A         |
| Notes: 41) [1998] Pier #11: Cap has extensive "gunnite" repairs.   |                      |     |            |           |             |             |             |             |             |

Crew Number: 7627

Inspector: INSPECTOR

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 04-03-2000

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 356   | FATIGUE CRACKING    | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 357   | PACK RUST           | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 358   | CONC DECK CRACKING  | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: 158) [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.   |                     |     |            |          |             |             |             |             |             |
| 359   | CONC DECK UNDERSIDE | 2   | 04-03-2000 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
| Notes: 159) [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched). |                     |     |            |          |             |             |             |             |             |
| 360   | SETTLEMENT          | 2   | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 363   | SECTION LOSS        | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 981   | SIGNING             | 2   | 04-03-2000 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | 0           | 0           |
| Notes: 181) OH Sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.  |                     |     |            |          |             |             |             |             |             |
| 982   | GUARDRAIL           | 2   | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: 182) [1998] Approach guardrail repaired (new impact attenuator at NB off ramp).  |                     |     |            |          |             |             |             |             |             |
| 984   | DRAINAGE            | 2   | 04-03-2000 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes: 184) Pier #6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.  |                     |     |            |          |             |             |             |             |             |
| 985   | SLOPES              | 2   | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: 185) [1994] North Abutment slope paving has 20 LF of horizontal cracks.  |                     |     |            |          |             |             |             |             |             |
| 986   | CURB & SIDEWALK     | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: 186) [1993] Curb below exterior railings have spalling & delamination.   |                     |     |            |          |             |             |             |             |             |
| 988   | MISCELLANEOUS       | 2   | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-05-1999 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: 188) Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner).           |                     |     |            |          |             |             |             |             |             |

08/02/2007

Crew Number: 7627

Inspector: INSPECTOR

# Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340**

**I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 04-03-2000**

STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|

General Notes: \*Bridge #9340, Year 2000 Bridge Constructed in 1967. See "Fracture Critical" Report for additional information.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date

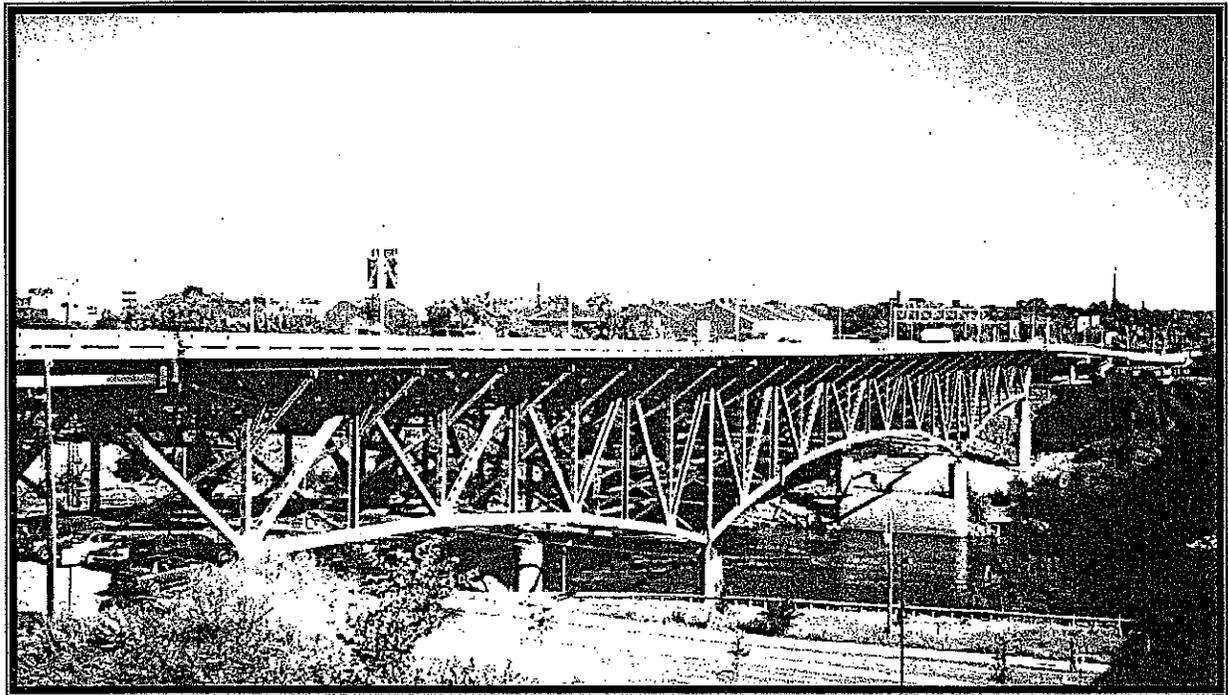


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# Fracture Critical Bridge Inspection Report

Annual

April 2000



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**Bridge #9340**

**I-35W over the Mississippi River at Minneapolis, Mn**

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**Prepared For**

**Minnesota Department of Transportation  
Office of Bridges & Structures  
Oakdale, MN 55128**

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**Prepared By**

**Minnesota Department of Transportation  
Metro Division  
Maintenance Operations, Bridge Inspection  
Roseville, MN 55113**

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

  
Mark Pribula

21102  
Registration No.

12/7/00  
Date

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**Structure Investigation Information**

**Inspection Date:** Main Truss Spans: April 3-6, 2000

Steel Approach Spans (Spring): March 28-29, 2000

Steel Approach Spans (Fall): October 30-31, 2000 July 5-7, 2000

**Inspection Team:** Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer,  
Wayne Tennison Pete Wilson, George Morelli, Rebecca Lane

**Inspection Report Author:** Pete Wilson

**Bridge Maintenance Sub Area:** Spring Lake Park

**Access Equipment Used:** Reach-All UB50 (Mn/DOT),  
Reach-All UB60 (City of St. Paul)  
Skyjack 66 ft. Snorkel Lift

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## Executive Summary

The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of the main truss spans and the in-depth inspection of the approach spans of bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots. Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with an acceleration/deceleration lane and 2-ft shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end.

The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

During the 1998 inspection numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9 & 10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location, the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).

The hinge joint in Span #2 is in locked in full expansion, several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

Four stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has two loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.

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Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL). This utilized a hot pour seal with wire mesh reinforcing (the final product looks similar to a strip seal gland). We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.

The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 are clogged because of an inadequate slope.

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## Bridge Inspection Recommendations

These recommendations refer to specific areas where fatigue cracks and other deficiencies were discovered during the 2000 inspection.

### Long Term Repair Recommendations

- The long term plans for this river crossing need to be defined (replacement, re-decking. Etc.). Due to the "Fracture Critical" configuration of the main river spans (and the problematic "crossbeam" details), and fatigue cracking in the approach spans - eventual replacement of the entire structure would be preferable.
- If bridge replacement is significantly delayed, the bridge should be re-decked (the design of the main river spans do not allow for deck widening). Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in Span #2, and reconfiguration of the deck drainage system.
- Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract (the expansion joints should also be replaced).

### Immediate Maintenance Recommendations

- Four stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has 2 loose bolts, and the bearing block has rotated (this will likely require jacking the superstructure). Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.
- Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions which anchor the gland had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL) - this utilized a hot pour seal with wire mesh reinforcing (the final product looks similar to a strip seal gland). We should monitor this joint to see how well this new gland repair performs., and consider using it at other locations.
- The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 have inadequate slope, and are clogged.

### Areas of Concern for Future Inspections

- During the 1998 inspection, numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9-10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange (at one location the web had cracked through entirely). Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

- 
- The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).
  - The hinge joint in Span #2 is in locked in full expansion several beam ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

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## Bridge Description

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction (along with an acceleration/deceleration lane). The shoulders are only 2 ft. wide. The bridge deck widens at the north end (to accommodate on & off ramps), and curves slightly at the south end.

The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses comprised of "built-up" welded members and 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings) – the control room is located at the northwest approach corner.

## Bridge Deck NBI Code #5 (Fair Condition)

The split deck has 3 through lanes each direction (along with an acceleration/deceleration lane) - the shoulders are only 2 ft. wide.. A low slump concrete overlay (along with numerous full-depth deck repairs) was placed on the deck in 1978. In 1998, the median copings were replaced (steel stay-in-place forms), and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks (sealed in 1998). The overlay has several patched areas, and some spalls (additional patching is typically required each year). A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the south approach spans). In 1998, the median coping overhangs were replaced (steel stay-in-place forms), and the exterior copings were repaired with shot-crete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers & beams has spalled off (exposed rebar), and in some locations, the spalling extends into the underside of the deck. Some of these areas were patched by the contractor.

**Open Finger Expansion Joints:** The deck has 3 open finger joints (at each end of the truss spans and above the hinge joint in Span #2). In 1999, rubber "skirts" were installed below the truss end finger joints (the drain troughs were removed).

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**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, Pier #11, and at 5 stringer joints in the main truss spans (these were installed in 1978). The strip seal glands have pulled out (joints leaking) in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the South Abutment gland (SBL) was patched using an experimental system - hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints (from staged deck construction). All of these joints are leaching below - at some joints, the deck is spalling below.

**Exterior Railings:** The original exterior Code #12 railings were retrofit in 1998 - a 32" high concrete face was installed in front of the existing concrete rail base (the horizontal steel rails were removed). The curb along the railing has moderate cracking, delamination and spalling.

**Median Railings:** J-rail (Code #22) was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

#### **Bridge Superstructure NBI Code #4 (Poor Condition)**

**Paint System:** The bridge was originally painted with a lead-base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & corrosion in scattered locations. The floorbeam trusses & stringer ends have corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 had severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floorbeams & "crossbeams" (located below open finger joints).

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floorbeam connections. The box beam truss members have welded interior stiffeners. Some of these have tack welded tabs (many of these tack welds have cracked). Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have corrosion at the floorbeam and sway frame connections (pack rust is forming between the connection plates), there is paint failure, surface rust, and flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access (this unfortunately prevents inspection of the interiors).

**Floorbeam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams (welded connections). The floorbeam trusses cantilever beyond the main truss on both sides (connected to the main truss, vertical members with bolts & rivets). The floorbeam truss members have numerous poor welding details - including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the

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top chord splices are offset vertically (up to ½" – from original construction) - the splice plates are bent. The floorbeam trusses below stringer joints have severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floorbeam sections below the median were re-painted some areas have section loss (holes).

**Stringers:** There are 14 steel stringers (27" deep rolled beams) bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss (holes). Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to Stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion, the bearings at Piers #3 & 8 are functioning properly (checked during each annual inspection), but the bearings at Pier #6 show no obvious signs of movement (difficult to reach with snooper).

**End Floorbeams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members. This area was re-painted in 1998-1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floorbeams:** The two end floorbeams are welded plate girders (they connect the main truss ends). The end floorbeams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss (surface pitting at the base of the web, and holes in the base of the vertical stiffeners). In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss (holes at the base of stiffeners). The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning (obvious signs of movement).

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam (2 cracked vertical web stiffeners). The rocker-bearing pin was replaced this required closing I-35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. The connection was also reinforced by installing braces between the crossbeam and Beams #2 & 3.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing (it was drilled out). In 1997, at the same location, a weld between a vertical & horizontal stiffener was found

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cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and the northeast connection was reinforced by installing bracing between the crossbeam and 2 stringers.

**Steel Multi-Beam Approach Spans (Spans #1-5 & #9-11):** The approach spans have welded beams - the depth transitions from 48" to 33" (connections are riveted). The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in Span #2). In Spans-#9 - 11, the deck widens from 15 to 18 beams. The fascia beams have flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified (they were lowered, using only four bolts at each connection). Most existing cracks were drilled out (some were too small to reach), and the fractured beam was reinforced with bolted plates.

In Span #2 (multi-beam approach span), there is a cantilever expansion hinge (sliding plate bearings). The joint is closed beyond tolerable limits possibly due to substructure movement & pavement thrust, and is no longer functioning. Some beam ends are contacting, and some bearing plates have tipped (preventing the joint from reopening). The hinge area was re-painted in 1999 (open finger joint above). The beam ends have moderate surface pitting.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 -14):** The far north approach spans consist of cast-in-place concrete continuous "voided" slabs (2 ft deep). A northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). These spans are in generally good condition. Spalling along the exterior and median copings was patched with shot-crete in 1998.

### **Bridge Substructure NBI Code #6 (Satisfactory Condition)**

**Abutments:** The abutments have minor vertical cracking, with some staining (from leaking deck joints).

**Truss Span Piers:** Piers #6 & 7 (main river span) have two concrete columns resting on a pier wall. The west column on Pier #7 has a minor vertical crack. Piers #5 & 8 have 2 concrete columns connected with an upper strut. The column on Pier #8 has been reinforced with a concrete "jacket".

**Approach Span Piers:** The piers supporting the steel spans (Piers #1 - 5 & #9 -11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). The pier columns supporting the voided slab spans (Piers #12 & 13) are cast directly into the slab (no cap). Pier #1 has

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tipped slightly to the north – this is related to the hinge failure in Span #2. The east column on Pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shot-crete repairs (leaking deck joint above).

## Other Bridge Elements

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed (the north approach (SBL and on ramp) has no relief joint).

**Channel & Protection:** NBI Code #8 (Very Good Condition). The bridge is located just downstream from the Lower St. Anthony Lock & Falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel (along the east bank) - typically, the water depth along the west face is only 1-2 feet (we do not conduct underwater inspections). Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure (running across the entire deck) mounted on the exterior railings at Truss Panel Point #2' (north end of truss). There is a signpost mounted on the west railing at Truss Panel Point #6 (south end of truss).

**Guardrail:** In 1998, the approach guardrails were repaired (a new impact attenuator was installed at the northbound off ramp to University Ave.).

**Drainage:** Several deck drains drop directly into the river. The drain troughs at Pier #6 have inadequate slope, and tend to fill-up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving (both abutments) is in good condition.

**Lighting:** The bridge has rail mounted deck lighting, under deck lighting (Span #13), and river navigation lighting. The lighting above the parking lots in Spans #11 & 12 is maintained by "Metal Matic Inc.". A light post on the west railing (W 5/3 L) has a 6" vertical split from plow damage.

**Miscellaneous:** The area below the south approach spans (Spans #2 -5) is leased out as a parking lot (used mainly by U of M students). The area below Spans #11 & 12 is used for parking by Metal Matic Inc. The U.S. Army Corps of Engineers is stockpiling material from river dredging below Span #8. There is a catwalk (for navigation light maintenance) running below the median of the truss spans - the catwalk is being accessed by graffiti "artists" at Pier #5.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). A control room was constructed at the NW approach corner.

## Bridge Snooper Field Investigation

Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

**South Abutment:** Strip seal deck joint above. [1998] Gland in (SBL) was patched using an experimental system. Hot poured seal with wire mesh reinforcement. Fourteen sliding plate bearing assemblies. [1995] The bearings are corroded and in full contraction (related to hinge failure in Span #2, and tipping of Pier #1). The seat area is cracked and discolored.

**Span #1 (Steel Multi-beam):** 14 beams, 33" deep rolled beams with welded cover plates (square ends). [1996] East fascia beam has flaking rust. [1978] Three west bays have some full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams.

**Pier #1:** 10 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a RR crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob).

**Span #2 (Steel Multi-beam):** 14 beams (33" deep rolled beam with welded cover plates) - the beams transition to 48" deep welded beams north of the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. [1978] Some full depth deck repairs. [1998] "Stool" concrete is spalling off adjacent to median beams.

**Hinge Joint (12 ft. South of Pier #2):** Open finger joint above. [1994] The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate has tipped (falling off the base plate) and is preventing the joint from opening. Several beam ends are contacting at the top flange or at the web. [1999] Hinge area re-painted. [2000] Beam ends have moderate surface pitting, debris has begun to build up on hinge area.

**Pier #2:** 14 sliding plate bearing assemblies. Pier consists of four concrete columns and cap, with a RR crash strut between the columns. [1997/2000] Bearings have corrosion, east end of cap has 6 SF of delamination.

**Span #3 (Steel Multi-beam):** Over Bluff St. 14 beams (48" deep welded plate beams). [1978] Three west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete spalling off (some loose concrete) adjacent to median beams.

**Diaphragm line just north of Pier #2:** [1999] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange.

**Diaphragm line just south of Pier #3:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| Diaphragm Crack Locations Pier #3 Southside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                                 | [1999/2000] 1/4" crack on top of interior stiffener weld  |
| G2 (NB)   | * [1998] Two 2" holes drilled in web.   |
| G3 (NB)   | * [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds.  |
| G4 (NB)   | * [1998] Two 2" holes drilled in web.   |
| G5 (NB)   | * [1998] Two 2" holes drilled in web.   |
| G6 (NB)   | * [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web (will be drilled out in spring 2000). |
| G7 (NB)   | * [1998] One 2" hole drilled in web (other end of crack was ground out).  |
| G8 (SB)   |   |
| G9 (SB)   |   |
| G10 (SB)  |   |

|                             |  |
|-----------------------------|--|
| <b>G11 (SB)</b>             |  |
| <b>G12 (SB).</b>            | * [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out).  |
| <b>G13 (SB):</b>            |  |
| <b>G14 (West Fascia SB)</b> | * [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack on at top of interior stiffener weld. |

**Pier #3:** 10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap.

**Span #4 (Steel Multi-beam):** Over contract parking lot. 14 beams (48" deep welded plate beams). [1978] Full depth deck repairs (2<sup>nd</sup> & 3<sup>rd</sup> bays from the east). [1998] Underside of deck 200 LF of transverse leaching cracks, and 200 SF of spall (exposed rebar) below a transverse poured joint (full width of deck). [2000] 4<sup>th</sup> bay from west has 20 SF of severe leaching.

**Diaphragm line just north of Pier #3:** [1998/99] Diaphragms lowered (strain gauges placed on beams #2 & 6). \*Denotes locations where cracks were found in 1998.

| <b>Diaphragm Crack Locations Pier #3 Northside</b>  |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| <b>Girder Location</b>                              | <b>Crack Description and or Repair Description</b>  |
| <b>G1 (East Fascia NB)</b>                          |   |
| <b>G2 (NB)</b>                                      |   |
| <b>G3 (NB)</b>                                      | * [1998/2000] 1/2" crack in top flange/web weld (West side), small crack in stiffener weld (East side). |
| <b>G4 (NB)</b>                                      | * [1998/2000] 1" crack in top flange/web weld (East Side).  |
| <b>G5 (NB)</b>                                      |   |
| <b>G6 (NB)</b>                                      | [1999/2000] 3/8" crack in top of stiffener weld.  |
| <b>G7 (NB)</b>                                      |   |
| <b>G8 (SB)</b>                                      |   |
| <b>G9 (SB)</b>                                      |   |
| <b>G10 (SB)</b>                                     |   |
| <b>G11 (SB)</b>                                     | * [1988] Two 2" holes drilled in web  |
| <b>G12 (SB).</b>                                    | * [1988] Two 2" holes drilled in web.   |
| <b>G13 (SB):</b>                                    |   |
| <b>G14 (West Fascia SB)</b>                         | * [1988] Two 2" holes drilled in web.   |

**Diaphragm line just south of Pier #4:** [1999] Diaphragms lowered, even though the connections have a "positive moment" configuration (stiffeners welded to the top flange).

**Pier #4:** 14 sliding plate expansion-bearing assemblies. [1997] Bearings have light rust. Pier consists of 4 concrete columns and cap.

**Span #5 (Multi-beam/Deck Truss):** Over contract parking lot. 14 beams (48" deep welded plate beams bolted onto the crossbeam). [1996] Four conduit clamps missing (NB fascia beam). Median girder has impact damage (parking lot below). [1978] Underside of deck has some full depth patches (2 west bays). [1997] Deck leaching near the finger joint. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked (photo).

**Diaphragm line just north of Pier #4:** \*Denotes locations where cracks were found in 1998.

| Diaphragm Crack Locations Pier #4 Northside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description                                 |
| G1 (East Fascia NB)                                 |   |
| G2 (NB)   |   |
| G3 (NB)   | * [1988] Two 2" holes drilled in web.                                       |
| G4 (NB)   | * [1988] Two 2" holes drilled in web.                                       |
| G5 (NB)   |   |
| G6 (NB)   |   |
| G7 (NB)   | * [1988] Two 2" holes drilled in web.                                       |
| G8 (SB)   |   |
| G9 (SB)   |   |
| G10 (SB)  | * [1988] Two 2" holes drilled in web.                                       |
| G11 (SB)  | [1999/2000] Small cracks at top of stiffener weld.                          |
| G12 (SB)  | * [1988] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld. |
| G13 (SB):   | * [1999/2000] Small cracks at top of stiffener weld.                        |
| G14 (West Fascia SB)                                | [1999] Small crack at top of interior stiffener weld.                       |

### Main Truss Spans (NBL East Truss)

Stringers are numbered from the east (see framing plan).

**Crossbeam:** [1986] The SE rocker froze, damaging the east end of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W closed to traffic) - the SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1998/99] Crossbeam re-painted, the side facing the finger joint has section loss.

#### Gap between Crossbeam & Floorbeam (East End)

| Date            | Measurement |
|-----------------|-------------|
| September, 1998 | 16-5/8"     |
| April, 1999     | 17-13/16"   |
| April, 2000     | 18"         |

**Panel Point #0 (Beginning of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] End floorbeam re-painted - there is section loss at the base of the stiffeners.

#### Panel Point #1, (East Truss, Pier #5):

**Pier #5:** Two "rollernest" bearing assemblies. [2000] Bearings show signs of recent movement. Pier consists of two concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**Span #6 (Deck Truss):** [1997] West River Parkway constructed below bridge.

#### Panel Point #2 (East Truss):

**Panel Point #3 (East Truss):** Floorbeam truss (near center) has an undercut weld in the flange.

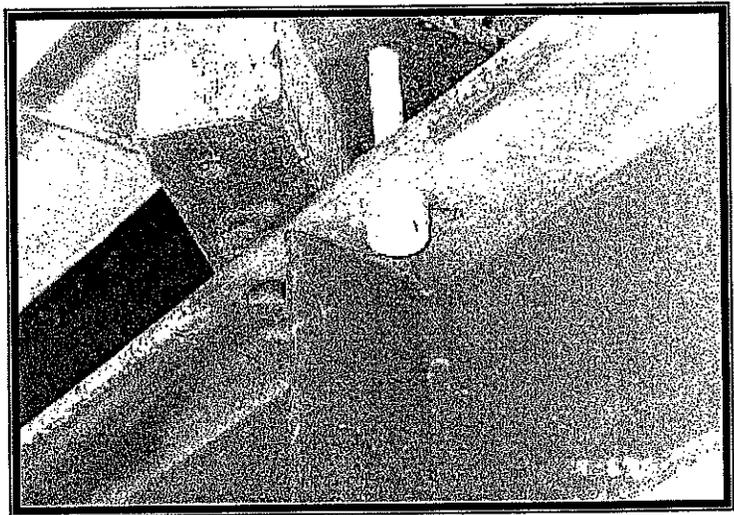
**Panel Point #4 (East Truss, Stringer Joint):** Strip seal deck joint above. [1999] 1 ft. of gland pulled out @ centerline. [1996] The floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box along catwalk has cover missing. [2000] Concrete in joint at east end.

**Panel Point #5 (East Truss):** [1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out @ Stringer #3 (photo), cracked tack welds remain @ Stringer #4 (photo).

**Panel Point #6 (East Truss):** [1994] Floorbeam truss top chord (bottom flange) has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10 (near the bottom chord connection) has a 4" long gouge (possible crack) along a connection weld – should be ground out (photos).

**Panel Point #7 (East Truss):**

**Panel Point #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. [1999] Joint is leaking. [1998] Stringer #4: bolt missing at south floorbeam connection. [1994] Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated. [2000] Missing bolt was replaced in 1999, but the bearing block was not returned to it's proper position – now bolt bolts are loose, needs repair (photos).



Panel Point #8, Stringer #2

**Pier #6 (Downtown side of Mississippi):** Two "rollernest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement (need to check!). Pier consists of two concrete columns with a pier wall at the base. [1997] The drain pipes are clogged (top & bottom @ median).

**Span #7 (Deck Truss):**

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):** Navigation light. [1999] Strain gauges installed on truss top chord member U9/U10 (U of M research project). [2000] Graffiti on top gusset plate.

**Panel Point #11 (East Truss):** Section loss at gusset plate, bottom chord. [2000] Stringer #3 has a bolt missing at the floorbeam connection.

**Panel Point #12 (East Truss):** [1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener. ✓

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**Panel Point #13 (East Truss):** Deck drains (falls directly into river). [1993] Bottom chord gusset plate has section loss. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners. ✓✓

**Panel Point #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint above. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. ✓

**Panel Point #13' (East Truss):** Floorbeam truss top chord has a ground out spot near Stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener. ✓

**Panel Point #12' (East Truss):** [1999] Deck (east bay) has 15 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener. ✓

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):** Deck drains (falls directly into river).

**Panel Point #8' (East Truss, Pier #7, Stringer Joint):** Red navigation light. Strip seal deck joint above. Floorbeam truss has severe rust below the median. [1993] North side: bolts replaced with "redi-rod" at Stringer #4, bolts replaced at Stringer #5.

**Pier #7 (East bank of Mississippi):** Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full-height leaching crack on the south face.

**Span #8 (Deck Truss):**

**Panel Point #7' (East Truss):**

**Panel Point #6' (East Truss):** [1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose.

**Panel Point #5' (East Truss):**

**Panel Point #4' (East Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4/L3' has backer bars along the interior edges.

**Panel Point #3' (East Truss):** Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):** Overhead sign bridge mounted on exterior railings. [1999] Deck in Bay #3 has 100 SF of water saturation (photos).

**Pier #8:** 2 "rollernest" bearing assemblies, they have light rust. [2000] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss, Pier #8):** [2000] Graffiti on bottom of truss (above bearing).

**Panel Point #0' (End of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] Floorbeam re-painted, side facing finger joint has section loss (holes in web stiffeners) - photos. [1998] North face (directly above east rocker bearing): two horizontal welds (between stiffener plates) have cracked through entirely (photos).

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" @ 40 Degrees F.

**Crossbeam:** [1998/99] Crossbeam re-painted. Side facing finger joint has section loss (pitting at base of stiffeners). [1992] North face: a crack in the crossbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997/98] North face: weld above east rocker bearing (between the horizontal & center vertical stiffener) has cracked through entirely (the weld end at the crossbeam web was partially drilled out). [1998] North face: cracks at both ends of the horizontal stiffener (above rocker bearing) were drilled out (two small holes drilled in crossbeam web at each location). [1998] Bracing installed between crossbeam (above east rocker) and Beams #3 & 5.

## North Approach Spans

Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

**Span #9 (Multi-beam):** The multi-beam spans resume (48" deep welded beams bolted onto the crossbeam) - NB bridge has 8 beams, SB bridge has 7 beams. There are two active railroad tracks below.

**Diaphragm line just south of Pier #9:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| Diaphragm Crack Locations Pier #9 Southside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                                 | [2000] Exterior top flange/web weld has a 1/2" indication.                            |
| GC (NB)   |   |
| G2 (NB)   | * [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| G3 (NB)   |   |
| G4 (NB)   | * [1998/2000] Small crack in top flange/web weld.                                     |
| G5 (NB)   |   |
| G6 (NB)   |   |
| G7 (NB)   |   |
| G8 (SB)   | * [1998] Small crack in top flange/web weld. [2000] No cracks found.                  |
| G9 (SB)   | * [1998] Crack in top of stiffener weld.  |
| G10 (SB)  |   |
| G11 (SB)  | * [1998/2000] Small crack in top of stiffener weld (East side).                       |
| G12 (SB)  | * [1998/2000] Small crack in top of stiffener weld (East side).                       |
| G13 (SB):   |   |
| G14 (West Fascia SB)                                |   |

**Pier #9:** 13 fixed, and four sliding plate bearing assemblies. Pier consists of four columns and cap, with a RR crash strut between the columns. [1969] East column damaged by train derailment - the column has minor scrapes and spalls (downspout had to be reconnected).

**Span #10 (Steel multi-beam):** NB bridge has 10 beams, SB bridge has seven beams (the welded beams transition from 48" to 33" depth just north of pier). Active railroad tracks below (one track splits into two).

**Diaphragm line just north of Pier #9:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| Diaphragm Crack Locations Pier #9 Northside         |  |
|---|--|
| *Denotes locations where cracks were found in 1998. |  |
| Girder Location                                     | Crack Description and or Repair Description                |
| G1 (East Fascia NB)                                 |  |
| G1B (NB)  | Stiffeners are welded to the top flange (positive moment). |
| G2 (NB)   |  |
| G3 (NB)   |  |
| G4 (NB)   | Stiffeners are welded to the top flange (positive moment). |
| G5 (NB)   |  |
| G6 (NB)   |  |
| G7 (NB)   |  |
| G8 (NB)   |  |
| G9 (NB)   | * [2000] Two 2" holes drilled in web.                      |
| G10 (NB)  | * [2000] Two 2" holes drilled in web.                      |
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**North Abutment:** Strip seal deck joint above. Fourteen sliding plate bearing assemblies. [2000] NB joint leaking at both ends (bearings rusty).

## **Main Truss Spans (SBL: West Truss)**

Stringers are numbered from the east (from original plans).

**Crossbeam:** [1998/99] Crossbeam re-painted (side facing finger joint has section loss). [1999] The bolted connection between Beam #12 and the crossbeam was re-tensioned (the connection had been "working").

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) measured at 3-9/16" (45 Degrees F.).

**Panel Point #0' (End floorbeam, beginning of West Truss):** Open finger deck above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] Floorbeam re-painted (side facing finger joint has section loss on stiffeners). [1996] The floorbeam/truss connection has severe corrosion (surface pitting on plates & bolts). [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam (photo).

### **Panel Point #1' (West Truss, Pier #8):**

**Pier #8:** See NB notes. [1999] West truss bearing shows signs of recent movement.

### **Span #8 (Deck Truss):**

**Panel Point #2' (West Truss):** Overhead sign bridge mounted on exterior railings.

**Panel Point #3' (West Truss):** The floorbeam truss (top flange of upper chord) has an ugly weld below the connection to Stringer #11.

**Panel Point #4' (West Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4/L3' has backer bars along interior edges.

### **Panel Point #5' (West Truss):**

**Panel Point #6' (West Truss):** [1996/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection two bolts are still loose. [1997] Stringer #10: 2 south bolts are loose at the floorbeam connection. [1999] Stringer #9: one south bolt is loose at the floorbeam connection

**Panel Point #7' (West Truss):** [1997] Top chord/floorbeam truss connection has a cracked tack weld on the interior. [1999] Wind bracing gusset plate at Stringer #14 has loose bolts.

**Panel Point #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1998] Stringer #11: bolt replaced at floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction).

**Pier #7:** See NB notes.

### **Span #7 (Deck Truss):**

### **Panel Point #9' (West Truss):**

**Panel Point #10' (West Truss):** [1994] Stringer #13: Loose bolt at floorbeam truss connection. Top chord (U10/U11) has 6 nicks on the exterior (15 ft. south of U10').

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**Panel Point #11' (West Truss):** Nick in the truss bottom chord L11' /L12'.

**Panel Point #12' (West Truss):** Truss diagonal member U12' /L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has flaking rust near the joint (gland pulled out above). Tack welds along the sway frame/truss, bottom chord, gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. ✓

**Panel Point #13 (West Truss):** [1999] Pack rust at the truss bottom chord/sway frame connection (plates are spread 3/4" - photo). [1996/99] Bottom chord member L13 /L14 has cracked tack welds at two internal stiffeners. ✓

**Panel Point #12 (West Truss):** [1996] Bottom chord member L12 /L13 has a cracked tack weld at the internal stiffener. ✓

**Panel Point #11 (West Truss):** [1998] Stringer #11: 3 bolts replaced at the floorbeam truss connection, the SE bolt is too short (inadequate threads) – the stringer has lifted 3/32" off the bearing block (south side).

**Panel Point #10 (West Truss):** Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):** Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains & horizontal troughs. [1996] Drain clogged at median. [1999] Standing water in east grate.

**Pier #6:** See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

**Panel Point #6 (West Truss):** Sign post mounted on railing, overhead sign above. Floorbeam truss top chord (U5/ U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice (from construction).

**Panel Point #5 (West Truss):** Truss top chord member U5/U6 has backer bars along the interior corners.

**Panel Point #4 (West Truss, Stringer Joint):** Strip seal deck joint. Truss top chord member U4/U5 has backer bars along the interior corners. [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire.

**Panel Point #3 (West Truss):** Truss diagonal member L3/U4 has backer bars along the interior corners. Truss bottom chord L2/L3 has a nick.

**Panel Point #2 (West Truss):** [1996] Floorbeam truss member L2/U3 has a welding flaw (no crack, MT 1997).

**Pier #5:** See NB notes.

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**Panel Point #1 (West truss, Pier #5):** [1994] Diagonal brace (floorbeam to stringer) has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout (originally drained into storm sewer).

**Panel Point #0 (End Floorbeam, end of West Truss):** Open finger deck joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1997] The floorbeam horizontal stiffener is bent down directly above the rocker bearing (photo). [1998/99] Floorbeam re-painted - side facing finger joint has section loss (pitting).

\*[2000] Gap between crossbeam & floorbeam (west end) measured at 16-1/2" (50 Degrees F).

**Crossbeam:** [1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out). [1998/99] Crossbeam re-painted, the side facing finger joint has section loss (pitting, with holes in the base of stiffeners).

**Span #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel Point #0.

See NB Notes for South Approach Spans

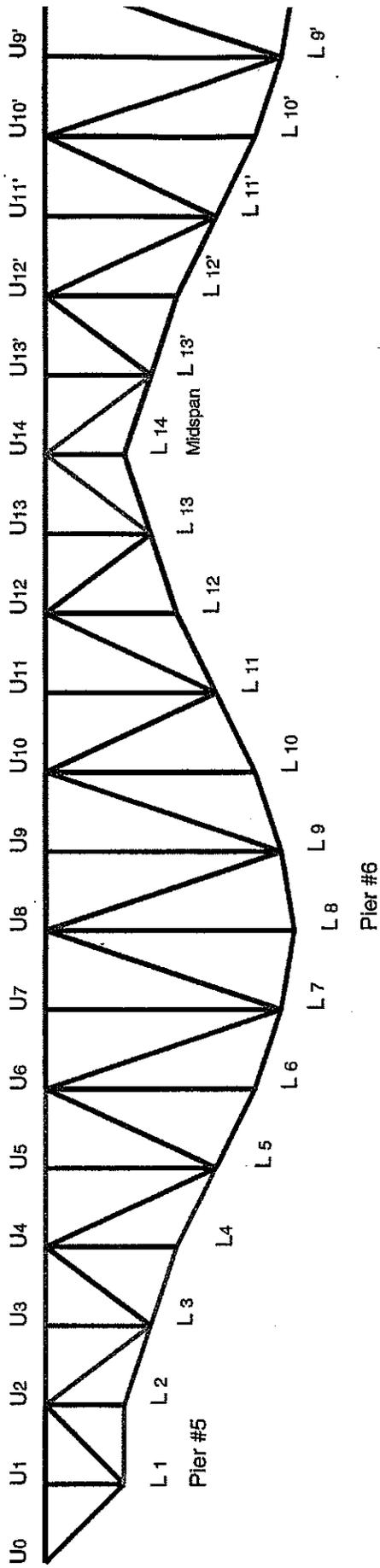
## Previous Snooper Inspections

|       |  |
|-------|--|
| 1999  | Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadegg, Pete Wilson                    |
| 1998  | Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson |
| 1997* | Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson  |
| 1996  | Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson                               |
| 1994  | Terry Moravec, Kurt Fuhrman, Pete Wilson   |
| 1993  | Terry Moravec, Chas Martin, Tom Waks   |
| 1991  | Chester Martin, Chas Martin, Jerry Anderson  |
| 1988  | Chester Martin   |

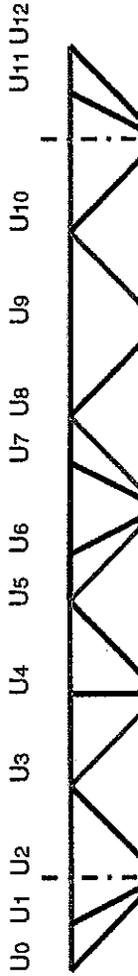
\*Denotes an "In-Depth" Inspection

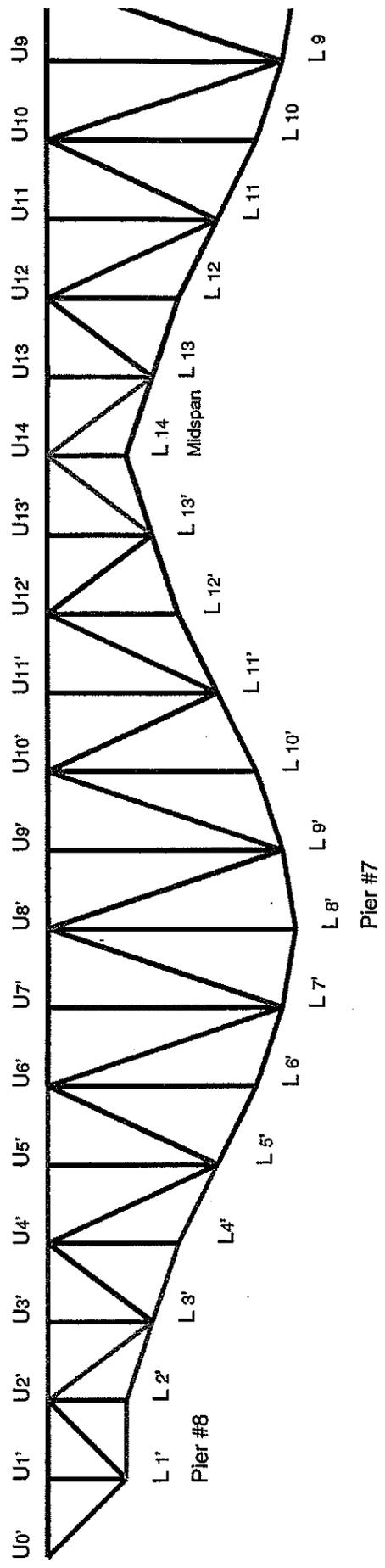
## Truss Diagrams

The following truss diagrams document the members on each span of the bridge.

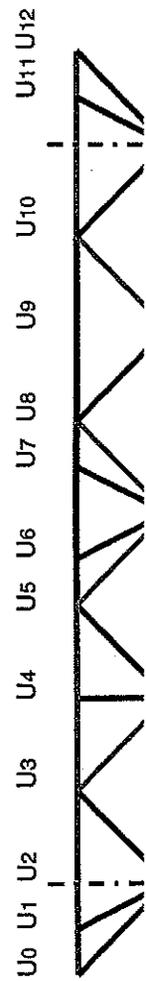


**Mainspan**





**Mainspan**





Crew Number: 7627  
 Inspector: DISTRICT9

### Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 09-26-2001**

|  |  |   |
|--|--|---|
| County: HENNEPIN                                   | Location: 1.0 MI NE OF JCT TH 94         | Length: 1,907.0 ft                          |
| City: MINNEAPOLIS                                  | Route: I 35W Ref. Pt.: 018+00.538        | Deck Width: 113.3 ft (Varies)               |
| Township:  | Control Section: 2783 Maint. Area: METRO | Rdwy. Area / Pct. Unsnd: 201,511 sq ft      |
| Section: 25 Township: 029N Range: 24W              | Local Agency Bridge Nbr:                 | Paint Area / Pct. Unsnd: 490,200 sq ft 15 % |
| Span Type: CSTL BEAM SPAN                          |  |   |
| NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N        | Open, Posted, Closed: OPEN               |   |
| Appraisal Ratings - Approach: 8 Waterway: 8        | MN Scour Code: L-STBL;LOW RISK           | Def. Stat: S.D. Suff. Rate:                 |
| Required Bridge Signs - Load Posting: NOT REQUIRED | 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 |
|--|----------------------|-----|------------|------------|----------|----------|----------|----------|----------|
| 22   | LS O/L (CONC DECK)   | 2   | 09-26-2001 | 1 SF       | 0        | 0        | 1        | 0        | 0        |
|  |                      |     | 04-03-2000 | 219,086 SF | 0        | 0        | 219,089  | 0        | 0        |
| Notes: 3 lanes + on/off ramp each direction (2 ft. shoulders). [1978] Low slump overlay (extensive full-depth repairs). [1993] Minor spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.   |                      |     |            |            |          |          |          |          |          |
| 48   | LS O/L (CONC SLAB)   | 2   | 09-26-2001 | 1 SF       | 0        | 1        | 0        | 0        | 0        |
|  |                      |     | 04-03-2000 | 219,086 SF | 0        | 219,089  | 0        | 0        | 0        |
| Notes: Spans 12-14 have a 2 ft. deep CIP concrete voided slab (continuous).  |                      |     |            |            |          |          |          |          |          |
| 300  | STRIP SEAL JOINT     | 2   | 09-26-2001 | 946 LF     | 906      | 40       | 0        | N/A      | N/A      |
|  |                      |     | 04-03-2000 | 946 LF     | 746      | 50       | 150      | N/A      | N/A      |
| Notes: [1978] Type H strip seal @ abutments, Pier 11, and stringer expansion joints (7 joints total). [1998] South Abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995/2000] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.   |                      |     |            |            |          |          |          |          |          |
| 301  | POURED DECK JOINT    | 2   | 09-26-2001 | 1,017 LF   | 1,017    | 0        | 0        | N/A      | N/A      |
|  |                      |     | 04-03-2000 | 1,017 LF   | 0        | 356      | 661      | N/A      | N/A      |
| Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).  |                      |     |            |            |          |          |          |          |          |
| 303  | ASSEMBLY DECK JOINT  | 2   | 09-26-2001 | 326 LF     | 216      | 110      | 0        | N/A      | N/A      |
|  |                      |     | 04-03-2000 | 326 LF     | 0        | 326      | 0        | N/A      | N/A      |
| Notes: Open finger joints at truss ends and Span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.  |                      |     |            |            |          |          |          |          |          |
| 321  | CONC APPROACH SLAB   | 2   | 09-26-2001 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |
|  |                      |     | 04-03-2000 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |
| Notes: [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).  |                      |     |            |            |          |          |          |          |          |
| 331  | CONCRETE RAILING     | 2   | 09-26-2001 | 7,628 LF   | 7,628    | 0        | 0        | 0        | N/A      |
|  |                      |     | 04-03-2000 | 7,628 LF   | 7,628    | 0        | 0        | 0        | N/A      |
| Notes: [1998] Railings re-constructed. Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally Code 12) were retrofit (32" high concrete face added, horizontal steel railings removed).  |                      |     |            |            |          |          |          |          |          |
| 107  | PAINTED STEEL GIRDER | 2   | 09-26-2001 | 10,596 LF  | 0        | 9,086    | 1,400    | 110      | 0        |
|  |                      |     | 04-03-2000 | 10,596 LF  | 1,272    | 7,947    | 1,377    | 0        | 0        |
| Notes: [1968] Bridge painted with Lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have flaking rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Beam ends at hinge have moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound. |                      |     |            |            |          |          |          |          |          |

Crew Number: 7627

Inspector: DISTRICT9

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 09-26-2001

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE  | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|----------------------|-----|---|-----------|-------------|-------------|-------------|-------------|-------------|
| 113   | PAINT STEEL STRINGER | 2   | 09-26-2001  | 14,896 LF | 0           | 14,746      | 0           | 150         | 0           |
|   |                      |     | 04-03-2000  | 14,896 LF | 1,788       | 12,960      | 0           | 149         | 0           |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have corrosion at expansion joints. [1999] Median stringers re-painted. [1991/2000] Stringer/Floorbeam connections are "working". Several bolts are loose or missing.  |                      |     |   |           |             |             |             |             |             |
| 131   | PAINT STL DECK TRUSS | 1   | 09-26-2001  | 2,127 LF  | 0           | 0           | 1,912       | 215         | 0           |
|   |                      |     | Notes: 20/156/157/161) Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have severe pigeon debris. [1999] Pigeon screens placed on truss member openings. [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting). |           |             |             |             |             |             |
| 152   | PAINT STL FLOORBEAM  | 2   | 09-26-2001  | 3,348 LF  | 0           | 2,623       | 725         | 0           | 0           |
|   |                      |     | 04-03-2000  | 3,348 LF  | 0           | 2,645       | 703         | 0           | 0           |
| Notes: 33/156/161) [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). 33/50/161) Floorbeam trusses have numerous poor weld details (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. Some areas had severe section loss (holes). |                      |     |   |           |             |             |             |             |             |
| 373   | STEEL HINGE          | 2   | 09-26-2001  | 18 EA     | 0           | 4           | 0           | 0           | 14          |
|   |                      |     | 04-03-2000  | 18 EA     | 0           | 4           | 0           | 0           | 14          |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.   |                      |     |   |           |             |             |             |             |             |
| 380   | SECONDARY ELEMENTS   | 2   | 09-26-2001  | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|   |                      |     | 04-03-2000  | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.  |                      |     |   |           |             |             |             |             |             |
| 311   | EXPANSION BEARING    | 2   | 09-26-2001  | 125 EA    | 81          | 44          | 0           | N/A         | N/A         |
|   |                      |     | 04-03-2000  | 125 EA    | 81          | 44          | 0           | N/A         | N/A         |
| Notes: [1994/2000] Some abutment bearings are rusty (joints leaking). [1996] South Abutment bearings are in full contraction. [1994] Main truss roller bearings have moderate corrosion.  |                      |     |   |           |             |             |             |             |             |
| 313   | FIXED BEARING        | 2   | 09-26-2001  | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|   |                      |     | 04-03-2000  | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes: < none >   |                      |     |   |           |             |             |             |             |             |
| 205   | CONCRETE COLUMN      | 2   | 09-26-2001  | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
|   |                      |     | 04-03-2000  | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
| Notes: [1969] Pier 9: East column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. 58/160) [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in Span 2 (South Abutment bearings are in full contraction).   |                      |     |   |           |             |             |             |             |             |
| 210   | CONCRETE PIER WALL   | 2   | 09-26-2001  | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|   |                      |     | 04-03-2000  | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
| Notes: < none >   |                      |     |   |           |             |             |             |             |             |
| 215   | CONCRETE ABUTMENT    | 2   | 09-26-2001  | 255 LF    | 255         | 0           | 0           | 0           | N/A         |
|   |                      |     | 04-03-2000  | 255 LF    | 230         | 26          | 0           | 0           | N/A         |
| Notes: [1991] Both Abutments have minor cracking & staining.  |                      |     |   |           |             |             |             |             |             |
| 234   | CONCRETE CAP         | 2   | 09-26-2001  | 819 LF    | 669         | 150         | 0           | 0           | N/A         |
|   |                      |     | 04-03-2000  | 819 LF    | 680         | 139         | 0           | 0           | N/A         |
| Notes: [1998] Pier 11: Cap has extensive "gunnite" repairs.   |                      |     |   |           |             |             |             |             |             |

Crew Number: 7627  
Inspector: DISTRICT9

## Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 09-26-2001**

**STRUCTURE UNIT: 0**

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 356   | FATIGUE CRACKING    | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1998/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. |                     |     |            |          |             |             |             |             |             |
| 357   | PACK RUST           | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).   |                     |     |            |          |             |             |             |             |             |
| 358   | CONC DECK CRACKING  | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.  |                     |     |            |          |             |             |             |             |             |
| 359   | CONC DECK UNDERSIDE | 2   | 09-26-2001 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).  |                     |     |            |          |             |             |             |             |             |
| 360   | SETTLEMENT          | 2   | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: < none >   |                     |     |            |          |             |             |             |             |             |
| 363   | SECTION LOSS        | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: < none >   |                     |     |            |          |             |             |             |             |             |
| 981   | SIGNING             | 2   | 09-26-2001 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|   |                     |     | 04-03-2000 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes: OH Sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.   |                     |     |            |          |             |             |             |             |             |
| 982   | GUARDRAIL           | 2   | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1998] Approach guardrail repaired (new impact attenuator at NB off ramp).   |                     |     |            |          |             |             |             |             |             |
| 984   | DRAINAGE            | 2   | 09-26-2001 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes: Pier 6: Horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.  |                     |     |            |          |             |             |             |             |             |
| 985   | SLOPES              | 2   | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1994] North Abutment slope paving has 20 LF of horizontal cracks.   |                     |     |            |          |             |             |             |             |             |
| 986   | CURB & SIDEWALK     | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1993] Curb below exterior railings have spalling & delamination.  |                     |     |            |          |             |             |             |             |             |
| 988   | MISCELLANEOUS       | 2   | 09-26-2001 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 04-03-2000 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner).  |                     |     |            |          |             |             |             |             |             |

08/02/2007

Crew Number: 7627

### Mn/DOT BRIDGE INSPECTION REPORT

Inspector: DISTRICT9

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 09-26-2001

STRUCTURE UNIT: 0

| ELEM<br>NBR | ELEMENT NAME | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|

General Notes: \*Bridge #9340, Year 2001 Bridge Constructed in 1967. See "Fracture Critical" Report for additional information.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date

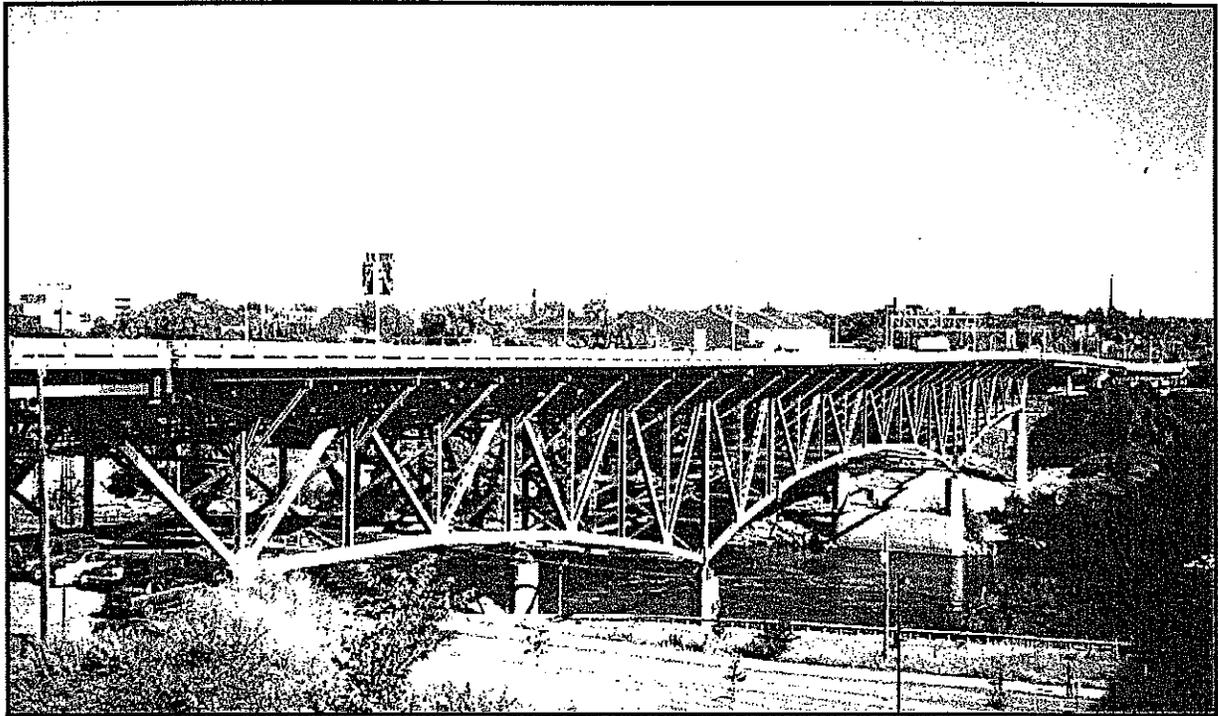


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# Fracture Critical Bridge Inspection Report

Annual

September 2001



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**Bridge#9340**

**I-35W over the Mississippi River at Minneapolis, Mn**

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**Prepared For**

**Minnesota Department of Transportation  
Office of Bridges & Structures  
Oakdale, MN 55128**

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**Prepared By**

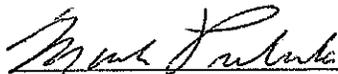
**Minnesota Department of Transportation  
Metro Division  
Maintenance Operations, Bridge Inspection  
Roseville, MN 55113**

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**Structure Investigation Information**

**Inspection Date:** Main Truss Spans: September 24, 25, & 26, 2001  
Steel Approach Spans (Spring): June 11, 2001  
Steel Approach Spans (Fall): September 24 & 26, 2001  
**Inspection Team:** Mark Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer,  
**Inspection Report Author:** Kurt Fuhrman  
**Bridge Maintenance Sub Area:** Spring Lake Park  
**Access Equipment Used:** Reach-All A-75 (Mn/DOT),  
Reach-All UB60 (City of St. Paul)  
Skyjack 66 ft. Snorkel Lift

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



Mark Pribula

21102

Registration No.

1/23/02

Date

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## Executive Summary

The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of the main truss spans and the in-depth inspection of the approach spans of bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with an acceleration/deceleration lane and 2-ft shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

During the 1998 inspection numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9 & 10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location, the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).

The hinge joint in Span #2 is in locked in full expansion, several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

Four stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has two loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.

Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL). This utilized a hot pour seal with wire mesh reinforcing (the final product looks similar

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to a strip seal gland). We should monitor this joint to see how well this new gland repair performs. and consider using it at other locations.

The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 are clogged because of an inadequate slope.

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## Bridge Inspection Recommendations

These recommendations refer to specific areas where fatigue cracks and other deficiencies were discovered during the 2001 inspection.

### Long Term Repair Recommendations

- The long term plans for this river crossing need to be defined (replacement, re-decking, Etc.). Due to the "Fracture Critical" configuration of the main river spans (and the problematic "crossbeam" details), and fatigue cracking in the approach spans - eventual replacement of the entire structure would be preferable.
- If bridge replacement is significantly delayed, the bridge should be re-decked (the design of the main river spans do not allow for deck widening). Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in Span #2, and reconfiguration of the deck drainage system.
- Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract (the expansion joints should also be replaced).

### Immediate Maintenance Recommendations

- Four stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has 2 loose bolts, and the bearing block has rotated (this will likely require jacking the superstructure). Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.
- Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions which anchor the gland had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL) - this utilized a hot pour seal with wire mesh reinforcing (the final product looks similar to a strip seal gland). We should monitor this joint to see how well this new gland repair performs., and consider using it at other locations.
- The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 have inadequate slope, and are clogged.

### Areas of Concern for Future Inspections

- During the 1998 inspection, numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9-10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange (at one location the web had cracked through entirely). Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these

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areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

- The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).
- The hinge joint in Span #2 is in locked in full expansion several beam ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

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## Bridge Description

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction (along with an acceleration/deceleration lane). The shoulders are only 2 ft. wide. The bridge deck widens at the north end (to accommodate on & off ramps), and curves slightly at the south end.

The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses comprised of "built-up" welded members and 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings) – the control room is located at the northwest approach corner.

### Bridge Deck NBI Code #5 (Fair Condition)

The split deck has 3 through lanes each direction (along with an acceleration/deceleration lane) - the shoulders are only 2 ft. wide.. A low slump concrete overlay (along with numerous full-depth deck repairs) was placed on the deck in 1978. In 1998, the median copings were replaced (steel stay-in-place forms), and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks (sealed in 1998). The overlay has several patched areas, and some spalls (additional patching is typically required each year). A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. The overlay had numerous repair patches in 2001.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the south approach spans). In 1998, the median coping overhangs were replaced (steel stay-in-place forms), and the exterior copings were repaired with shot-crete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers & beams has spalled off (exposed rebar), and in some locations, the spalling extends into the underside of the deck. Some of these areas were patched by the contractor.

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**Open Finger Expansion Joints:** The deck has 3 open finger joints (at each end of the truss spans and above the hinge joint in Span #2). In 1999, rubber "skirts" were installed below the truss end finger joints (the drain troughs were removed).

**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, Pier #11, and at 5 stringer joints in the main truss spans (these were installed in 1978). The strip seal glands have pulled out (joints leaking) in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the South Abutment gland (SBL) was patched using an experimental system - hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints (from staged deck construction). All of these joints are leaching below - at some joints, the deck is spalling below.

**Exterior Railings:** The original exterior Code #12 railings were retrofit in 1998 - a 32" high concrete face was installed in front of the existing concrete rail base (the horizontal steel rails were removed). The curb along the railing has moderate cracking, delamination and spalling.

**Median Railings:** J-rail (Code #22) was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

#### **Bridge Superstructure NBI Code #4 (Poor Condition)**

**Paint System:** The bridge was originally painted with a lead-base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & corrosion in scattered locations. The floorbeam trusses & stringer ends have corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 had severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floorbeams & "crossbeams" (located below open finger joints).

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floorbeam connections. The box beam truss members have welded interior stiffeners. Some of these have tack welded tabs (many of these tack welds have cracked). Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have corrosion at the floorbeam and sway frame connections (pack rust is forming between the connection plates), there is paint failure, surface rust, and flaking rust is scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access (this unfortunately prevents inspection of the interiors).

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**Floorbeam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams (welded connections). The floorbeam trusses cantilever beyond the main truss on both sides (connected to the main truss, vertical members with bolts & rivets). The floorbeam truss members have numerous poor welding details – including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically (up to ½” – from original construction) - the splice plates are bent. The floorbeam trusses below stringer joints have severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floorbeam sections below the median were re-painted some areas have section loss (holes).

**Stringers:** There are 14 steel stringers (27” deep rolled beams) bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are “working” and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss (holes). Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to Stringers #4 & 11. The pinned connections on these braces are “working” and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six “geared roller-nest” bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion, the bearings at Piers #3 & 8 are functioning properly (checked during each annual inspection), but the bearings at Pier #6 show no obvious signs of movement (difficult to reach with snooper).

**End Floorbeams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a “crossbeam”. The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members. This area was re-painted in 1998-1999, and rubber “skirts” were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floorbeams:** The two end floorbeams are welded plate girders (they connect the main truss ends). The end floorbeams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss (surface pitting at the base of the web, and holes in the base of the vertical stiffeners). In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two “cross-beams” are welded plate girders each one is supported by two “rocker” bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss (holes at the base of stiffeners). The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning (obvious signs of movement).

In 1986, the southeast rocker bearing “froze”, resulting in damage to the crossbeam (2 cracked vertical web stiffeners). The rocker-bearing pin was replaced this required closing I-35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and

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stiffeners reinforced with angle plates. The connection was also reinforced by installing braces between the crossbeam and Beams #2 & 3.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing (it was drilled out). In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and the northeast connection was reinforced by installing bracing between the crossbeam and 2 stringers.

**Steel Multi-Beam Approach Spans (Spans #1-5 & #9-11):** The approach spans have welded beams - the depth transitions from 48" to 33" (connections are riveted). The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in Span #2). In Spans #9 - 11, the deck widens from 15 to 18 beams. The fascia beams have flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified (they were lowered, using only four bolts at each connection). Most existing cracks were drilled out (some were too small to reach), and the fractured beam was reinforced with bolted plates.

In Span #2 (multi-beam approach span), there is a cantilever expansion hinge (sliding plate bearings). The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam ends are contacting, and some bearing plates have tipped (preventing the joint from reopening). The hinge area was re-painted in 1999 (open finger joint above). The beam ends have moderate surface pitting.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 -14):** The far north approach spans consist of cast-in-place concrete continuous "voided" slabs (2 ft deep). A northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). These spans are in generally good condition. Spalling along the exterior and median copings was patched with shot-crete in 1998.

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## Bridge Substructure NBI Code #6 (Satisfactory Condition)

**Abutments:** The abutments have minor vertical cracking, with some staining (from leaking deck joints).

**Truss Span Piers:** Piers #6 & 7 (main river span) have two concrete columns resting on a pier wall. The west column on Pier #7 has a minor vertical crack. Piers #5 & 8 have 2 concrete columns connected with an upper strut. The column on Pier #8 has been reinforced with a concrete "jacket". [2001] Underwater inspections conducted by Collins Engineers, Inc. in 2000 found Pier 7 to be in good condition with no defects of structural significance. A 3x3-foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5-year inspection interval.

**Approach Span Piers:** The piers supporting the steel spans (Piers #1 - 5 & #9 -11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). The pier columns supporting the voided slab spans (Piers #12 & 13) are cast directly into the slab (no cap). Pier #1 has tipped slightly to the north – this is related to the hinge failure in Span #2. The east column on Pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shot-crete repairs (leaking deck joint above).

## Other Bridge Elements

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed (the north approach (SBL and on ramp) has no relief joint).

**Channel & Protection:** NBI Code #8 (Very Good Condition). The bridge is located just downstream from the Lower St. Anthony Lock & Falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel (along the east bank) - typically, the water depth along the west face is only 1-2 feet (we do not conduct underwater inspections). Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure (running across the entire deck) mounted on the exterior railings at Truss Panel Point #2' (north end of truss). There is a signpost mounted on the west railing at Truss Panel Point #6 (south end of truss).

**Guardrail:** In 1998, the approach guardrails were repaired (a new impact attenuator was installed at the northbound off ramp to University Ave.).

**Drainage:** Several deck drains drop directly into the river. The drain troughs at Pier #6 have inadequate slope, and tend to fill-up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving (both abutments) is in good condition.

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**Lighting:** The bridge has rail mounted deck lighting, under deck lighting (Span #13), and river navigation lighting. The lighting above the parking lots in Spans #11 & 12 is maintained by "Metal Matic Inc.". A light post on the west railing (W 5/3 L) has a 6" vertical split from plow damage.

**Miscellaneous:** The area below the south approach spans (Spans #2 -5) is leased out as a parking lot (used mainly by U of M students). The area below Spans #11 & 12 is used for parking by Metal Matic Inc. The U.S. Army Corps of Engineers is stockpiling material from river dredging below Span #8. There is a catwalk (for navigation light maintenance) running below the median of the truss spans - the catwalk is being accessed by graffiti "artists" at Pier #5.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). A control room was constructed at the NW approach corner.

## Bridge Snooper Field Investigation

Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

**South Abutment:** Strip seal deck joint above. [1998] Gland in (SBL) was patched using an experimental system. Hot poured seal with wire mesh reinforcement. Fourteen sliding plate bearing assemblies. [1995] The bearings are corroded and in full contraction (related to hinge failure in Span #2, and tipping of Pier #1). The seat area is cracked and discolored.

**Span #1 (Steel Multi-beam):** 14 beams, 33" deep rolled beams with welded cover plates (square ends). [1996] East fascia beam has flaking rust. [1978] Three west bays have some full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Pier #1:** 10 fixed, and 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a RR crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #2 (Steel Multi-beam):** 14 beams (33" deep rolled beam with welded cover plates) - the beams transition to 48" deep welded beams north of the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. [1978] Some full depth deck repairs. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Hinge Joint (12 ft. South of Pier #2):** Open finger joint above. [1994] The hinge assemblies (particularly SBL) are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate has tipped (falling off the base plate) and is preventing the joint from opening. Several beam ends are contacting at the top flange or at the web. [1999] Hinge area re-painted. [2000] Beam ends have moderate surface pitting, debris has begun to build up on hinge area.

**Pier #2:** 14 sliding plate bearing assemblies. Pier consists of four concrete columns and cap, with a RR crash strut between the columns. [1997/2000] Bearings have corrosion, east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #3 (Steel Multi-beam):** Over Bluff St. 14 beams (48" deep welded plate beams). [1978] Three west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete spalling off (some loose concrete) adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just north of Pier #2:** [1999] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange.

**Diaphragm line just south of Pier #3:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| <b>Diaphragm Crack Locations Pier #3 Southside</b>  |  |
|---|--|
| *Denotes locations where cracks were found in 1998. |  |
| <b>Girder Location</b>                              | <b>Crack Description and or Repair Description</b>   |
| <b>G1 (East Fascia NB)</b>                          | [1999/2000] 1/4" crack on top of interior stiffener weld   |
| <b>G2 (NB)</b>                                      | * [1998] Two 2" holes drilled in web   |
| <b>G3 (NB)</b>                                      | * [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds.   |
| <b>G4 (NB)</b>                                      | * [1998] Two 2" holes drilled in web.  |
| <b>G5 (NB)</b>                                      | * [1998] Two 2" holes drilled in web.  |
| <b>G6 (NB)</b>                                      | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web (will be drilled out in spring 2000)   |
| <b>G7 (NB)</b>                                      | * [1998] One 2" hole drilled in web (other end of crack was ground out).   |
| <b>G8 (SB)</b>                                      |  |
| <b>G9 (SB)</b>                                      |  |
| <b>G10 (SB)</b>                                     |  |
| <b>G11 (SB)</b>                                     |  |
| <b>G12 (SB)</b>                                     | * [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out).  |
| <b>G13 (SB)</b>                                     |  |
| <b>G14 (West Fascia SB)</b>                         | * [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack on at top of interior stiffener weld. |

**Pier #3:** 10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #4 (Steel Multi-beam):** Over contract parking lot. 14 beams (48" deep welded plate beams). [1978] Full depth deck repairs (2<sup>nd</sup> & 3<sup>rd</sup> bays from the east). [1998] Underside of deck 200 LF of transverse leaching cracks, and 200 SF of spall (exposed rebar) below a transverse poured joint (full width of deck). [2000] 4<sup>th</sup> bay from west has 20 SF of severe leaching. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just north of Pier #3:** [1998/99] Diaphragms lowered (strain gauges placed on beams #2 & 6). \*Denotes locations where cracks were found in 1998.

| Diaphragm Crack Locations Pier #3 Northside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                                 |   |
| G2 (NB)   |   |
| G3 (NB)   | * [1998/2000] 1/2" crack in top flange/web weld (West side), small crack in stiffener weld (East side). |
| G4 (NB)   | * [1998/2000] 1" crack in top flange/web weld (East Side)   |
| G5 (NB)   |   |
| G6 (NB)   | [1999/2000] 3/8" crack in top of stiffener weld.  |
| G7 (NB)   |   |
| G8 (SB)   |   |
| G9 (SB)   |   |
| G10 (SB)  |   |
| G11 (SB)  | * [1988] Two 2" holes drilled in web  |
| G12 (SB)  | * [1988] Two 2" holes drilled in web.   |
| G13 (SB)  |   |
| G14 (West Fascia SB)                                | * [1988] Two 2" holes drilled in web  |

**Diaphragm line just south of Pier #4:** [1999] Diaphragms lowered, even though the connections have a "positive moment" configuration (stiffeners welded to the top flange).

**Pier #4:** 14 sliding plate expansion-bearing assemblies. [1997] Bearings have light rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #5 (Multi-beam/Deck Truss):** Over contract parking lot. 14 beams (48" deep welded plate beams bolted onto the crossbeam). [1996] Four conduit clamps missing (NB fascia beam). Median girder has impact damage (parking lot below). [1978] Underside of deck has some full depth patches (2 west bays). [1997] Deck leaching near the finger joint. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked (photo). [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just north of Pier #4:** \*Denotes locations where cracks were found in 1998.

| Diaphragm Crack Locations Pier #4 Northside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                                 |   |
| G2 (NB)   |   |
| G3 (NB)   | * [1988] Two 2" holes drilled in web.   |
| G4 (NB)   | * [1988] Two 2" holes drilled in web  |
| G5 (NB)   |   |
| G6 (NB)   |   |
| G7 (NB)   | * [1988] Two 2" holes drilled in web. [2001] Small crack at the top of the stiffener weld |
| G8 (SB)   |   |
| G9 (SB)   |   |
| G10 (SB)  | * [1988] Two 2" holes drilled in web.   |
| G11 (SB)  | [1999/2000] Small cracks at top of stiffener weld.  |
| G12 (SB)  | * [1988] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld                |
| G13 (SB)  | * [1999/2000] Small cracks at top of stiffener weld.                                      |
| G14 (West Fascia SB)                                | [1999] Small crack at top of interior stiffener weld                                      |

## Main Truss Spans (NBL East Truss)

Stringers are numbered from the east (see framing plan).

**Crossbeam:** [1986] The SE rocker froze, damaging the east end of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W closed to traffic) - the SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1998/99] Crossbeam re-painted, the side facing the finger joint has section loss.

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Date   | Measurement |
| September, 1998                              | 16-5/8"     |
| April, 1999                                  | 17-13/16"   |
| April, 2000                                  | 18"         |
| September, 2001                              | 18 1/16"    |

**Panel Point #0 (Beginning of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] End floorbeam re-painted - there is section loss at the base of the stiffeners.

### Panel Point #1, (East Truss, Pier #5):

**Pier #5:** Two "rollernest" bearing assemblies. [2000] Bearings show signs of recent movement. Pier consists of two concrete columns connected by a strut. The catwalk can be accessed by climbing onto the strut (debris piled at base).

**Span #6 (Deck Truss):** [1997] West River Parkway constructed below bridge. [1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

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**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):** Floorbeam truss (near center) has an undercut weld in the flange.

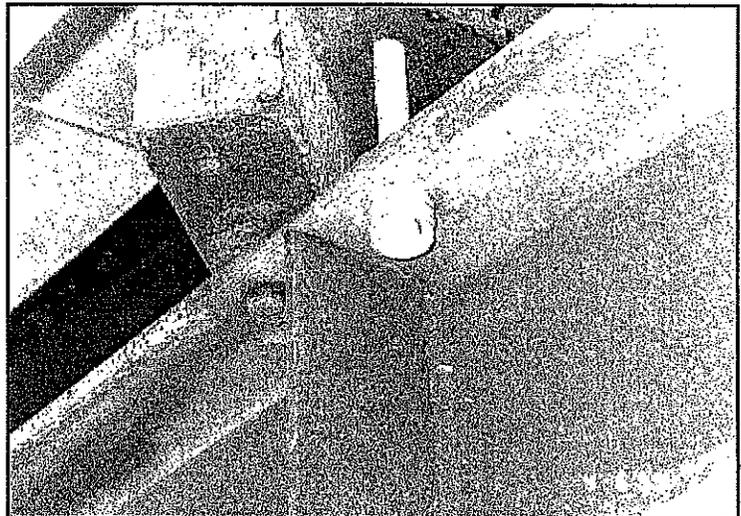
**Panel Point #4 (East Truss, Stringer Joint):** Strip seal deck joint above. [1999] 1 ft. of gland pulled out @ centerline. [1996] The floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box along catwalk has cover missing. [2000] Concrete in joint at east end.

**Panel Point #5 (East Truss):** [1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out @ Stringer #3 (photo), cracked tack welds remain @ Stringer #4 (photo).

**Panel Point #6 (East Truss):** [1994] Floorbeam truss top chord (bottom flange) has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10 (near the bottom chord connection) has a 4" long gouge (possible crack) along a connection weld – should be ground out (photos).

**Panel Point #7 (East Truss):**

**Panel Point #8 (East Truss, Pier #6, Stringer Joint):** Strip seal and deck drain above. [1999] Joint is leaking. [1998] Stringer #4: bolt missing at south floorbeam connection. [1994] Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated. [2000] Missing bolt was replaced in 1999, but the bearing block was not returned to it's proper position – now bolt bolts are loose, needs repair (photos).



Panel Point #8, Stringer #2

**Pier #6 (Downtown side of Mississippi):** Two "rollernest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement (need to check!). Pier consists of two concrete columns with a pier wall at the base. [1997] The drain pipes are clogged (top & bottom @ median).

**Span #7 (Deck Truss):** [1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):** Navigation light. [1999] Strain gauges installed on truss top chord member U9/U10 (U of M research project). [2000] Graffiti on top gusset plate.

**Panel Point #11 (East Truss):** Section loss at gusset plate, bottom chord. [2000] Stringer #3 has a bolt missing at the floorbeam connection.

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**Panel Point #12 (East Truss):** [1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener.

**Panel Point #13 (East Truss):** Deck drains (falls directly into river). [1993] Bottom chord gusset plate has section loss. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners.

**Panel Point #14 (East Truss, Midspan, Stringer Joint):** Strip seal joint above. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener.

**Panel Point #13' (East Truss):** Floorbeam truss top chord has a ground out spot near Stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener.

**Panel Point #12' (East Truss):** [1999] Deck (east bay) has 15 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):** Deck drains (falls directly into river).

**Panel Point #8' (East Truss, Pier #7, Stringer Joint):** Red navigation light. Strip seal deck joint above. Floorbeam truss has severe rust below the median. [1993] North side: bolts replaced with "redi-rod" at Stringer #4, bolts replaced at Stringer #5.

**Pier #7 (East bank of Mississippi):** Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full-height leaching crack on the south face.

**Span #8 (Deck Truss):** [1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

**Panel Point #7' (East Truss):**

**Panel Point #6' (East Truss):** [1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose.

**Panel Point #5' (East Truss):** [2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along the interior edges. [2001] Both connection plates, the top chord, and floorbeam have flaking rust.

**Panel Point #3' (East Truss):** Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):** Overhead sign bridge mounted on exterior railings. [1999] Deck in Bay #3 has 100 SF of water saturation (photos).

**Pier #8: 2 "rollernest" bearing assemblies,** they have light rust. [2000] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss, Pier #8):** [2000] Graffiti on bottom of truss (above bearing).

**Panel Point #0' (End of East Truss):** Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need

flushing). [1998/99] Floorbeam re-painted, side facing finger joint has section loss (holes in web stiffeners) - photos. [1998] North face (directly above east rocker bearing): two horizontal welds (between stiffener plates) have cracked through entirely (photos).

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" @ 40° Degrees F.

**Crossbeam:** [1998/99] Crossbeam re-painted. Side facing finger joint has section loss (pitting at base of stiffeners). [1992] North face: a crack in the crossbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997/98] North face: weld above east rocker bearing (between the horizontal & center vertical stiffener) has cracked through entirely (the weld end at the crossbeam web was partially drilled out). [1998] North face: cracks at both ends of the horizontal stiffener (above rocker bearing) were drilled out (two small holes drilled in crossbeam web at each location). [1998] Bracing installed between crossbeam (above east rocker) and Beams #3 & 5.

## North Approach Spans

Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

**Span #9 (Multi-beam):** The multi-beam spans resume (48" deep welded beams bolted onto the crossbeam) - NB bridge has 8 beams, SB bridge has 7 beams. There are two active railroad tracks below. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just south of Pier #9:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| Diaphragm Crack Locations Pier #9 Southside         |   |
|---|---|
| *Denotes locations where cracks were found in 1998. |   |
| Girder Location                                     | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                                 | [2000] Exterior top flange/web weld has a 1/2" indication.                            |
| GC (NB)   |   |
| G2 (NB)   | * [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| G3 (NB)   |   |
| G4 (NB)   | * [1998/2000] Small crack in top flange/web weld.                                     |
| G5 (NB)   |   |
| G6 (NB)   |   |
| G7 (NB)   |   |
| G8 (SB)   | * [1998] Small crack in top flange/web weld. [2000] No cracks found.                  |
| G9 (SB)   | * [1998] Crack in top of stiffener weld.  |
| G10 (SB)  |   |
| G11 (SB)  | * [1998/2000] Small crack in top of stiffener weld (East side).                       |
| G12 (SB)  | * [1998/2000] Small crack in top of stiffener weld (East side)                        |
| G13 (SB):   |   |
| G14 (West Fascia SB)                                |   |

**Pier #9:** 13 fixed, and four sliding plate bearing assemblies. Pier consists of four columns and cap, with a RR crash strut between the columns. [1969] East column damaged by train derailment - the column has minor scrapes and spalls (downspout had to be reconnected). [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #10 (Steel multi-beam):** NB bridge has 10 beams, SB bridge has seven beams (the welded beams transition from 48" to 33" depth just north of pier). Active railroad tracks below (one track splits into two). [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just north of Pier #9:** \*Denotes locations where cracks were found in 1998. [1999] Diaphragms lowered.

| <b>Diaphragm Crack Locations Pier #9 Northside</b>  |  |
|---|--|
| *Denotes locations where cracks were found in 1998. |  |
| <b>Girder Location</b>                              | <b>Crack Description and or Repair Description</b>                               |
| <b>G1 (East Fascia NB)</b>                          |  |
| <b>G1B (NB)</b>                                     | Stiffeners are welded to the top flange (positive moment).                       |
| <b>G2 (NB)</b>                                      |  |
| <b>G3 (NB)</b>                                      |  |
| <b>G4 (NB)</b>                                      | * [2000] Two 2" holes drilled in web.  |
| <b>G5 (NB)</b>                                      | * [2000] Two 2" holes drilled in web.  |
| <b>G6 (NB)</b>                                      |  |
| <b>G7 (NB)</b>                                      |  |
| <b>G8 (SB)</b>                                      |  |
| <b>G9 (SB)</b>                                      | * [1998/2000] Cracks in top flange/web weld & top of stiffener weld (west side). |
| <b>G10 (SB)</b>                                     | * [2000] Two 2" holes drilled in web.  |
| <b>G11 (SB)</b>                                     | * [1998/2000] Small crack in top of stiffener weld (East side).                  |
| <b>G12 (SB)</b>                                     | * [2000] Two 2" holes drilled in web.  |
| <b>G13 (SB)</b>                                     |  |
| <b>G14 (West Fascia SB)</b>                         |  |

**Diaphragm line just south of Pier #10:** [1999] Diaphragms were inverted & lowered (even though the beam connections have a "positive moment" configuration (welded to top flange). [2000] Beam #6 appears to be "working" at the top connection.

**Pier #10:** 18 sliding plate expansion bearings. Pier has 5 columns & cap with a RR crash strut between the columns. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #11 (Steel Multi-beam):** NB bridge has 11 beams, SB bridge has 7 beams, parking lot below. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm line just north of Pier #10:** [1999] Diaphragms were inverted & lowered (even though the beam connections have a "positive moment" configuration (welded to top flange).

**Pier #11:** Beginning of the NB off ramp to University Ave. (Br. #9340A). Strip seal deck joint above. [1995/2000] Gland is leaking in several locations (NB & SB). Eighteen sliding plate bearings for the steel beams and 15 sliding plate bearings for the slab span. Pier consists of seven columns and a cap. [1998 ] Extensive shotcrete repairs on cap. [2000] West column has 1 SF spall. [1999] Sliding plate bearings for the steel beams are re-painted.

**Span #12 (Concrete Voided Slab Span):** Parking lot below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #12:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

---

**Span #13 (Concrete Voided Slab Span):** 2nd St. passes below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #13:** Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #14 (Concrete Slab Span):** [1998] Shot-crete repairs along median and exterior copings.

**North Abutment:** Strip seal deck joint above. Fourteen sliding plate bearing assemblies. [2000] NB joint leaking at both ends (bearings rusty).

### **Main Truss Spans (SBL: West Truss)**

Stringers are numbered from the east (from original plans).

**Crossbeam:** [1998/99] Crossbeam re-painted (side facing finger joint has section loss). [1999] The bolted connection between Beam #12 and the crossbeam was re-tensioned (the connection had been "working").

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) measured at 3-9/16" (45° Degrees F.).

\*\* [2001] Gap between crossbeam & floorbeam (at rocker bearing) measured at 3 1/2" (45° Degrees F.).

**Panel Point #0' (End floorbeam, beginning of West Truss):** Open finger deck above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] Floorbeam re-painted (side facing finger joint has section loss on stiffeners). [1996] The floorbeam/truss connection has severe corrosion (surface pitting on plates & bolts). [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam (photo).

**Panel Point #1' (West Truss, Pier #8):**

**Pier #8:** See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):** [2001] Underside of the deck has 16SF of water saturation.

**Panel Point #2' (West Truss):** Overhead sign bridge mounted on exterior railings.

**Panel Point #3' (West Truss):** The floorbeam truss (top flange of upper chord) has an ugly weld below the connection to Stringer #11.

**Panel Point #4' (West Truss, Stringer Joint):** Strip seal deck joint above. Truss diagonal member U4/L3' has backer bars along interior edges.

**Panel Point #5' (West Truss):**

**Panel Point #6' (West Truss):** [1996/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection two bolts are still loose. [1997] Stringer #10: 2 south bolts are loose at the floorbeam connection. [1999] Stringer #9: one south bolt is loose at the floorbeam connection

**Panel Point #7' (West Truss):** [1997] Top chord/floorbeam truss connection has a cracked tack weld on the interior. [1999] Wind bracing gusset plate at Stringer #14 has loose bolts.

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**Panel Point #8' (West Truss, Pier #7, Stringer Joint):** Strip seal deck joint above. [1998] Stringer #11: bolt replaced at floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction). [2001] Heavy flaking rust at the truss bottom chord/sway frame connection.

**Pier #7:** See NB notes.

**Span #7 (Deck Truss):**

**Panel Point #9' (West Truss):**

**Panel Point #10' (West Truss):** [1994] Stringer #13: Loose bolt at floorbeam truss connection. Top chord (U10/U11) has 6 nicks on the exterior (15 ft. south of U10).

**Panel Point #11' (West Truss):** Nick in the truss bottom chord L11' /L12'.

**Panel Point #12' (West Truss):** Truss diagonal member U12' /L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss, Midspan, Stringer Joint):** Strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has flaking rust near the joint (gland pulled out above). Tack welds along the sway frame/truss, bottom chord, gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener.

**Panel Point #13 (West Truss):** [1999] Pack rust at the truss bottom chord/sway frame connection (plates are spread 3/4" - photo). [1996/99] Bottom chord member L13 /L14 has cracked tack welds at two internal stiffeners.

**Panel Point #12 (West Truss):** [1996] Bottom chord member L12 /L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):** [1998] Stringer #11: 3 bolts replaced at the floorbeam truss connection, the SE bolt is too short (inadequate threads) – the stringer has lifted 3/32" off the bearing block (south side).

**Panel Point #10 (West Truss):** Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):** Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss, Pier #6, Stringer Joint):** Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains & horizontal troughs. [1996] Drain clogged at median. [1999] Standing water in east grate.

**Pier #6:** See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

**Panel Point #6 (West Truss):** Sign post mounted on railing, overhead sign above. Floorbeam truss top chord (U5/ U4) has gouges in the bottom flange at the end of the connection plate, the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice (from construction).

**Panel Point #5 (West Truss):** Truss top chord member U5/U6 has backer bars along the interior corners.

---

**Panel Point #4 (West Truss, Stringer Joint):** Strip seal deck joint. Truss top chord member U4/U5 has backer bars along the interior corners. [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire.

**Panel Point #3 (West Truss):** Truss diagonal member L3/U4 has backer bars along the interior corners. Truss bottom chord L2/L3 has a nick.

**Panel Point #2 (West Truss):** [1996] Floorbeam truss member L2/U3 has a welding flaw (no crack, MT 1997).

**Pier #5:** See NB notes.

**Panel Point #1 (West truss, Pier #5):** [1994] Diagonal brace (floorbeam to stringer) has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout (originally drained into storm sewer).

**Panel Point #0 (End Floorbeam, end of West Truss):** Open finger deck joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1997] The floorbeam horizontal stiffener is bent down directly above the rocker bearing (photo). [1998/99] Floorbeam re-painted - side facing finger joint has section loss (pitting).

\*[2000] Gap between crossbeam & floorbeam (west end) measured at 16-1/2" (50 Degrees F.).

**Crossbeam:** [1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out). [1998/99] Crossbeam re-painted, the side facing finger joint has section loss (pitting, with holes in the base of stiffeners).

**Span #5 (Deck Truss/Steel Multi-beam):** The multi-beam spans resume at Panel Point #0.

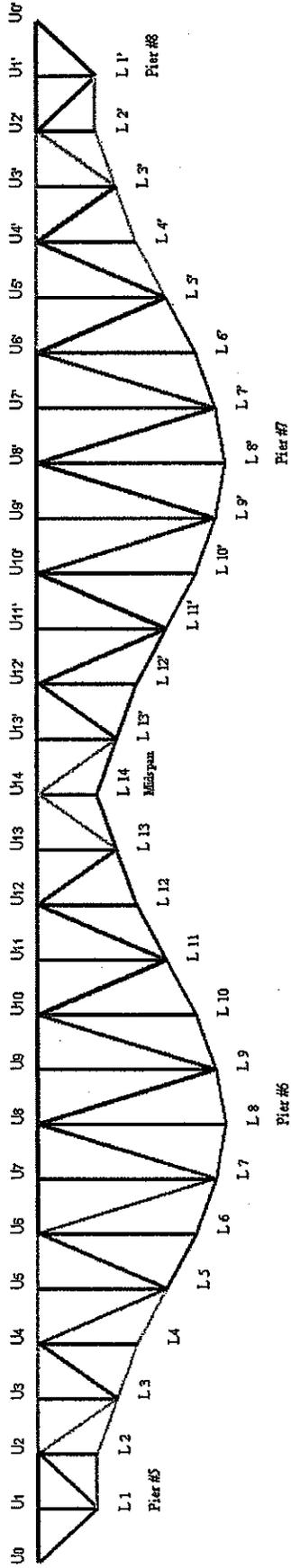
See NB Notes for South Approach Spans

## Previous Snooper Inspections

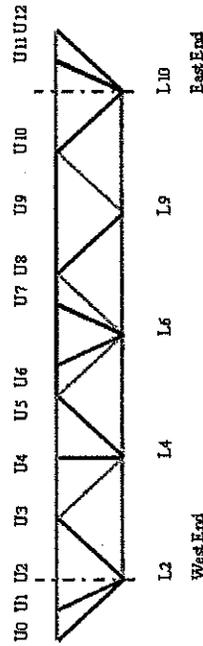
2000 Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer, Wayne Tennison, Pete Wilson, George Morelli, Rebecca Lane  
1999 Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadegg, Pete Wilson  
1998 Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson  
1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson  
1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson  
1994 Terry Moravec, Kurt Fuhrman, Pete Wilson  
1993 Terry Moravec, Chas Martin, Tom Waks  
1991 Chester Martin, Chas Martin, Jerry Anderson  
1988 Chester Martin

\*Denotes an "In-Depth" Inspection

# Truss Diagram



Mainspan



Floor Beam Truss



Truck Highway I-35W  
Minnesota Department of Transportation  
Bridge Division, Minnesota Operations  
Main Division

Bridge No. 9340

I-35W over the Mississippi River  
at Minneapolis, MN

Northbound Truss Diagram

See's 24 & 25 T. 29 N R. 24 W  
Hennepin Co., MN.

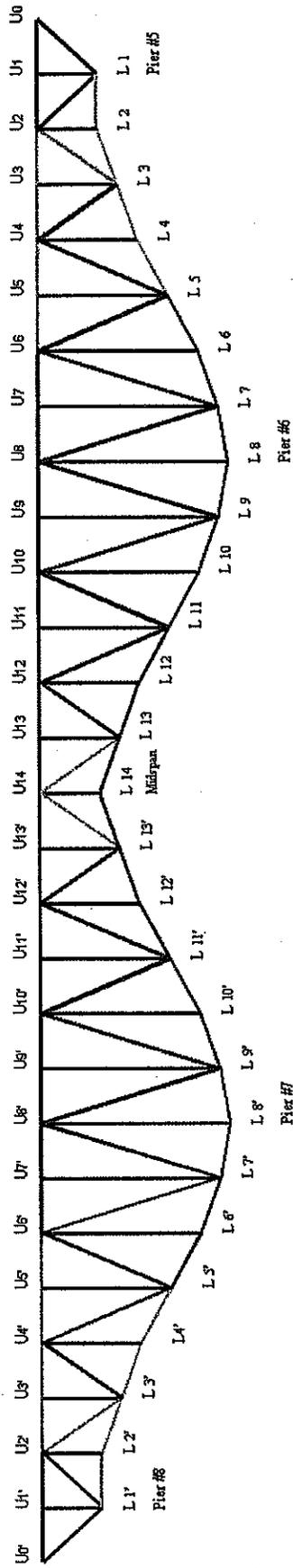
Dr. \_\_\_\_\_ Date 1/23/02

9340

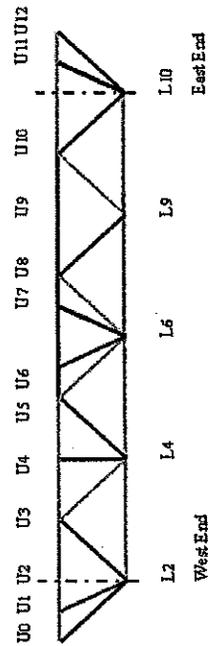
### Legend

- Blue Compression
- Red Tension
- Orange Rayired
- Black Secondary
- Member

# Truss Diagram



Mainspan



Floor Beam Truss



Trunk Highway 1-35W  
Minnesota Department of Transportation  
Highway Division, Minneapolis, Minnesota  
Main Division

Bridge No. 9340  
I-35W over the Mississippi River  
at Minneapolis, MN

Southbound Truss Diagram  
Sec 24 & 25 T. 29 N R. 24 W  
Hennepin Co., MN.

|      |              |      |
|------|--------------|------|
| Dr.  | Date 1/23/02 | 9340 |
| Chk. |              |      |

### Legend

- Blue Compression
- Red Tension
- Orange Reversal
- Black Secondary
- Member



Crew Number: 7627  
 Inspector: DISTRICT5  
 BRIDGE 9340

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 05-17-2002

|  |  |   |
|--|--|---|
| County: HENNEPIN                                   | Location: 1.0 MI NE OF JCT TH 94         | Length: 1,907.0 ft                          |
| City: MINNEAPOLIS                                  | Route: Isth 35W Ref. Pt.: 018+00.538     | Deck Width: 113.3 ft (Varies)               |
| Township:  | Control Section: 2783 Maint. Area: METRO | Rdwy. Area / Pct. Unsnd: 201,511 sq ft      |
| Section: 25 Township: 029N Range: 24W              | Local Agency Bridge Nbr:                 | Paint Area / Pct. Unsnd: 490,200 sq ft 15 % |
| Span Type: CSTL BEAM SPAN                          |  |   |
| NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N        | Open, Posted, Closed: OPEN               |   |
| Appraisal Ratings - Approach: 8 Waterway: 8        | MN Scour Code: L-STBL;LOW RISK           | Def. Stat: S.D. Suff. Rate: 50.0            |
| Required Bridge Signs - Load Posting: NOT REQUIRED | Traffic: NOT REQUIRED                    |   |
| Horizontal: NOT REQUIRED                           | Vertical: NOT APPLICABLE                 |   |

### STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| 22   | LS O/L (CONC DECK)   | 2   | 05-17-2002 | 1 SF      | 0           | 0           | 1           | 0           | 0           |
|  |                      |     | 09-26-2001 | 1 SF      | 0           | 0           | 1           | 0           | 0           |
| Notes: 3 lanes + on/off ramp each direction (2 ft. shoulders). [1978] Low slump overlay (extensive full-depth repairs). [1993] Minor spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.   |                      |     |            |           |             |             |             |             |             |
| 48   | LS O/L (CONC SLAB)   | 2   | 05-17-2002 | 1 SF      | 0           | 1           | 0           | 0           | 0           |
|  |                      |     | 09-26-2001 | 1 SF      | 0           | 1           | 0           | 0           | 0           |
| Notes: Spans 12 - 14 have a 2 ft. deep CIP concrete voided slab (continuous).  |                      |     |            |           |             |             |             |             |             |
| 300  | STRIP SEAL JOINT     | 2   | 05-17-2002 | 946 LF    | 906         | 0           | 40          | N/A         | N/A         |
|  |                      |     | 09-26-2001 | 946 LF    | 906         | 40          | 0           | N/A         | N/A         |
| Notes: [1978] Type H strip seal @ abutments, Pier 11, and stringer expansion joints (7 joints total). [1998] South Abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995/2000] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.   |                      |     |            |           |             |             |             |             |             |
| 301  | POURED DECK JOINT    | 2   | 05-17-2002 | 1,017 LF  | 1,017       | 0           | 0           | N/A         | N/A         |
|  |                      |     | 09-26-2001 | 1,017 LF  | 1,017       | 0           | 0           | N/A         | N/A         |
| Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).  |                      |     |            |           |             |             |             |             |             |
| 303  | ASSEMBLY DECK JOINT  | 2   | 05-17-2002 | 326 LF    | 191         | 110         | 25          | N/A         | N/A         |
|  |                      |     | 09-26-2001 | 326 LF    | 216         | 110         | 0           | N/A         | N/A         |
| Notes: Open finger joints at truss ends and Span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.  |                      |     |            |           |             |             |             |             |             |
| 321  | CONC APPROACH SLAB   | 2   | 05-17-2002 | 4 EA      | 0           | 4           | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 4 EA      | 0           | 4           | 0           | 0           | N/A         |
| Notes: [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).  |                      |     |            |           |             |             |             |             |             |
| 331  | CONCRETE RAILING     | 2   | 05-17-2002 | 7,628 LF  | 7,628       | 0           | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 7,628 LF  | 7,628       | 0           | 0           | 0           | N/A         |
| Notes: [1998] Railings re-constructed. Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally Code 12) were retrofit (32" high concrete face added, horizontal steel railings removed).  |                      |     |            |           |             |             |             |             |             |
| 107  | PAINTED STEEL GIRDER | 2   | 05-17-2002 | 10,596 LF | 0           | 9,086       | 1,400       | 110         | 0           |
|  |                      |     | 09-26-2001 | 10,596 LF | 0           | 9,086       | 1,400       | 110         | 0           |
| Notes: [1968] Bridge painted with Lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have flaking rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Beam ends at hinge have moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound. |                      |     |            |           |             |             |             |             |             |

Crew Number: 7627

Inspector: DISTRICT5

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 05-17-2002

## STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| 113  | PAINT STEEL STRINGER | 2   | 05-17-2002 | 14,896 LF | 0           | 14,746      | 0           | 150         | 0           |
|  |                      |     | 09-26-2001 | 14,896 LF | 0           | 14,746      | 0           | 150         | 0           |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have corrosion at expansion joints. [1999] Median stringers re-painted. [1991/2000] Stringer/Floorbeam connections are "working". Several bolts are loose or missing.   |                      |     |            |           |             |             |             |             |             |
| 131  | PAINT STL DECK TRUSS | 1   | 05-17-2002 | 2,127 LF  | 0           | 0           | 1,912       | 215         | 0           |
|  |                      |     | 09-26-2001 | 2,127 LF  | 0           | 0           | 1,912       | 215         | 0           |
| Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have severe pigeon debris. [1999] Pigeon screens placed on truss member openings. [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).  |                      |     |            |           |             |             |             |             |             |
| 152  | PAINT STL FLOORBEAM  | 2   | 05-17-2002 | 3,348 LF  | 0           | 2,623       | 725         | 0           | 0           |
|  |                      |     | 09-26-2001 | 3,348 LF  | 0           | 2,623       | 725         | 0           | 0           |
| Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). Floorbeam trusses have numerous poor weld details (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. Some areas had severe section loss (holes). |                      |     |            |           |             |             |             |             |             |
| 373  | STEEL HINGE          | 2   | 05-17-2002 | 18 EA     | 0           | 4           | 0           | 0           | 14          |
|  |                      |     | 09-26-2001 | 18 EA     | 0           | 4           | 0           | 0           | 14          |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.  |                      |     |            |           |             |             |             |             |             |
| 380  | SECONDARY ELEMENTS   | 2   | 05-17-2002 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.   |                      |     |            |           |             |             |             |             |             |
| 311  | EXPANSION BEARING    | 2   | 05-17-2002 | 125 EA    | 81          | 44          | 0           | N/A         | N/A         |
|  |                      |     | 09-26-2001 | 125 EA    | 81          | 44          | 0           | N/A         | N/A         |
| Notes: [1994/2000] Some abutment bearings are rusty (joints leaking). [1996] South Abutment bearings are in full contraction. [1994] Main truss roller bearings have moderate corrosion.   |                      |     |            |           |             |             |             |             |             |
| 313  | FIXED BEARING        | 2   | 05-17-2002 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|  |                      |     | 09-26-2001 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 205  | CONCRETE COLUMN      | 2   | 05-17-2002 | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
| Notes: [1969] Pier 9: East column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. 58/160) [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in Span 2 (South Abutment bearings are in full contraction).  |                      |     |            |           |             |             |             |             |             |
| 210  | CONCRETE PIER WALL   | 2   | 05-17-2002 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 215  | CONCRETE ABUTMENT    | 2   | 05-17-2002 | 255 LF    | 255         | 0           | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 255 LF    | 255         | 0           | 0           | 0           | N/A         |
| Notes: [1991] Both Abutments have minor cracking & staining.   |                      |     |            |           |             |             |             |             |             |
| 234  | CONCRETE CAP         | 2   | 05-17-2002 | 819 LF    | 669         | 150         | 0           | 0           | N/A         |
|  |                      |     | 09-26-2001 | 819 LF    | 669         | 150         | 0           | 0           | N/A         |
| Notes: [1998] Pier 11: Cap has extensive "gunnite" repairs.  |                      |     |            |           |             |             |             |             |             |

Crew Number: 7627

Inspector: DISTRICT5

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 05-17-2002

## STRUCTURE UNIT: 0

| ELEM<br>NBR   | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|---|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 356   | FATIGUE CRACKING    | 2   | 05-17-2002 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1998/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. |                     |     |            |          |             |             |             |             |             |
| 357   | PACK RUST           | 2   | 05-17-2002 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).   |                     |     |            |          |             |             |             |             |             |
| 358   | CONC DECK CRACKING  | 2   | 05-17-2002 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.  |                     |     |            |          |             |             |             |             |             |
| 359   | CONC DECK UNDERSIDE | 2   | 05-17-2002 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).  |                     |     |            |          |             |             |             |             |             |
| 360   | SETTLEMENT          | 2   | 05-17-2002 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 363   | SECTION LOSS        | 2   | 05-17-2002 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes:  |                     |     |            |          |             |             |             |             |             |
| 964   | CRITICAL FINDING    | 2   | 05-17-2002 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
|   |                     |     |            |          |             |             |             |             |             |
| Notes: DO NOT DELETE THIS CRITICAL FINDING SMART FLAG.  |                     |     |            |          |             |             |             |             |             |
| 981   | SIGNING             | 2   | 05-17-2002 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|   |                     |     | 09-26-2001 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes: OH Sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.   |                     |     |            |          |             |             |             |             |             |
| 982   | GUARDRAIL           | 2   | 05-17-2002 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1998] Approach guardrail repaired (impact attenuator at NB off ramp).   |                     |     |            |          |             |             |             |             |             |
| 984   | DRAINAGE            | 2   | 05-17-2002 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes: Pier 6: Horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.  |                     |     |            |          |             |             |             |             |             |
| 985   | SLOPES              | 2   | 05-17-2002 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1994] North Abutment slope paving has 20 LF of horizontal cracks.   |                     |     |            |          |             |             |             |             |             |
| 986   | CURB & SIDEWALK     | 2   | 05-17-2002 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|   |                     |     | 09-26-2001 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1993] Curb below exterior railings have spalling & delamination.  |                     |     |            |          |             |             |             |             |             |

Crew Number: 7627

### Mn/DOT BRIDGE INSPECTION REPORT

Inspector: DISTRICT5

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 05-17-2002

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 |
|----------|---------------|-----|------------|----------|----------|----------|----------|----------|----------|
| 988      | MISCELLANEOUS | 2   | 05-17-2002 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
|          |               |     | 09-26-2001 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |

Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner).

General Notes: \*Bridge #9340, Year 2002 Bridge Constructed in 1967. See "Fracture Critical" Report for additional information.

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Reviewer's Signature / Date

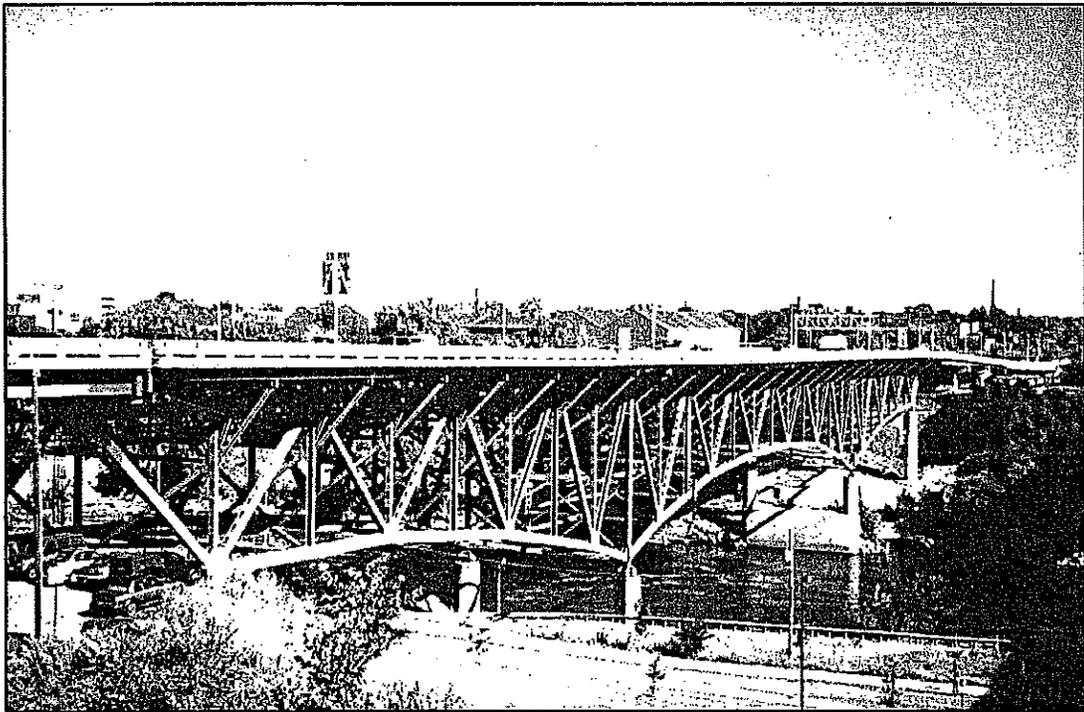


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# FRACTURE CRITICAL BRIDGE INSPECTION

In-Depth

2002 Report



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**BRIDGE # 9340**

**I-35W over the Mississippi River at Minneapolis, MN  
("Squirt Bridge")**

**MAY 2002**

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## PREPARED FOR

Minnesota Department of Transportation  
Office of Bridges & Structures  
Oakdale, MN 55128

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## PREPARED BY

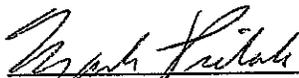
Minnesota Department of Transportation  
Metro District  
Maintenance Operations, Bridge Inspection  
Roseville, MN 55113

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## STRUCTURE INVESTIGATION INFORMATION

**Inspection Date:** Main Truss Spans: May 13, 14, 15, 16, 17, 2002  
Steel Approach Spans (Spring): May 13, & 15, 2002  
**Inspection Team:** Mark Pribula, Kurt Fuhrman, Jerry Oldeen, Pete Wilson,  
Bruce Anderson, Mike Palmer  
**Inspection Report Author:** Kurt Fuhrman  
**Bridge Maintenance Sub Area:** Spring Lake Park  
**Access Equipment Used:** Reach-All UB50 (Mn/DOT),  
Aspen A75 (Mn/DOT)

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

  
Mark Pribula

21102  
Registration No.

3/26/03  
Date

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## EXECUTIVE SUMMARY

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The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of the main truss spans and the in-depth inspection of the approach spans of bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with an acceleration/deceleration lane and 2-ft shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

During the 1998 inspection numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9 & 10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location, the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).

The hinge joint in Span #2 is in locked in full expansion, several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

Four-stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has two loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.

Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL). This utilized a hot pour seal with wire mesh reinforcing (the final product looks similar to a strip seal gland). We should monitor this joint to see how well this new gland repair performs and consider using it at other locations.

The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 are clogged because of an inadequate slope.

## Bridge Inspection Recommendations

This recommendation listing refers to specific areas where fatigue cracks and other deficiencies were located during the 2002 inspection. Bridge inspection lists these deficiencies in the highest priority first.

### Long Term Repair Recommendations

- 1) The long term plans for this river crossing need to be defined (replacement, re-decking, Etc.). Due to the "Fracture Critical" configuration of the main river spans (and the problematic "crossbeam" details), and fatigue cracking in the approach spans - eventual replacement of the entire structure would be preferable.
- 2) If bridge replacement is significantly delayed, the bridge should be re-decked (the design of the main river spans do not allow for deck widening). Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in Span #2, and reconfiguration of the deck drainage system.
- 3) Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract (the expansion joints should also be replaced).

### Immediate Maintenance Recommendations

- 1) Four-stringer connection bolts need replacement (all in the NBL). At Panel Point #8, Stringer #2 has 2 loose bolts, and the bearing block has rotated (this will likely require jacking the superstructure). Stringer bolts also need replacement at Panel Point #8, Stringer #4 (south side), and at Panel Point #11, Stringer #3.
- 2) Several strip seal joints are leaking (the glands have ripped or pulled out). Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the South Abutment (SBL) - this utilized a hot pour seal with wire mesh reinforcing (the final product looks similar to a strip seal gland). We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.
- 3) The rubber "skirts" sections above the truss end rockers (installed in 1999) tend to fill with debris - these should be flushed out annually. The horizontal drain troughs at Pier #6 have inadequate slope, and are clogged.

### Areas of Concern for Future Inspections

- 1) During the 1998 inspection, numerous fatigue cracks were found in the approach spans (Spans #3-5 and #9-10). The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the

top flange (at one location the web had cracked through entirely). Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot (used mainly by U of M students) and the Minnesota Commercial Railroad: (651) 646-2010.

- 2) The truss end rocker bearings (and main truss bearings) should be measured for movement during each annual inspection. The truss end floorbeams & approach end "crossbeams" should be closely inspected (they have section loss & fatigue cracks).
- 3) The hinge joint in Span #2 is in locked in full expansion several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, Pier #1 has tipped slightly to the north, and the South Abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## Bridge Description

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction (along with an acceleration/deceleration lane). The shoulders are only 2 ft. wide. The bridge deck widens at the north end (to accommodate on & off ramps), and curves slightly at the south end.

The main river spans (Spans #6-8) are "Fracture Critical" steel deck trusses comprised of "built-up" welded members and 456 ft. long. The truss is approximately 60 ft. deep at Piers #6 & 7. The two main trusses are connected by welded floorbeam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. The approach spans (Spans #1-5 & 9-11) have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams (connections are riveted). The far north spans (Spans #12-14) are cast-in-place concrete voided slabs.

Due to several factors (including mist from nearby St. Anthony Falls), the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings) – the control room is located at the northwest approach corner.

## Bridge Deck: NBI Condition Code 5

The split deck has 3 through lanes each direction (along with an acceleration/deceleration lane) - the shoulders are only 2 ft. wide.. A low slump concrete overlay (along with numerous full-depth deck repairs) was placed on the deck in 1978. In 1998, the median copings were replaced (steel stay-in-place forms), and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks (sealed in 1998). The overlay has several patched areas, and some spalls (additional patching is typically required each year). A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. The overlay had numerous repair patches in 2001.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the south approach spans). In 1998, the median coping overhangs were replaced (steel stay-in-place forms), and the exterior copings were repaired with shot-crete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers &

beams has spalled off (exposed rebar), and in some locations, the spalling extends into the underside of the deck.

**Open Finger Expansion Joints:** The deck has 3 open finger joints (at each end of the truss spans and above the hinge joint in Span #2). In 1999, rubber "skirts" were installed below the truss end finger joints (the drain troughs were removed).

**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, Pier #11, and at 5 stringer joints in the main truss spans (these were installed in 1978). The strip seal glands have pulled out (joints leaking) in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the South Abutment gland (SBL) was patched using an experimental system - hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints (from staged deck construction). All of these joints are leaching below; at some joints the deck is spalling below.

**Exterior Railings:** The original exterior Code #12 railings were retrofit in 1998 - a 32" high concrete face was installed in front of the existing concrete rail base (the horizontal steel rails were removed). The curb along the railing has moderate cracking, delamination and spalling.

**Median Railings:** J-rail (Code #22) was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

## **Bridge Superstructure: NBI Condition Code 4**

**Paint System:** The bridge was originally painted with a lead-base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & corrosion in scattered locations. The floorbeam trusses & stringer ends have corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 had severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floorbeams & "crossbeams" (located below open finger joints).

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floorbeam connections. The box beam truss members have welded interior stiffeners. Some of these have tack-welded tabs (many of these tack welds have

cracked). Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have corrosion at the floorbeam and sway frame connections (pack rust is forming between the connection plates), there is paint failure, surface rust, and flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access (this unfortunately prevents inspection of the interiors).

**Floorbeam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams (welded connections). The floorbeam trusses cantilever beyond the main truss on both sides (connected to the main truss, vertical members with bolts & rivets). The floorbeam truss members have numerous poor welding details – including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically (up to ½" – from original construction) - the splice plates are bent. The floorbeam trusses below stringer joints have severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floorbeam sections below the median were re-painted some areas have section loss (holes).

**Stringers:** There are 14 steel stringers (27" deep rolled beams) bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss (holes). Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to Stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have moderate corrosion, the bearings at Piers #3 & 8 are functioning properly (checked during each annual inspection), but the bearings at Pier #6 show no obvious signs of movement (difficult to reach with snooper).

**End Floorbeams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members. This area was re-painted in 1998-1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floorbeams:** The two end floorbeams are welded plate girders (they connect the main truss ends). The end floorbeams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss (surface pitting at the base of the web, and holes in the base of the vertical stiffeners). In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss (holes at the base of stiffeners). The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning (obvious signs of movement).

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam (2 cracked vertical web stiffeners). The rocker-bearing pin was replaced this required closing I-35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. Installing braces between the crossbeam and Beams #2 & 3 also reinforced the connection.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing (it was drilled out). In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and installing bracing between the crossbeam and 2 stringers reinforced the northeast connection.

**Steel Multi-Beam Approach Spans (Spans #1-5 & #9-11):** The approach spans have welded beams - the depth transitions from 48" to 33" (connections are riveted). The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in Span #2). In Spans-#9 - 11, the deck widens from 15 to 18 beams. The fascia beams have flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and were caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified (they were lowered, using only four bolts at each connection). Most existing cracks were drilled out (some were too small to reach), and the fractured beam was reinforced with bolted plates.

In Span #2 (multi-beam approach span), there is a cantilever expansion hinge (sliding plate bearings). The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam-ends are contacting, and some bearing plates have tipped (preventing the joint from reopening). The hinge area was re-painted in 1999 (open finger joint above). The beam-ends have moderate surface pitting.

The north approach spans have lateral (diagonal) bracing welded to the web.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 -14):** The far north approach spans consist of cast-in-place concrete continuous "voided" slabs (2 ft deep). A northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at Pier #11 and the North Abutment (total of 29 assemblies). Piers #12 & #13 are cast directly into the slab (no bearings). These spans are in generally good condition. Spalling along the exterior and median copings was patched with shot-crete in 1998. [2001] Light fixtures @ Metal Matic Incorporated parking lot.

## **Bridge Substructure: NBI Condition Code 6**

**Abutments:** The abutments have minor vertical cracking, with some staining (from leaking deck joints).

**Truss Span Piers:** Piers #6 & 7 (main river span) have two concrete columns resting on a pier wall. The west column on Pier #7 has a minor vertical crack. Piers #5 & 8 have 2 concrete columns connected with an upper strut. The column on Pier #8 has been reinforced with a concrete "jacket". [2001] Underwater inspections conducted by Collins Engineers, Inc. in 2000 found Pier 7 to be in good condition with no defects of structural significance. A 3x3-foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5-year inspection interval.

**Approach Span Piers:** The piers supporting the steel spans (Piers #1 - 5 & #9 -11) consist of concrete columns with a cap (those adjacent to railroad tracks have lower struts). The pier columns supporting the voided slab spans (Piers #12 & 13) are cast directly into the slab (no cap). Pier #1 has tipped slightly to the north – this is related to the hinge failure in Span #2. The east column on Pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shot-crete repairs (leaking deck joint above).

## **Other Bridge Elements**

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed (the north approach (SBL and on ramp) has no relief joint).

**Channel & Protection:** NBI Code #8 (Very Good Condition). The bridge is located just downstream from the Lower St. Anthony Lock & Falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel (along the east bank) - typically, the water depth along the west face is only 1-2 feet (we do not conduct underwater inspections). Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure (running across the entire deck) mounted on the exterior railings at Truss Panel Point #2' (north end of truss). There is a signpost mounted on the west railing at Truss Panel Point #6 (south end of truss).

**Guardrail:** In 1998, the approach guardrails were repaired (a new impact attenuator was installed at the northbound off ramp to University Ave.).

**Drainage:** Several deck drains drop directly into the river. The drain troughs at Pier #6 have inadequate slope, and tend to fill-up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving (both abutments) is in good condition.

**Lighting:** The Bridge has rail mounted deck lighting, under deck lighting (Span #13), and river navigation lighting. "Metal Matic Inc." maintains the lighting above the parking lots in Spans #11 & 12. A light post on the west railing (W 5/3 L) has a 6" vertical split from plow damage.

**Miscellaneous:** The area below the south approach spans (Spans #2 -5) is leased out as a parking lot (used mainly by U of M students). Metal Matic Inc uses the area below Spans #11 & 12 for parking. The U.S. Army Corps of Engineers is stockpiling material from river dredging below Span #8. There is a catwalk (for navigation light maintenance) running below the median of the truss spans - the catwalk is being accessed by graffiti "artists" at Pier #5. [2002] Conduit @ east coping.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck (spray nozzles installed in the deck and railings). A control room was constructed at the NW approach corner.

## Bridge Snooper Field Investigation

### Approach Spans:

Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

### South Abutment:

Strip seal deck joint above. [1998] Gland in (SBL) was patched using an experimental system, hot poured seal with wire mesh reinforcement, and fourteen sliding plate-bearing assemblies. [1995] The bearings are corroded and in full contraction (related to hinge failure in Span #2, and tipping of Pier #1). The seat area is cracked and discolored.

### Span #1 (Steel Multi-beam):

14 beams, 33" deep rolled beams with welded cover plates (square ends). [1996] East fascia beam has flaking rust. [1978] Three west bays have some full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Pier #1:**

10 fixed, and 4 sliding plate-bearing assemblies. Pier consists of 4 concrete columns and cap, with a RR crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #2 (Steel Multi-beam):**

14 beams, 33" rolled beams with welded cover plates the beams transition to 48" welded beams north of the hinge joint. [1996] Flaking rust on bottom flange at girder transitions. [1997] Conduit is loose below median. [1978] Some full depth deck repairs. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Hinge Joint (12 ft. South of Pier #2:**

Open finger joint above. [1994] The hinge assemblies are expanded beyond tolerance (the sliding plates extend 1-3/4" beyond the base plates). At Beam #10, the sliding plate has tipped (falling off the base plate) and is preventing the joint from opening. [1999] Hinge area re-painted. [2000] Beam-ends have moderate surface pitting; debris has begun to build up on hinge area. [2002] The sole plate & bearing surfaces have "moved" 4" off of the masonry plate allowing for an approximate 50% reduction in bearing capacity? This condition has existed since 1994. Additionally, the tops of the beam-ends are contacting at the top flange or at the web along this joint.

**Pier #2:**

Pier consists of four concrete columns, 14 sliding plate-bearing assemblies, and cap, with a RR crash strut between the columns. [1997/2000] Bearings have corrosion; east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #3 (Steel Multi-beam):**

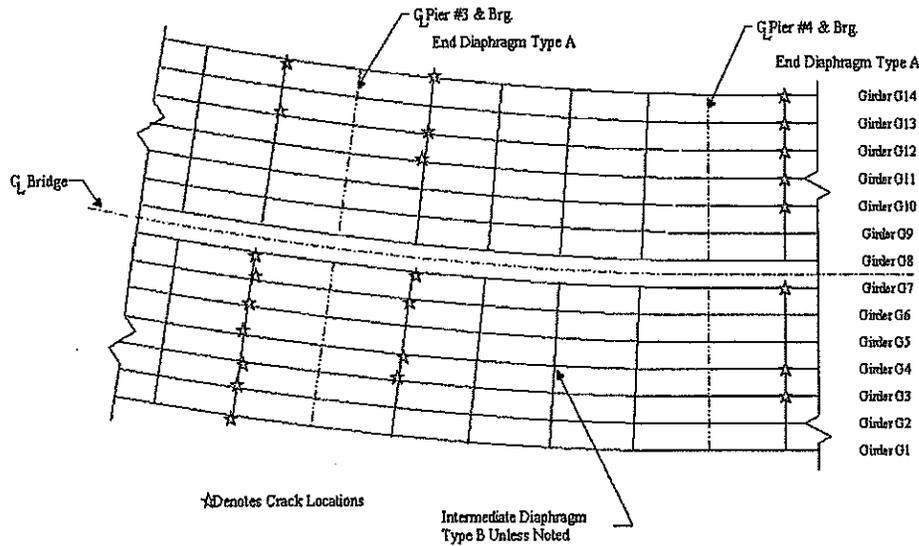
Over Bluff St. 14 beams (48" deep welded plate beams). [1978] Three west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete spalling off (some loose concrete) adjacent to median beams. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm Line North of Pier #2:**

[1999] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange.

**Diaphragm Line South of Pier #3:**

Refer to chart titled **Diaphragm Crack Locations South of Pier #3** for crack locations, crack description/repair description. [1999] Diaphragms lowered.



| Diaphragm Crack Locations South of Pier #3 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description  |
| G1 (East Fascia NB)                        | [1999/2000] 1/4" crack on top of interior stiffener weld   |
| G2 (NB)                                    | * [1998] Two 2" holes drilled in web   |
| G3 (NB)                                    | * [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds.   |
| G4 (NB)                                    | * [1998] Two 2" holes drilled in web.  |
| G5 (NB)                                    | * [1998] Two 2" holes drilled in web.  |
| G6 (NB)                                    | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web (will be drilled out in spring 2000)   |
| G7 (NB)                                    | * [1998] One 2" hole drilled in web (other end of crack was ground out).   |
| G8 (SB)                                    |  |
| G9 (SB)                                    |  |
| G10 (SB)                                   |  |
| G11 (SB)                                   |  |
| G12 (SB)                                   | * [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out).  |
| G13 (SB)                                   |  |
| G14 (West Fascia SB)                       | * [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack on at top of interior stiffener weld. |

\*Denotes locations where cracks were found in 1998.

**Pier #3:**

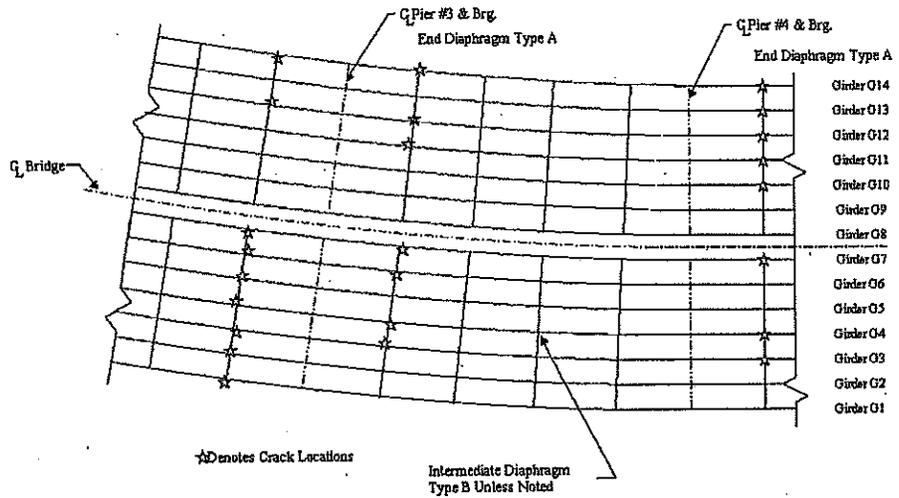
10 fixed plate, and four sliding plate-bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #4 (Steel Multi-beam):**

Over contract parking lot, 14 beams (48" deep welded plate beams). [1978] Full depth deck repairs (2<sup>nd</sup> & 3<sup>rd</sup> bays from the east). [1998] Underside of deck 200 LF of transverse leaching cracks, and 200 SF of spall (exposed rebar) below a transverse poured joint (full width of deck). [2000] 4<sup>th</sup> bay from west has 20 SF of severe leaching. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm Line North of Pier #3:**

Refer to chart titled **Diaphragm Crack Locations North of Pier #3** for crack locations, crack description/repair description. [1998/99] Diaphragms lowered (strain gauges placed on beams #2 & 6). \*Denotes locations where cracks were found in 1998.



| Diaphragm Crack Locations North of Pier #3 |   |
|--|---|
| Girder Location                            | Crack Description and or Repair Description   |
| G1 (E. Fascia NB)                          |   |
| G2 (NB)                                    |   |
| G3 (NB)                                    | * [1998/2000] 1/2" crack in top flange/web weld (West side), small crack in stiffener weld (East side). |
| G4 (NB)                                    | * [1998/2000] 1" crack in top flange/web weld (East Side)   |
| G5 (NB)                                    |   |
| G6 (NB)                                    | [1999/2000] Two 2" holes drilled in web.  |
| G7 (NB)                                    | Two 2" holes drilled in web.  |
| G8 (SB)                                    |   |
| G9 (SB)                                    |   |
| G10 (SB)                                   |   |
| G11 (SB)                                   | * [1988] Two 2" holes drilled in web  |
| G12 (SB)                                   | * [1988] Two 2" holes drilled in web.   |
| G13 (SB)                                   |   |
| G14 (W. Fascia SB)                         | * [1988] Two 2" holes drilled in web  |

\*Denotes locations where cracks were found in 1998.

**Diaphragm Line South of Pier #4:**

[1999] Diaphragms lowered, even though the connections have a "positive moment" configuration (stiffeners welded to the top flange).

**Pier #4:**

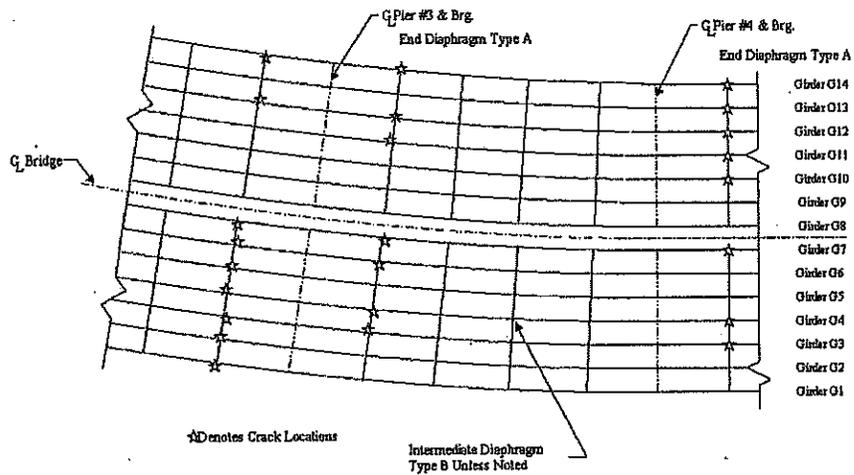
14 sliding plate expansion-bearing assemblies. [1997] Bearings have light rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #5 (Multi-beam/Deck Truss):**

Over contract parking lot, 14 beams (48" deep welded plate beams bolted onto the crossbeam). [1996] Four conduit clamps missing (NB fascia beam). Median girder has impact damage (parking lot below). [1978] Underside of deck has some full depth patches (2 west bays). [1997] Deck leaching near the finger joint. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm Line North of Pier #4:**

Refer to chart titled **Diaphragm Crack Locations North of Pier #4** for crack locations, crack description/repair description.



| Diaphragm Crack Locations North of Pier #4 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description                                      |
| G1 (E Fascia NB)                           |  |
| G2 (NB)                                    |  |
| G3 (NB)                                    | * [1988] Two 2" holes drilled in web.  |
| G4 (NB)                                    | * [1988] Two 2" holes drilled in web   |
| G5 (NB)                                    |  |
| G6 (NB)                                    |  |
| G7 (NB)                                    | * [1988] Two 2" holes drilled in web. [2001] Small crack @ top of stiffener weld |
| G8 (SB)                                    |  |
| G9 (SB)                                    |  |
| G10 (SB)                                   | * [1988] Two 2" holes drilled in web.  |
| G11 (SB)                                   | [1999/2000] Small cracks at top of stiffener weld.                               |
| G12 (SB)                                   | * [1988] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld       |
| G13 (SB)                                   | * [1999/2000] Small cracks at top of stiffener weld.                             |
| G14 (W Fascia SB)                          | [1999] Small crack at top of interior stiffener weld                             |

\*Denotes locations where cracks were found in 1998.

#### Main Truss Spans (Northbound, East Truss)

Stringers are numbered from the east (see framing plan).

#### Crossbeam:

[1986] The SE rocker froze, damaging the east end of the crossbeam (cracked web stiffeners). The bridge was jacked up (I-35W closed to traffic) - the SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and Beams #3 & 4. [1998/99] Crossbeam re-painted, the side facing the finger joint has section loss.

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Date   | Measurement |
| September, 1998                              | 16-5/8"     |
| April, 1999                                  | 17-13/16"   |
| April, 2000                                  | 18"         |
| September, 2001                              | 18-1/16"    |
|  |             |

#### Panel Point #0 (Beginning of East Truss):

Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] End floorbeam re-painted - there is section loss at the base of the stiffeners. [2002] Water saturation between stringers 2 thru 4 @ panel points 0 thru 1.

#### Panel Point #1 (East Truss, Pier #5):

##### Pier #5:

Two "rollernest" bearing assemblies. Climbing onto the pier strut at this location accesses the catwalk. Debris piled at pier strut base allow for unauthorized access. [2002] Bearings show signs of recent movement.

**Span #6 (Deck Truss):**

[1997] West River Parkway constructed below bridge. [1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):**

Floorbeam truss (near center) has an undercut weld in the flange.

**Panel Point #4 (East Truss Stringer Joint):**

Strip seal deck joint above. [1999] 1 ft. of gland pulled out @ centerline. [1996] The floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box along catwalk has cover missing. [2000] Concrete in joint at east end.

**Panel Point #5 (East Truss):**

[1997] Cracked tack weld between the floorbeam truss top chord and a stringer-bearing pedestal. [1999] Tack welds ground out @ Stringer #3 (photo), cracked tack welds remain @ Stringer #4 (photo).

**Panel Point #6 (East Truss):**

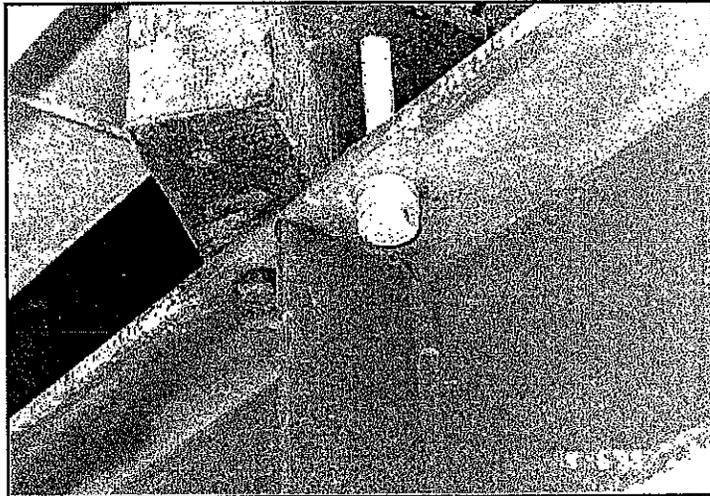
[1994] Floorbeam truss top chord (bottom flange) has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10 (near the bottom chord connection) has a 4" long gouge (possible crack) along a connection weld – should be ground out (photos).

**Panel Point #7 (East Truss):**

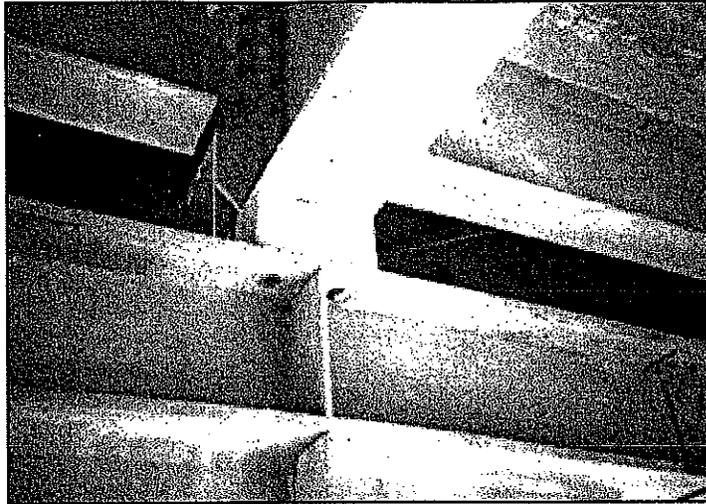
**Panel Point #8 (East Truss Pier #6 Stringer Joint):**

Strip seal and deck drain above. [2002] Joint is leaking, small hole. Stringer #4: bolt broken off at south floorbeam connection. There is corrosion and flaking rust on the vertical truss member. [1994] Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt - the bearing block has rotated. [2000] Missing bolt was replaced in 1999, but the bearing block was not returned to it's proper position – now bolt bolts are loose, needs repair (photos).

Stringer #2



Stringer #4



**Pier #6 (Downtown Side of Mississippi):**

Two "rollernest" bearing assemblies. [1997] Bearings have moderate corrosion and show no signs of movement (need to check!). Pier consists of two concrete columns with a pier wall at the base. [1997] The drainpipes are clogged (top & bottom @ median).

**Span #7 (Deck Truss):**

[1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

**Panel Point #9 (East Truss):**

**Panel Point #10 (East Truss):**

Navigation light. [1999] Strain gauges installed on truss top chord member U9/U10, L9/U10 & L9/L10 (U of M research project). [2000] Graffiti on top gusset plate.

**Panel Point #11 (East Truss):**

Section loss at gusset plate, bottom chord. [2000] Stringer #3 has a bolt missing at the floorbeam connection.

**Panel Point #12 (East Truss):**

[1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener.

**Panel Point #13 (East Truss):**

Deck drains (falls directly into river). [2002] Bottom chord gusset plates have section loss, flaking & pack rust. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners.

**Panel Point #14 (East Truss Midspan Stringer Joint):**

Strip seal joint above. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2002] Pack rust @ bottom chord & floorbeam connection.

**Panel Point #13' (East Truss):**

Floorbeam truss top chord has a ground out spot near Stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener.

**Panel Point #12' (East Truss):**

[1999] Deck (east bay) has 15 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

**Panel Point #9' (East Truss):**

Deck drains (falls directly into river). [2002] Bottom chord member L9'/L8' has flaking rust.

**Panel Point #8 (East Truss Pier #7 Stringer Joint):**

Red navigation light. Strip seal deck joint above. Floorbeam truss has severe rust below the median. [1993] North side: bolts replaced with "redi-rod" at Stringer #4, bolts replaced at Stringer #5.

**Pier #7 (East Bank of Mississippi):**

Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full-height leaching crack on the south face.

**Span #8 (Deck Truss):**

[1999] The floorbeam trusses and sway bracing located below the median and the Beams 6, 7, 8, & 9 are re-painted.

**Panel Point #7' (East Truss):**

**Panel Point #6' (East Truss):**

[1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose.

**Panel Point #5' (East Truss):**

[2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss Stinger Joint):**

Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along the interior edges. [2001] Both connection plates, the top chord, and floorbeam have flaking rust.

**Panel Point #3' (East Truss):**

Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):**

Overhead sign bridge mounted on exterior railings. [1999] Deck in Bay #3 has 100 SF of water saturation (photos).

**Pier #8:**

Two "rollernest" bearing assemblies, they have light rust. [2000] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them.

**Panel Point #1' (East Truss Pier #8):**

[2000] Graffiti on bottom of truss (above bearing).

**Panel Point #0' (End of East Truss):**

Open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] Floorbeam re-painted, side facing finger joint has section loss (holes in web stiffeners) - photos. [1998] North face (directly above east rocker bearing): two horizontal welds (between stiffener plates) have cracked through entirely (photos).

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" @ 40° F.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss (pitting at base of stiffeners). [1992] North face: a crack in the crossbeam web stiffener (above the rocker at the Beam #12 connection) was drilled out. [1997/98] North face: weld above east rocker bearing (between the horizontal & center vertical stiffener) has cracked through entirely (the weld end at the crossbeam web was partially drilled out). [1998] North face: cracks at both ends of the horizontal stiffener (above rocker bearing) were drilled out (two small holes drilled in crossbeam web at each location). [1998] Bracing installed between crossbeam (above east rocker) and Beams #3 & 5.

**Approach Spans:**

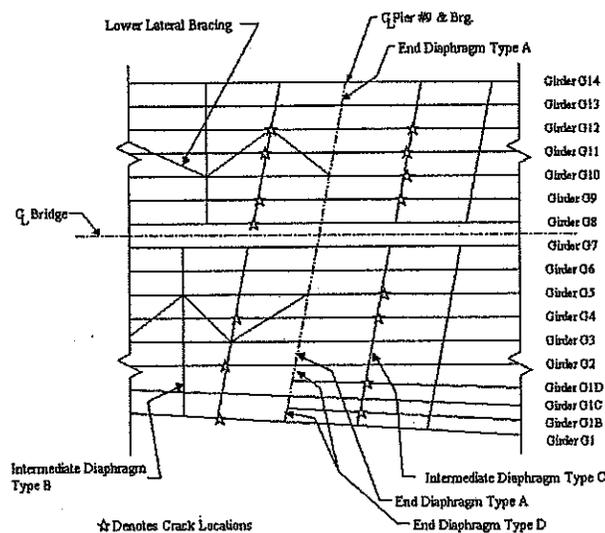
Northbound & southbound inspection notes are combined. Beams are numbered from the east (see framing plan).

**Span #9 (Multi-beam):**

The multi-beam spans resume (48" deep welded beams bolted onto the crossbeam) - NB has 8 beams, SB has 7 beams. There are two active railroad tracks below. [1999] Beams 6, 7, 8, & 9 are re-painted. Lateral bracing welded to web & stiffener. [2002] Underside of deck at the south end (NBL) has 150 SF of water saturation near the spray head. In the SBL 2<sup>nd</sup> & 3<sup>rd</sup> bays from west have large areas of salt and water saturation.

**Diaphragm Line South of Pier #9:**

Refer to chart titled **Diaphragm Crack Locations south of Pier #9** for crack locations, crack description/repair description. [1999] Diaphragms lowered.



### Diaphragm Crack Locations South of Pier #9

| Girder Location   | Crack Description and or Repair Description   |
|-------------------|---|
| G1 (E Fascia NB)  | [2000] Exterior top flange/web weld has a 1/2" indication.                            |
| GC (NB)           |   |
| G2 (NB)           | * [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| G3 (NB)           |   |
| G4 (NB)           | * [1998/2000] Small crack in top flange/web weld.                                     |
| G5 (NB)           |   |
| G6 (NB)           |   |
| G7 (NB)           |   |
| G8 (SB)           | * [1998] Small crack in top flange/web weld. [2000] No cracks found.                  |
| G9 (SB)           | * [1998] Crack in top of stiffener weld.  |
| G10 (SB)          |   |
| G11 (SB)          | * [1998/2000] Small crack in top of stiffener weld (East side).                       |
| G12 (SB).         | * [1998/2000] Small crack in top of stiffener weld (East side).                       |
| G13 (SB):         |   |
| G14 (W Fascia SB) |   |

\*Denotes locations where cracks were found in 1998

#### Pier #9:

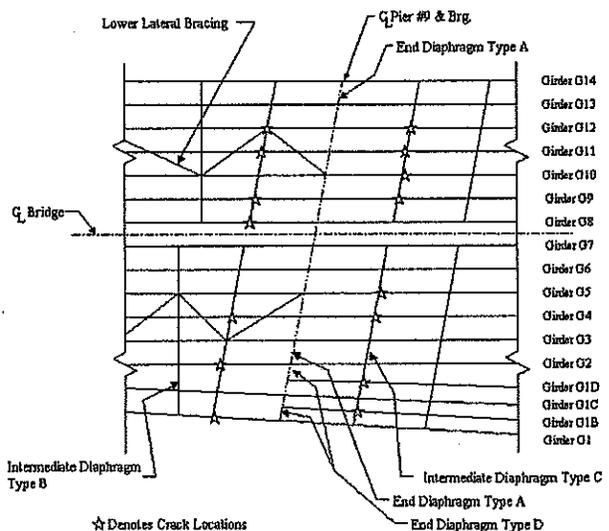
13 fixed, and four sliding plate bearing assemblies. Pier consists of four columns and cap, with a RR crash strut between the columns. [1969] East column damaged by train derailment - the column has minor scrapes and spalls (downspout had to be reconnected). [1999] Bearings 6, 7, 8, & 9 are re-painted.

#### Span #10 (Steel Multi-beam):

Northbound has 10 beams; southbound has 7 beams (the welded beams transition from 48" to 33" depth just north of pier) with active railroad tracks below (one track splits into two). [1999] Beams 6, 7, 8, & 9 are re-painted.

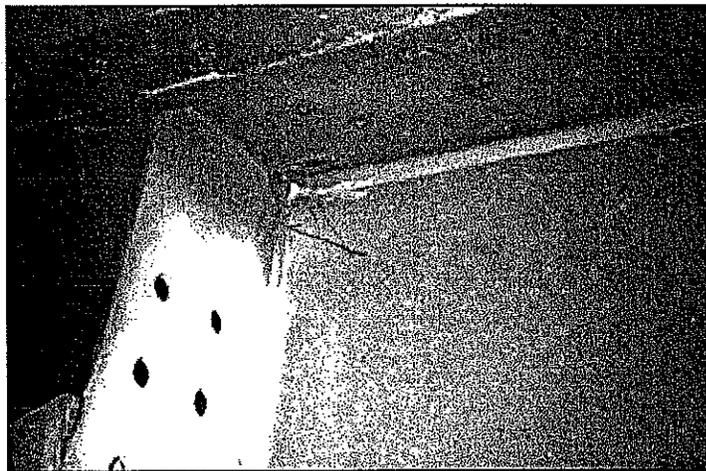
#### Diaphragm Line North of Pier #9:

Refer to chart titled **Diaphragm Crack Locations North of Pier #9** for crack locations, crack description/repair description. [1999] Diaphragms lowered.



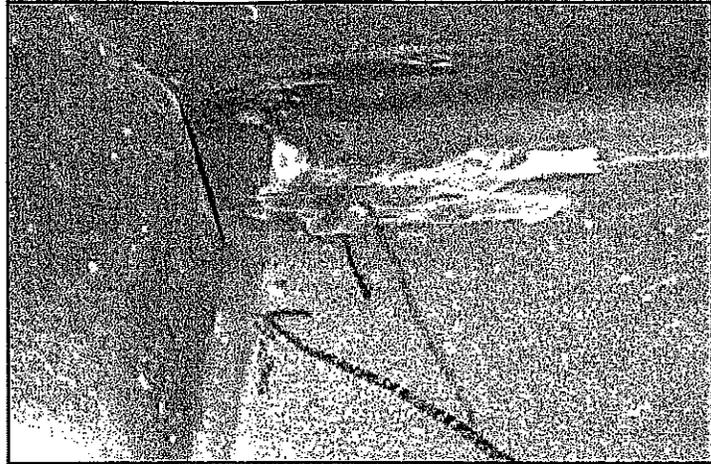
| Diaphragm Crack Locations North of Pier #9 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description  |
| G1 (East Fascia NB)                        |  |
| G1B (NB)                                   | Stiffeners are welded to the top flange (positive moment).                           |
| GC (NB)                                    |  |
| G1D (NB)                                   | Stiffeners are welded to the top flange (positive moment)                            |
| G2 (NB)                                    |  |
| G3 (NB)                                    |  |
| G4 (NB)                                    | * [2000] Two 2" holes drilled in web.  |
| G5 (NB)                                    | * [2000] Two 2" holes drilled in web.  |
| G6 (NB)                                    |  |
| G7 (NB)                                    |  |
| G8 (SB)                                    |  |
| G9 (SB)                                    | * [1998/2000] Cracks in top flange/web weld & top of stiffener weld (west side).     |
| G10 (SB)                                   | * [2000] Crack in top flange/ web weld (east side) This crack has grown; see photos. |
| G11 (SB)                                   | * [2000] Two 2" holes drilled in web.  |
| G12 (SB)                                   | * [2000] Two 2" holes drilled in web.  |
| G13 (SB)                                   |  |
| G14 (West Fascia SB)                       |  |

\*Denotes locations where cracks were found in 1998



Girder #10 Photo 1

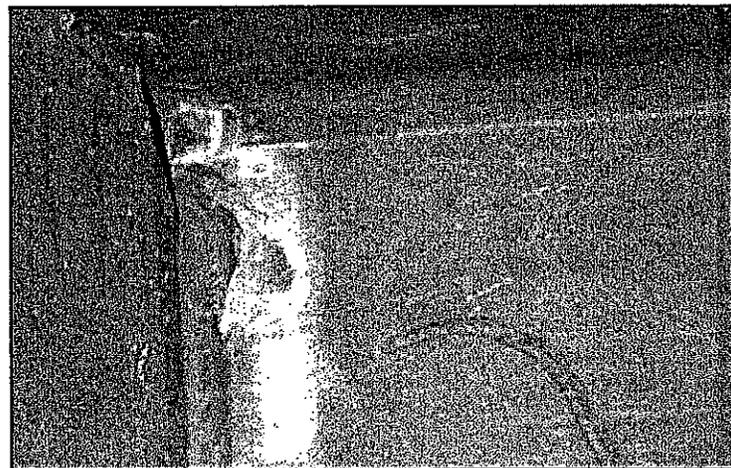
Girder #10 Photo 2



Girder #10 Photo 3



Girder #10 Photo 4



**Diaphragm Line South of Pier #10:**

[1999] Diaphragms were inverted & lowered (even though the beam connections have a "positive moment" configuration (welded to top flange). [2000] Beam #6 appears to be "working" at the top connection.

**Pier #10:**

Pier has 5 columns & cap with a RR crash strut between the columns and 18 sliding plate expansion bearings. [1999] Bearings 6, 7, 8, & 9 are re-painted.

**Span #11 (Steel Multi-beam):**

Northbound has 11 beams; southbound has 7 beams, and the parking lot below. [1999] Beams 6, 7, 8, & 9 are re-painted.

**Diaphragm Line North of Pier #10:**

[1999] Diaphragms were inverted & lowered (even though the beam connections have a "positive moment" configuration (welded to top flange).

**Pier #11:**

Beginning of the NB off ramp to University Ave. (Br. #9340A). Strip seal deck joint above. The slab span consists of 18 sliding plate bearings for the steel beams and 15 sliding plate bearings. The pier consists of seven columns and a cap. [1995/2000] Gland is leaking in several locations (NB & SB). [1998] Extensive shot-crete repairs on cap. [2000] West column has 1 SF spall. [1999] Sliding plate bearings for the steel beams are re-painted.

**Span #12 (Concrete Voided Slab Span):**

Parking lot below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #13 (Concrete Voided Slab Span):**

2nd St. passes below. [1998] Shot-crete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck - no bearings).

**Span #14 (Concrete Slab Span):**

[1998] Shot-crete repairs along median and exterior copings.

**North Abutment:**

Strip seal deck joint above with 14 sliding plate-bearing assemblies. [2000] NB joint leaking at both ends (bearings rusty).

**Main Truss Spans (Southbound West Truss)**

Stringers are numbered from the east (from original plans).

**Crossbeam:**

[1998/99] Crossbeam re-painted (side facing finger joint has section loss). [1999] The bolted connection between Beam #12 and the crossbeam was re-tensioned (the connection had been "working").

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) measured at 3-9/16" (45° F).

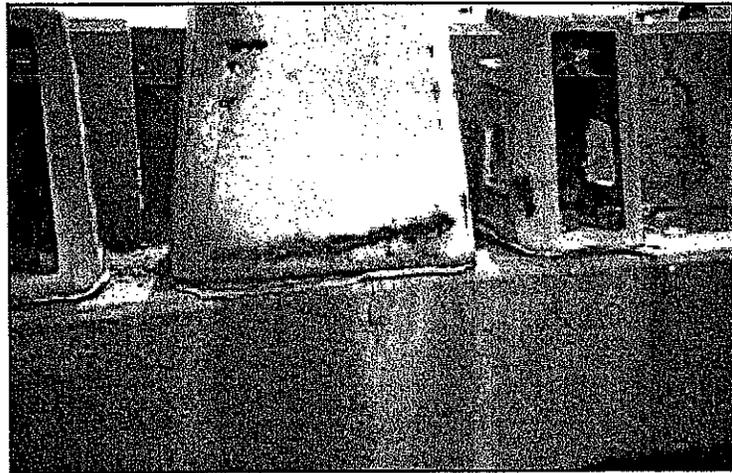
\*\* [2001] Gap between crossbeam & floorbeam (at rocker bearing) measured at 3-1/2" (45° F).

**Panel Point #0' (End Floorbeam Beginning West of Truss):**

Open finger deck above. [2002] High spots of fingers torched off right land & shoulder. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1998/99] Floorbeam re-painted (side facing finger joint has section loss on stiffeners). [1996] The floorbeam/truss connection has severe corrosion (surface pitting on plates & bolts). [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam (photo).

**Panel Point #1' (West Truss Pier #8):**

Light pole base rusted through @ two faces. Pole feed point number (W5L8?).



**Pier #8:**

See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):**

[2002] Underside of the deck has 150 SF of water saturation and numerous full depth repairs.

**Panel Point #2' (West Truss):**

Overhead sign bridge mounted on exterior railings. [2002] Stringer bolts are "working" at stringer 11.

**Panel Point #3' (West Truss):**

The floorbeam truss (top flange of upper chord) has an ugly weld below the connection to Stringer #11.

**Panel Point #4' (West Truss Stringer Joint):**

Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges.

**Panel Point #5' (West Truss):**

[2002] Sprayer fitting corroded?

**Panel Point #6' (West Truss):**

[1996/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection. [1997] Stringer #10, the two south bolts are loose at the floorbeam connection. [1999] Stringer #9, one south bolt is loose at the floorbeam connection. [2002] All bolts at stringers # 9 & #10 appear to be tight.

**Panel Point #7' (West Truss):**

[1997] Top chord/floorbeam truss connection has a cracked tack weld on the interior. [1999] Wind bracing gusset plate at Stringer #14 has loose bolts. [2002] Stringer #14 was installed crooked.

**Panel Point #8' (West Truss Pier #7 Stringer Joint):**

Strip seal deck joint above. [1998] Stringer #11: bolt replaced at floorbeam truss connection. Below Stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent (from original construction). [2001] Heavy flaking rust at the truss bottom chord/sway frame connection.

**Pier #7:**

See NB notes. [2002] Column with vertical leaching.

**Span #7 (Deck Truss):**

**Panel Point #9' (West Truss):**

[2001] Heavy flaking rust at the truss bottom chord/sway frame connection. [2002] Corrosion on L8'/L9'

**Panel Point #10' (West Truss):**

[1994] Stringer #13: Loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior (15 ft. south of U10'). [2002] Heavy flaking rust at the truss bottom chord/sway frame connection and there is corrosion on L8'/L9'

**Panel Point #11' (West Truss):**

Nick in the truss bottom chord L11' /L12'

**Panel Point #12' (West Truss):**

Truss diagonal member U12' /L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss Midspan Stringer Joint):**

Strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has flaking rust near the joint (gland pulled out above). Tack welds along the sway frame/truss, bottom chord, and gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener.

**Panel Point #13 (West Truss):**

[1999] Pack rust at the truss bottom chord/sway frame connection (plates are spread 3/4" - photo). [1996/99] Bottom chord member L13 /L14 has cracked tack welds at two internal stiffeners.

**Panel Point #12 (West Truss):**

[1996] Bottom chord member L12 /L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):**

[1998] Stringer #11: 3 bolts replaced at the floorbeam truss connection, the SE bolt is too short (inadequate threads) – the stringer has lifted 3/32" off the bearing block (south side).

**Panel Point #10 (West Truss):**

Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):**

Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss Pier #6 Stringer Joint):**

Strip seal above - [1996] 8 ft of the gland is pulled out (right gutterline). Deck drains & horizontal troughs. [1996] Drain clogged at median. [1999] Standing water in east grate.

**Pier #6:**

See NB notes.

**Span #6:**

**Panel Point #7 (West Truss):**

[2002] 20 SF of water saturation @ stringer 12 thru 14.

**Panel Point #6 (West Truss):**

Signpost mounted on railing, overhead sign above. Floorbeam truss top chord (U5/ U4) has gouges in the bottom flange at the end of the connection plate; the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice (from construction).

**Panel Point #5 (West Truss):**

Truss top chord member U5/U6 has backer bars along the interior corners.

**Panel Point #4 (West Truss):**

Strip seal deck joint. Truss top chord member U4/U5 has backer bars along the interior corners. [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire.

**Panel Point #3 (West Truss):**

Truss diagonal member L3/U4 has backer bars along the interior corners. Truss bottom chord L2/L3 has a nick.

**Panel Point #2 (West Truss):**

[1996] Floorbeam truss member L2/U3 has a welding flaw (no crack, MT 1997).

**Pier #5:**

See NB notes.

**Panel Point #2 (West Truss Pier #5):**

[1994] Diagonal brace (floorbeam to stringer) has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout (originally drained into storm sewer).

**Panel Point #2 (End Floorbeam End of West Truss):**

Open finger deck joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris (need flushing). [1997] The floorbeam horizontal stiffener is bent down directly above the rocker bearing (photo). [1998/99] Floorbeam re-painted - side facing finger joint has section loss (pitting).

\*[2000] Gap between crossbeam & floorbeam (west end) measured at 16-1/2" (50° Degrees F).

**Crossbeam:**

[1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker (partially ground out). [1998/99] Crossbeam re-painted, the side facing finger joint has section loss (pitting, with holes in the base of stiffeners).

**Span #5(Deck Truss Multi-beam):**

The multi-beam spans resume at Panel Point #0.

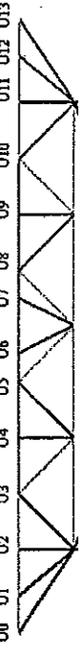
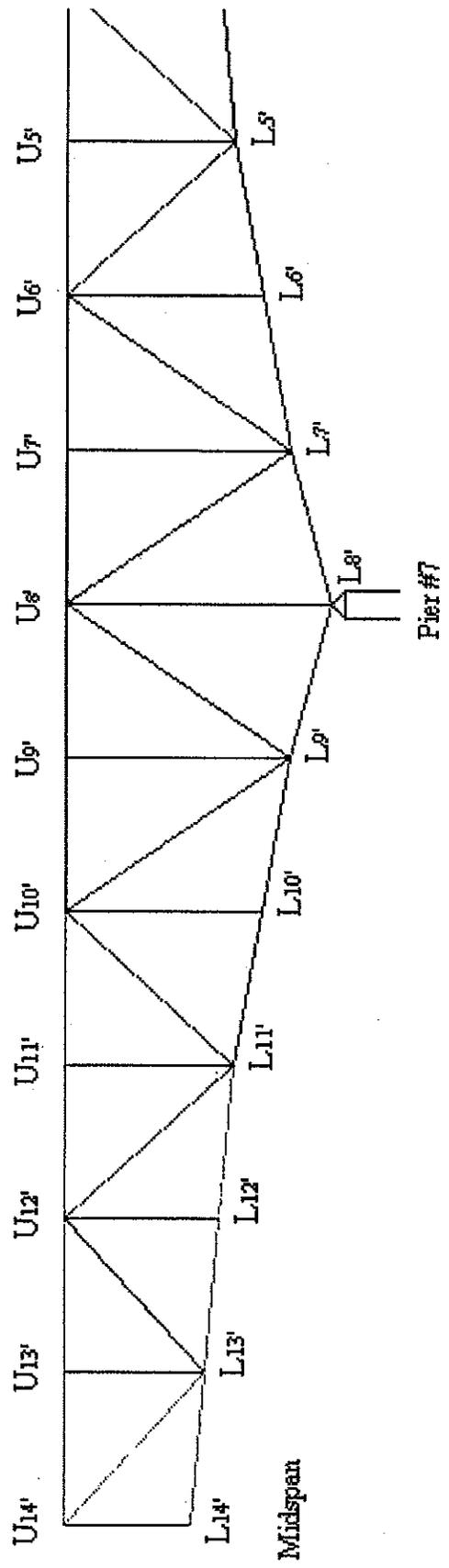
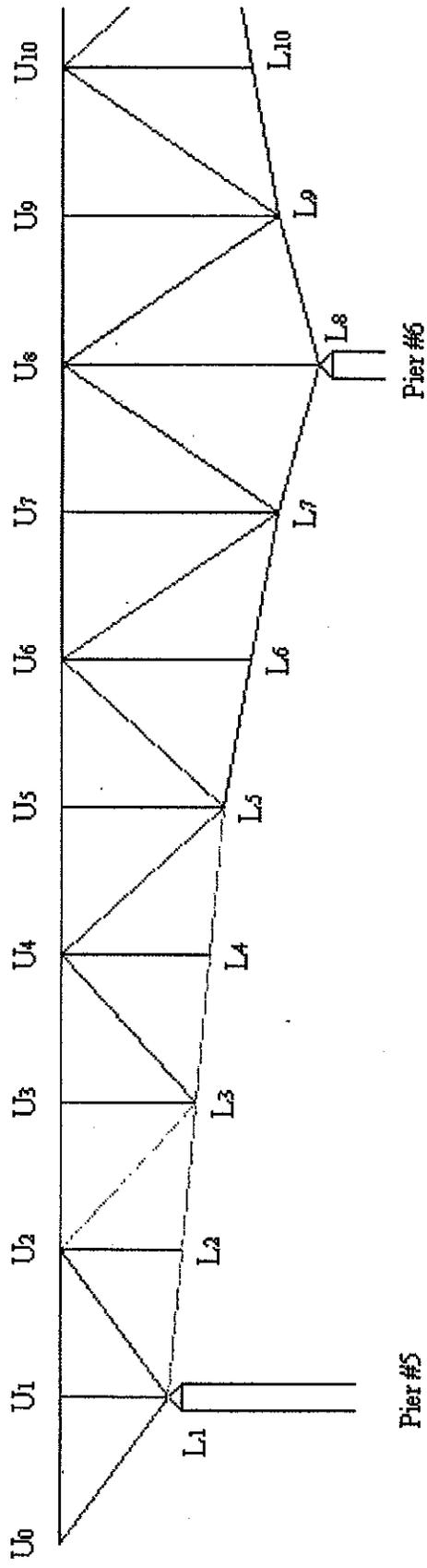
See NB Notes for South Approach Spans

**Previous Snooper Inspections**

- 2001** Mark Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer
- 2000** Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer, Wayne Tennison, Pete Wilson, George Morelli, Rebecca Lane
- 1999** Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadeegg, Pete Wilson
- 1998** Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson
- 1997\*** Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson
- 1996** Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994** Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993** Terry Moravec, Chas Martin, Tom Waks
- 1991** Chester Martin, Chas Martin, Jerry Anderson
- 1988** Chester Martin

\*Denotes an "In-Depth" Inspection

# Truss Diagram





Crew Number: 7627

Inspector: METRO

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 06-13-2003**

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft 6 %  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 15 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate: 50.0  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

**STRUCTURE UNIT: 0**

| ELEM<br>NBR | ELEMENT NAME  | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|---|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|
| 22          | LS O/L (CONC DECK)  | 2   | 06-13-2003 | 201,853 SF | 0           | 0           | 201,853     | 0           | 0           |
|             |   |     | 05-17-2002 | 1 SF       | 0           | 0           | 1           | 0           | 0           |
|             | Notes: 3 lanes + on/off ramp each direction (2 FT shoulders). [1978] Low slump overlay (extensive full depth repairs). [1993] Spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.   |     |            |            |             |             |             |             |             |
| 48          | LS O/L (CONC SLAB)  | 2   | 06-13-2003 | 17,233 SF  | 0           | 17,233      | 0           | 0           | 0           |
|             |   |     | 05-17-2002 | 1 SF       | 0           | 1           | 0           | 0           | 0           |
|             | Notes: Spans 12 - 14 have a 2 ft. deep CIP concrete voided slab (continuous).   |     |            |            |             |             |             |             |             |
| 300         | STRIP SEAL JOINT  | 2   | 06-13-2003 | 946 LF     | 852         | 0           | 94          | N/A         | N/A         |
|             |   |     | 05-17-2002 | 946 LF     | 906         | 0           | 40          | N/A         | N/A         |
|             | Notes: [1978] Type H strip seal at abutments, pier 11, and stringer expansion joints (7 total). [1998] Strip gland replaced at pier 11, north abutment. South abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.  |     |            |            |             |             |             |             |             |
| 301         | POURED DECK JOINT   | 2   | 06-13-2003 | 1,017 LF   | 1,000       | 0           | 17          | N/A         | N/A         |
|             |   |     | 05-17-2002 | 1,017 LF   | 1,017       | 0           | 0           | N/A         | N/A         |
|             | Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).   |     |            |            |             |             |             |             |             |
| 303         | ASSEMBLY DECK JOINT   | 2   | 06-13-2003 | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |
|             |   |     | 05-17-2002 | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |
|             | Notes: Open finger joints at truss ends and span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.   |     |            |            |             |             |             |             |             |
| 321         | CONC APPROACH SLAB  | 2   | 06-13-2003 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |
|             |   |     | 05-17-2002 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |
|             | Notes: [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).   |     |            |            |             |             |             |             |             |
| 331         | CONCRETE RAILING  | 2   | 06-13-2003 | 7,831 LF   | 7,831       | 0           | 0           | 0           | N/A         |
|             |   |     | 05-17-2002 | 7,628 LF   | 7,628       | 0           | 0           | 0           | N/A         |
|             | Notes: [1998] 4018 LF Railings re-constructed. 3813 LF Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally code 12) were retrofit (32" high concrete face added, horizontal steel railings removed).   |     |            |            |             |             |             |             |             |
| 107         | PAINTED STEEL GIRDER  | 2   | 06-13-2003 | 10,596 LF  | 0           | 9,000       | 1,400       | 110         | 86          |
|             |   |     | 05-17-2002 | 10,596 LF  | 0           | 9,086       | 1,400       | 110         | 0           |
|             | Notes: [1968] Bridge painted with lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have section loss: flaking & surface rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Beam ends at hinge have section loss, moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound. |     |            |            |             |             |             |             |             |

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 06-13-2003

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 |
|--|----------------------|-----|------------|-----------|----------|----------|----------|----------|----------|
| 113  | PAINT STEEL STRINGER | 2   | 06-13-2003 | 14,896 LF | 0        | 14,700   | 0        | 150      | 46       |
|  |                      |     | 05-17-2002 | 14,896 LF | 0        | 14,746   | 0        | 150      | 0        |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have section loss, flaking & surface rust corrosion at expansion joints. [1999] Median stringers re-painted. [91/2000] Stringer/floorbeam connections are "working". Several bolts are loose or missing.  |                      |     |            |           |          |          |          |          |          |
| 131  | PAINT STL DECK TRUSS | 1   | 06-13-2003 | 2,127 LF  | 0        | 0        | 1,880    | 215      | 32       |
|  |                      |     | 05-17-2002 | 2,127 LF  | 0        | 0        | 1,912    | 215      | 0        |
| Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have section loss, flaking & surface rust, severe pigeon debris, at the floorbeam & sway frame brace connections ( with pack rust & surface pitting). [1999] Pigeons screens placed on truss member openings.   |                      |     |            |           |          |          |          |          |          |
| 152  | PAINT STL FLOORBEAM  | 2   | 06-13-2003 | 3,348 LF  | 0        | 2,000    | 725      | 600      | 23       |
|  |                      |     | 05-17-2002 | 3,348 LF  | 0        | 2,623    | 725      | 0        | 0        |
| Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). Floorbeam trusses have numerous poor weld details, section loss, flaking & surface rust, some have holes, (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. |                      |     |            |           |          |          |          |          |          |
| 373  | STEEL HINGE          | 2   | 06-13-2003 | 18 EA     | 0        | 4        | 0        | 0        | 14       |
|  |                      |     | 05-17-2002 | 18 EA     | 0        | 4        | 0        | 0        | 14       |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. Section loss at hinges, (open finger joint) steel has flaking & surface rust. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.  |                      |     |            |           |          |          |          |          |          |
| 380  | SECONDARY ELEMENTS   | 2   | 06-13-2003 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
|  |                      |     | 05-17-2002 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.   |                      |     |            |           |          |          |          |          |          |
| 311  | EXPANSION BEARING    | 2   | 06-13-2003 | 125 EA    | 75       | 44       | 6        | N/A      | N/A      |
|  |                      |     | 05-17-2002 | 125 EA    | 81       | 44       | 0        | N/A      | N/A      |
| Notes: [94/2000] Some abutment bearings are rusty (joints leaking). [1996] South abutment bearings are in full contraction. [1994] Main truss roller bearings have section loss: flaking & surface rust, moderate corrosion.   |                      |     |            |           |          |          |          |          |          |
| 313  | FIXED BEARING        | 2   | 06-13-2003 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
|  |                      |     | 05-17-2002 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 205  | CONCRETE COLUMN      | 2   | 06-13-2003 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
|  |                      |     | 05-17-2002 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
| Notes: [1969] Pier 9: east column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in span 2 (south abutment bearings are in full contraction).  |                      |     |            |           |          |          |          |          |          |
| 210  | CONCRETE PIER WALL   | 2   | 06-13-2003 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
|  |                      |     | 05-17-2002 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 215  | CONCRETE ABUTMENT    | 2   | 06-13-2003 | 255 LF    | 230      | 25       | 0        | 0        | N/A      |
|  |                      |     | 05-17-2002 | 255 LF    | 255      | 0        | 0        | 0        | N/A      |
| Notes: [1991] Both abutments have minor cracking & staining.   |                      |     |            |           |          |          |          |          |          |
| 234  | CONCRETE CAP         | 2   | 06-13-2003 | 819 LF    | 669      | 150      | 0        | 0        | N/A      |
|  |                      |     | 05-17-2002 | 819 LF    | 669      | 150      | 0        | 0        | N/A      |

## Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340**

**1 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-13-2003**

| 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 |
| Notes: [1998] Pier 11: cap has extensive "gunnite" repairs.  |                     |     |            |          |          |          |          |          |          |
| 356  | FATIGUE CRACKING    | 2   | 06-13-2003 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
| Notes: [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. |                     |     |            |          |          |          |          |          |          |
| 357  | PACK RUST           | 2   | 06-13-2003 | 1 EA     | 0        | 0        | 1        | 0        | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 1        | 0        | 0        | N/A      |
| Notes: [1995] Truss members have flaking & surface rust corrosion at the floorbeam & sway brace connections (with pack rust & some section loss, surface pitting).   |                     |     |            |          |          |          |          |          |          |
| 358  | CONC DECK CRACKING  | 2   | 06-13-2003 | 1 EA     | 0        | 1        | 0        | 0        | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 1        | 0        | 0        | N/A      |
| Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.   |                     |     |            |          |          |          |          |          |          |
| 359  | CONC DECK UNDERSIDE | 2   | 06-13-2003 | 1 EA     | 0        | 0        | 1        | 0        | 0        |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 0        | 1        | 0        | 0        |
| Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).   |                     |     |            |          |          |          |          |          |          |
| 360  | SETTLEMENT          | 2   | 06-13-2003 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
| Notes:   |                     |     |            |          |          |          |          |          |          |
| 363  | SECTION LOSS        | 2   | 06-13-2003 | 1 EA     | 0        | 1        | 0        | 0        | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 1        | 0        | 0        | N/A      |
| Notes: Section loss: pitting, flaking & surface rust on steel.   |                     |     |            |          |          |          |          |          |          |
| 964  | CRITICAL FINDING    | 2   | 06-13-2003 | 1 EA     | 1        | 0        | N/A      | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 1        | 0        | N/A      | N/A      | N/A      |
| Notes:   |                     |     |            |          |          |          |          |          |          |
| 981  | SIGNING             | 2   | 06-13-2003 | 1 EA     | 1        | 0        | 0        | 0        | 0        |
|  |                     |     | 05-17-2002 | 1 EA     | 1        | 0        | 0        | 0        | 0        |
| Notes: OH sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.  |                     |     |            |          |          |          |          |          |          |
| 982  | GUARDRAIL           | 2   | 06-13-2003 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
| Notes: [1998] Approach guardrail repaired (impact attenuator at NB off ramp).  |                     |     |            |          |          |          |          |          |          |
| 984  | DRAINAGE            | 2   | 06-13-2003 | 1 EA     | 0        | 0        | 1        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 0        | 1        | N/A      | N/A      |
| Notes: Pier 6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.   |                     |     |            |          |          |          |          |          |          |
| 985  | SLOPES              | 2   | 06-13-2003 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 1        | 0        | 0        | N/A      | N/A      |
| Notes: [1994] North abutment slope paving has 20 LF of horizontal cracks.  |                     |     |            |          |          |          |          |          |          |
| 986  | CURB & SIDEWALK     | 2   | 06-13-2003 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |
|  |                     |     | 05-17-2002 | 1 EA     | 0        | 1        | 0        | N/A      | N/A      |

## Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-13-2003**

**STRUCTURE UNIT: 0**

| ELEM<br>NBR | ELEMENT NAME | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
|-------------|--------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|

Notes: [1993] Curb below exterior railings have spalling & delamination.

|     |               |   |            |      |   |   |   |     |     |
|-----|---------------|---|------------|------|---|---|---|-----|-----|
| 988 | MISCELLANEOUS | 2 | 06-13-2003 | 1 EA | 0 | 1 | 0 | N/A | N/A |
|     |               |   | 05-17-2002 | 1 EA | 0 | 1 | 0 | N/A | N/A |

Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner).

General Notes: \*Bridge #9340, Year 2003  
 Bridge constructed in 1967.

See "Fracture Critical" report for additional information.

Inspectors: K Fuhrman, V Desens.

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Inspector's Signature

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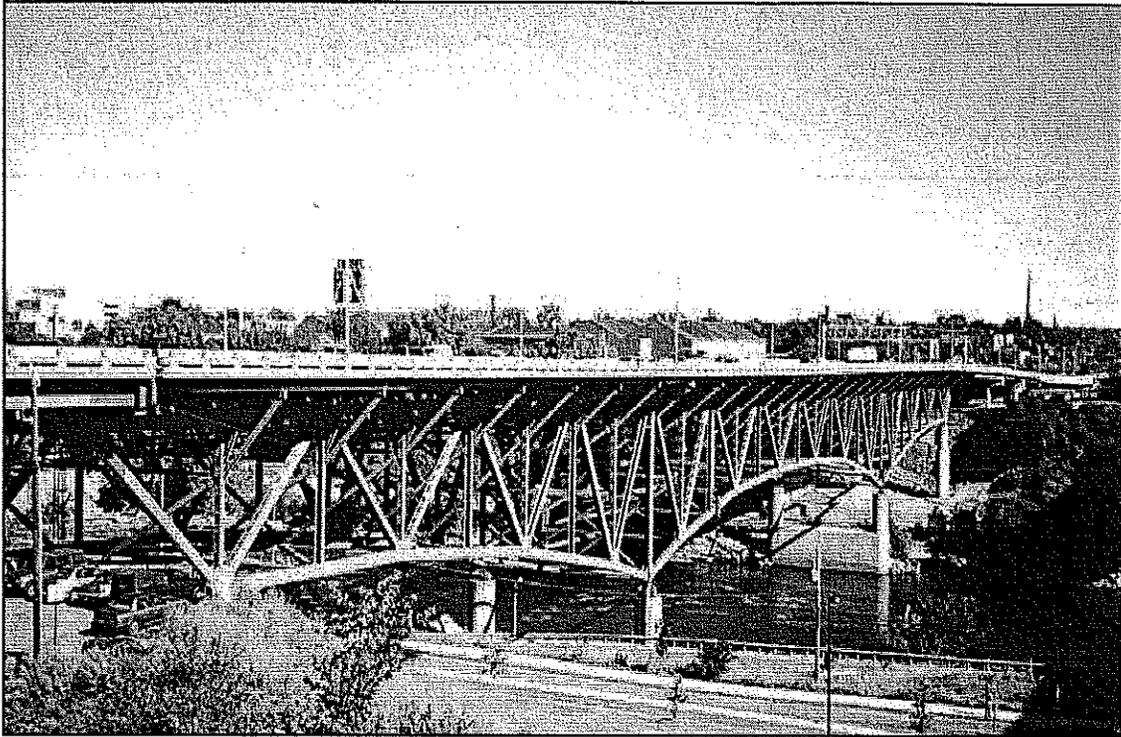
Reviewer's Signature / Date



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# **FRACTURE CRITICAL BRIDGE INSPECTION**

**In-Depth Report**



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**BRIDGE # 9340 (SQUIRT BRIDGE)**

**I-35W over the Mississippi River at Minneapolis, MN**

**JUNE 2003**

**Prepared For**

**Minnesota Department of Transportation  
Office of Bridges & Structures**

**Prepared By**

**Minnesota Department of Transportation Metro District  
Maintenance Operations, Bridge Inspection**



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|  |    |
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## EXECUTIVE SUMMARY

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The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of the main truss spans and the in-depth inspection of the approach spans of Bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with acceleration/deceleration lanes and 2 ft. shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. Spans #6 - 8, the main river spans, are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 988 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams. Connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck with spray nozzles installed in the deck and railings. The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

During the 1998 inspection numerous fatigue cracks were found in Spans #3 - 5 and #9 & 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location, the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot, used mainly by U of M students, and the Minnesota Commercial Railroad: (651) 646-2010.

The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss & fatigue cracks.

The hinge joint in span #2 is locked in full expansion, several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2, has two loose bolts and the bearing block has rotated. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3. This will likely require jacking the superstructure.

Several strip seal joints are leaking with glands ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the south abutment, in SBL. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs and consider using it at other locations.

The rubber "skirts", installed in 1999, above the truss end rockers tend to fill with debris. This should be flushed out annually. The horizontal drain troughs at pier #6 are clogged because of an inadequate slope.

## BRIDGE INSPECTION RECOMMENDATIONS

This recommendation listing refers to specific areas where fatigue cracks and other deficiencies were located during the 2003 inspection. Bridge inspection lists these deficiencies in the highest priority first.

### Long Term Repair Recommendations

- 1) The long term plans for this river crossing need to be defined with replacement, re-decking, etc. Due to the "Fracture Critical" configuration of the main river spans and the problematic "crossbeam" details, and fatigue cracking in the approach spans, eventual replacement of the entire structure would be preferable.
- 2) If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- 3) Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract. The expansion joints should also be replaced.

### Immediate Maintenance Recommendations

- 1) Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2 has 2 loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3.
- 2) Several strip seal joints are leaking. The glands have ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the, SBL, south abutment. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.
- 3) The rubber "skirts" sections above the truss end rockers, installed in 1999, tend to fill with debris. These should be flushed out annually. The horizontal drain troughs at pier #6 have inadequate slope, and are clogged.

### Areas of Concern for Future Inspections

- 1) During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the

top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. [2003] Span 3, stringer #7 NB, has a 1 1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end. The area below includes a contract parking lot, used mainly by U of M students, and the Minnesota Commercial Railroad: (651) 646-2010.

- 2) The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss, had flaking rust & fatigue cracks (open finger joint).
- 3) The hinge joint in span #2 is locked in full expansion several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## BRIDGE DESCRIPTION

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction & also acceleration/deceleration lanes. The shoulders are only 2 ft. wide. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end.

Spans #6 - 8, are "Fracture Critical" steel deck trusses, comprised of "built-up" welded members. Steel deck truss spans are 988 ft long. Span #7 is 456 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration, (open finger joint). The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams. The connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings. Control room is located at the northwest approach corner.

## BRIDGE DECK: NBI CONDITION CODE 5

The split deck has 3 through lanes each direction, with acceleration/deceleration lanes. Shoulders are only 2 ft. wide. A low slump concrete overlay, with numerous full-depth deck repairs, was placed on the deck in 1978. In 1998, the median copings were replaced with steel stay-in-place forms, and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks, sealed in 1998. The overlay has several patched areas, and some spalls. Additional patching is typically required each year. A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. [2001] The overlay has 15,250 SF of concrete repair patches.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling, particularly in the south approach spans. In 1998, the median coping overhangs were replaced with steel stay-in-place forms, and the exterior copings were repaired with shotcrete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers

& beams has spalled off with exposed rebar; and in some locations, the spalling extends into the underside of the deck. [2001] The structural slab has 1,200 SF full depth repair patches.

**Open Finger Expansion Joints:** The deck has 3 open finger joints, above the hinge joint in span #2, & at each end of the truss spans. In 1999, rubber "skirts" were installed below the truss end finger joints & the drain troughs were removed.

**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, pier #11, and at five stringer joints in the main truss spans. These were installed in 1978. The strip seal glands have pulled out, with joints leaking, in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the south abutment, SBL, gland was patched using an experimental system. Hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints, from staged deck construction. All of these joints are leaching below; & at some joints the deck is spalling below.

**Exterior Railings:** The original exterior code #12 railings were retrofit in 1998. A 32" high concrete face was installed in front of the existing concrete rail base. The horizontal steel rails were removed. The curb along the railing has moderate cracking, delamination and spalling. The curb has 800 LF reconstructed in 2001.

**Median Railings:** Code #22, type "J"-rail, was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

## **BRIDGE SUPERSTRUCTURE: NBI CONDITION CODE 4**

**Paint System:** Bridge was originally painted with a lead base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have surface rust corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & surface rust corrosion in scattered locations. The floorbeam trusses & stringer ends have surface rust corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 have severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floor beams & "crossbeams", located below the open finger joints.

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members; connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floor beam connections. The box beam truss members have welded interior stiffeners. Some of these have tack-welded tabs. Many of these tack welds have

cracked. Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have surface rust corrosion at the floor beam and sway frame connections. Pack rust is forming between the connection plates. There is paint failure, surface rust, and section loss, flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access. This unfortunately prevents inspection of the interiors.

**Floor Beam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams with welded connections. The floorbeam trusses cantilever beyond the main truss on both sides. They are connected to the main truss, vertical members with bolts & rivets. The floorbeam truss members have numerous poor welding details, including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically, up to 1/2" – from original construction. The splice plates are bent. The floorbeam trusses below stringer joints have section loss, severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floor beam sections below the median were re-painted. Some areas have section loss with holes.

**Stringers:** There are 14 steel stringers, 27" deep rolled beams, bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have surface rust corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss with holes. Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have section loss, flaking & surface rust; moderate corrosion, the bearings at piers #5 & 8 are functioning properly. They are checked during each annual inspection. The bearings at pier #6 show no obvious signs of movement, difficult to reach with snooper.

**End Floor Beams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members, severe section loss on steel. This area was re-painted in 1998 - 1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floor Beams:** The two end floor beams are welded plate girders. They connect the main truss ends. The end floor beams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss with surface pitting at the base of the web, and holes in the base of the vertical stiffeners. In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss with holes at the base of stiffeners. The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning. They show obvious signs of movement.

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam with two cracked vertical web stiffeners. The rocker-bearing pin was replaced. This required closing I - 35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. Installing braces between the crossbeam and beams #2 & 3 also reinforced the connection.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing, which was drilled out. In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and installing bracing between the crossbeam and 2 stringers reinforced the northeast connection.

**Steel Multi-Beam Approach Spans (spans #1 - 5 & #9 - 11):** The approach spans have welded beams - the depth transitions from 48" to 33". Connections are riveted. The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in span #2). In spans #9 - 11, the deck widens from 15 to 18 beams. The fascia beams have section loss, flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and was caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified. They were lowered, using only four bolts at each connection. Most existing cracks were drilled out. Some were too small to reach, and the fractured beam was reinforced with bolted plates.

In span #2, multi-beam approach span, there is a cantilever expansion hinge with sliding plate bearings. The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam-ends are contacting, and some bearing plates have tipped, preventing the joint from reopening. The hinge area, with open finger joint above, was re-painted in 1999. The beam-ends have section loss, moderate surface pitting.

The north approach spans have lateral & diagonal bracing welded to the web.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 – 14):** The far north approach spans consist of cast-in-place concrete continuous “voided” slabs. They are 2 ft deep. Northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at pier #11 and the north abutment. There are 29 bearing assemblies. Piers #12 & #13 are cast directly into the slab with no bearings. These spans are in generally good condition. Spalling along the exterior and median copings was patched with shotcrete in 1998. [2001] Light fixtures at Metal Matic Incorporated parking lot.

## **BRIDGE SUBSTRUCTURE: NBI CONDITION CODE 6**

**Abutments:** The abutments have vertical cracking, with some staining from leaking deck joints.

**Truss Span Piers:** Piers #6 & 7, main river span, have two concrete columns resting on a pier wall. The west column on pier #7 has a minor vertical crack. Piers #5 & 8 have two concrete columns connected with an upper strut. The column on pier #8 has been reinforced with a concrete “jacket”. [2001] Underwater inspection conducted by Collins Engineers, Inc. in 2000 found pier 7 to be in good condition with no defects of structural significance. A 3 x 3 foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5 year inspection interval.

**Approach Span Piers:** Piers #1 - 5 & #9 - 11, piers supporting the steel spans, consist of concrete columns with a cap. Those adjacent to railroad tracks have lower struts. The pier columns supporting the voided slab spans (piers #12 & 13) are cast directly into the slab with no cap. Pier #1 has tipped slightly to the north. This is related to the hinge failure in span #2. The east column on pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shotcrete repairs from leaking deck joint above.

## **OTHER BRIDGE ELEMENTS**

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed. North approach, SBL and on ramp, has no relief joint. [2001] South approach panel was scarified and a low slump overlay was installed.

**Channel & Protection:** NBI code #8 which is very good condition. The bridge is located just downstream from the Lower St. Anthony Lock & falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel, along the east bank. Typically, the water depth along the west face is only 1 -

2 feet. Mn/Dot does not conduct underwater inspections. Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure running across the entire deck, mounted on the exterior railings at truss panel point #2' at north end of truss. There is a signpost mounted on the west railing at truss panel point #6 at south end of truss.

**Guardrail:** In 1998, the approach guardrails were repaired. Impact attenuator was installed at the northbound off ramp to University Avenue.

**Drainage:** Several deck drains drop directly into the river. The drain troughs at pier #6 have inadequate slope, and tend to fill up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving, at both abutments, is in good condition.

**Lighting:** Rail mounted deck lighting, under deck lighting in span #13, and river navigation lighting. "Metal Matic Inc." maintains the lighting above the parking lots in spans #11 & 12. A light post, W 5/3 L, on the west railing, has a 6" vertical split from plow damage.

**Miscellaneous:** The area below spans #2 - 5, the south approach spans, is leased out as a parking lot & used mainly by U of M students. [2003] This parking lot has been barricaded from use. Metal Matic Inc uses the area below spans #11 & 12 for parking. The U.S. Army Corps of Engineers is stockpiling material from river dredging below span #8. There is a catwalk, for navigation light maintenance, running below the median of the truss spans. Catwalk is being accessed by graffiti "artists" at pier #5. [2002] East coping has conduit.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings. Control room was constructed at the NW approach corner.

## BRIDGE SNOOPER FIELD INVESTIGATION

### Approach Spans:

**Northbound & southbound inspection notes are combined.** Plans have beams numbered from the east.

### South Abutment:

Strip seal deck joint above. [1998] SBL Gland was patched using an experimental joint, hot poured seal with wire mesh reinforcement, and fourteen sliding plate bearing assemblies. [1995] Bearings are corroded and in full contraction from hinge failure in span #2, and tipping of pier #1. The seat area is cracked and discolored. [2003] 72 LF random cracks: south abutment.

### Span #1 (Steel Multi-beam):

Span is 53 FT long with 14 beams, 33" deep rolled beams, with welded cover plates with square ends. [1996] East fascia beam has section loss, flaking rust. [2003] Surface rust: on the beams. [1978] 3 West bays have 300 SF full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted.

**Pier #1:**

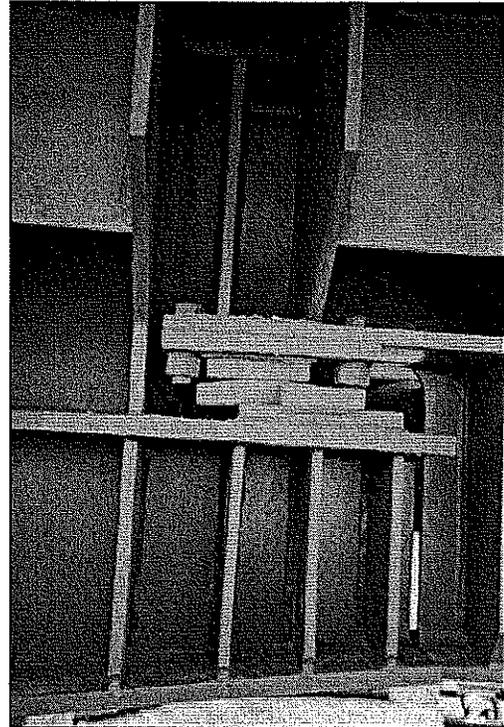
10 Fixed; & 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a railroad crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #2 (Steel Multi-beam):**

Span is 72 FT long with 14 beams; 33" rolled beams with welded cover plates, some with square end welded cover plates, the beams transition to 48" welded beams north of the hinge joint. [1978] 350 SF: full depth deck repairs. [1997] Conduit is loose below median. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted. [96/2003] Bottom flange at girder transitions & at hinge has section loss, flaking rust.

**Hinge Joint (12 ft. South of Pier #2):**

Hinge joint has open finger joint above. [94/2002] Hinge assemblies are expanded beyond tolerance; sliding plates extend 4" beyond the base plates, reducing bearing capacity. At beam #10, the sliding plate has tipped, falling off the base plate, and is preventing the joint from opening. [1999] Hinge area re-painted. [2000] Beam-ends have section loss, moderate surface pitting; debris has begun to build up on hinge area. Additionally, the tops of the beam-ends are contacting at the top flange or at the web along this joint.



Hinge Bearing Sole Plate

**Pier #2:**

Pier consists of four concrete columns, 14 sliding plate bearing assemblies, and cap, with a railroad crash strut between the columns. [97/2000] Bearings have surface rust corrosion; east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 re-painted. [2003] East end of cap, south face has 10 SF of map cracking.

**Span #3 (Steel Multi-beam):**

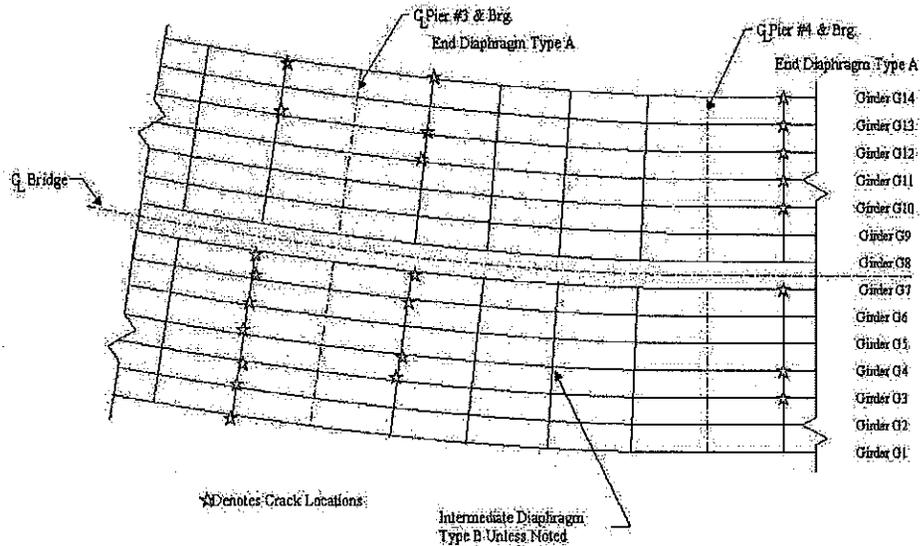
Over Bluff St. Span is 110 FT long with fourteen, 48" deep welded plate beams. [1978] The 3 west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete: spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 re-painted.

**Diaphragm Line North of Pier #2:**

[99/2003] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange, no cracks.

**Diaphragm Line South of Pier #3:**

Refer to chart titled **Diaphragm Crack Locations South of Pier #3** for crack locations, description & repair. [1999] Diaphragms lowered.



| Diaphragm Crack Locations South of Pier #3 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description  |
| G1 (East Fascia NB)                        | [199/2000] 1/4" crack on top of interior stiffener weld. [2003] No change.   |
| G2 (NB)                                    | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G3 (NB)                                    | * [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds. [2003] No crack.  |
| G4 (NB)                                    | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G5 (NB)                                    | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G6 (NB)                                    | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web & was drilled out. Crack is contained.   |
| G7 (NB)                                    | * [1998] One 2" hole drilled in web & other end of crack was ground out. [2003] The ground out end is cracked, visible on both sides web, should be drilled out.   |
| G8 (SB)                                    |  |
| G9 (SB)                                    |  |
| G10 (SB)                                   |  |
| G11 (SB)                                   |  |
| G12 (SB)                                   | * [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out). [2003] No change.  |
| G13 (SB)                                   |  |
| G14 (West Fascia SB)                       | * [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack on at top of interior stiffener weld. [2003] No change. |

\*Denotes locations where cracks were found in 1998.

**Pier #3:**

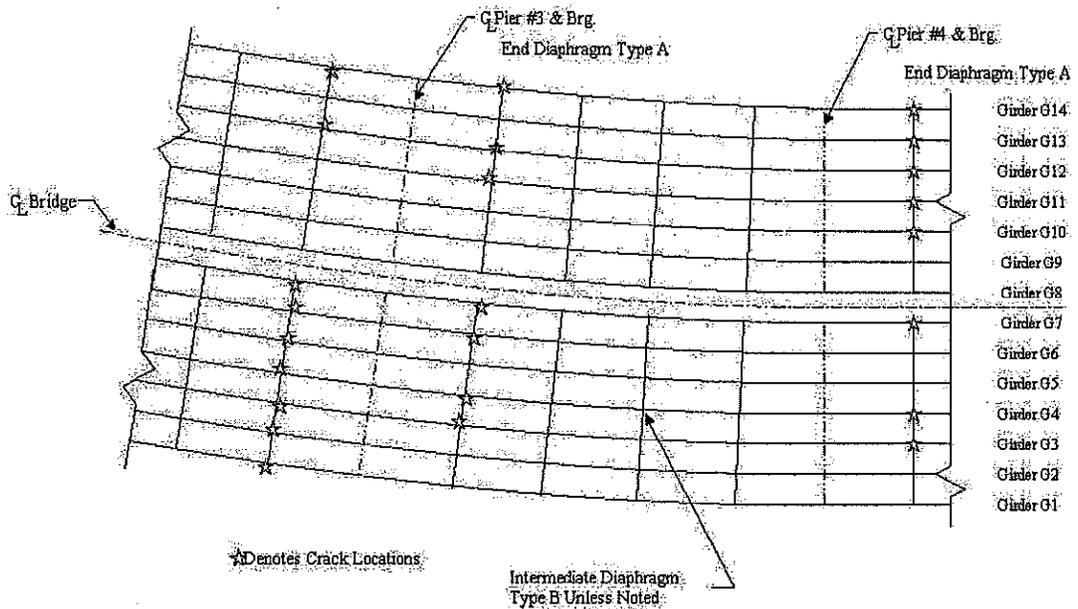
10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #4 (Steel Multi-beam):**

Over contract parking lot & Bluff St. Span is 110 FT long with fourteen 48" deep welded plate beams. [1978] Second & third bays from the east have full depth deck repairs. [1998] Underside of deck has 200 LF of transverse leaching cracks, 200 SF of spall with exposed rebar below a transverse poured joint, full width of deck. [2000] Fourth bay from west has 20 SF of severe leaching. [1999] Beams 6, 7, 8, & 9 were re-painted.

**Diaphragm Line North of Pier #3:**

Refer to chart titled **Diaphragm Crack Locations North of Pier #3** for crack locations, description & repair. [1998/99] Diaphragms lowered with strain gauges placed on beams #2 & 6. \*Denotes locations where cracks were found in 1998.



| Diaphragm Crack Locations North of Pier #3 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description  |
| G1 (East Fascia NB)                        |  |
| G2 (NB)                                    | Strain gauges on both faces.   |
| G3 (NB)                                    | * [98/2000] West side, top flange web weld has 1/2" crack. Eastside, stiffener weld has a small crack. [2003] No change. |
| G4 (NB)                                    | * [1999] West face, top of stiffener weld small crack. [2003] Crack is growing down toe of weld 3/4", drill out.         |
| G5 (NB)                                    | * [2003] Small crack at the top of stiffener weld.   |
| G6 (NB)                                    | * [1999] Small crack at top of stiffener weld. Strain gauges on the east face. [2003] No change.                         |
| G7 (NB)                                    | * [2003] Small crack at the top of the interior stiffener weld.  |
| G8 (SB)                                    |  |
| G9 (SB)                                    |  |
| G10 (SB)                                   |  |
| G11 (SB)                                   | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G12 (SB)                                   | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G13 (SB)                                   |  |
| G14 (West Fascia SB)                       | * [1998] Two 2" holes drilled in web. Crack is contained.  |

\*Denotes locations where cracks were found in 1998.

#### Diaphragm Line South of Pier #4:

[1999] Diaphragms lowered, even though the connections have a "positive moment" configuration. Stiffeners are welded to the top flange.

#### Pier #4:

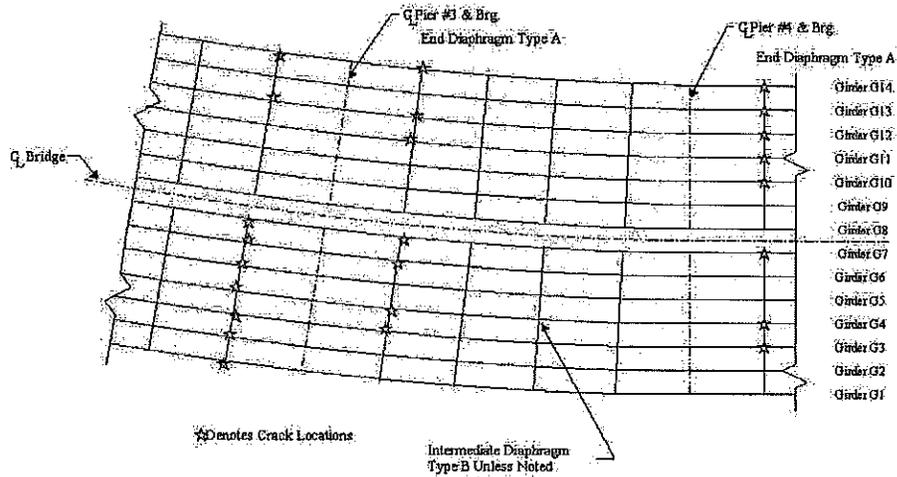
14 Sliding plate expansion bearing assemblies. [1997] Bearings have surface rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

#### Span #5 (Multi-beam/Deck Truss):

Over contract parking lot; span is 109 FT long with fourteen, 48" deep welded plate beams bolted onto the crossbeam. [1996] 4 conduit clamps missing on NB fascia beam. Median girder has impact damage from parking lot below. [1978] Underside of deck is leaching at the finger joint, has two full depth patches in the west bays. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked. [1999] Beams 6, 7, 8, & 9 were re-painted.

**Diaphragm Line North of Pier #4:**

Refer to chart titled **Diaphragm Crack Locations North of Pier #4** for crack locations, description & repair.



| <b>Diaphragm Crack Locations North of Pier #4</b> |   |
|---|---|
| <b>Girder Location</b>                            | <b>Crack Description and or Repair Description</b>  |
| G1 (East Fascia NB)                               |   |
| G2 (NB)   |   |
| G3 (NB)   | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G4 (NB)   | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G5 (NB)   |   |
| G6 (NB)   |   |
| G7 (NB)   | * [1998] Two 2" holes drilled in web. [2001/03] Both sides, small crack at top of stiffener weld. |
| G8 (SB)   |   |
| G9 (SB)   |   |
| G10 (SB)  | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G11 (SB)  | [99/2000] Small crack at top of stiffener weld. [2003] No change.                                 |
| G12 (SB)  | * [1998] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld. Crack is contained.   |
| G13 (SB)  | * [99/2000] Small crack at top of stiffener weld. [2003] No change.                               |
| G14 (West Fascia SB)                              | [1999] Small crack at top of interior stiffener weld. [2003] No change.                           |

\*Denotes locations where cracks were found in 1998.

**Main Truss Spans (Northbound, East Truss)**

Stringers are numbered from the east (see framing plan).

**Crossbeam:**

[1986] The SE rocker bearing froze, damaging the east end of the crossbeam, resulting in cracked web stiffeners. The bridge was jacked up. I - 35W was closed to traffic. SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and beams #3 & 4. [1998/99] Crossbeam was repainted; the side facing the finger joint has section loss.

| <b>Gap between Crossbeam &amp; Floorbeam (East End)</b> |                    |
|---|--------------------|
| <b>Date</b>   | <b>Measurement</b> |
| September, 1998   | 16-5/8"            |
| April, 1999   | 17-13/16"          |
| April, 2000   | 18"                |
| September, 2001   | 18-1/16"           |
| June, 2003  | 16-7/8"            |

**Panel Point #0 (Beginning of East Truss):**

Expansion joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] End floorbeam was repainted; section loss at the base of the stiffeners. [2002] Water saturation between stringers 2 thru 4 at panel points 0 to 1.

**Panel Point #1 (East Truss, Pier #5):****Pier #5:**

Bearing assemblies have two "rollernest". Climbing onto the pier strut at this location accesses the catwalk. Debris piled at pier strut base allow for unauthorized access. [2002] Bearings show signs of recent movement.

**Span #6 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1997] West River Parkway constructed below bridge. [1999] Floorbeam truss's, sway bracing located below the median and beams 6, 7, 8, & 9 were re-painted.

**Panel Point #2 (East Truss):****Panel Point #3 (East Truss):**

Floorbeam truss, near center, has an undercut weld in the flange.

**Panel Point #4 (East Truss Stringer Joint):**

Strip seal deck joint above. [1999] 1 ft. of gland pulled out at centerline. [1996] Floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box cover is missing at catwalk. [2000] Concrete in joint at east end.

**Panel Point #5 (East Truss):**

[1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out at stringer #3, cracked tack welds remain at stringer #4.

**Panel Point #6 (East Truss):**

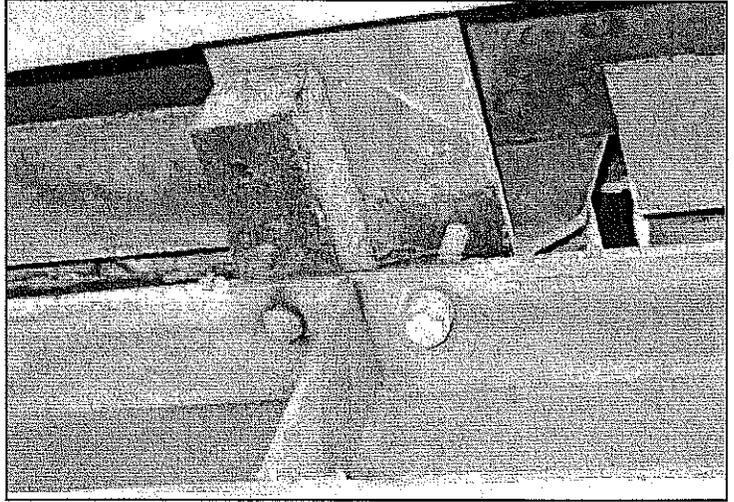
[1994] Floorbeam truss top chord, bottom flange, has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10, near the bottom chord connection, has a 4" long gouge with possible crack along

a connection weld, should grind out. [2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #7 (East Truss):** [2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #8 (East Truss Pier #6 Stringer Joint):**

Strip seal and deck drain above. [94/2003] Joint is leaking, small hole & membrane has pulled out. Stringer #4: one bolt broken off at south floorbeam connection. Deck drain is plugged solid. Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt. The bearing block has rotated 90°. [1999] Missing bolt replaced. [2000] Bolts are loose, needs repair. Vertical truss member has section loss, moderate flaking rust. Floorbeam bottom chord & middle bracing connection plate has moderate section loss, severe flaking rust. Middle bracing connection plate has 1/2" spread from pack rust. Underside of the deck has 50 SF of water saturation.



Stringer 2 Bearing Block Rotated



Stringer 4 Bolt Missing

**Pier #6 (Downtown, West Bank of Mississippi):**

Pier consists of two concrete columns with a pier wall at the base, two "rollernest" bearing assemblies. [1997] Bearings have surface rust, moderate corrosion and show no signs of movement. [1997] Deck drain downspouts are clogged, top & bottom at median.

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #9 (East Truss):** [2003] Floorbeam bottom chord connection plate has a cracked tack weld on the south side. Underside of the deck has 20 SF of water saturation.

**Panel Point #10 (East Truss):**

Red navigation light for Mississippi river channel. [1999] Strain gauges installed on truss top chord member U9/U10, L9/U10 & L9/L10 from U of M research project.

**Panel Point #11 (East Truss):**

Section loss: at gusset plate bottom chord. [2000] Stringer #3 has a bolt missing at the floorbeam connection.

**Panel Point #12 (East Truss):**

[1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener.

**Panel Point #13 (East Truss):**

Water from deck drains fall directly into river. [99/2002] Bottom chord gusset plate has section loss, flaking & pack rust. Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners.

**Panel Point #14 (East Truss Midspan Stringer Joint):**

Strip seal expansion joint on the deck. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2002/03] Floorbeam bottom chord & middle bracing connection plate has ½ " pack rust. Underside of the deck has 4 SF of delamination.

**Panel Point #13' (East Truss):**

Floorbeam truss top chord has a ground out spot near stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener. [2003] Truss bottom chord connection plate has ½ " pack rust. Underside of the deck has 20 SF of water saturation.

**Panel Point #12' (East Truss):**

[99/2003] Underside of the deck has 65 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

[2003] Underside of the deck has 1 SF of spall with exposed rebar. Light pole, W5L3, has 1 LF crack.

**Panel Point #9' (East Truss):**

Water from deck drains fall onto the steel & directly into river. [2002] Bottom chord member L9'/L8' has section loss, flaking rust.

**Panel Point #8' (East Truss Pier #7 Stringer Joint):**

Red navigation light for Mississippi river channel. Strip seal expansion joint on the deck. [93/2003] Floorbeam truss has section loss, moderate flaking rust. North side: bolts replaced with "threaded-rod" at stringer #4, bolts replaced at stringer #5. Underside of the deck has 80 SF of water saturation.

**Pier #7 (East Bank of Mississippi):**

Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full height, leaching crack on the south face.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #7' (East Truss):**

[2003] Underside of the deck has 240 SF of water saturation, & 80 SF of delamination.

**Panel Point #6' (East Truss):**

[1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose. [2003] Underside of the deck has 10 SF of water saturation.

**Panel Point #5' (East Truss):**

[2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss Stinger Joint):**

Strip seal expansion joint on the deck. Truss diagonal member U4'/L3' has backer bars along the interior edges. [2001/03] Strip seal has 3 LF of gland pulled out. Truss connection plates, the top chord, and floorbeam have moderate section loss, severe flaking rust. Bottom connection plates have 1/2" pack rust.

**Panel Point #3' (East Truss):**

Center lane has road sensors on the deck surface. Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):**

Overhead sign mounted on exterior railings. [1999] Deck in bay #3 has 100 SF of water saturation. [2003] Bottom connection plates have 1/2" pack rust.

**Pier #8:**

Two "rollernest" bearing assemblies, have surface rust. [2000] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them with vertical cracks.

**Panel Point #1' (East Truss Pier #8):**

[2000] Bottom of truss above bearing has graffiti.

**Panel Point #0' (End of East Truss):**

Joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris, need to be flushed. [1998/99] Floorbeam re-painted, side facing finger joint has section loss with holes in web stiffeners. [1998] North face, directly above east rocker bearing, has two horizontal welds between stiffener plates. They have cracked through entirely.

\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" at 40° F.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss, with pitting at base of stiffeners. [1992] North face has crack in the crossbeam web stiffener, above the rocker at the beam

#12 connection. This was drilled out. [1997/98] North face: weld above east rocker bearing, between the horizontal & center vertical stiffener, has cracked through entirely. Weld end at the crossbeam web was partially drilled out. [1998] North face has cracks at both ends of the horizontal stiffener, above rocker bearing. They were drilled out with two small holes drilled in crossbeam web at each location. [1998] Bracing installed between crossbeam, above east rocker, and beams #3 & 5.

**Approach Spans:**

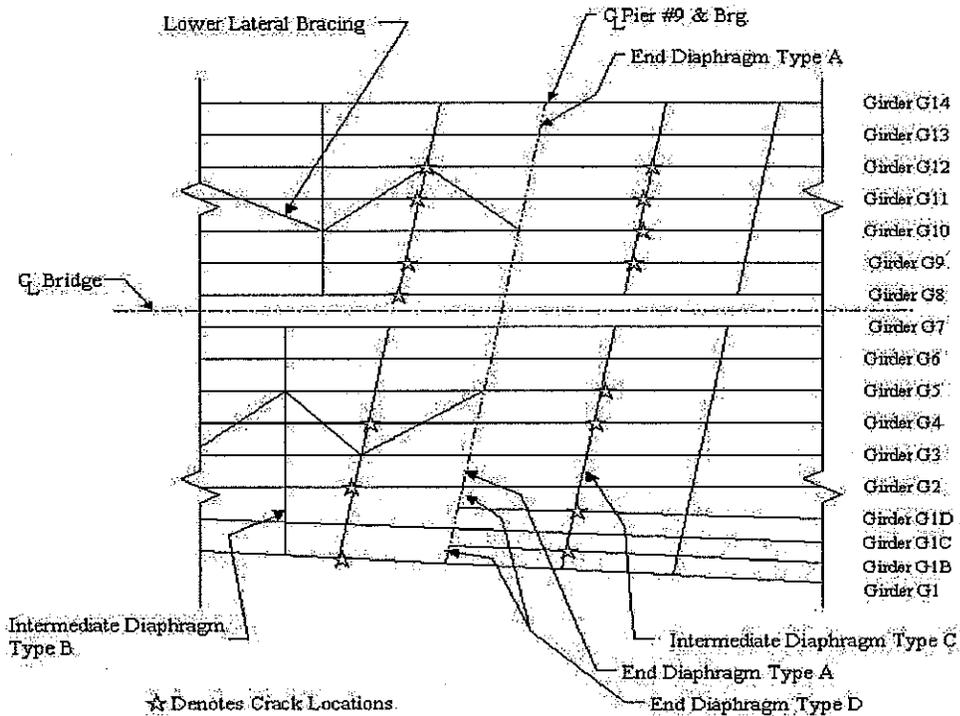
Northbound & southbound inspection notes are combined. Plans show beams are numbered from the east.

**Span #9 (Multi-beam):**

Span is 168 FT long with one floorbeam truss at pier #8, fourteen 48" deep welded plate beams bolted onto the crossbeam. Multi-beam spans resume. NB has 8 beams. SB has 7 beams. There are two active railroad tracks below. [1999] Beams 6, 7, 8, & 9 are re-painted. Lateral bracing welded to web & stiffener. [2002] Underside of deck at the south end, in NBL, has 150 SF of water saturation near the spray head. In the SBL 2<sup>nd</sup> & 3<sup>rd</sup> bays from west are large areas of salt and water saturation. [2003] Conduit: at east side bottom of deck.

**Diaphragm Line South of Pier #9:**

Refer to chart titled **Diaphragm Crack Locations South of Pier #9** for crack locations, description & repair. [1999] Diaphragms lowered.



| Diaphragm Crack Locations South of Pier #9 |   |
|--|---|
| Girder Location                            | Crack Description and or Repair Description   |
| G1 (East Fascia NB)                        | [2000] Exterior top flange/web weld has a 1/2" indication. [2003] No change.          |
| GC (NB)                                    |   |
| G2 (NB)                                    | * [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| G3 (NB)                                    |   |
| G4 (NB)                                    | * [98/2000] Small crack in top flange/web weld. [2003] No change.                     |
| G5 (NB)                                    |   |
| G6 (NB)                                    |   |
| G7 (NB)                                    |   |
| G8 (SB)                                    |   |
| G9 (SB)                                    | * [1998] Crack in top of stiffener weld. [2003] No change.                            |
| G10 (SB)                                   |   |
| G11 (SB)                                   | * [98/2000] Small crack in top of stiffener weld (east side). [2003] No change.       |
| G12 (SB)                                   | * [98/2000] Small crack in top of stiffener weld (east side). [2003] No change.       |
| G13 (SB):                                  |   |
| G14 (West Fascia SB)                       |   |

\*Denotes locations where cracks were found in 1998

**Pier #9:**

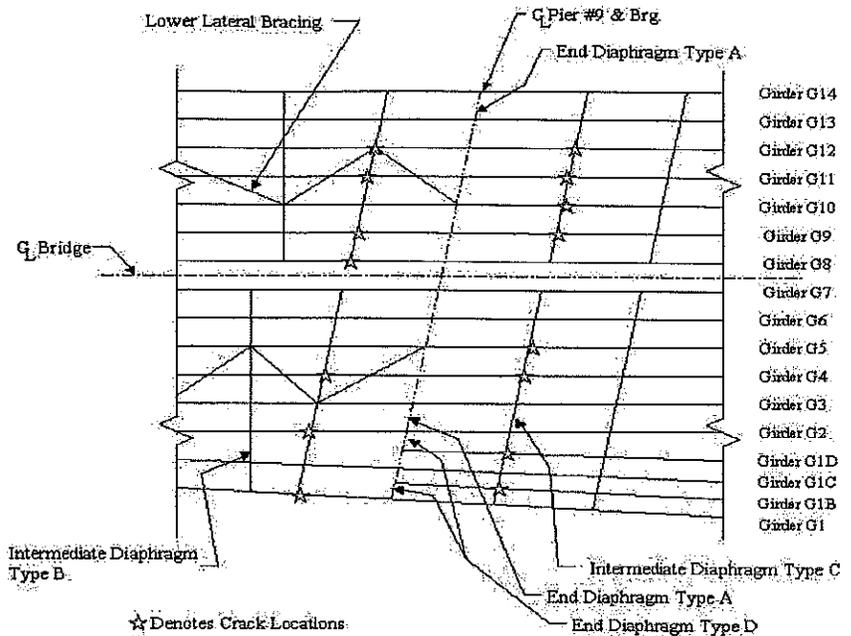
Plate bearing assemblies have 13 fixed, and four sliding. Pier consists of four columns and cap, with a railroad crash strut between the columns. Deck drain: downspout. [1969] East column damaged by train derailment - the column has minor scrapes and spalls. Downspout had to be reconnected. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #10 (Steel Multi-beam):**

Span is 94 FT long with 17 steel beams. NB has 10 beams; SB has 7 beams (the welded beams transition from 48" to 33" depth just north of pier) with active railroad tracks below. One track splits into two. [1999] Beams 6, 7, 8, & 9 were re-painted. [2003] Conduit: at east side bottom of deck.

**Diaphragm Line North of Pier #9:**

Refer to chart titled **Diaphragm Crack Locations North of Pier #9** for crack locations, description & repair. [1999]  
Diaphragms lowered.

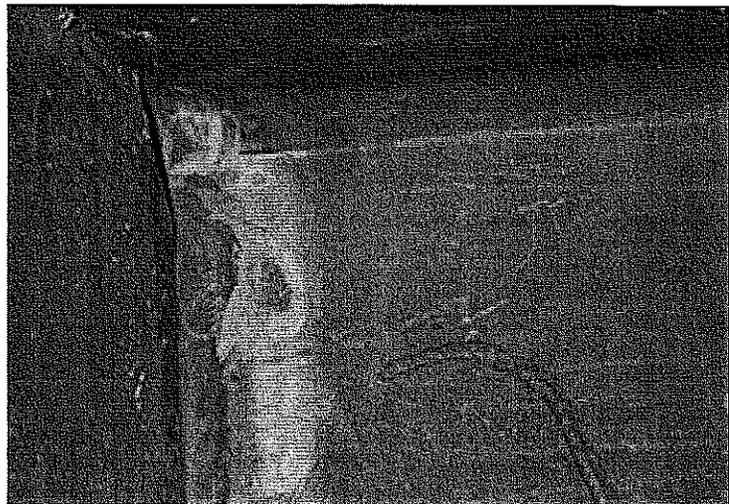


| Diaphragm Crack Locations North of Pier #9 |  |
|--|--|
| Girder Location                            | Crack Description and or Repair Description  |
| G1 (East Fascia NB)                        |  |
| G1B (NB)                                   | Stiffeners are welded to the top flange (positive moment).   |
| GC (NB)                                    |  |
| G1D (NB)                                   | Stiffeners are welded to the top flange (positive moment)  |
| G2 (NB)                                    |  |
| G3 (NB)                                    |  |
| G4 (NB)                                    | * [2000] Two 2" holes drilled in web. Crack contained.   |
| G5 (NB)                                    | * [2000] Two 2" holes drilled in web. Crack contained.   |
| G6 (NB)                                    |  |
| G7 (NB)                                    |  |
| G8 (SB)                                    |  |
| G9 (SB)                                    | * [98/2000] Crack in top flange/web weld & top of stiffener weld (west side).<br>[2003] No change. |
| G10 (SB)                                   | * [2000] Crack in top flange/ web weld (east side) This crack has grown; see photos.               |
| G11 (SB)                                   | * [2000] Two 2" holes drilled in web. Crack contained.   |
| G12 (SB)                                   | * [2000] Two 2" holes drilled in web. Crack contained.   |
| G13 (SB)                                   |  |
| G14 (West Fascia SB)                       |  |

\*Denotes locations where cracks were found in 1998



Girder #10 Vertical Stiffener/Girder Web



Girder #10 Vertical Stiffener/Girder Web

**Diaphragm Line South of Pier #10:**

[1999] Diaphragms were inverted & lowered, even though the beam connections have a "positive moment" configuration. Connections welded to top flange. [2000] Beam #6 appears to be "working" at the top connection.

**Pier #10:**

Pier has 5 columns & cap with a RR crash strut between the columns and 18 sliding plate expansion bearings. [1999] Bearings 6, 7, 8, & 9 were re-painted. [2003] North face of cap has 20 SF of delamination.

**Span #11 (Steel Multi-beam):**

Span is 68 FT long with 18 steel beams. Northbound has 11 beams; southbound has 7 beams, and the parking lot below. [1999] Beams 6, 7, 8, & 9 were re-painted. [2003] Conduit: east side bottom of deck.

**Diaphragm Line North of Pier #10:**

[1999] Diaphragms were inverted & lowered, even though the beam connections have "positive moment" configuration. Connections welded to top flange.

**Pier #11:**

Beginning: NB off ramp to University Avenue. (Br. #9340A). Strip seal deck joint above. The slab span consists of 18 sliding plate bearings, (steel beams) and 15 sliding plate bearings (voided slab). The pier consists of seven columns and a cap. [95/2000] Gland is leaking in several locations (NB & SB). [1998] Extensive shotcrete repairs on pier cap. [2000] West column has 1 SF spall. [1999] Sliding plate bearings for the steel beams were re-painted.

**Span #12 (Concrete Voids Slab Span):**

Parking lot: below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #13 (Concrete Voids Slab Span):**

2nd St. passes below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #13:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #14 (Concrete Voids Slab Span):**

[1998] Shotcrete repairs were done along median and exterior copings.

**North Abutment:**

Strip seal deck joint above with 14 sliding plate bearing assemblies. [2000] NB joint leaking at both ends. Bearings are rusty.

**Main Truss Spans (Southbound West Truss)**

Plans show stringers are numbered from the east.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss. [1999] Bolted connection between beam #12 and the crossbeam was re-tensioned. Connection had been "working".

\*\* [2000] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-9/16".

\*\* [2001/03] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-1/2".

**Panel Point #0' (End Floorbeam Beginning West of Truss):**

Open finger joint on the deck. [1996] Floorbeam/truss connection has section loss, severe corrosion with surface pitting on plates & bolts. [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] Floorbeam re-painted. Side facing finger joint has section loss on stiffeners. [2002] High spots of fingers torched off right lane & shoulder.

**Panel Point #1' (West Truss Pier #8):**

**Pier #8:**

See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [2002] Underside of the deck has 150 SF of water saturation and numerous full depth repairs.

**Panel Point #2' (West Truss):**

Overhead sign on bridge mounted on exterior railings. [2002] Bolts are "working" at stringer #11.

**Panel Point #3' (West Truss):**

The floorbeam truss, top flange of upper chord, has an ugly weld below the connection to stringer #11. [2003] Stringer #12 has connection bolts "working".

**Panel Point #4' (West Truss Stringer Joint):**

Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges. [2003] Floorbeam truss bottom chord at Stringer #11 connection: have section loss, moderate flaking rust.

**Panel Point #5' (West Truss):**

[2002] Sprayer fitting corroded.

**Panel Point #6' (West Truss):**

[1996/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection. [1997] Stringer #10, the two south bolts are loose at the floorbeam connection. [99/2003] Stringer #9, south face, has one bolt loose at the floorbeam connection.

**Panel Point #7' (West Truss):**

[1997] Top chord/floorbeam truss connection has a cracked tack weld on the interior. [1999] Wind bracing gusset plate, at stringer #14 has loose bolts. [2002] Stringer #14 was installed crooked.

**Panel Point #8' (West Truss Pier #7 Stringer Joint):**

Strip seal deck joint above. [1998] Stringer #11: bolt replaced at floorbeam truss connection. Below stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent, from original construction. [2001] Truss bottom chord/sway frame connection has section loss, heavy flaking rust.

**Pier #7:**

See NB notes. [2002] West column has vertical leaching cracks.

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses.

**Panel Point #9' (West Truss):**

[2001] Truss bottom chord/sway frame connection has section loss, heavy flaking rust. [2002] Section loss: heavy flaking rust on truss bottom chord, L8'/L9'.

**Panel Point #10' (West Truss):**

[1994] Stringer #13: loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior, 15 ft. south of U10'.

**Panel Point #11' (West Truss):**  
Nick in the truss bottom chord L11'/L12'

**Panel Point #12' (West Truss):**  
Truss diagonal member U12'/L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

**Panel Point #14 (West Truss Midspan Stringer Joint):**  
Strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has section loss, flaking rust near the joint from gland pulled out above. Tack welds along the sway frame/truss, bottom chord, and gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2003] Stringer #14 connection, south side of the floorbeam, has a cracked tack weld.

**Panel Point #13 (West Truss):**  
[1999] Truss bottom chord/sway frame connection plates have 3/4" pack rust. [1996/99] Bottom chord member L13/L14 has cracked tack welds at two internal stiffeners.

**Panel Point #12 (West Truss):**  
[1996] Bottom chord member L12/L13 has a cracked tack weld at the internal stiffener.

**Panel Point #11 (West Truss):**  
[1998] Stringer #11 has three bolts replaced at the floorbeam truss connection; the SE bolt is too short with inadequate threads. Stringer has lifted 3/32" off the bearing block on the south side.

**Panel Point #10 (West Truss):**  
Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):**  
Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss Pier #6 Stringer Joint):**  
Strip seal expansion joint on the deck. [1996] Gland has 8 ft pulled out in right gutter line. Deck drains. [96/2003] Drain clogged at median, horizontal trough, standing water in east grate.

**Pier #6:**  
See NB notes.

**Span #6:**  
Span is 266 FT long with seven floorbeam trusses.

**Panel Point #7 (West Truss):**  
[2002] Underside of the deck has 20 SF of water saturation at stringer 12 thru 14.

**Panel Point #6 (West Truss):**  
Overhead sign mounted on railing. Floorbeam truss top chord (U5/U4) has gouges in the bottom flange at the end of the connection plate; the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice from construction.

**Panel Point #5 (West Truss):**  
Truss top chord member U5/U6 has backer bars along the interior corners.

**Panel Point #4 (West Truss Stringer Joint):**

Strip seal expansion joint on the deck, Truss top chord member U4/U5 has backer bars along the interior corners. [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire.

**Panel Point #3 (West Truss):**

Truss diagonal member L3/U4 has backer bars along the interior corners. Truss bottom chord L2/L3 has a nick.

**Panel Point #2 (West Truss):**

[1996] Floorbeam truss member L2/U3 has a welding flaw. [1997] No crack! Magnetic particle tested.

**Pier #5:**

See NB notes. Access ladder to catwalk removed.

**Panel Point #1 (West Truss Pier #5):**

[1994] Diagonal brace, floorbeam to stringer, has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout, originally drained into storm sewer.

**Panel Point #0 (End Floorbeam End of West Truss):**

Open finger joint on the deck. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings: filled with debris, needs to be flushed. [1997] Floorbeam horizontal stiffener is bent directly above the rocker bearing. [1998/99] Floorbeam re-painted, side facing finger joint has section loss, pitting.

\*[2000] Gap between crossbeam & floorbeam, at west end, measures 16-1/2".

**Crossbeam:**

[1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker were partially ground out. [1998/99] Crossbeam re-painted, the side facing finger joint has section loss, pitting with holes in the base of stiffeners, pitting on bottom flange at median.

**Span #5(Deck Truss Multi-beam):**

The multi-beam spans resume at panel point #0.

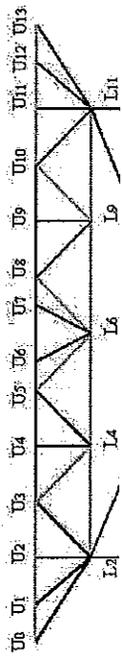
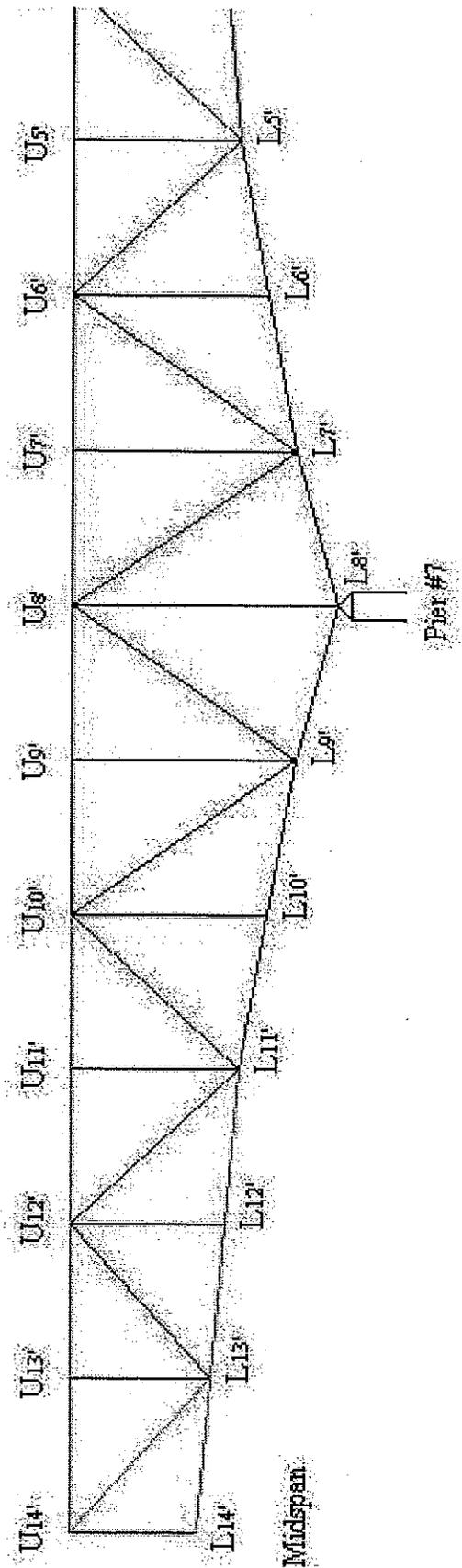
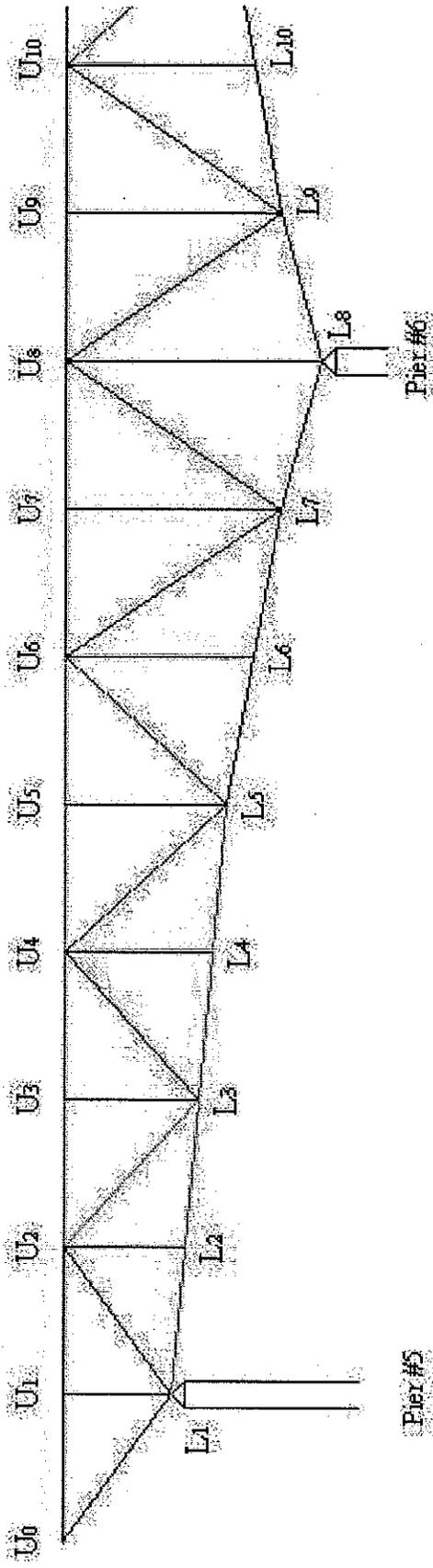
**See NB Notes for South Approach Spans**

## PREVIOUS SNOOPER INSPECTIONS

- 2002\* Mark Pribula, Kurt Fuhrman, Pete Wilson, Jerry Oldeen, Bruce Anderson, Mike Palmer
- 2001 Marl Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer
- 2000 Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer, Wayne Tennison Pete Wilson, George Morelli, Rebecca Lane
- 1999 Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadeegg, Pete Wilson
- 1998 Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson
- 1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson
- 1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994 Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993 Terry Moravec, Chas Martin, Tom Waks
- 1991 Chester Martin, Chas Martin, Jerry Anderson
- 1988 Chester Martin

**\*Denotes an "In-Depth" Inspection**

# TRUSS DIAGRAM





Crew Number: 7627

Inspector: METRO

BRIDGE 9340

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 06-16-2004

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft 6 %  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 15 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N  
 Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 8 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate: 50.0  
 Required Bridge Signs - Load Posting: NOT REQUIRED 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 |
|----------|--|-----|------------|------------|----------|----------|----------|----------|----------|
| 22       | LS O/L (CONC DECK)   | 2   | 06-16-2004 | 201,853 SF | 0        | 0        | 201,853  | 0        | 0        |
|          |  |     | 06-13-2003 | 201,853 SF | 0        | 0        | 201,853  | 0        | 0        |
|          | Notes: 3 lanes + on/off ramp each direction (2 FT shoulders). [1978] Low slump overlay (extensive full depth repairs). [1993] Spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.  |     |            |            |          |          |          |          |          |
| 48       | LS O/L (CONC SLAB)   | 2   | 06-16-2004 | 17,233 SF  | 0        | 17,233   | 0        | 0        | 0        |
|          |  |     | 06-13-2003 | 17,233 SF  | 0        | 17,233   | 0        | 0        | 0        |
|          | Notes: Spans 12 - 14 have a 2 ft. deep CIP concrete voided slab (continuous).  |     |            |            |          |          |          |          |          |
| 300      | STRIP SEAL JOINT   | 2   | 06-16-2004 | 946 LF     | 852      | 0        | 94       | N/A      | N/A      |
|          |  |     | 06-13-2003 | 946 LF     | 852      | 0        | 94       | N/A      | N/A      |
|          | Notes: [1978] Type H strip seal at abutments, pier 11, and stringer expansion joints (7 total). [1998] Strip gland replaced at pier 11, north abutment. South abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.   |     |            |            |          |          |          |          |          |
| 301      | POURED DECK JOINT  | 2   | 06-16-2004 | 1,017 LF   | 1,000    | 0        | 17       | N/A      | N/A      |
|          |  |     | 06-13-2003 | 1,017 LF   | 1,000    | 0        | 17       | N/A      | N/A      |
|          | Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).  |     |            |            |          |          |          |          |          |
| 303      | ASSEMBLY DECK JOINT  | 2   | 06-16-2004 | 326 LF     | 191      | 110      | 25       | N/A      | N/A      |
|          |  |     | 06-13-2003 | 326 LF     | 191      | 110      | 25       | N/A      | N/A      |
|          | Notes: Open finger joints at truss ends and span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.  |     |            |            |          |          |          |          |          |
| 321      | CONC APPROACH SLAB   | 2   | 06-16-2004 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |
|          |  |     | 06-13-2003 | 4 EA       | 0        | 4        | 0        | 0        | N/A      |
|          | Notes: [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).  |     |            |            |          |          |          |          |          |
| 331      | CONCRETE RAILING   | 2   | 06-16-2004 | 7,831 LF   | 7,831    | 0        | 0        | 0        | N/A      |
|          |  |     | 06-13-2003 | 7,831 LF   | 7,831    | 0        | 0        | 0        | N/A      |
|          | Notes: [1998] 4018 LF Railings re-constructed. 3813 LF Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally code 12) were retrofit (32" high concrete face added, horizontal steel railings removed).  |     |            |            |          |          |          |          |          |
| 107      | PAINTED STEEL GIRDER   | 2   | 06-16-2004 | 10,596 LF  | 0        | 9,000    | 1,400    | 110      | 86       |
|          |  |     | 06-13-2003 | 10,596 LF  | 0        | 9,000    | 1,400    | 110      | 86       |
|          | Notes: [1968] Bridge painted with lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have section loss: flaking & surface rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. [1999] Beam ends at hinge have section loss: moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound. |     |            |            |          |          |          |          |          |

Crew Number: 7627

Inspector: METRO

BRIDGE 9340

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 06-16-2004

## STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY  | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|----------------------|-----|------------|-----------|-------------|-------------|-------------|-------------|-------------|
| 113  | PAINT STEEL STRINGER | 2   | 06-16-2004 | 14,896 LF | 0           | 14,700      | 0           | 150         | 46          |
|  |                      |     | 06-13-2003 | 14,896 LF | 0           | 14,700      | 0           | 150         | 46          |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have section loss: flaking & surface rust corrosion at expansion joints. [1999] Median stringers re-painted. [91/2000] Stringer/floorbeam connections are "working". Several bolts are loose or missing.  |                      |     |            |           |             |             |             |             |             |
| 131  | PAINT STL DECK TRUSS | 1   | 06-16-2004 | 2,127 LF  | 0           | 0           | 1,880       | 215         | 32          |
|  |                      |     | 06-13-2003 | 2,127 LF  | 0           | 0           | 1,880       | 215         | 32          |
| Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have section loss: flaking & surface rust, severe pigeon debris, at the floorbeam & sway frame brace connections (with pack rust & surface pitting). [1999] Pigeons screens placed on truss member openings.  |                      |     |            |           |             |             |             |             |             |
| 152  | PAINT STL FLOORBEAM  | 2   | 06-16-2004 | 3,348 LF  | 0           | 2,000       | 725         | 600         | 23          |
|  |                      |     | 06-13-2003 | 3,348 LF  | 0           | 2,000       | 725         | 600         | 23          |
| Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). Floorbeam trusses have numerous poor weld details, section loss: flaking & surface rust, some have holes, (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. [2004] Crack found in cope north approach crossbeam at beam G1C bottom flange 2 1/2" east side, 2" west side. |                      |     |            |           |             |             |             |             |             |
| 373  | STEEL HINGE          | 2   | 06-16-2004 | 18 EA     | 0           | 4           | 0           | 0           | 14          |
|  |                      |     | 06-13-2003 | 18 EA     | 0           | 4           | 0           | 0           | 14          |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. Section loss at hinges, (open finger joint) steel has flaking & surface rust. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.  |                      |     |            |           |             |             |             |             |             |
| 380  | SECONDARY ELEMENTS   | 2   | 06-16-2004 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
|  |                      |     | 06-13-2003 | 1 EA      | 0           | 0           | 1           | 0           | N/A         |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.   |                      |     |            |           |             |             |             |             |             |
| 311  | EXPANSION BEARING    | 2   | 06-16-2004 | 125 EA    | 75          | 44          | 6           | N/A         | N/A         |
|  |                      |     | 06-13-2003 | 125 EA    | 75          | 44          | 6           | N/A         | N/A         |
| Notes: [94/2000] Some abutment bearings are rusty (joints leaking). [1996] South abutment bearings are in full contraction. [1994] Main truss roller bearings have section loss: flaking & surface rust, moderate corrosion.   |                      |     |            |           |             |             |             |             |             |
| 313  | FIXED BEARING        | 2   | 06-16-2004 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
|  |                      |     | 06-13-2003 | 35 EA     | 35          | 0           | 0           | N/A         | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 205  | CONCRETE COLUMN      | 2   | 06-16-2004 | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
|  |                      |     | 06-13-2003 | 52 EA     | 49          | 3           | 0           | 0           | N/A         |
| Notes: [1969] Pier 9: east column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in span 2 (south abutment bearings are in full contraction).  |                      |     |            |           |             |             |             |             |             |
| 210  | CONCRETE PIER WALL   | 2   | 06-16-2004 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
|  |                      |     | 06-13-2003 | 168 LF    | 168         | 0           | 0           | 0           | N/A         |
| Notes:   |                      |     |            |           |             |             |             |             |             |
| 215  | CONCRETE ABUTMENT    | 2   | 06-16-2004 | 255 LF    | 230         | 25          | 0           | 0           | N/A         |
|  |                      |     | 06-13-2003 | 255 LF    | 230         | 25          | 0           | 0           | N/A         |
| Notes: [1991] Both abutments have minor cracking & staining.   |                      |     |            |           |             |             |             |             |             |
| 234  | CONCRETE CAP         | 2   | 06-16-2004 | 819 LF    | 669         | 150         | 0           | 0           | N/A         |
|  |                      |     | 06-13-2003 | 819 LF    | 669         | 150         | 0           | 0           | N/A         |

Crew Number: 7627

Inspector: METRO

## Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340

I 35W OVER RR, MISS R, 2ND ST &amp; RD

INSP. DATE: 06-16-2004

## STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes: [1998] Pier 11: cap has extensive "gunnite" repairs.  |                     |     |            |          |             |             |             |             |             |
| 356  | FATIGUE CRACKING    | 2   | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. [2004] Crack found in cope north approach crossbeam at beam G1C bottom flange 2 1/2" east side, 2" west side. |                     |     |            |          |             |             |             |             |             |
| 357  | PACK RUST           | 2   | 06-16-2004 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
| Notes: [1995] Truss members have flaking & surface rust corrosion at the floorbeam & sway brace connections (with pack rust & some section loss, surface pitting).   |                     |     |            |          |             |             |             |             |             |
| 358  | CONC DECK CRACKING  | 2   | 06-16-2004 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.   |                     |     |            |          |             |             |             |             |             |
| 359  | CONC DECK UNDERSIDE | 2   | 06-16-2004 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).   |                     |     |            |          |             |             |             |             |             |
| 360  | SETTLEMENT          | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 361  | SCOUR               | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [2004] Underwater Inspection by "Ayres Associates" found no evidence of scour or changes to structure condition.  |                     |     |            |          |             |             |             |             |             |
| 363  | SECTION LOSS        | 2   | 06-16-2004 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: Section loss: pitting, flaking & surface rust on steel.   |                     |     |            |          |             |             |             |             |             |
| 964  | CRITICAL FINDING    | 2   | 06-16-2004 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 966  | FRACTURE CRITICAL   | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: See in-depth report for location of F/C members.  |                     |     |            |          |             |             |             |             |             |
| 981  | SIGNING             | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|  |                     |     | 06-13-2003 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes: OH sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.  |                     |     |            |          |             |             |             |             |             |
| 982  | GUARDRAIL           | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: Plate beam guardrail SE & SW corners, north & south median I 35W. [1998] Approach guardrail repaired (impact attenuator at NB off ramp).  |                     |     |            |          |             |             |             |             |             |
| 984  | DRAINAGE            | 2   | 06-16-2004 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|  |                     |     | 06-13-2003 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |

## Mn/DOT BRIDGE INSPECTION REPORT

I 35W OVER RR, MISS R, 2ND ST & RD

INSP. DATE: 06-16-2004

**STRUCTURE UNIT: 0**

| ELEM<br>NBR  | ELEMENT NAME    | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|-----------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes: Pier 6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.   |                 |     |            |          |             |             |             |             |             |
| 985  | SLOPES          | 2   | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                 |     | 06-13-2003 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1994] North abutment slope paving has 20 LF of horizontal cracks.  |                 |     |            |          |             |             |             |             |             |
| 986  | CURB & SIDEWALK | 2   | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-13-2003 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1993] Curb below exterior railings have spalling & delamination.   |                 |     |            |          |             |             |             |             |             |
| 988  | MISCELLANEOUS   | 2   | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-13-2003 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner). |                 |     |            |          |             |             |             |             |             |

General Notes: \*Bridge #9340, Year 2004  
 Bridge constructed in 1967.

See "Fracture Critical" report for additional information.

Inspectors: K Fuhrman, V Desens.

Inspector's Signature

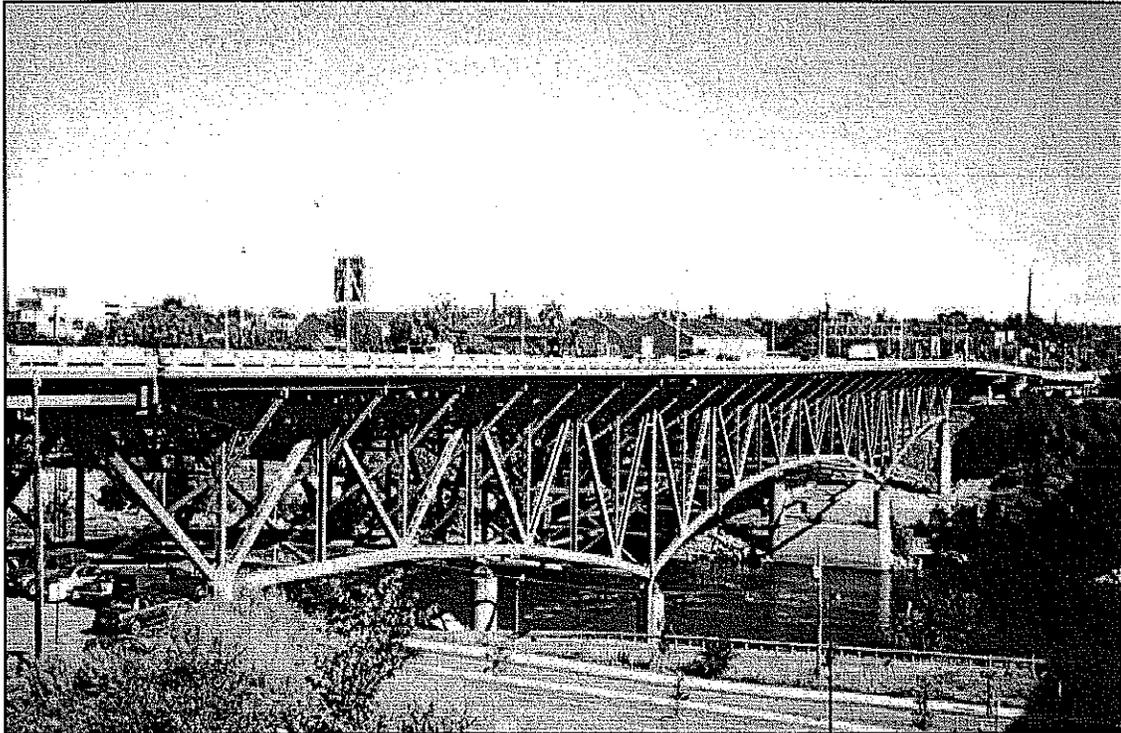
Reviewer's Signature / Date



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# **FRACTURE CRITICAL BRIDGE INSPECTION**

**Annual Report**



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**BRIDGE # 9340 (SQUIRT BRIDGE)**

**I-35W over the Mississippi River at Minneapolis, MN**

**JUNE 2004**

**Prepared For**  
**Minnesota Department of Transportation**  
**Office of Bridges & Structures**

**Prepared By**  
**Minnesota Department of Transportation Metro District**  
**Maintenance Operations, Bridge Inspection**



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## EXECUTIVE SUMMARY

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The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of the main truss spans and the in-depth inspection of the approach spans of Bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with acceleration/deceleration lanes and 2 ft. shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. Spans #6 - 8, the main river spans, are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 988 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams. Connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck with spray nozzles installed in the deck and railings. The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

During the 1998 inspection numerous fatigue cracks were found in Spans #3 - 5 and #9 & 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location, the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis. The area below includes a contract parking lot, used mainly by U of M students, and the Minnesota Commercial Railroad: (651) 646-2010.

The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss & fatigue cracks.

The hinge joint in span #2 is locked in full expansion, several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2, has two loose bolts and the bearing block has rotated. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3. This will likely require jacking the superstructure.

Several strip seal joints are leaking with glands ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the south abutment, in SBL. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs and consider using it at other locations.

The rubber "skirts", installed in 1999, above the truss end rockers tend to fill with debris. This should be flushed out annually. The horizontal drain troughs at pier #6 are clogged because of an inadequate slope.

During the 2004 inspection the plastic pigeon screens (installed in 1999) were removed on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment. These areas should be inspected during the next in-depth inspection.

## BRIDGE INSPECTION RECOMMENDATIONS

This recommendation listing refers to specific areas where fatigue cracks and other deficiencies were located during the 2004 inspection. Bridge inspection lists these deficiencies in the highest priority first.

### Long Term Repair Recommendations

- The long term plans for this river crossing need to be defined with replacement, re-decking, etc. Due to the "Fracture Critical" configuration of the main river spans and the problematic "crossbeam" details, and fatigue cracking in the approach spans, eventual replacement of the entire structure would be preferable.
- If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract. The expansion joints should also be replaced.

### Immediate Maintenance Recommendations

- 1) The plastic pigeon screens were removed, in 2004, on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment. These areas should be inspected during the next in-depth inspection.
- 2) Fatigue cracks at girder #1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("back face"). Fatigue cracks a girder #3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). The cracks are located in negative moment regions where the diaphragm web stiffener was not welded to the top flange and were pervious fatigue cracks occurred and were repaired in 1998 and 1999. These areas should be inspected next year for any lengthening of the cracks and drilling of possible stress relief holes.
- 3) Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2 has 2 loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3.
- 4) Several strip seal joints are leaking. The glands have ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract,

but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the, SBL, south abutment. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.

- 5) The rubber "skirts" sections above the truss end rockers, installed in 1999, tend to fill with debris. These should be flushed out annually. The horizontal drain troughs at pier #6 have inadequate slope, and are clogged.

### **Areas of Concern for Future Inspections**

- 1) Span 3, stringer #7 NB, has a 1-1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end.
- 2) During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis.
- 3) The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss, had flaking rust & fatigue cracks (open finger joint).
- 4) The hinge joint in span #2 is locked in full expansion several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## BRIDGE DESCRIPTION

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction & also acceleration/deceleration lanes. The shoulders are only 2 ft. wide. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end.

Spans #6 - 8 are "Fracture Critical" steel deck trusses, comprised of "built-up" welded members. Steel deck truss spans are 988 ft long. Span #7 is 456 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration, (open finger joint). The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams. The connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings. Control room is located at the northwest approach corner.

## BRIDGE DECK: NBI CONDITION CODE 5

The split deck has 3 through lanes each direction, with acceleration/deceleration lanes. Shoulders are only 2 ft. wide. A low slump concrete overlay, with numerous full-depth deck repairs, was placed on the deck in 1978. In 1998, the median copings were replaced with steel stay-in-place forms, and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks, sealed in 1998. The overlay has several patched areas, and some spalls. Additional patching is typically required each year. A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. [2001] The overlay has 15,250 SF of concrete repair patches.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling, particularly in the south approach spans. In 1998, the median coping overhangs were replaced with steel stay-in-place forms, and the exterior copings were repaired with shotcrete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers & beams has spalled off with exposed rebar; and in some locations, the spalling extends into the underside of the deck. [2001] The structural slab has 1,200 SF full depth repair patches.

**Open Finger Expansion Joints:** The deck has 3 open finger joints, above the hinge joint in span #2, & at each end of the truss spans. In 1999, rubber "skirts" were installed below the truss end finger joints & the drain troughs were removed.

**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, pier #11, and at five stringer joints in the main truss spans. These were installed in 1978. The strip seal glands have pulled out, with joints leaking, in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the south abutment, SBL, gland was patched using an experimental system. Hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints, from staged deck construction. All of these joints are leaching below; & at some joints the deck is spalling below.

**Exterior Railings:** The original exterior code #12 railings were retrofit in 1998. A 32" high concrete face was installed in front of the existing concrete rail base. The horizontal steel rails were removed. The curb along the railing has moderate cracking, delamination and spalling. The curb has 800 LF reconstructed in 2001.

**Median Railings:** Code #22, type "J"-rail, was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

## **BRIDGE SUPERSTRUCTURE: NBI CONDITION CODE 4**

**Paint System:** Bridge was originally painted with a lead base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have surface rust corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & surface rust corrosion in scattered locations. The floorbeam trusses & stringer ends have surface rust corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 have severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floor beams & "crossbeams", located below the open finger joints.

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members; connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floor beam connections. The box beam truss members have welded interior stiffeners. Some of these have tack-welded tabs. Many of these tack welds have cracked. Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have surface rust corrosion at the floor beam and sway frame connections. Pack rust is forming between the connection plates. There is paint failure,

surface rust, and section loss, flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access. This unfortunately prevents inspection of the interiors. During the 2004 inspection the plastic pigeon screens were removed on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment.

**Floor Beam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams with welded connections. The floorbeam trusses cantilever beyond the main truss on both sides. They are connected to the main truss, vertical members with bolts & rivets. The floorbeam truss members have numerous poor welding details, including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically, up to 1/2" – from original construction. The splice plates are bent. The floorbeam trusses below stringer joints have section loss, severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floor beam sections below the median were re-painted. Some areas have section loss with holes.

**Stringers:** There are 14 steel stringers, 27" deep rolled beams, bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have surface rust corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss with holes. Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have section loss, flaking & surface rust; moderate corrosion, the bearings at piers #5 & 8 are functioning properly. They are checked during each annual inspection. The bearings at pier #6 show no obvious signs of movement, difficult to reach with snooper.

**End Floor Beams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members, severe section loss on steel. This area was re-painted in 1998 - 1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floor Beams:** The two end floor beams are welded plate girders. They connect the main truss ends. The end floor beams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss with surface pitting at the base of the web, and

holes in the base of the vertical stiffeners. In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss with holes at the base of stiffeners. The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning. They show obvious signs of movement.

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam with two cracked vertical web stiffeners. The rocker-bearing pin was replaced. This required closing I - 35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. Installing braces between the crossbeam and beams #2 & 3 also reinforced the connection.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing, which was drilled out. In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and installing bracing between the crossbeam and 2 stringers reinforced the northeast connection.

**Steel Multi-Beam Approach Spans (spans #1 - 5 & #9 - 11):** The approach spans have welded beams - the depth transitions from 48" to 33". Connections are riveted. The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in span #2). In spans-#9 - 11, the deck widens from 15 to 18 beams. The fascia beams have section loss, flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and was caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified. They were lowered, using only four bolts at each connection. Most existing cracks were drilled out. Some were too small to reach, and the fractured beam was reinforced with bolted plates.

In span #2, multi-beam approach span, there is a cantilever expansion hinge with sliding plate bearings. The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam-ends are contacting, and some bearing plates have tipped, preventing the joint from reopening. The hinge area, with open finger joint above, was re-painted in 1999. The beam-ends have section loss, moderate surface pitting.

The north approach spans have lateral & diagonal bracing welded to the web.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 – 14):** The far north approach spans consist of cast-in-place concrete continuous “voided” slabs. They are 2 ft deep. Northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at pier #11 and the north abutment. There are 29 bearing assemblies. Piers #12 & #13 are cast directly into the slab with no bearings. These spans are in generally good condition. Spalling along the exterior and median copings was patched with shotcrete in 1998. [2001] Light fixtures at Metal Matic Incorporated parking lot.

## **BRIDGE SUBSTRUCTURE: NBI CONDITION CODE 6**

**Abutments:** The abutments have vertical cracking, with some staining from leaking deck joints.

**Truss Span Piers:** Piers #6 & 7, main river span, have two concrete columns resting on a pier wall. The west column on pier #7 has a minor vertical crack. Piers #5 & 8 have two concrete columns connected with an upper strut. The column on pier #8 has been reinforced with a concrete “jacket”. [2001] Underwater inspection conducted by Collins Engineers, Inc. in 2000 found pier 7 to be in good condition with no defects of structural significance. A 3 x 3 foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5 year inspection interval. [2004] Underwater Inspection by Ayres Associates found no evidence of scour or changes to structure condition.

**Approach Span Piers:** Piers #1 - 5 & #9 - 11, piers supporting the steel spans, consist of concrete columns with a cap. Those adjacent to railroad tracks have lower struts. The pier columns supporting the voided slab spans (piers #12 & 13) are cast directly into the slab with no cap. Pier #1 has tipped slightly to the north. This is related to the hinge failure in span #2. The east column on pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shotcrete repairs from leaking deck joint above.

## **OTHER BRIDGE ELEMENTS**

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed. North approach, SBL and on ramp, has no relief joint. [2001] South approach panel was scarified and a low slump overlay was installed.

**Channel & Protection:** NBI code #8 which is very good condition. The bridge is located just downstream from the Lower St. Anthony Lock & falls - the flow is very turbulent. At

normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel, along the east bank. Typically, the water depth along the west face is only 1 - 2 feet. Mn/Dot does not conduct underwater inspections. Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure running across the entire deck, mounted on the exterior railings at truss panel point #2' at north end of truss. There is a signpost mounted on the west railing at truss panel point #6 at south end of truss.

**Guardrail:** In 1998, the approach guardrails were repaired. Impact attenuator was installed at the northbound off ramp to University Avenue.

**Drainage:** Several deck drains drop directly into the river. The drain troughs at pier #6 have inadequate slope, and tend to fill up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving, at both abutments, is in good condition.

**Lighting:** Rail mounted deck lighting, under deck lighting in span #13, and river navigation lighting. "Metal Matic Inc." maintains the lighting above the parking lots in spans #11 & 12. A light post, W 5/3 L, on the west railing, has a 6" vertical split from plow damage.

**Miscellaneous:** The former "U of M" parking lot area below spans #2 - 5 has been barricaded from use while the parking lot area below spans #11 & 12 continues to be used by Metal Matic Inc employees. The U.S. Army Corps of Engineers is stockpiling river dredging material below span #8 this material is approximately 10 to 15 feet below the bottom truss diagonals (2003). The navigation light maintenance catwalk which runs below the median of the truss spans is being accessed by graffiti "artists" at pier #5.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings and a pump house/control room was constructed at the NW approach corner.

# BRIDGE SNOOPER FIELD INVESTIGATION

## Approach Spans

Northbound & southbound inspection notes are combined. Plans have beams numbered from the east.

## South Abutment:

Strip seal deck joint above. [1998] SBL Gland was patched using an experimental joint, hot poured seal with wire mesh reinforcement, and fourteen sliding plate bearing assemblies. [1995] Bearings are corroded and in full contraction from hinge failure in span #2, and tipping of pier #1. The seat area is cracked and discolored. [2003] 72 LF random cracks: south abutment.

## Span #1 (Steel Multi-beam):

Span is 53 FT long with 14 beams, 33" deep rolled beams, with welded cover plates with square ends. [1996] East fascia beam has section loss, flaking rust. [2003] Surface rust: on the beams. [1978] 3 West bays have 300 SF full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted.

## Pier #1:

10 Fixed; & 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a railroad crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 were re-painted.

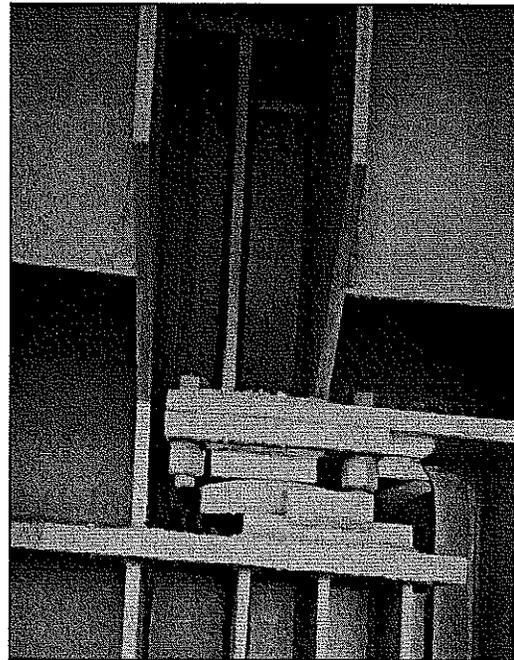
## Span #2 (Steel Multi-beam):

Span is 72 FT long with 14 beams; 33" rolled beams with welded cover plates, some with square end welded cover plates, the beams transition to 48" welded beams north of the hinge joint. [1978] 350 SF: full depth deck repairs. [1997] Conduit is loose below median. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted. [96/2003] Bottom flange at girder transitions & at hinge has section loss, flaking rust.

## Hinge Joint (12 ft. South of Pier #2):

Hinge joint has open finger joint above. [94/2002] Hinge assemblies are expanded beyond tolerance; sliding plates extend 4" beyond the base plates, reducing bearing capacity. At beam #10, the sliding plate has tipped, falling off the base plate, and is preventing the joint from opening. [1999] Hinge area re-painted. [2000] Beam-ends have section loss, moderate surface pitting; debris has begun to build up on hinge area. Additionally, the tops of the beam-ends are contacting at the top flange or at the web along this joint.

Hinge Bearing Sole Plate



**Pier #2:**

Pier consists of four concrete columns, 14 sliding plate bearing assemblies, and cap, with a railroad crash strut between the columns. [97/2000] Bearings have surface rust corrosion; east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 re-painted. [2003] East end of cap, south face has 10 SF of map cracking.

**Span #3 (Steel Multi-beam):**

Over Bluff St. Span is 110 FT long with fourteen, 48" deep welded plate beams. [1978] The 3 west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete: spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 re-painted. Diaphragm Line North of Pier #2 [1999] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange, no cracks. Refer to **First Diaphragm South of Pier #3** graph for crack locations, description & repair to the diaphragm line.

| <b>DIAPHRAGM CRACK LOCATIONS</b> |  |
|----------------------------------|--|
| <b>Girder Location</b>           | <b>First Diaphragm South of Pier #3</b><br>*Denotes original 1998 crack locations  |
| G1 (East Fascia NB)              | [99/2000] 1/4" crack on top of interior stiffener weld. [2003] No change.  |
| G2 (NB)                          | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G3 (NB)                          | * [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds. [2003] No crack.  |
| G4 (NB)                          | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G5 (NB)                          | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G6 (NB)                          | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web & was drilled out. Crack is contained.   |
| G7 (NB)                          | * [1998] One 2" hole drilled in web & other end of crack was ground out. [2003] The ground out end is cracked, visible on both sides web, should be drilled out.                                       |
| G8 (SB)                          |  |
| G9 (SB)                          |  |
| G10 (SB)                         |  |
| G11 (SB)                         |  |
| G12 (SB)                         | * [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out). [2003] No change.  |
| G13 (SB)                         |  |
| G14 (West Fascia SB)             | * [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack @ top of interior stiffener weld. [2003] No change. |

**Pier #3:**

10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #4 (Steel Multi-beam):**

Over contract parking lot & Bluff St. Span is 110 FT long with fourteen 48" deep welded plate beams. [1978] Second & third bays from the east have full depth deck repairs. [1998] Underside of deck has 200 LF of transverse leaching cracks, 200 SF of spall with exposed rebar below a transverse poured joint, full width of deck. [2000] Fourth bay from west has 20 SF of severe leaching. [1999] Beams 6, 7, 8, & 9 were re-painted. [1999] Diaphragms lowered. Refer to **First Diaphragm North of Pier #3** graph for crack locations, description & repair to the diaphragm line. [1998/99] Diaphragms lowered with strain gauges placed on beams #2 & 6 (*first diaphragm Line South of*

**Pier #4).** [1999] Diaphragms lowered, even though the connections have a “positive moment” configuration. Stiffeners are welded to the top flange.

| <b>DIAPHRAGM CRACK LOCATIONS</b> |  |
|----------------------------------|--|
| <b>Girder Location</b>           | <b>First Diaphragm North of Pier #3</b><br>*Denotes original 1998 crack locations  |
| G1 (East Fascia NB)              |  |
| G2 (NB)                          | Strain gauges on both faces.   |
| G3 (NB)                          | * [98/2000] West side, top flange web weld has 1/2" crack. Eastside, stiffener weld has a small crack. [2003] No change. |
| G4 (NB)                          | * [1999] West face, top of stiffener weld small crack. [2003] Crack is growing down toe of weld 3/4", drill out.         |
| G5 (NB)                          | * [2003] Small crack at the top of stiffener weld.   |
| G6 (NB)                          | * [1999] Small crack at top of stiffener weld. Strain gauges on the east face. [2003] No change.                         |
| G7 (NB)                          | * [2003] Small crack at the top of the interior stiffener weld.  |
| G8 (SB)                          |  |
| G9 (SB)                          |  |
| G10 (SB)                         |  |
| G11 (SB)                         | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G12 (SB)                         | * [1998] Two 2" holes drilled in web. Crack is contained.  |
| G13 (SB)                         |  |
| G14 (West Fascia SB)             | * [1998] Two 2" holes drilled in web. Crack is contained.  |

**Pier #4:**

14 Sliding plate expansion bearing assemblies. [1997] Bearings have surface rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #5 (Multi-beam/Deck Truss):**

Over contract parking lot; span is 109 FT long with fourteen, 48" deep welded plate beams bolted onto the crossbeam. [1996] 4 conduit clamps missing on NB fascia beam. Median girder has impact damage from parking lot below. [1978] Underside of deck is leaching at the finger joint, has two full depth patches in the west bays. [1998] Bay just east of median has severe spalling on “stool” and the adjacent deck is cracked. [1999] Beams 6, 7, 8, & 9 were re-painted. Refer to **First Diaphragm North of Pier #4** graph for crack locations, description & repair to the diaphragm line.

## DIAPHRAGM CRACK LOCATIONS

| Girder Location      | First Diaphragm North of Pier #4<br>*Denotes original 1998 crack locations                        |
|----------------------|---|
| G1 (East Fascia NB)  |   |
| G2 (NB)              |   |
| G3 (NB)              | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G4 (NB)              | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G5 (NB)              |   |
| G6 (NB)              |   |
| G7 (NB)              | * [1998] Two 2" holes drilled in web. [2001/03] Both sides, small crack at top of stiffener weld. |
| G8 (SB)              |   |
| G9 (SB)              |   |
| G10 (SB)             | * [1998] Two 2" holes drilled in web. Crack is contained.   |
| G11 (SB)             | [99/2000] Small crack at top of stiffener weld. [2003] No change.                                 |
| G12 (SB)             | * [1998] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld. Crack is contained.   |
| G13 (SB)             | [99/2000] Small crack at top of stiffener weld. [2003] No change.                                 |
| G14 (West Fascia SB) | [1999] Small crack at top of interior stiffener weld. [2003] No change.                           |

### MAIN TRUSS SPANS (NORTHBOUND, EAST TRUSS)

Stringers are numbered from the east (see framing plan).

#### Crossbeam:

[1986] The SE rocker bearing froze, damaging the east end of the crossbeam, resulting in cracked web stiffeners. The bridge was jacked up. I-35W was closed to traffic. SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and beams #3 & 4. [1998/99] Crossbeam was repainted; the side facing the finger joint has section loss.

#### CROSSBEAM & FLOORBEAM GAP (EAST END)

| Date            | Measurement |
|-----------------|-------------|
| September, 1998 | 16-5/8"     |
| April, 1999     | 17-13/16"   |
| April, 2000     | 18"         |
| September, 2001 | 18-1/16"    |
| June, 2003      | 16-7/8"     |

#### Panel Point #0 (Beginning of East Truss):

Expansion joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] End floorbeam was repainted; section loss at the base of the stiffeners. [2002] Water saturation between stringers 2 thru 4 at panel points 0 to 1.

**Panel Point #1 (East Truss, Pier #5):**

**Pier #5:**

Bearing assemblies have two "rollernest". Climbing onto the pier strut at this location accesses the catwalk. Debris piled at pier strut base allow for unauthorized access. [2002] Bearings show signs of recent movement.

**Span #6 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1997] West River Parkway constructed below bridge. [1999] Floorbeam truss's, sway bracing located below the median and beams 6, 7, 8, & 9 were re-painted.

**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):**

Floorbeam truss, near center, has an undercut weld in the flange.

**Panel Point #4 (East Truss Stringer Joint):**

Strip seal deck joint above. [1999] 1 ft. of gland pulled out at centerline. [1996] Floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box cover is missing at catwalk. [2000] Concrete in joint at east end.

**Panel Point #5 (East Truss):**

[1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out at stringer #3, cracked tack welds remain at stringer #4.

**Panel Point #6 (East Truss):**

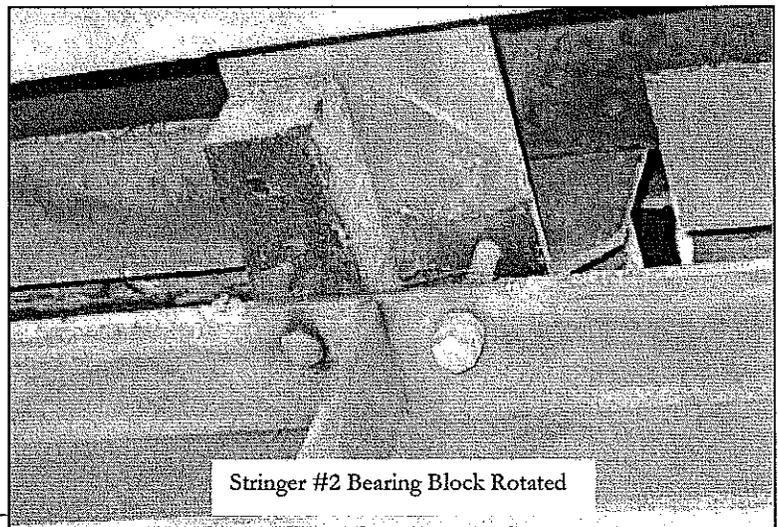
[1994] Floorbeam truss top chord, bottom flange, has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10, near the bottom chord connection, has a 4" long gouge with possible crack along a connection weld, should grind out. [2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #7 (East Truss):**

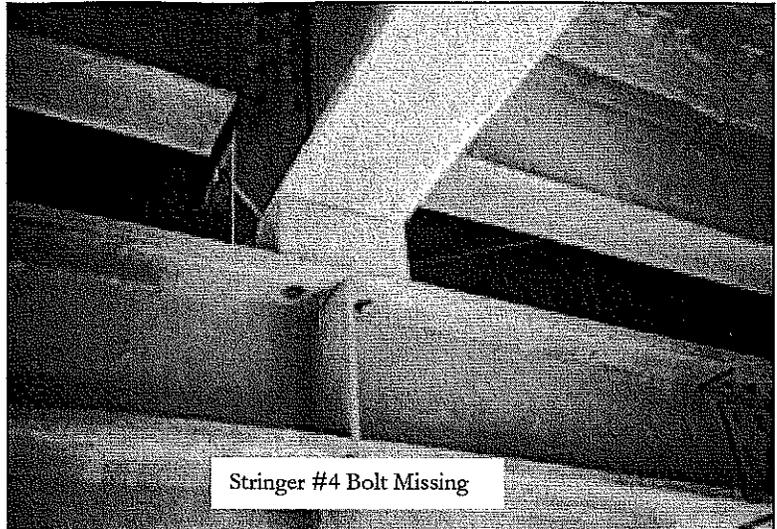
[2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #8 (East Truss Pier #6 Stringer Joint):**

Strip seal and deck drain above. [94/2003] Joint is leaking, small hole & membrane has pulled out. Stringer #4: one bolt broken off at south floorbeam connection. Deck drain is plugged solid. Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt. The bearing block has rotated 90°. [1999] Missing bolt replaced. [2000] Bolts are loose, needs repair. Vertical truss member has section loss, moderate flaking rust. Floorbeam bottom chord & middle bracing connection plate has moderate section loss, severe flaking rust. Middle bracing connection plate

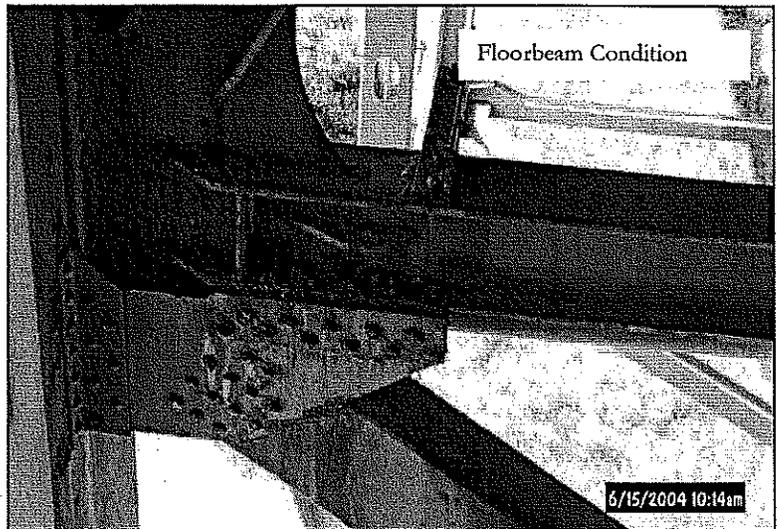


has 1/2" spread from pack rust.  
Underside of the deck has 50 SF of water saturation.



**Pier #6 (Downtown, West Bank of Mississippi):**

Pier consists of two concrete columns with a pier wall at the base, two "rollernest" bearing assemblies. [1997] Bearings have surface rust, moderate corrosion and show no signs of movement. [1997] Deck drain downspouts are clogged, top & bottom at median. [2004] Typical condition & rust at floorbeam connection near deck drain at connection U8. Possible clogged deck drain.



**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #9 (East Truss):**

[2003] Floorbeam bottom chord connection plate has a cracked tack weld on the south side. Underside of the deck has 20 SF of water saturation.

**Panel Point #10 (East Truss):**

Red navigation light for Mississippi river channel. [1999] Strain gauges installed on truss top chord member U9/U10, L9/U10 & L9/L10 from U of M research project.

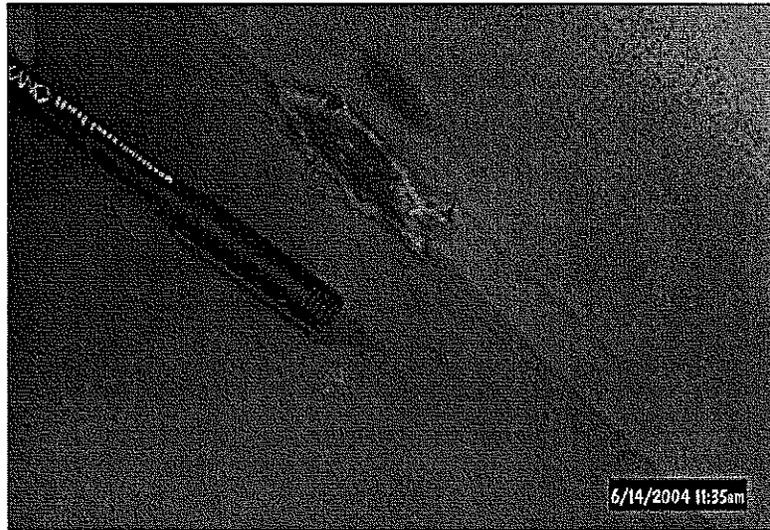
**Panel Point #11 (East Truss):**

Section loss: at gusset plate  
bottom chord. [2000] Stringer  
#3 has a bolt missing at the  
floorbeam connection. [2004]  
Pitting inside gusset plate  
connection at L11 toward  
L10



**Panel Point #12 (East Truss):**

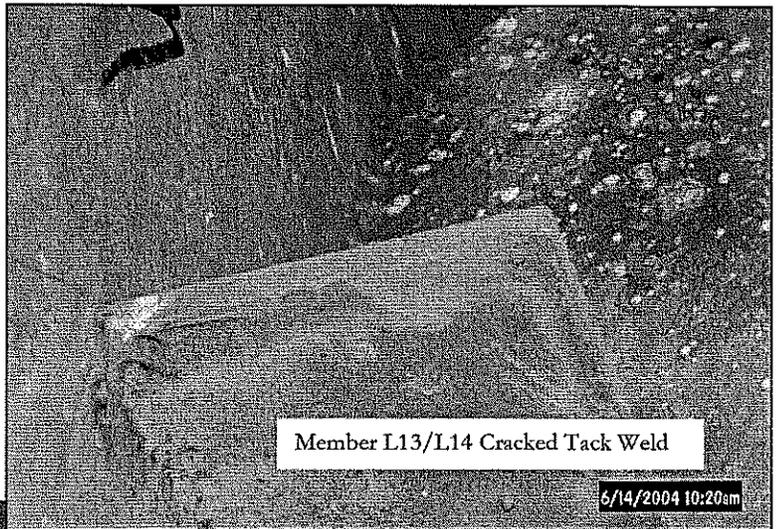
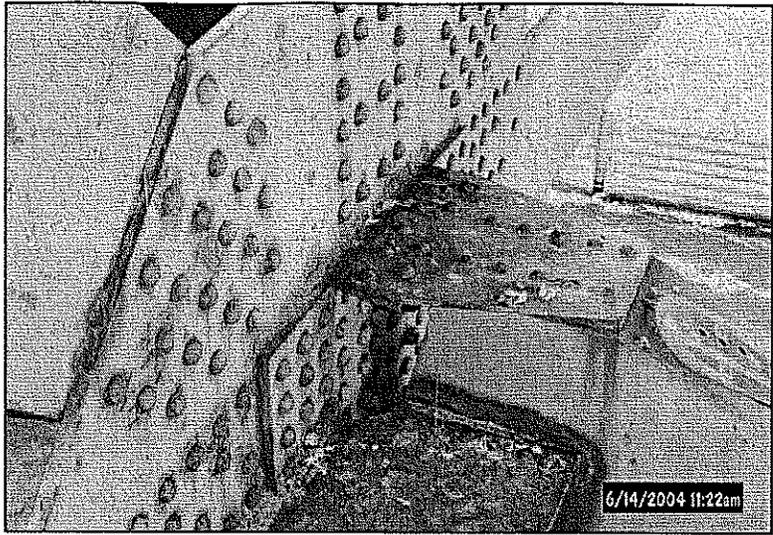
[1999] Truss bottom chord  
member L12/L13 has a  
cracked tack weld at an  
interior stiffener. [2004]  
Ground out pit from past  
inspection when???



**Panel Point #13 (East Truss):**

Water from deck drains fall directly into river. [99/2002] Bottom chord gusset plate has section loss, flaking & pack rust. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners. [2004] Bottom chord member L13/L14 cracked tack weld @ diagram tab (diagram #1?). Cracked tack weld @ diagram tab member L13/U14 see photos.

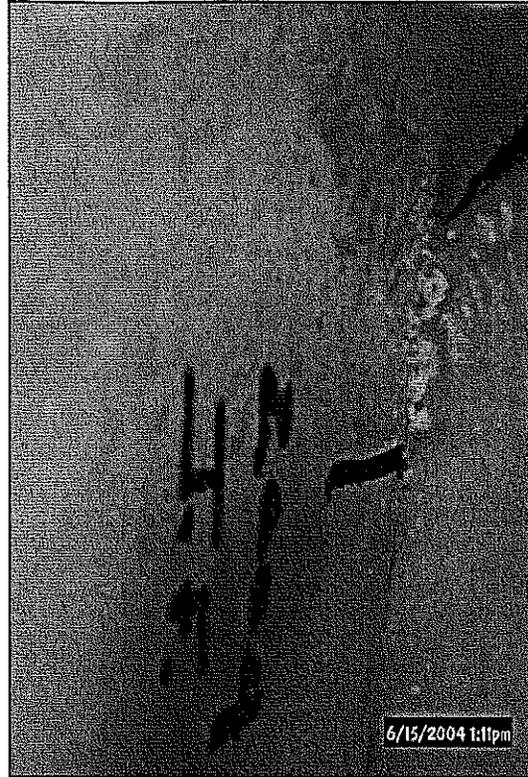
Bottom Chord Connection Condition



Member L13/U14 Cracked Tack Weld

**Panel Point #14 (East Truss Midspan Stringer Joint):**

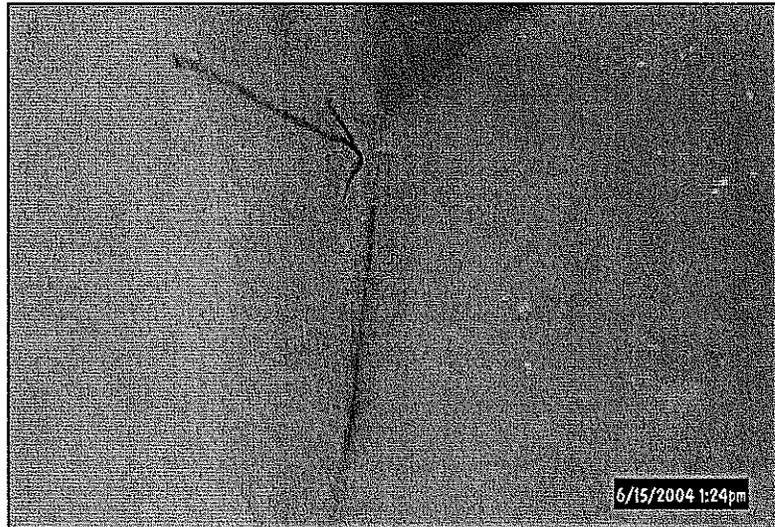
Strip seal expansion joint on the deck. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2002/03] Floorbeam bottom chord & middle bracing connection plate has 1/2" pack rust. Underside of the deck has 4 SF of delamination. [2004] Bottom chord member L14/L13' cracked tack weld @ diagram tab (diagram #3?) see photo.



Member L14/L13' Cracked Tack Weld

**Panel Point #13' (East Truss):**

Floorbeam truss top chord has a ground out spot near stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener. [2003] Truss bottom chord connection plate has 1/2" pack rust. Underside of the deck has 20 SF of water saturation. [2004] Bottom chord member L13'/L12' cracked tack weld @ diagram tab (diagram #3?) see photo.



Member L13'/L12' Cracked Tack Weld

**Panel Point #12' (East Truss):**

[99/2003] Underside of the deck has 65 SF of water saturation.  
[1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.  
[2004] Bottom chord member L12'/L11' two cracked tack weld @ diagram tab (diagram #3?) see photo.



Member L12'/L11' Cracked Tack Weld

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

[2003] Underside of the deck has 1 SF of spall with exposed rebar. Light pole, W5L3, has 1 LF crack.

**Panel Point #9' (East Truss):**

Water from deck drains fall onto the steel & directly into river. [2002] Bottom chord member L9'/L8' has section loss, flaking rust.

**Panel Point #8' (East Truss Pier #7 Stringer Joint):**

Red navigation light for Mississippi river channel. Strip seal expansion joint on the deck. [93/2003] Floorbeam truss has section loss, moderate flaking rust. North side: bolts replaced with "threaded-rod" at stringer #4, bolts replaced at stringer #5. Underside of the deck has 80 SF of water saturation.

**Pier #7 (East Bank of Mississippi):**

Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full height, leaching crack on the south face.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #7' (East Truss):**

[2003] Underside of the deck has 240 SF of water saturation, & 80 SF of delamination.

**Panel Point #6' (East Truss):**

[1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose. [2003] Underside of the deck has 10 SF of water saturation.

**Panel Point #5' (East Truss):**

[2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss Stinger Joint):**

Strip seal expansion joint on the deck. Truss diagonal member U4'/L3' has backer bars along the interior edges. [01/04] Strip seal has 3 LF of gland pulled out. Truss connection plates, the top chord, and floorbeam have moderate section loss, severe flaking rust. Bottom connection plates have 1/2" pack rust.

Top Condition of Floorbeam Truss



Bottom Condition of Floorbeam Truss

**Panel Point #3' (East Truss):**

Center lane has road sensors on the deck surface. Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):**

Overhead sign mounted on exterior railings. [1999] Deck in bay #3 has 100 SF of water saturation. [2003] Bottom connection plates have 1/2" pack rust. [2004] Area underneath overhead sign has 100 SF of water saturation.

**Pier #8:**

Two "rollernest" bearing assemblies, have surface rust. [2000] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them with vertical cracks.

**Panel Point #1' (East Truss Pier #8):**

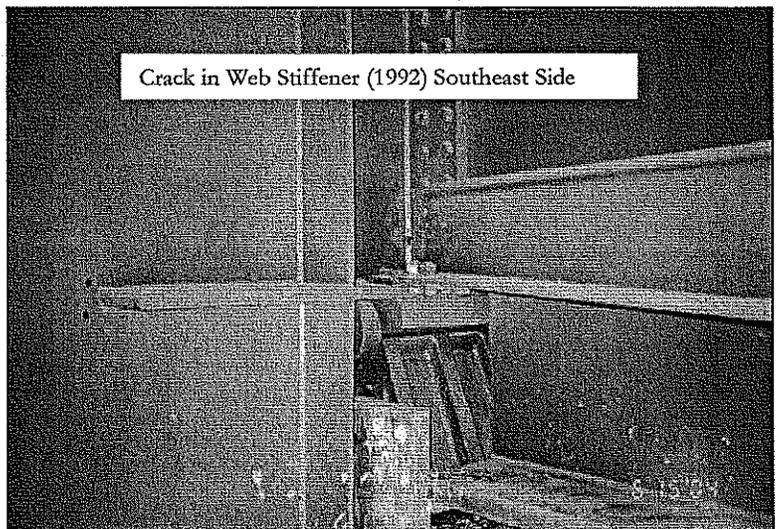
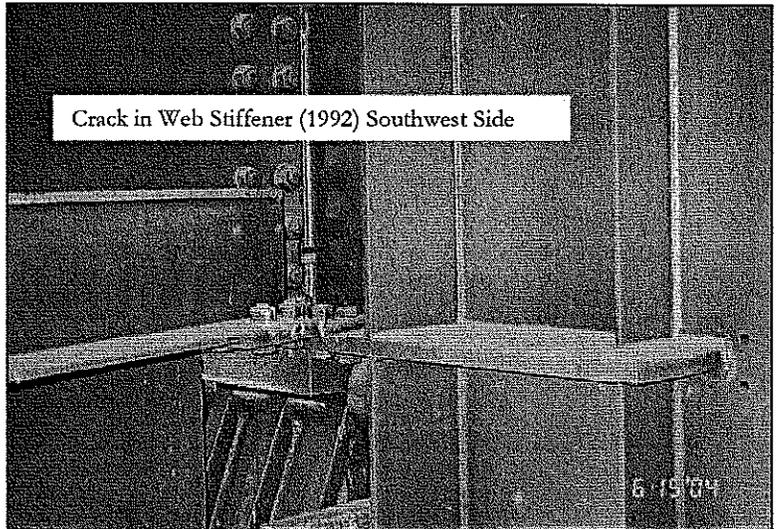
[2000] Bottom of truss above bearing has graffiti.

**Panel Point #0' (End of East Truss):**

Joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris, need to be flushed. [1998/99] Floorbeam re-painted, side facing finger joint has section loss with holes in web stiffeners. [1998] North face, directly above east rocker bearing, has two horizontal welds between stiffener plates. They have cracked through entirely. [2004] finger joint in the right lane and shoulder has been ground down to prevent the snow plows catching on the joint.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss, with pitting at base of stiffeners. [1992] North face has crack in the crossbeam web stiffener, above the rocker at the beam #12 connection. This was drilled out. [1997/98] North face: weld above east rocker bearing, between the horizontal & center vertical stiffener, has cracked through entirely. Weld end at the crossbeam web was partially drilled out. [1998] North face has cracks at both ends of the horizontal stiffener, above rocker bearing. They were drilled out with two small holes drilled in crossbeam web at each location. [1998] Bracing installed between crossbeam, above east rocker, and beams #3 & 5. *\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" at 40° F.*



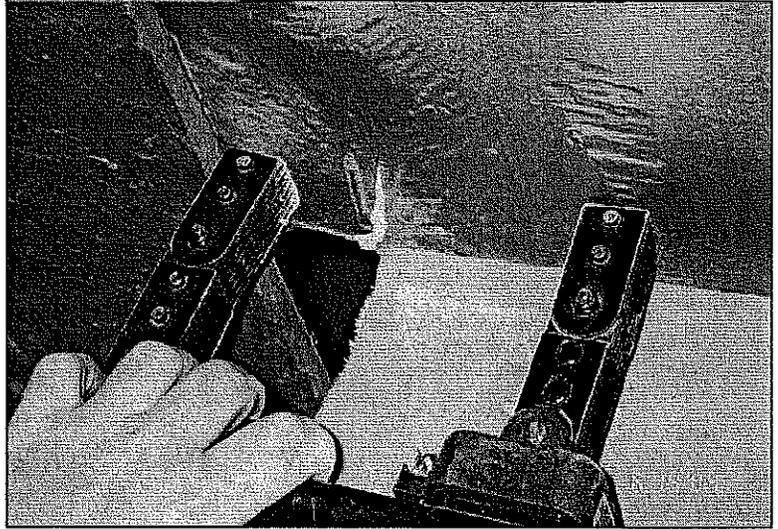
APPROACH SPANS (NB & SB NOTES ARE COMBINED)

Plans have beams numbered from the east.

**Span #9 (Multi-beam):**

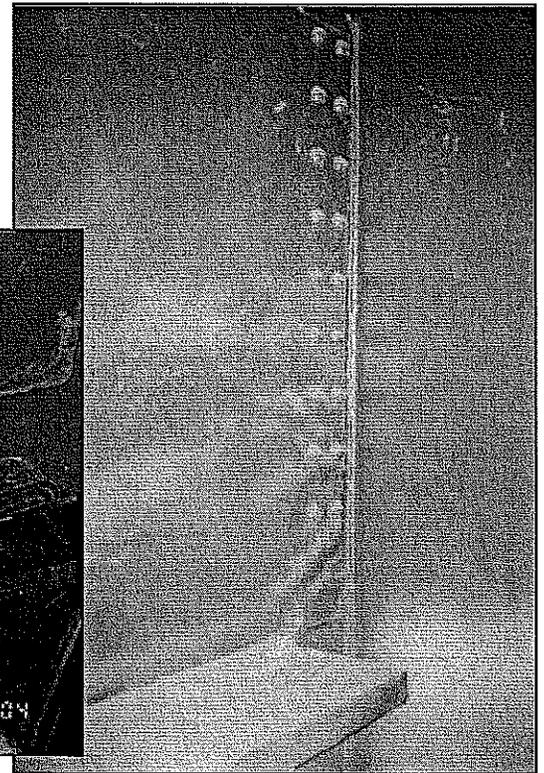
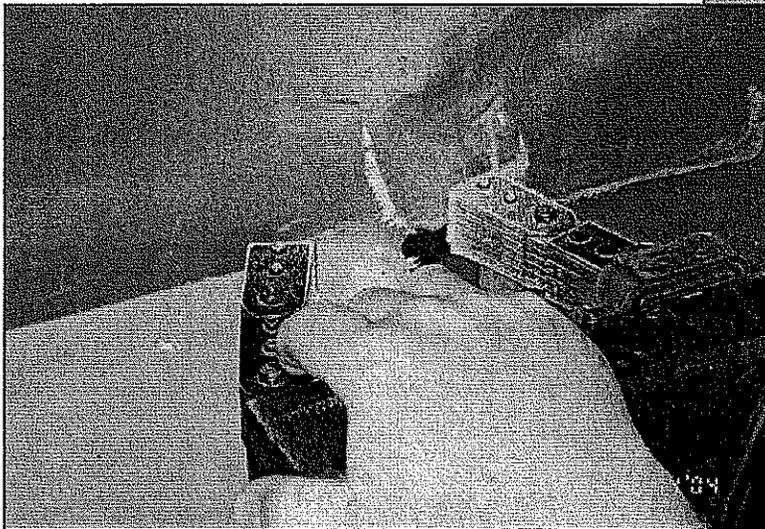
Span is 168 FT long with one floorbeam truss at pier #8, fourteen 48" deep welded plate beams bolted onto the crossbeam. Multi-beam spans resume. NB has 8 girders. SB has 7 girders. There are two active railroad tracks below. Refer to **First Diaphragm South of Pier #9** graph for crack locations, description & repair to the diaphragm line. [1999] Girders 6, 7, 8, & 9 are re-painted.

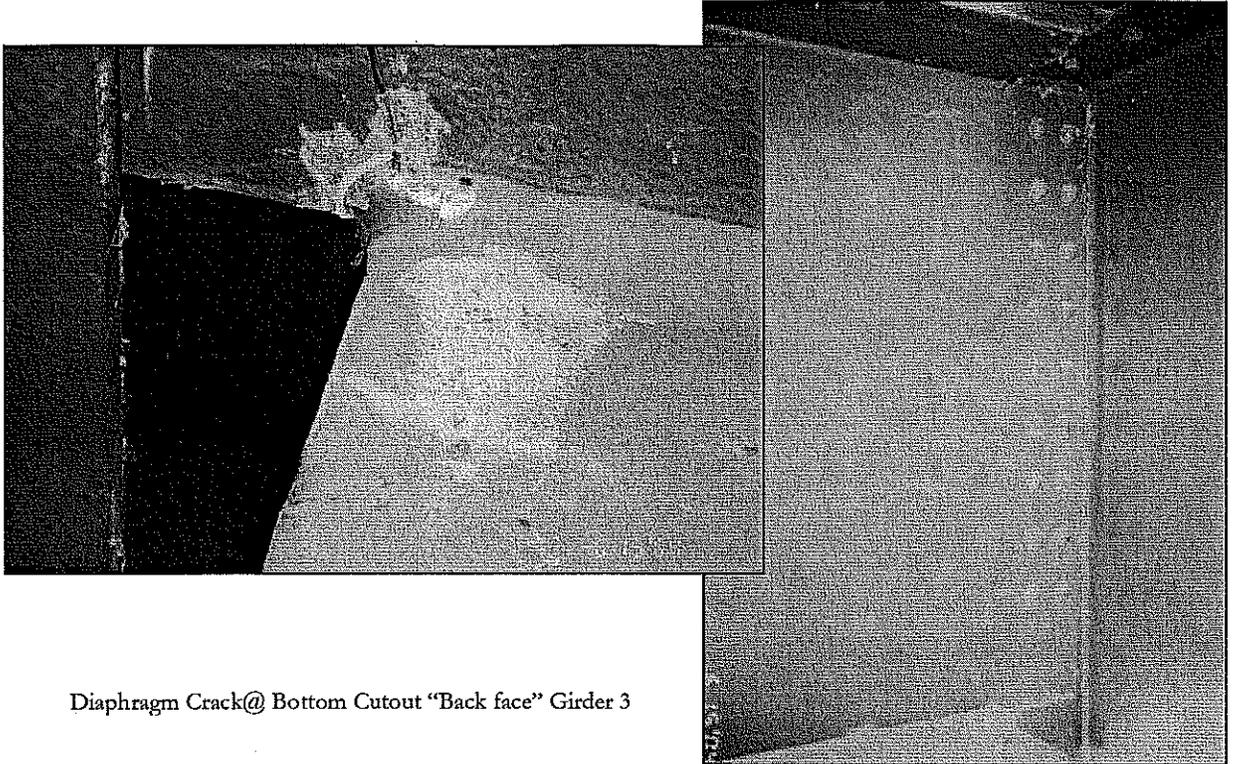
Lateral bracing welded to web & stiffener. [2003] Conduit at east side bottom of deck. [2002/04] Underside of deck at the south end, in NBL, has 150 SF of water saturation near the spray head. The 2<sup>nd</sup> & 3<sup>rd</sup> bays from west (southbound) have 250 SF of salt and water saturation. [2004] Girder 1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("Back face"). Girder 3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). [1998??] Girder #3 has a "tear" in the girder's web at the diaphragm girder connection. The "tear" measured 42" long on one side and 12" long on the other and was caused by out of plane bending between the diaphragm and the girder. Girder Connection Lowered & Girder Web Repaired with Splice Plate



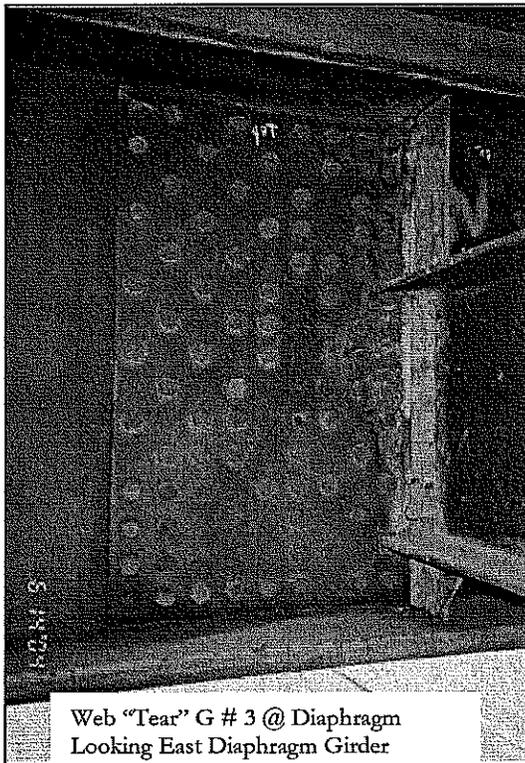
Diaphragm Crack@ Bottom Cutout "Front face" Girder 1C

Diaphragm Crack@ Bottom Cutout "Back face" Girder 1C

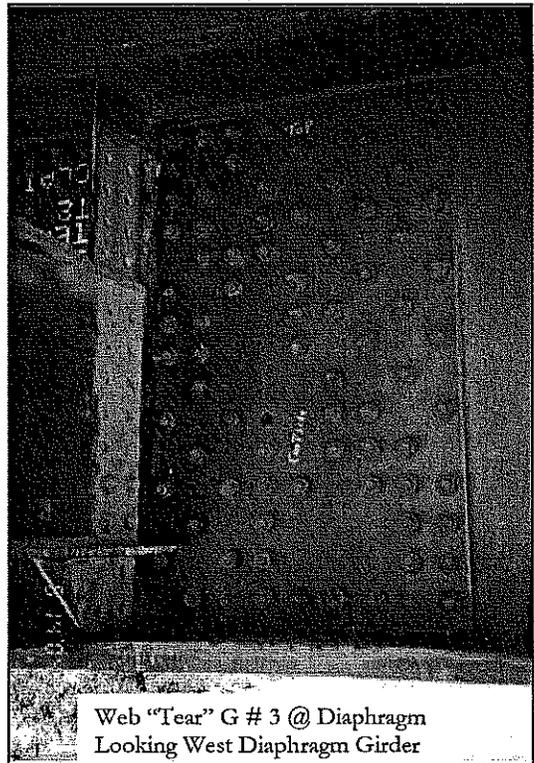




Diaphragm Crack @ Bottom Cutout "Back face" Girder 3



Web "Tear" G # 3 @ Diaphragm  
Looking East Diaphragm Girder



Web "Tear" G # 3 @ Diaphragm  
Looking West Diaphragm Girder

## DIAPHRAGM CRACK LOCATIONS

| Girder Location      | First Diaphragm South of Pier #9<br>*Denotes original 1998 crack locations            |
|----------------------|---|
| G1 (East Fascia NB)  | [2000] Exterior top flange/web weld has a 1/2" indication. [03] No change.            |
| G1C (NB)             |   |
| G2 (NB)              | * [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| G3 (NB)              |   |
| G4 (NB)              | * [98/2000] Small crack in top flange/web weld. [03] No change.                       |
| G5 (NB)              |   |
| G6 (NB)              |   |
| G7 (NB)              |   |
| G8 (SB)              |   |
| G9 (SB)              | * [1998] Crack in top of stiffener weld. [2003] No change.                            |
| G10 (SB)             |   |
| G11 (SB)             | * [98/2000] Small crack in top of stiffener weld (east side). [03] No change.         |
| G12 (SB)             | * [98/2000] Small crack in top of stiffener weld (east side). [03] No change.         |
| G13 (SB):            |   |
| G14 (West Fascia SB) |   |

### Pier #9:

Plate bearing assemblies have 13 fixed, and four sliding. Pier consists of four columns and cap, with a railroad crash strut between the columns. Deck drain: downspout. [1969] East column damaged by train derailment - the column has minor scrapes and spalls. Downspout had to be reconnected. [1999] Bearings 6, 7, 8, & 9 were re-painted. [2004] West vertical deck drain plugged.

### Span #10 (Steel Multi-beam):

Span is 94 FT long with 17 steel beams. NB has 10 beams; SB has 7 beams (the welded beams transition from 48" to 33" depth just north of pier) with active railroad tracks below. One track splits into two. Refer to **First Diaphragm North of Pier #9** graph for crack locations, description & repair to the diaphragm line. [1999] Beams 6, 7, 8, & 9 were re-painted. Diaphragms were inverted & lowered, even though the beam connections have a "positive moment" configuration. Connections welded to top flange. [2003] Conduit: at east side bottom of deck. [2000] Beam #6 appears to be "working" at the top connection. [2004] 250LF of leaching cracks underneath.

## DIAPHRAGM CRACK LOCATIONS

| Girder Location      | First Diaphragm North of Pier #9<br>*Denotes original 1998 crack locations                    |
|----------------------|---|
| G1 (East Fascia NB)  |   |
| G1B (NB)             | Stiffeners are welded to the top flange (positive moment).                                    |
| G1C (NB)             |   |
| G1D (NB)             | Stiffeners are welded to the top flange (positive moment)                                     |
| G2 (NB)              |   |
| G3 (NB)              |   |
| G4 (NB)              | * [2000] Two 2" holes drilled in web. Crack contained.  |
| G5 (NB)              | * [2000] Two 2" holes drilled in web. Crack contained.  |
| G6 (NB)              |   |
| G7 (NB)              |   |
| G8 (SB)              |   |
| G9 (SB)              | * [98/2000] Crack in top flange/web weld & top of stiffener weld (west side). [03] No change. |
| G10 (SB)             | * [2000] Crack in top flange/ web weld (east side) This crack has grown; see photos.          |
| G11 (SB)             | * [2000] Two 2" holes drilled in web. Crack contained.  |
| G12 (SB)             | * [2000] Two 2" holes drilled in web. Crack contained.  |
| G13 (SB)             |   |
| G14 (West Fascia SB) |   |



Girder #10 Vertical Stiffener/Girder Web



**Pier #10:**

Pier has 5 columns & cap with a RR crash strut between the columns and 18 sliding plate expansion bearings. [1999] Bearings 6, 7, 8, & 9 were re-painted. [2003] North face of cap has 20 SF of delamination.

**Span #11 (Steel Multi-beam):**

Span is 68 ft. long with 18 steel beams. Northbound has 11 beams; southbound has 7 beams, and the parking lot below. [1999] Beams 6, 7, 8, & 9 were re-painted. Connections welded to top flange. Diaphragms were inverted & lowered, even though the beam connections have "positive moment" configuration. [2003] Conduit: east side bottom of deck. [2004] 50 SF of water saturated deck underneath.

**Pier #11:**

Beginning: NB off ramp to University Avenue. (Br. #9340A). Strip seal deck joint above. The slab span consists of 18 sliding plate bearings, (steel beams) and 15 sliding plate bearings (voided slab). The pier consists of seven columns and a cap. [95/2000] Gland is leaking in several locations (NB & SB). [1998] Extensive shotcrete repairs on pier cap. [2000] West column has 1 SF spall. [1999] Sliding plate bearings for the steel beams were re-painted. [2004] Cover plate is missing from "J" barrier east rail NBL.

**Span #12 (Concrete Voids Slab Span):**

Parking lot: below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #13 (Concrete Voids Slab Span):**

2nd St. passes below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #13:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #14 (Concrete Voids Slab Span):**

[1998] Shotcrete repairs were done along median and exterior copings.

**North Abutment:**

Strip seal deck joint above with 14 sliding plate bearing assemblies. [2000] NB joint leaking at both ends. Bearings are rusty.

**MAIN TRUSS SPANS (SOUTHBOUND, WEST TRUSS)**

Plans show stringers are numbered from the east.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss. [1999] Bolted connection between beam #12 and the crossbeam was re-tensioned. Connection had been "working".

- [2000] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-9/16".
- [2001/03] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-1/2".

**Panel Point #0' (End Floorbeam Beginning West of Truss):**

Open finger joint on the deck. [1996] Floorbeam/truss connection has section loss, severe corrosion with surface pitting on plates & bolts. [1997] Conduit running along catwalk is hanging loose, and has

pulled out at the floorbeam. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] Floorbeam re-painted. Side facing finger joint has section loss on stiffeners. [2002] High spots of fingers torched off right lane & shoulder.

**Panel Point #1' (West Truss Pier #8):**

**Pier #8:**

See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [2002] Underside of the deck has 150 SF of water saturation and numerous full depth repairs.

**Panel Point #2' (West Truss):**

Overhead sign on bridge mounted on exterior railings. [2002] Bolts are "working" at stringer #11.

**Panel Point #3' (West Truss):**

The floorbeam truss, top flange of upper chord, has an ugly weld below the connection to stringer #11. [2003] Stringer #12 has connection bolts "working".

**Panel Point #4' (West Truss Stringer Joint):**

Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges. [199?] Two cracked tack welds at elevation block underneath Stinger #11. [2003] Floorbeam truss bottom chord at Stringer #11 connection: have section loss, moderate flaking and surface rust.

**Panel Point #5' (West Truss):**

[2002] Sprayer fitting corroded.

**Panel Point #6' (West Truss):**

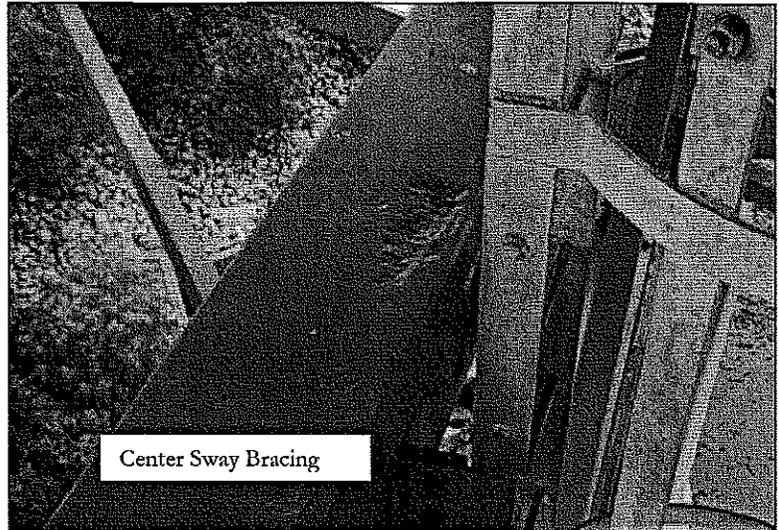
[96/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection. [1997] Stringer #10, the two south bolts are loose at the floorbeam connection. [99/2003] Stringer #9, south face, has one bolt loose at the floorbeam connection. [2004] Stringer #11 has one loose bolt south side.

**Panel Point #7' (West Truss):**

[1997] Top chord/floorbeam truss connection has a cracked tack weld on the diaphragm. [1999] Wind bracing gusset plate, at stringer #14 has loose bolts. [2002] Stringer #14 was installed crooked.

**Panel Point #8' (West Truss Pier #7 Stringer Joint):**

Strip seal deck joint above. [1998]  
Stringer #11: bolt replaced at floorbeam truss connection. [1996]  
Below stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent, from original construction.  
[2001] Truss bottom chord/sway frame connection (gusset plates) has section loss, heavy flaking rust.  
[2004] Sway bracing center horizontal has severe pitting & a hole; bottom sway bracing has another hole at the diagonal intersection (unable to reach with snooper) see photos.



**Pier #7:**

See NB notes. [2002] West column has vertical leaching cracks.

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses.

**Panel Point #9' (West Truss):**

[2001] Truss bottom chord/sway frame connection (gusset plates) has section loss, heavy flaking rust. [2002] Section loss: heavy flaking rust on truss bottom chord, L8'/L9'.

**Panel Point #10' (West Truss):**

[1994] Stringer #13: loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior, 15 ft. south of U10'.

**Panel Point #11' (West Truss):**

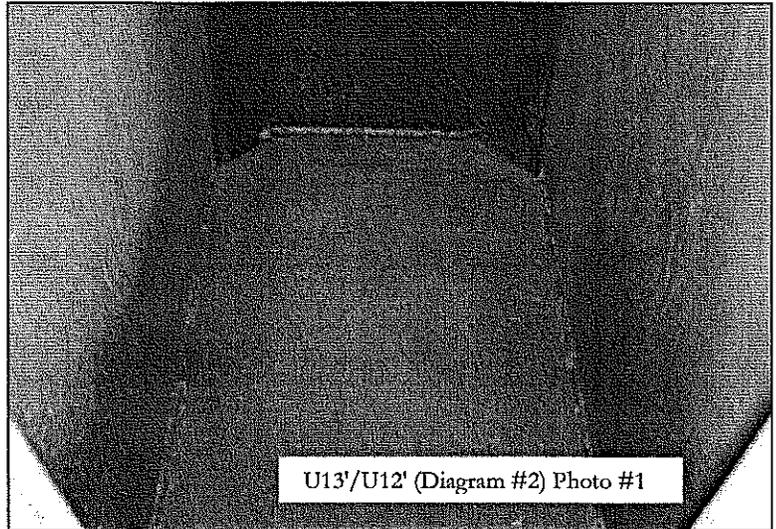
Nick in the truss bottom chord L11'/L12'

**Panel Point #12' (West Truss):**

Truss diagonal member U12'/L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

[2004] Upper chord member U13'/U12' (diagram #2) has no tabs, diagram is welded (full length) one side only see photo #1. Bottom chord member L13'/L12' cracked tack weld (diagram #1), (not @ diagram tab), (clean break) see photo #2.

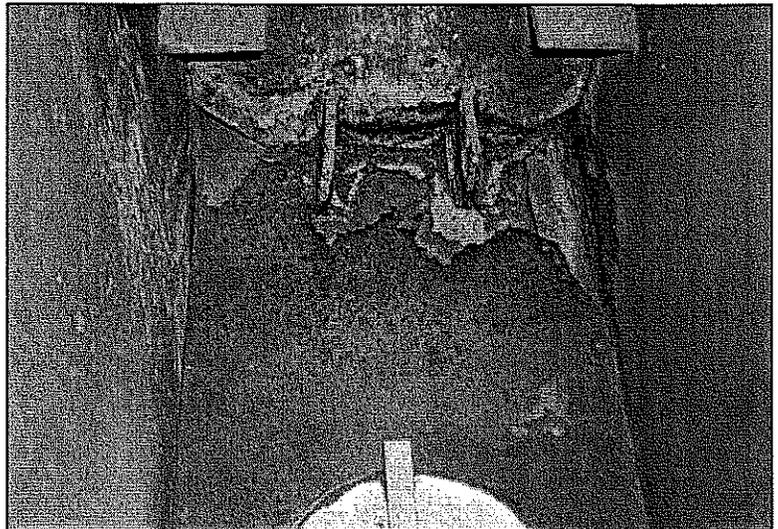


**Panel Point #14 (West Truss Midspan Stringer Joint):**

Strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has section loss, flaking rust near the joint from gland pulled out above. Tack welds along the sway frame/truss, bottom chord, and gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2003] Stringer #14 connection, south side of the floorbeam, has a cracked tack weld. [2004] Upper chord member U14/U13' has internal tack welds (full length) at interior diagram. Bottom chord member L14/L13' has corrosion from deck drain (?) see photo.



Flaking Rust @ Stringer #11

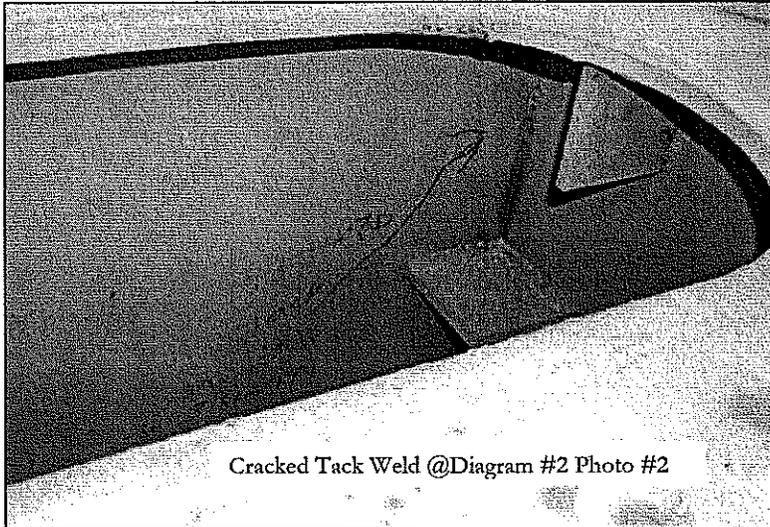


Member L14/L13' Corrosion

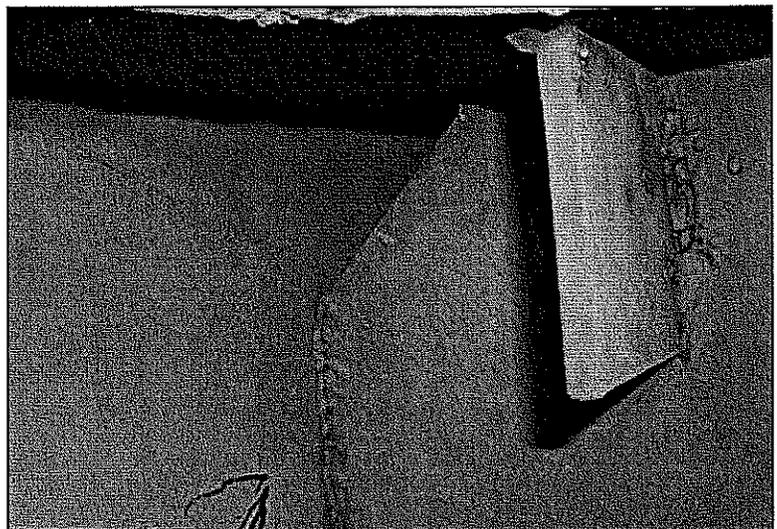
**Panel Point #13 (West Truss):**  
 [1999] Truss bottom chord/sway frame connection plates have 3/4" pack rust. [1996/99] Bottom chord member L13/L14 has cracked tack welds at two internal stiffeners. [2004] Bottom chord member L13/L14 has corrosion from deck drain (P), (diagram #1). Cracked tack weld (diagram #2) (not @ diagram tab) see photo #2 & #3. Cracked tack weld (diagram #3), (not @ diagram tab), (entire tack weld broken cleanly) see photo #4 & #5.



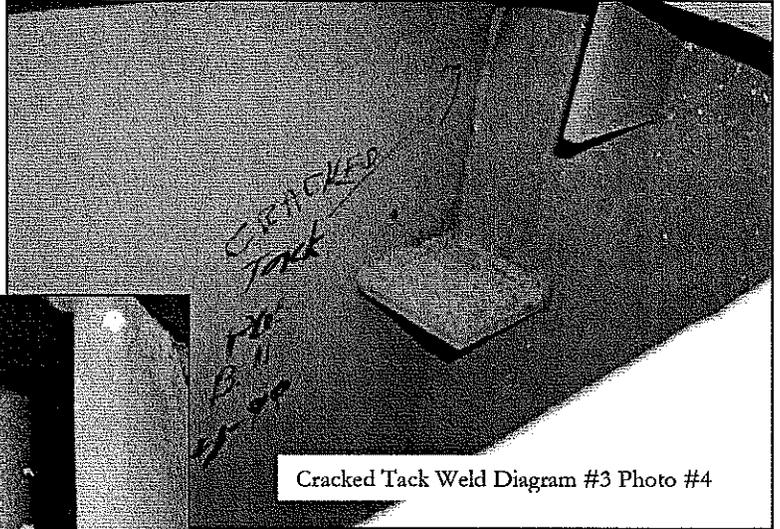
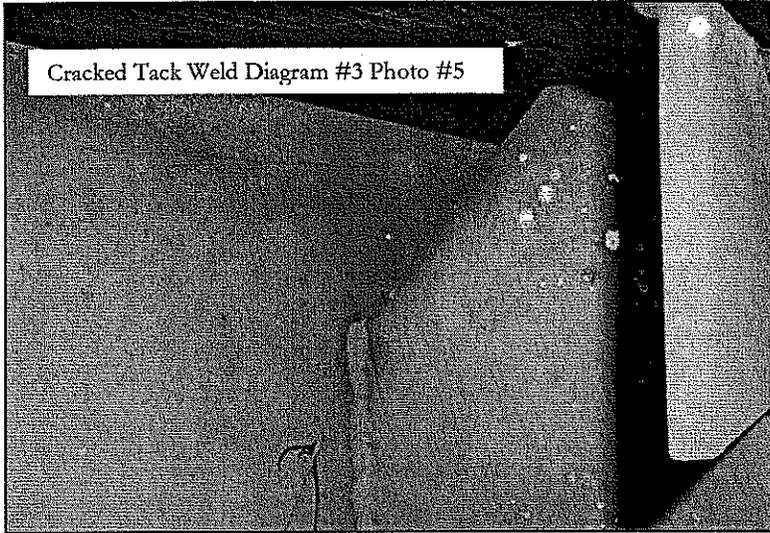
L13/L14 Corrosion @Diagram #1



Cracked Tack Weld @Diagram #2 Photo #2



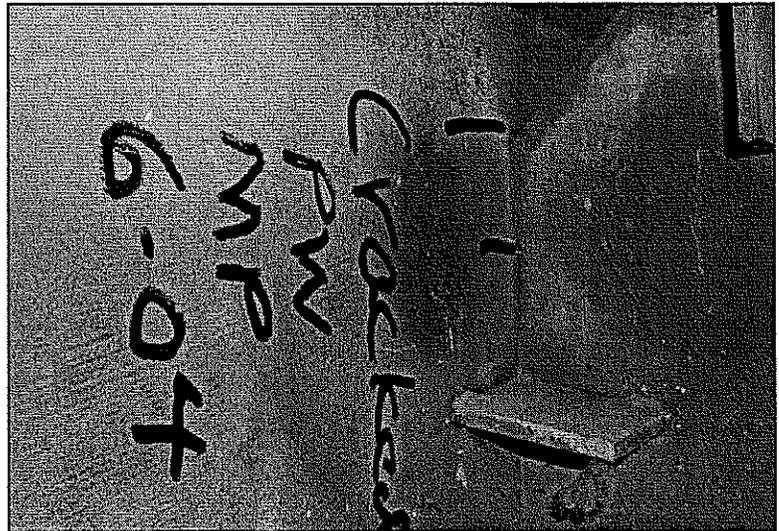
Cracked Tack Weld Diagram #2 Photo #3



**Panel Point #12 (West Truss):**

[1996] Bottom chord member L12/L13 has a cracked tack weld at the internal stiffener.

[2004] Bottom chord member L12/L13 has a cracked tack weld (diagram #2), (not @ diagram tab) see photo.



Member L12/L13 Cracked Tack Weld Diagram #2

**Panel Point #11 (West Truss):**

[1998] Stringer #11 has three bolts replaced at the floorbeam truss connection; the SE bolt is too short with inadequate threads. Stringer has lifted 3/32" off the bearing block on the south side.

**Panel Point #10 (West Truss):**

Truss top chord U10/U9 has two spots ground out.

**Panel Point #9 (West Truss):**

Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss Pier #6 Stringer Joint):**

Strip seal expansion joint on the deck. [1996] Gland has 8 ft pulled out in right gutter line. Deck drains. [96/2003] Drain clogged at median, horizontal trough, standing water in east grate. [2004] Vertical member L8/U8, bottom chord, & floorbeam connection plates have flaking rust from plugged deck drain.

**Pier #6:**

See NB notes.

**Span #6:**

Span is 266 FT long with seven floorbeam trusses.

**Panel Point #7 (West Truss):**

[2002] Underside of the deck has 20 SF of water saturation at stringer 12 thru 14.

**Panel Point #6 (West Truss):**

Overhead sign mounted on railing. Floorbeam truss top chord (U5/U4) has gouges in the bottom flange at the end of the connection plate; the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice from construction.

**Panel Point #5 (West Truss):**

Top chord U5/U6 has backer bars tack welded along the top interior corners of member see photo. [2004] Truss bottom chord, bottom lateral connection plates have spread 3/16" from pack rust.



Backer Bars Tack Welded Along Top Interior

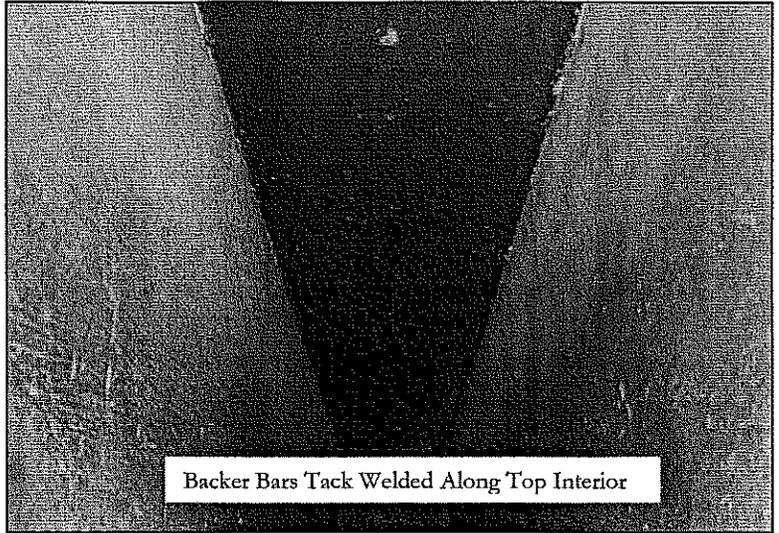
**Panel Point #4 (West Truss Stringer Joint):**

Strip seal expansion joint on the deck, Top chord U4/U5 has backer bars tack welded along the top interior corners of member see photo.

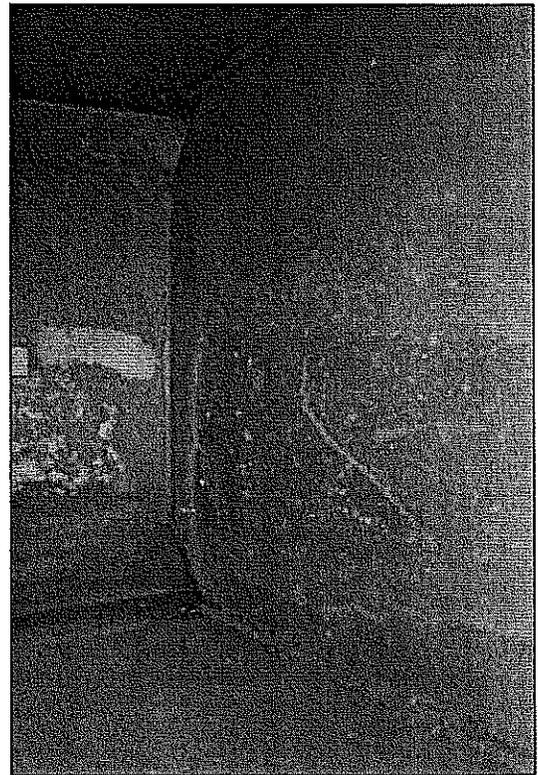
Bottom chord I4/L5 has no diaphragm tabs, full weld on side and tack welds on other see photo. [1998] Stringer #10:

bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire. [2004] Stringer #10, floorbeam connection, has flaking rust. Truss top chord has flaking rust.

Floorbeam top chord, stiffener under stringer #9 has cracked tack weld & is working.



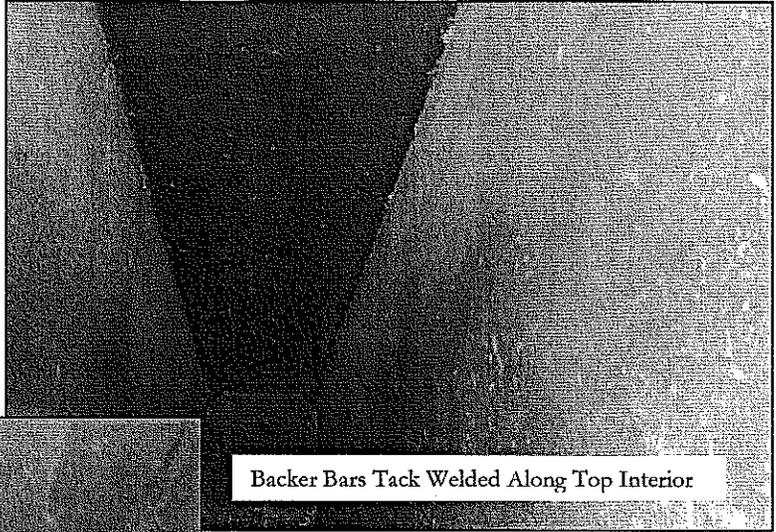
Backer Bars Tack Welded Along Top Interior



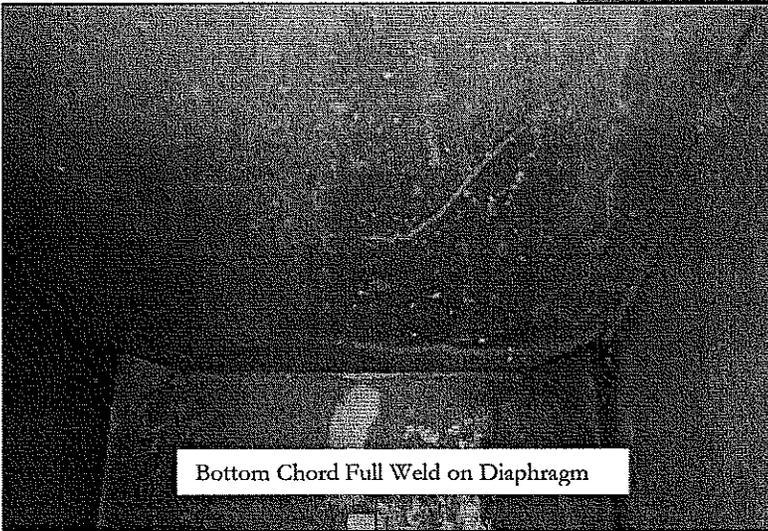
Bottom Chord Full Weld on Diaphragm

**Panel Point #3 (West Truss):**

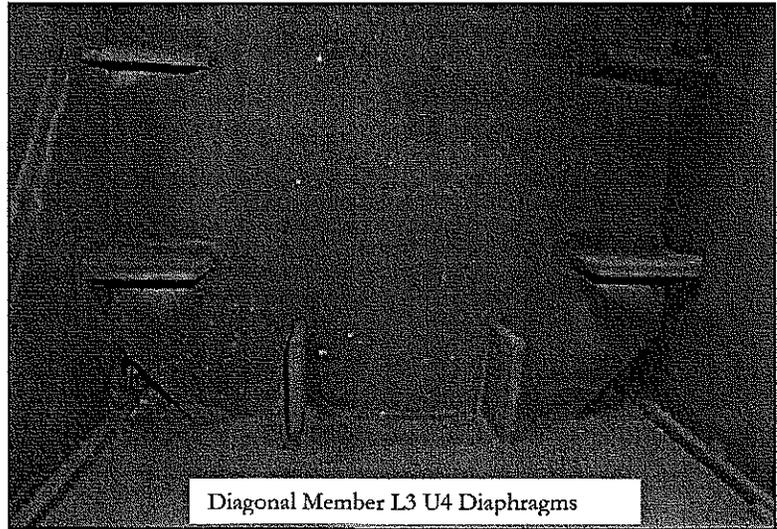
Truss bottom chord L2/L3 has a nick. Top chord U3/U4 has backer bars tack welded along the top interior corners of member see [2004] photo. Bottom chord L4/L5 has no diaphragm tabs, full weld on side and tack welds on other see [2004] photo. Diagonal member L3/U4 has 4 diaphragms with tabs see [2004] photo.



Backer Bars Tack Welded Along Top Interior



Bottom Chord Full Weld on Diaphragm



Diagonal Member L3 U4 Diaphragms

**Panel Point #2 (West Truss):**

[1996] Floorbeam truss member L2/U3 has a welding flaw. [1997] No crack! Magnetic particle tested. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Pier #5:**

See NB notes. Access ladder to catwalk removed.

**Panel Point #1 (West Truss Pier #5):**

[1994] Diagonal brace, floorbeam to stringer, has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout, originally drained into storm sewer. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Panel Point #0 (End Floorbeam End of West Truss):**

Open finger joint on the deck. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings: filled with debris, needs to be flushed. [1997] Floorbeam horizontal stiffener is bent directly above the rocker bearing. [1998/99] Floorbeam re-painted, side facing finger joint has section loss, pitting. [2004] Truss, top chord exterior connection plate has 1/8" deep section loss with pitting. SW rocker bearing has no movement.

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Date   | Measurement |
| September, 1998                              | 16-5/8"     |
| April, 1999                                  | 17-13/16"   |
| April, 2000                                  | 18"         |
| September, 2001                              | 18-1/16"    |
| June, 2003                                   | 16-7/8"     |

\*[2004] Gap between crossbeam & floorbeam, at west end, measures 14-1/2".

\*[2000] Gap between crossbeam & floorbeam, at west end, measures 16-1/2".

**Crossbeam:**

[1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker were partially ground out. [1998/99] Crossbeam re-painted, the side facing finger joint has section loss, pitting with holes in the base of stiffeners, pitting on bottom flange at median.

**Span #5(Deck Truss Multi-beam):**

The multi-beam spans resume at panel point #0.

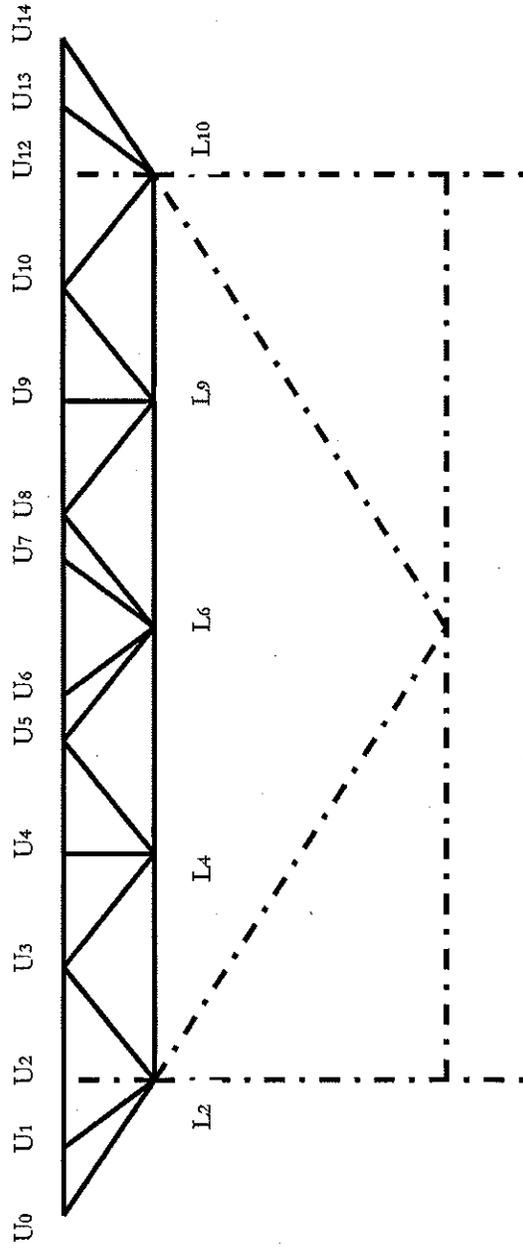
See NB Notes for South Approach Spans

## PREVIOUS SNOOPER INSPECTIONS

- 2003 Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Bill Nelson
- 2002\* Mark Pribula, Kurt Fuhrman, Pete Wilson, Jerry Oldeen, Bruce Anderson, Mike Palmer
- 2001 Marl Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer
- 2000 Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer, Wayne Tennison Pete Wilson, George Morelli, Rebecca Lane
- 1999 Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadegg, Pete Wilson
- 1998 Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson
- 1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson.
- 1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994 Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993 Terry Moravec, Chas Martin, Tom Waks
- 1991 Chester Martin, Chas Martin, Jerry Anderson
- 1988 Chester Martin

\*Denotes an "In-Depth" Inspection

# TRUSS DIAGRAM



Minnesota Department of Transportation  
 Bridge Inspection, Maintenance Operations Metro District

Bridge No. 9340

Truss Diagram (Floor Beam)

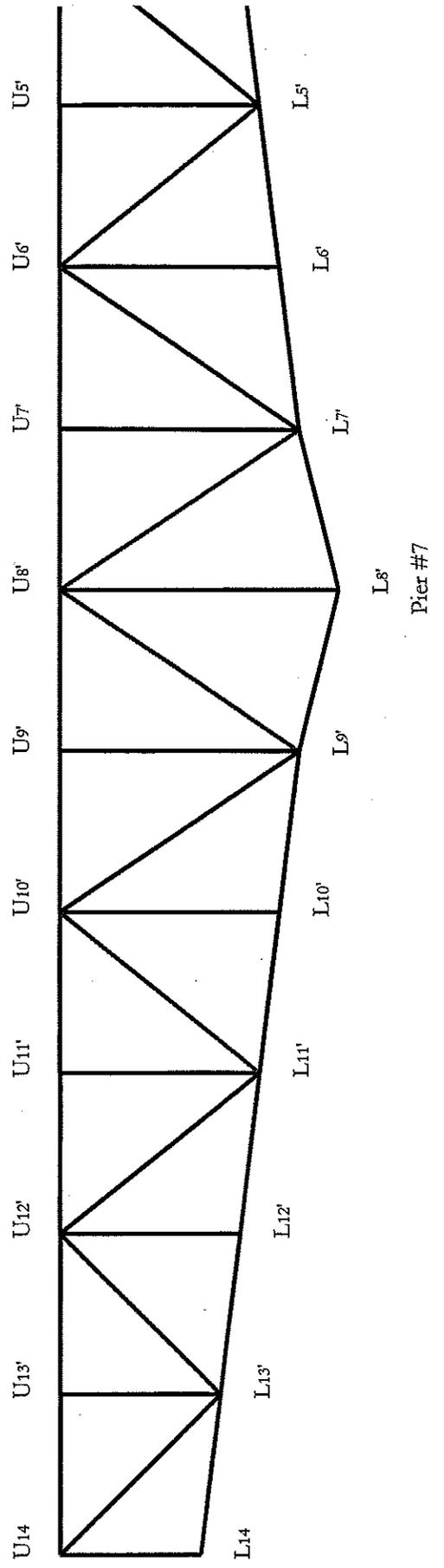
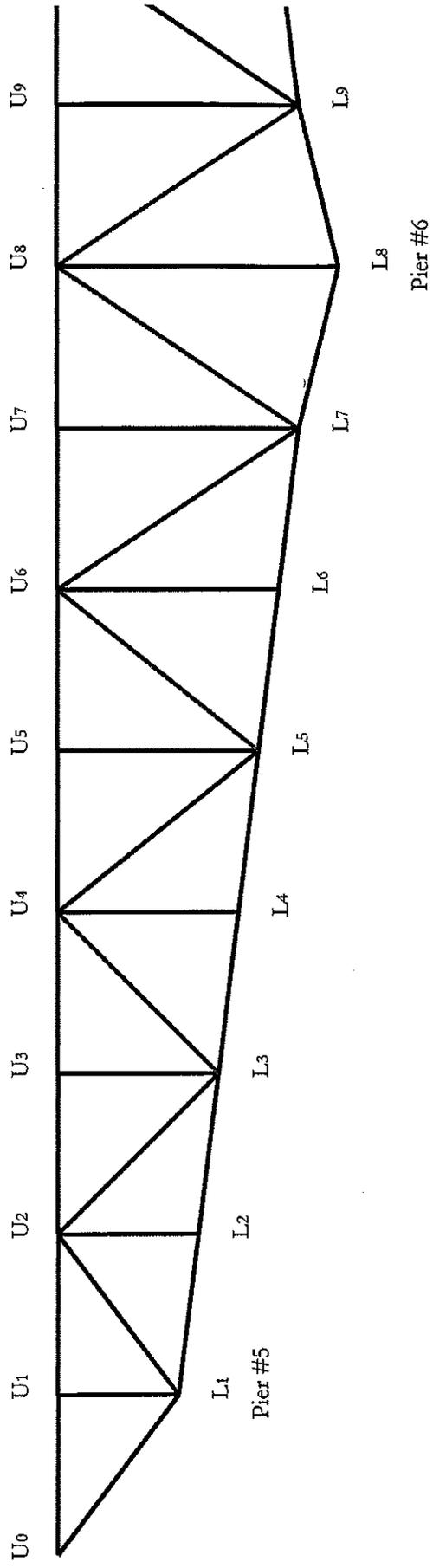
I-35W over the Mississippi River at Minneapolis, MN

Section 24 & 25 Township T. 29 N Range 24 W  
 County Hennepin Co. MN

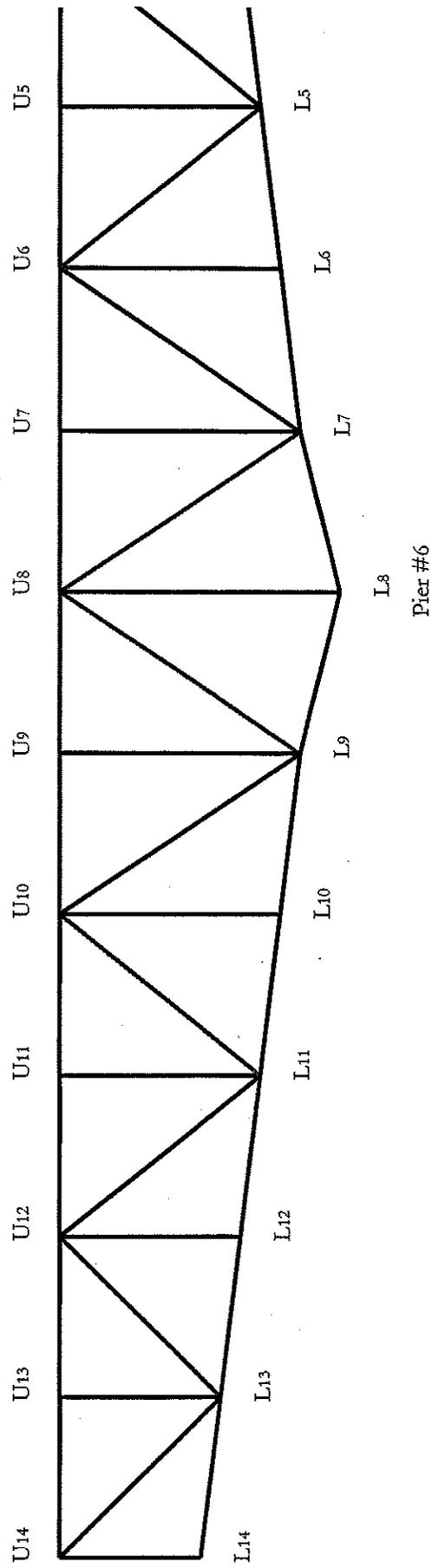
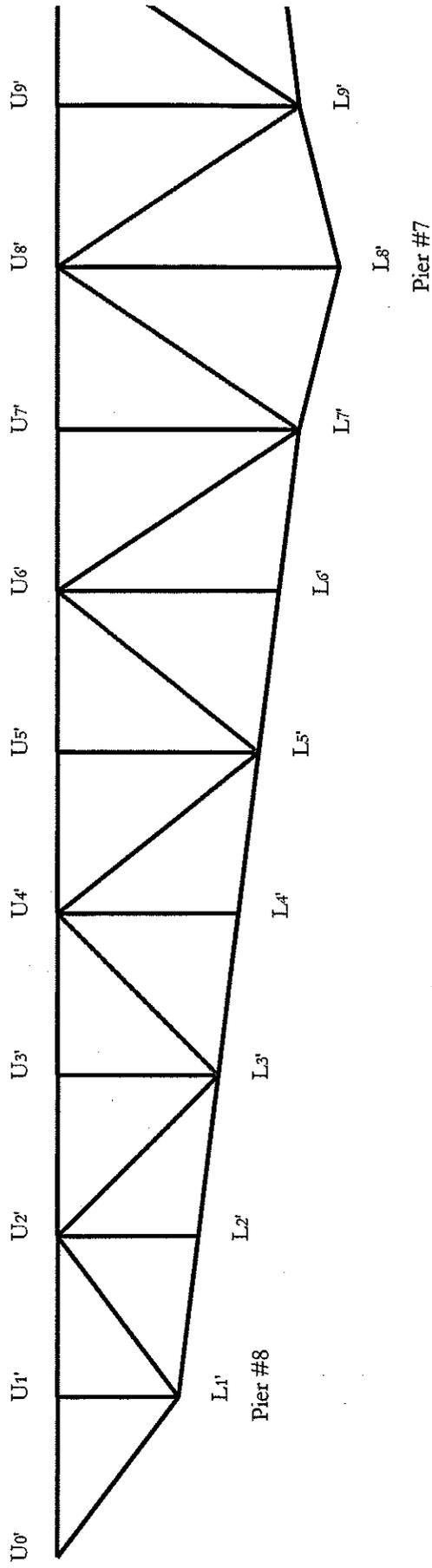
**Note**

- Tension Members in Red
- Compression Members in Black
- Reversal Members in Blue
- Dashed Lines are Secondary Members

# TRUSS DIAGRAM



# TRUSS DIAGRAM





## Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340**

**I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-10-2005**

|  |  |   |
|--|--|---|
| County: HENNEPIN                                   | Location: 1.0 MI NE OF JCT TH 94         | Length: 1,907.0 ft                          |
| City: MINNEAPOLIS                                  | Route: Isth 35W Ref. Pt.: 018+00.538     | Deck Width: 113.3 ft (Varies)               |
| Township:  | Control Section: 2783 Maint. Area: METRO | Rdwy. Area / Pct. Unsnd: 201,511 sq ft 6 %  |
| Section: 25 Township: 029N Range: 24W              | Local Agency Bridge Nbr:                 | Paint Area / Pct. Unsnd: 490,200 sq ft 15 % |
| Span Type: CSTL BEAM SPAN                          |  |   |
| NBI Deck: 5 Super: 4 Sub: 6 Chan: 7 Culv: N        |  |   |
| Open, Posted, Closed: OPEN                         |  |   |
| Appraisal Ratings - Approach: 8                    | Waterway: 9                              | MN Scour Code: L-STBL;LOW RISK              |
| Required Bridge Signs - Load Posting: NOT REQUIRED | Traffic: NOT REQUIRED                    | Def. Stat: S.D. Suff. Rate: 50.0            |
| Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE  |  |   |

**STRUCTURE UNIT: 0**

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE  | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|---|----------------------|-----|---|------------|-------------|-------------|-------------|-------------|-------------|--|
| 22  | LS O/L (CONC DECK)   | 2   | 06-10-2005  | 201,853 SF | 0           | 0           | 201,853     | 0           | 0           |  |
|   |                      |     | 06-16-2004  | 201,853 SF | 0           | 0           | 201,853     | 0           | 0           |  |
| Notes: 3 lanes + on/off ramp each direction (2 FT shoulders). [1978] Low slump overlay (extensive full depth repairs). [1993] Spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound. [2001] Mill and Patch repair of deck by Contract. |                      |     |   |            |             |             |             |             |             |  |
| 48  | LS O/L (CONC SLAB)   | 2   | 06-10-2005  | 17,233 SF  | 0           | 17,233      | 0           | 0           | 0           |  |
|   |                      |     | 06-16-2004  | 17,233 SF  | 0           | 17,233      | 0           | 0           | 0           |  |
| Notes: Spans 12 - 14 have a 2 FT deep CIP concrete voided slab (continuous).  |                      |     |   |            |             |             |             |             |             |  |
| 300   | STRIP SEAL JOINT     | 2   | 06-10-2005  | 946 LF     | 852         | 0           | 94          | N/A         | N/A         |  |
|   |                      |     | 06-16-2004  | 946 LF     | 852         | 0           | 94          | N/A         | N/A         |  |
| Notes: [1978] Type H strip seal at abutments, pier 11, and stringer expansion joints (7 total). [1998] Strip gland replaced at pier 11, north abutment. South abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.  |                      |     |   |            |             |             |             |             |             |  |
| 301   | POURED DECK JOINT    | 2   | 06-10-2005  | 1,017 LF   | 1,000       | 0           | 17          | N/A         | N/A         |  |
|   |                      |     | 06-16-2004  | 1,017 LF   | 1,000       | 0           | 17          | N/A         | N/A         |  |
| Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).   |                      |     |   |            |             |             |             |             |             |  |
| 303   | ASSEMBLY DECK JOINT  | 2   | 06-10-2005  | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |  |
|   |                      |     | 06-16-2004  | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |  |
| Notes: Open finger joints at truss ends and span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners).   |                      |     |   |            |             |             |             |             |             |  |
| 412   | APPR RELIEF JOINT    | 2   | 06-10-2005  | 226 LF     | 0           | 226         | 0           | N/A         | N/A         |  |
|   |                      |     | Notes: Relief joint at approaches. 52 LF SBL 4" wide; 52 LF NBL 3 1/2" wide; south approach. 26 LF SBL ramp 2" wide; 48 LF SBL 1" wide; 48 LF NBL 1" wide; north approach. Relief joints need re-sealing. |            |             |             |             |             |             |  |
| 321   | CONC APPROACH SLAB   | 2   | 06-10-2005  | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
|   |                      |     | 06-16-2004  | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
| Notes: [1991] All 4 approach panels have transverse cracks.   |                      |     |   |            |             |             |             |             |             |  |
| 331   | CONCRETE RAILING     | 2   | 06-10-2005  | 7,831 LF   | 7,000       | 831         | 0           | 0           | N/A         |  |
|   |                      |     | 06-16-2004  | 7,831 LF   | 7,831       | 0           | 0           | 0           | N/A         |  |
| Notes: [1998] 4018 LF Railings re-constructed. 3813 LF Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally code 12) were retrofit (32" high concrete face added, horizontal steel railings removed). Vertical cracks.  |                      |     |   |            |             |             |             |             |             |  |
| 107   | PAINTED STEEL GIRDER | 2   | 06-10-2005  | 10,596 LF  | 0           | 9,000       | 1,400       | 110         | 86          |  |
|   |                      |     | 06-16-2004  | 10,596 LF  | 0           | 9,000       | 1,400       | 110         | 86          |  |

**Mn/DOT BRIDGE INSPECTION REPORT**

**I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-10-2005**

**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 |
|--|----------------------|-----|------------|-----------|----------|----------|----------|----------|----------|
| Notes: [1968] Bridge painted with lead base system. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have salt film, minor chalking throughout, fascia beams have section loss: pitting, flaking & surface rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound.  |                      |     |            |           |          |          |          |          |          |
| 113  | PAINT STEEL STRINGER | 2   | 06-10-2005 | 14,896 LF | 0        | 14,700   | 0        | 150      | 46       |
|  |                      |     | 06-16-2004 | 14,896 LF | 0        | 14,700   | 0        | 150      | 46       |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have section loss: pitting, flaking & surface rust corrosion at expansion joints. [1999] Median stringers re-painted. [91/2000] Stringer/floorbeam connections are "working". Several bolts are loose or missing.   |                      |     |            |           |          |          |          |          |          |
| 131  | PAINT STL DECK TRUSS | 2   | 06-10-2005 | 2,127 LF  | 0        | 0        | 1,880    | 215      | 32       |
| Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have section loss: pitting, flaking & surface rust, severe pigeon debris, at the floorbeam & sway frame brace connections (with pack rust & surface pitting). [1999] Pigeons screens placed on truss member openings.   |                      |     |            |           |          |          |          |          |          |
| 152  | PAINT STL FLOORBEAM  | 2   | 06-10-2005 | 3,348 LF  | 0        | 2,000    | 725      | 600      | 23       |
|  |                      |     | 06-16-2004 | 3,348 LF  | 0        | 2,000    | 725      | 600      | 23       |
| Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. Floorbeam trusses have numerous poor weld details, section loss: pitting, flaking & surface rust, some have holes, (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have salt film, chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. |                      |     |            |           |          |          |          |          |          |
| 373  | STEEL HINGE          | 2   | 06-10-2005 | 18 EA     | 0        | 4        | 0        | 0        | 14       |
|  |                      |     | 06-16-2004 | 18 EA     | 0        | 4        | 0        | 0        | 14       |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. Section loss at hinges, (open finger joint) steel has moderate pitting, flaking & surface rust. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.  |                      |     |            |           |          |          |          |          |          |
| 380  | SECONDARY ELEMENTS   | 2   | 06-10-2005 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
|  |                      |     | 06-16-2004 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.   |                      |     |            |           |          |          |          |          |          |
| 311  | EXPANSION BEARING    | 2   | 06-10-2005 | 125 EA    | 75       | 44       | 6        | N/A      | N/A      |
|  |                      |     | 06-16-2004 | 125 EA    | 75       | 44       | 6        | N/A      | N/A      |
| Notes: [94/2000] Some abutment bearings are rusty (joints leaking). [1996] South abutment bearings are in full contraction. [1994] Main truss roller bearings have section loss: pitting, flaking & surface rust, moderate corrosion.  |                      |     |            |           |          |          |          |          |          |
| 313  | FIXED BEARING        | 2   | 06-10-2005 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
|  |                      |     | 06-16-2004 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 205  | CONCRETE COLUMN      | 2   | 06-10-2005 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
|  |                      |     | 06-16-2004 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
| Notes: [1969] Pier 9: east column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in span 2 (south abutment bearings are in full contraction).  |                      |     |            |           |          |          |          |          |          |
| 210  | CONCRETE PIER WALL   | 2   | 06-10-2005 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
|  |                      |     | 06-16-2004 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 215  | CONCRETE ABUTMENT    | 2   | 06-10-2005 | 255 LF    | 230      | 25       | 0        | 0        | N/A      |
|  |                      |     | 06-16-2004 | 255 LF    | 230      | 25       | 0        | 0        | N/A      |

Crew Number: 7627

Inspector: METRO

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 06-10-2005****STRUCTURE UNIT: 0**

| ELEM<br>NBR  | ELEMENT NAME        | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|---------------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes: [1991] Both abutments have minor cracking & staining.   |                     |     |            |          |             |             |             |             |             |
| 234  | CONCRETE CAP        | 2   | 06-10-2005 | 819 LF   | 669         | 150         | 0           | 0           | N/A         |
|  |                     |     | 06-16-2004 | 819 LF   | 669         | 150         | 0           | 0           | N/A         |
| Notes: [1998] Pier 11: cap has extensive "gunnite" repairs.  |                     |     |            |          |             |             |             |             |             |
| 356  | FATIGUE CRACKING    | 2   | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. [2004] Crack found in cope north approach crossbeam at beam G1C bottom flange 2 1/2" east side, 2" west side. |                     |     |            |          |             |             |             |             |             |
| 357  | PACK RUST           | 2   | 06-10-2005 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
| Notes: [1995] Truss members have flaking & surface rust corrosion at the floorbeam & sway brace connections (with pack rust & some section loss, surface pitting).   |                     |     |            |          |             |             |             |             |             |
| 358  | CONC DECK CRACKING  | 2   | 06-10-2005 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.   |                     |     |            |          |             |             |             |             |             |
| 359  | CONC DECK UNDERSIDE | 2   | 06-10-2005 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|  |                     |     | 06-16-2004 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
| Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).   |                     |     |            |          |             |             |             |             |             |
| 360  | SETTLEMENT          | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 361  | SCOUR               | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [2004] Underwater Inspection by "Ayres Associates" found no evidence of scour or changes to structure condition.  |                     |     |            |          |             |             |             |             |             |
| 363  | SECTION LOSS        | 2   | 06-10-2005 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
| Notes: Section loss: pitting, flaking & surface rust on steel.   |                     |     |            |          |             |             |             |             |             |
| 964  | CRITICAL FINDING    | 2   | 06-10-2005 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
| Notes:   |                     |     |            |          |             |             |             |             |             |
| 966  | FRACTURE CRITICAL   | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: See in-depth report for location of F/C members.  |                     |     |            |          |             |             |             |             |             |
| 981  | SIGNING             | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
| Notes: OH sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.  |                     |     |            |          |             |             |             |             |             |
| 982  | GUARDRAIL           | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                     |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |

Crew Number: 7627

Inspector: METRO

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 06-10-2005**

STRUCTURE UNIT: 0

| ELEM<br>NBR  | ELEMENT NAME    | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|-----------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| Notes: Plate beam guardrail SE & SW corners, north & south median I 35W. [1998] Approach guardrail repaired (impact attenuator at NB off ramp).  |                 |     |            |          |             |             |             |             |             |
| 984  | DRAINAGE        | 2   | 06-10-2005 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|  |                 |     | 06-16-2004 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
| Notes: Pier 6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.   |                 |     |            |          |             |             |             |             |             |
| 985  | SLOPES          | 2   | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                 |     | 06-16-2004 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1994] North abutment slope paving has 20 LF of horizontal cracks.  |                 |     |            |          |             |             |             |             |             |
| 986  | CURB & SIDEWALK | 2   | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1993] Curb below exterior railings have spalling & delamination.   |                 |     |            |          |             |             |             |             |             |
| 988  | MISCELLANEOUS   | 2   | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-16-2004 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner). |                 |     |            |          |             |             |             |             |             |

General Notes: \*Bridge #9340, Year 2005  
Bridge constructed in 1967.

See "Fracture Critical" report for additional information.

Inspectors: K Fuhrman, V Desens.

Inspector's Signature

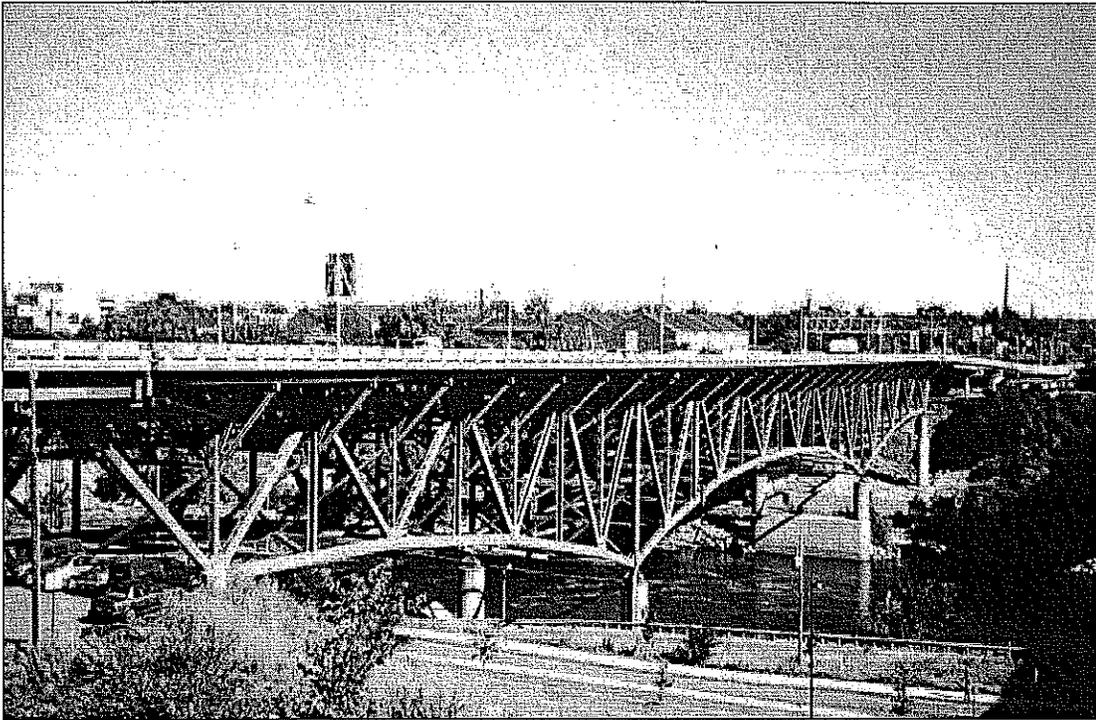
Reviewer's Signature / Date



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# **FRACTURE CRITICAL BRIDGE INSPECTION**

**Annual Report**



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**BRIDGE # 9340 (SQUIRT BRIDGE)**

**I-35W over the Mississippi River at Minneapolis, MN**

**JUNE 2005**

**Prepared For**

**Minnesota Department of Transportation  
Office of Bridges & Structures**

**Prepared By**

**Minnesota Department of Transportation Metro District  
Maintenance Operations, Bridge Inspection**



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## EXECUTIVE SUMMARY

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The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of Bridge # 9340 over the Mississippi River at Minneapolis, Mn. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with acceleration/deceleration lanes and 2 ft. shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. Spans #6 - 8, the main river spans, are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 988 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams. Connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck with spray nozzles installed in the deck and railings. The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

- If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- The plastic pigeon screens were removed on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment. These areas should be inspected on a two year inspection cycle.
- Fatigue cracks at girder #1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("back face"). Fatigue cracks a girder #3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). The cracks are located in negative moment regions where the diaphragm web stiffener was not welded to the top flange and were pervious fatigue cracks occurred and were repaired in 1998 and 1999. These areas should be inspected next year for any lengthening of the cracks and drilling of possible stress relief holes.
- Span 3, stringer #7 NB, has a 1-1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end.

- During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis.

## BRIDGE INSPECTION RECOMMENDATIONS

This recommendation listing refers to specific areas where fatigue cracks and other deficiencies were located during the 2005 inspection. Bridge inspection lists these deficiencies in the highest priority first.

### Long Term Repair Recommendations

- The long term plans for this river crossing need to be defined with replacement, re-decking, etc. Due to the "Fracture Critical" configuration of the main river spans and the problematic "crossbeam" details, and fatigue cracking in the approach spans, eventual replacement of the entire structure would be preferable.
- If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract. The expansion joints should also be replaced.

### Immediate Maintenance Recommendations

- The plastic pigeon screens were removed on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment. These areas should be inspected during the next in-depth inspection.
- Fatigue cracks at girder #1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("back face"). Fatigue cracks a girder #3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). The cracks are located in negative moment regions where the diaphragm web stiffener was not welded to the top flange and were pervious fatigue cracks occurred and were repaired in 1998 and 1999. These areas should be inspected next year for any lengthening of the cracks and drilling of possible stress relief holes.
- Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2 has 2 loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3.
- Several strip seal joints are leaking. The glands have ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the, SBL, south abutment. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.

- The rubber "skirts" sections above the truss end rockers, installed in 1999, tend to fill with debris. These should be flushed out annually. The horizontal drain troughs at pier #6 have inadequate slope, and are clogged.

#### **Areas of Concern - Future Inspections**

- Span 3, stringer #7 NB, has a 1-1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end.
- During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis.
- The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss, had flaking rust & fatigue cracks (open finger joint).
- The hinge joint in span #2 is locked in full expansion several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## BRIDGE DESCRIPTION

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction & also acceleration/deceleration lanes. The shoulders are only 2 ft. wide. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end.

Spans #6 - 8 are "Fracture Critical" steel deck trusses, comprised of "built-up" welded members. Steel deck truss spans are 988 ft long. Span #7 is 456 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration, (open finger joint). The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams. The connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings. Control room is located at the northwest approach corner.

## BRIDGE DECK: NBI CONDITION CODE 5

The split deck has 3 through lanes each direction, with acceleration/deceleration lanes. Shoulders are only 2 ft. wide. A low slump concrete overlay, with numerous full-depth deck repairs, was placed on the deck in 1978. In 1998, the median copings were replaced with steel stay-in-place forms, and the exterior copings were patched with shot-crete.

**Wearing Surface:** The overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks, sealed in 1998. The overlay has several patched areas, and some spalls. Additional patching is typically required each year. A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. [2001] The overlay has 15,250 SF of concrete repair patches.

**Structural Slab:** The underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling, particularly in the south approach spans. In 1998, the median coping overhangs were replaced with steel stay-in-place forms, and the exterior copings were repaired with shotcrete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers & beams has spalled off with exposed rebar; and in some locations, the spalling extends into the underside of the deck. [2001] The structural slab has 1,200 SF full depth repair patches.

**Open Finger Expansion Joints:** The deck has 3 open finger joints, above the hinge joint in span #2, & at each end of the truss spans. In 1999, rubber "skirts" were installed below the truss end finger joints & the drain troughs were removed.

**Strip Seal Expansion Joints:** There are strip seal joints at the abutments, pier #11, and at five stringer joints in the main truss spans. These were installed in 1978. The strip seal glands have pulled out, with joints leaking, in several locations. The steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the south abutment, SBL, gland was patched using an experimental system. Hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints, from staged deck construction. All of these joints are leaching below; & at some joints the deck is spalling below.

**Exterior Railings:** The original exterior code #12 railings were retrofit in 1998. A 32" high concrete face was installed in front of the existing concrete rail base. The horizontal steel rails were removed. The curb along the railing has moderate cracking, delamination and spalling. The curb has 800 LF reconstructed in 2001.

**Median Railings:** Code #22, type "J"-rail, was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

## **BRIDGE SUPERSTRUCTURE: NBI CONDITION CODE 4**

**Paint System:** Bridge was originally painted with a lead base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have surface rust corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & surface rust corrosion in scattered locations. The floorbeam trusses & stringer ends have surface rust corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 have severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floor beams & "crossbeams", located below the open finger joints.

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members; connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floor beam connections. The box beam truss members have welded interior stiffeners. Some of these have tack-welded tabs. Many of these tack welds have cracked. Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have surface rust corrosion at the floor beam and sway frame connections. Pack rust is forming between the connection plates. There is paint failure,

surface rust, and section loss, flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access. This unfortunately prevents inspection of the interiors. During the 2004 inspection the plastic pigeon screens were removed on all tension and reversal members to visually inspect the member's internal diaphragms any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment.

**Floor Beam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams with welded connections. The floorbeam trusses cantilever beyond the main truss on both sides. They are connected to the main truss, vertical members with bolts & rivets. The floorbeam truss members have numerous poor welding details, including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically, up to 1/2" – from original construction. The splice plates are bent. The floorbeam trusses below stringer joints have section loss, severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floor beam sections below the median were re-painted. Some areas have section loss with holes.

**Stringers:** There are 14 steel stringers, 27" deep rolled beams, bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have surface rust corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss with holes. Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have section loss, flaking & surface rust; moderate corrosion, the bearings at piers #5 & 8 are functioning properly. They are checked during each annual inspection. The bearings at pier #6 show no obvious signs of movement, difficult to reach with snoopers.

**End Floor Beams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members, severe section loss on steel. This area was re-painted in 1998 - 1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floor Beams:** The two end floor beams are welded plate girders. They connect the main truss ends. The end floor beams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss with surface pitting at the base of the web, and

holes in the base of the vertical stiffeners. In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss with holes at the base of stiffeners. The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning. They show obvious signs of movement.

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam with two cracked vertical web stiffeners. The rocker-bearing pin was replaced. This required closing I - 35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. Installing braces between the crossbeam and beams #2 & 3 also reinforced the connection.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing, which was drilled out. In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and installing bracing between the crossbeam and 2 stringers reinforced the northeast connection.

**Steel Multi-Beam Approach Spans (spans #1 - 5 & #9 - 11):** The approach spans have welded beams - the depth transitions from 48" to 33". Connections are riveted. The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in span #2). In spans-#9 - 11, the deck widens from 15 to 18 beams. The fascia beams have section loss, flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and was caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After stain gauge analysis by the University of Minnesota, the diaphragm connections were modified. They were lowered, using only four bolts at each connection. Most existing cracks were drilled out. Some were too small to reach, and the fractured beam was reinforced with bolted plates.

In span #2, multi-beam approach span, there is a cantilever expansion hinge with sliding plate bearings. The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam-ends are contacting, and some bearing plates have tipped, preventing the joint from reopening. The hinge area, with open finger joint above, was re-painted in 1999. The beam-ends have section loss, moderate surface pitting.

The north approach spans have lateral & diagonal bracing welded to the web.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 – 14):** The far north approach spans consist of cast-in-place concrete continuous “voided” slabs. They are 2 ft deep. Northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at pier #11 and the north abutment. There are 29 bearing assemblies. Piers #12 & #13 are cast directly into the slab with no bearings. These spans are in generally good condition. Spalling along the exterior and median copings was patched with shotcrete in 1998. [2001] Light fixtures at Metal Matic Incorporated parking lot.

## **BRIDGE SUBSTRUCTURE: NBI CONDITION CODE 6**

**Abutments:** The abutments have vertical cracking, with some staining from leaking deck joints.

**Truss Span Piers:** Piers #6 & 7, main river span, have two concrete columns resting on a pier wall. The west column on pier #7 has a minor vertical crack. Piers #5 & 8 have two concrete columns connected with an upper strut. The column on pier #8 has been reinforced with a concrete “jacket”. [2001] Underwater inspection conducted by Collins Engineers, Inc. in 2000 found pier 7 to be in good condition with no defects of structural significance. A 3 x 3 foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5 year inspection interval. [2004] The concrete surfaces below the water are in good condition. Minor scaling was found above the, but not of the quantity or depth as noted in the previous report the total area was 2 feet square and ¼" deep penetration. No significant changes in the structure or channel condition since last inspection by Ayres Associates.

**Approach Span Piers:** Piers #1 - 5 & #9 - 11, piers supporting the steel spans, consist of concrete columns with a cap. Those adjacent to railroad tracks have lower struts. The pier columns supporting the voided slab spans (piers #12 & 13) are cast directly into the slab with no cap. Pier #1 has tipped slightly to the north. This is related to the hinge failure in span #2. The east column on pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shotcrete repairs from leaking deck joint above.

## **OTHER BRIDGE ELEMENTS**

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed. North approach, SBL and on ramp, has no relief joint. [2001] South approach panel was scarified and a low slump overlay was installed.

**Channel & Protection:** NBI code #8 which is very good condition. The bridge is located just downstream from the Lower St. Anthony Lock & falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel, along the east bank. Typically, the water depth along the west face is only 1 - 2 feet. Mn/Dot does not conduct underwater inspections. Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure running across the entire deck, mounted on the exterior railings at truss panel point #2' at north end of truss. There is a signpost mounted on the west railing at truss panel point #6 at south end of truss.

**Guardrail:** In 1998, the approach guardrails were repaired. Impact attenuator was installed at the northbound off ramp to University Avenue. Plate beam guardrail SE, SW corners, south & north approach median I 35W.

**Drainage:** Several deck drains drop directly into the river. The drain troughs at pier #6 have inadequate slope, and tend to fill up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving, at both abutments, is in good condition.

**Lighting:** Rail mounted deck lighting, under deck lighting in span #13, and river navigation lighting. "Metal Matic Inc." maintains the lighting above the parking lots in spans #11 & 12. A light post, W 5/3 L, on the west railing, has a 6" vertical split from plow damage.

**Miscellaneous:** The former "U of M" parking lot area below spans #2 - 5 has been barricaded from use while the parking lot area below spans #11 & 12 continues to be used by Metal Matic Inc employees. The U.S. Army Corps of Engineers is stockpiling river dredging material below span #8 this material is approximately 10 to 15 feet below the bottom truss diagonals (2003). The navigation light maintenance catwalk which runs below the median of the truss spans is being accessed by graffiti "artists" at pier #5.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings and a pump house/control room was constructed at the NW approach corner.

# BRIDGE SNOOPER FIELD INVESTIGATION

## Approach Spans

Northbound & southbound inspection notes are combined. Plans have beams numbered from the east. Exterior of west rail & west coping have conduit full length of bridge.

## South Abutment:

Strip seal deck joint above. [1998] SBL Gland was patched using an experimental joint, hot poured seal with wire mesh reinforcement, and fourteen sliding plate bearing assemblies. [1995] Bearings are corroded and in full contraction from hinge failure in span #2, and tipping of pier #1. The seat area is cracked and discolored. [2003] 72 LF random cracks: south abutment.

## Span #1 (Steel Multi-beam):

Span is 53 FT long with 14 beams, 33" deep rolled beams, with welded cover plates with square ends. [96/2005] East fascia beam has section loss, flaking & surface rust on bottom flange. [2003] Surface rust: on the beams. [1978] 3 West bays have 300 SF full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted.

## Pier #1:

10 Fixed; & 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a railroad crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 were re-painted.

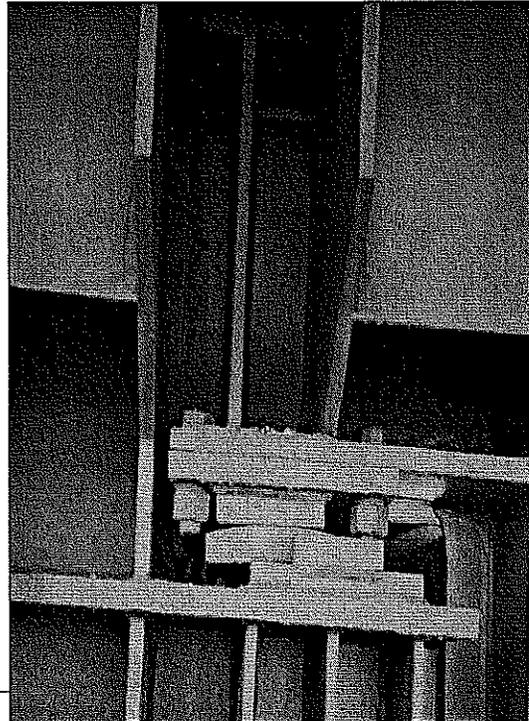
## Span #2 (Steel Multi-beam):

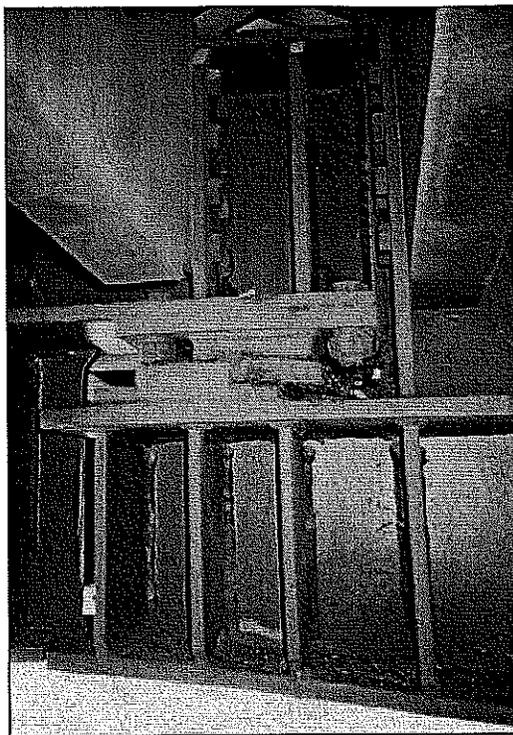
Span is 72 FT long with 14 beams; 33" rolled beams with welded cover plates, some with square end welded cover plates, the beams transition to 48" welded beams north of the hinge joint. [1978] 350 SF: full depth deck repairs. [1997] Conduit is loose below median. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted. [96/2003] Bottom flange at girder transitions & at hinge has section loss, flaking rust. [2005] East fascia beam has section loss, flaking & surface rust on bottom flange, peeling paint beam 11 bottom flange.

## Hinge Joint (12 ft. South of Pier #2):

Hinge joint has open finger joint above. [94/2005] All hinge assemblies are expanded beyond tolerance; sliding plates extend 4" or more beyond the base plates, reducing bearing capacity. At beam #10, the sliding plate has tipped, falling off the base plate, and is preventing the joint from opening. [1999] Hinge area re-painted. [2000] Beam-ends have section loss, moderate surface pitting; debris has begun to build up on hinge area. Additionally, the tops of the beam ends are contacting at the top flange or at the web along this joint. [2005] Hinges should be flushed.

West Fascia SBL Hinge  
Bearing Sole Plate





Beam 6 NBL @ Hinge



Beam 5 NBL @ Hinge

**Pier #2:**

Pier consists of four concrete columns, 14 sliding plate bearing assemblies, and cap, with a railroad crash strut between the columns. [97/2000] Bearings have surface rust corrosion; east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 re-painted. [2003] East end of cap, south face has 2 SF delamination, 10 SF of map cracking.

**Span #3 (Steel Multi-beam):**

Over Bluff St. Span is 110 FT long with fourteen, 48" deep welded plate beams. [1978] The 3 west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete: spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 re-painted. [2005] East & west fascia beam has section loss, flaking & surface rust on bottom flange. Diaphragm Line North of Pier #2 [1999] Diaphragms lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange, no cracks. Refer to Appendix A **First Diaphragm South of Pier #3** graph for crack locations, description & repair to the diaphragm line

**Pier #3:**

10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 were re-painted. Vertical stiffener working: at girder 11.

**Span #4 (Steel Multi-beam):**

Over contract parking lot (no access) & Bluff St. Span is 110 FT long with fourteen 48" deep welded plate beams. [1978] Second & third bays from the east have full depth deck repairs. [1998] Underside of deck has 200 LF of transverse leaching cracks, 200 SF of spall with exposed rebar below a transverse poured joint, full width of deck. [2000] Fourth bay from west has 20 SF of severe leaching.

[1999] Beams 6, 7, 8, & 9 were re-painted. [2005] East fascia beam has section loss, flaking & surface rust on bottom flange. [1999] Diaphragms lowered. Refer to Appendix A **First Diaphragm North of Pier #3** graph for crack locations, description & repair to the diaphragm line. [1998/99] Diaphragms lowered with strain gauges placed on beams #2 & 6 (*first diaphragm line south of Pier #4*). [1999] Diaphragms lowered, even though the connections have a "positive moment" configuration. Stiffeners are welded to the top flange.

**Pier #4:**

14 Sliding plate expansion bearing assemblies. [1997] Bearings have surface rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #5 (Multi-beam/Deck Truss):**

Over contract parking lot; span is 109 FT long with fourteen, 48" deep welded plate beams bolted onto the crossbeam. [1996] 4 conduit clamps missing on NB fascia beam. Median girder has impact damage from parking lot below. [1978] Underside of deck is leaching at the finger joint, has two full depth patches in the west bays. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked. [1999] Beams 6, 7, 8, & 9 were re-painted. Refer to Appendix A **First Diaphragm North of Pier #4** graph for crack locations, description & repair to the diaphragm line.

**MAIN TRUSS SPANS (NORTHBOUND, EAST TRUSS)**

Stringers are numbered from the east (see framing plan).

**Crossbeam:**

[1986] The SE rocker bearing froze, damaging the east end of the crossbeam, resulting in cracked web stiffeners. The bridge was jacked up. I-35W was closed to traffic. SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and beams #3 & 4. [1998/99] Crossbeam was repainted; the side facing the finger joint has section loss.

| CROSSBEAM & FLOORBEAM GAP (EAST END) |             |
|--------------------------------------|-------------|
| Date                                 | Measurement |
| September, 1998                      | 16-5/8"     |
| April, 1999                          | 17-13/16"   |
| April, 2000                          | 18"         |
| September, 2001                      | 18-1/16"    |
| June, 2003                           | 16-7/8"     |

**Panel Point #0 (Beginning of East Truss):**

Expansion joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] End floorbeam was repainted; section loss at the base of the stiffeners. [2002] Water saturation between stringers 2 thru 4 at panel points 0 to 1. [2005] Stringers 2 & 3 have flaking & surface rust.

**Panel Point #1 (East Truss, Pier #5):**

[2005] Bottom of truss diagonal L1U0 has flaking & surface rust.

**Pier #5:**

Bearing assemblies have two "rollernest". Climbing onto the pier strut at this location accesses the catwalk. Debris piled at pier strut base allow for unauthorized access. [2002] Bearings show signs of recent movement.

**Span #6 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1997] West River Parkway constructed below bridge. [1999] Floorbeam truss's, sway bracing located below the median and beams 6, 7, 8, & 9 were re-painted.

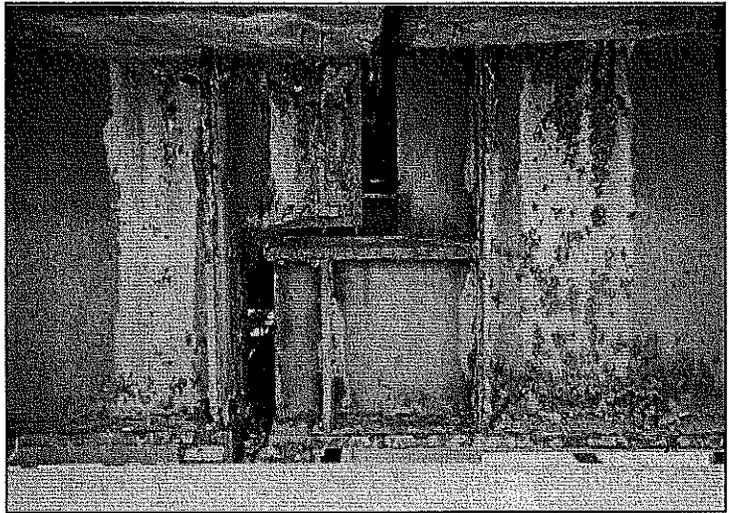
**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):**

Floorbeam truss, near center, has an undercut weld in the flange.

**Panel Point #4 (East Truss Stringer Joint):**

Strip seal deck joint above. [1999] 1 ft. of gland pulled out at centerline. [1996] Floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Junction box cover is missing at catwalk. [2000] Concrete in joint at east end. [2005] Flaking & surface rust exterior east truss.



Flaking & Surface Rust Exterior East Truss

**Panel Point #5 (East Truss):**

[1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out at stringer #3, cracked tack welds remain at stringer #4.

**Panel Point #6 (East Truss):**

[1994] Floorbeam truss top chord, bottom flange, has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2000] Floorbeam truss diagonal member U10/L10, near the bottom chord connection, has a 4" long gouge with possible crack along a connection weld, should grind out. [2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

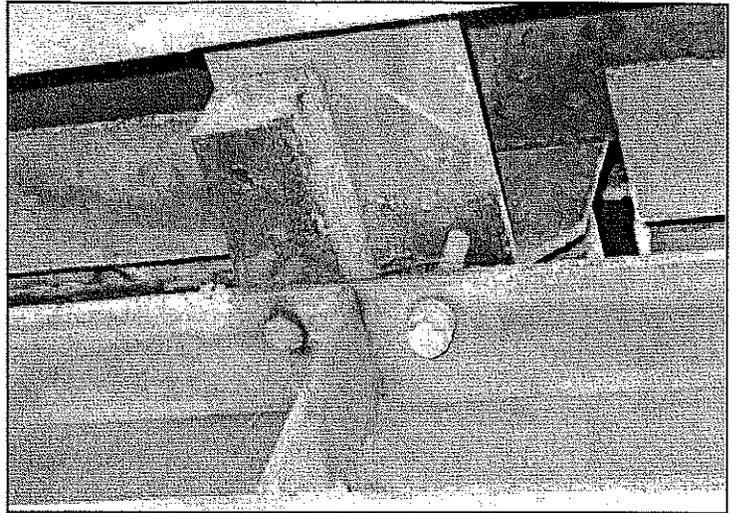
**Panel Point #7 (East Truss):**

[2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

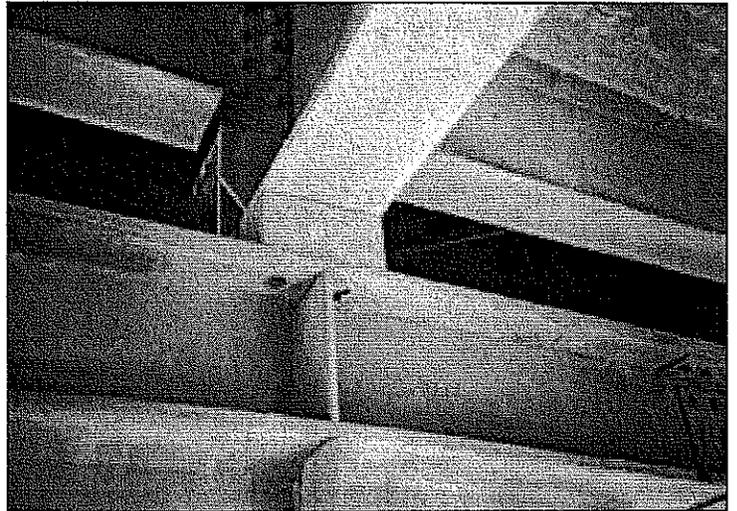
**Panel Point #8 (East Truss Pier #6 Stringer Joint):**

Strip seal and deck drain above. [94/2003] Joint is leaking, small hole & membrane has pulled out. Stringer #4: one bolt broken off at south floorbeam connection. Deck drain is plugged solid. Stringer #2 (south side): one bolt is missing and the nut is missing from the other bolt. The bearing block has rotated 90°. [1999] Missing bolt replaced. [2000] Bolts are loose, needs repair. Vertical truss member has section loss, moderate flaking rust. Floorbeam bottom chord & middle bracing connection plate has moderate section loss, severe flaking rust. Middle bracing connection plate has 1/2" spread from pack rust. Underside of the deck has 50 SF of water saturation.

Stringer #2 Bearing Block Rotated



Stringer #4 Bolt Missing



Plugged Horizontal Drain Trough



**Pier #6 (Downtown, West Bank of Mississippi):**

Pier consists of two concrete columns with a pier wall at the base, two "rollernest" bearing assemblies. [1997] Bearings have surface rust, moderate corrosion and show no signs of movement. [1997] Deck drain downspouts are clogged, top & bottom at median.

[2004] Typical condition & rust at floorbeam connection near deck drain at connection U8.



Floorbeam Condition

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #9 (East Truss):**

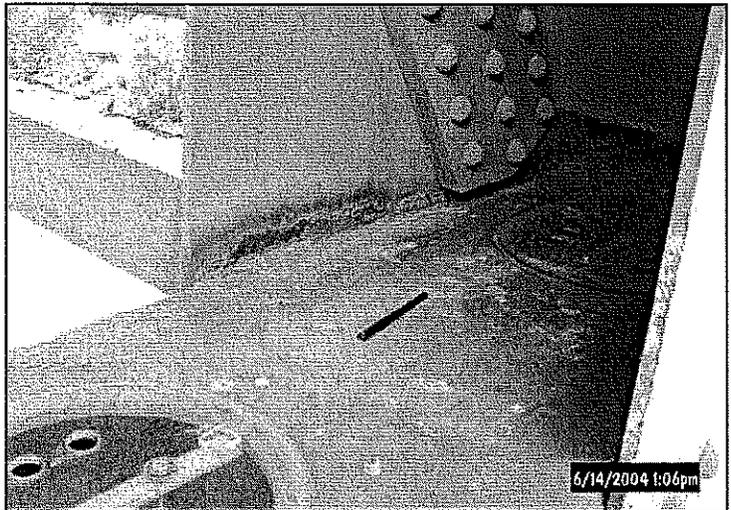
[2003] Floorbeam bottom chord connection plate has a cracked tack weld on the south side. Underside of the deck has 20 SF of water saturation.

**Panel Point #10 (East Truss):**

Red navigation light for Mississippi river channel. [1999] Strain gauges installed on truss top chord member U9/U10, L9/U10 & L9/L10 from U of M research project.

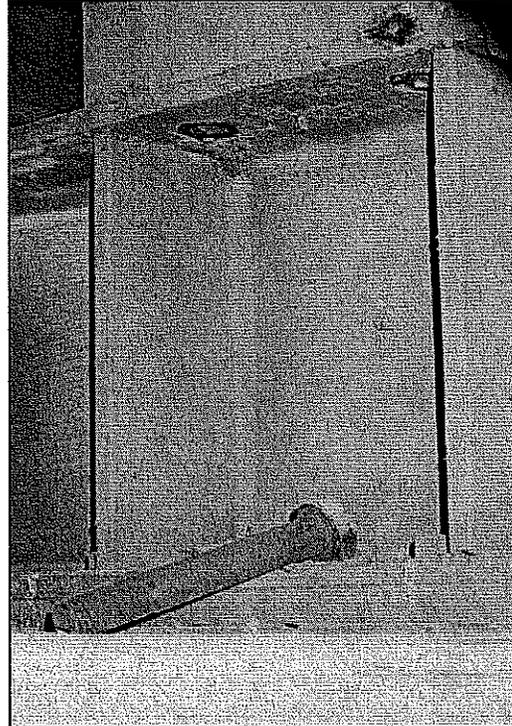
**Panel Point #11 (East Truss):**

Section loss: at gusset plate bottom chord. [2000/05] Stringer #3 has two bolts missing at the floorbeam connection. [2004] Pitting inside gusset plate connection at L11 toward L10



Pitting @ L11/L10 Connection

Bolts Missing @ Floorbeam Connection



**Panel Point #12 (East Truss):**

[1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener. [2004]  
Ground out pit from past inspection when???

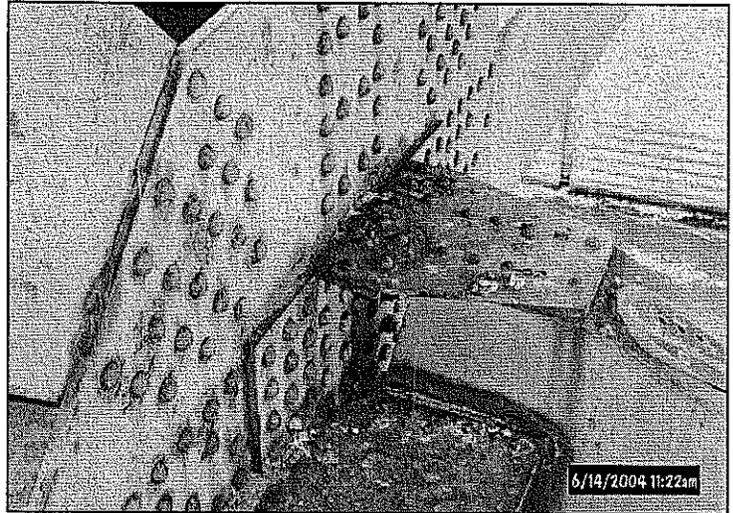


Weld Ground Out When?

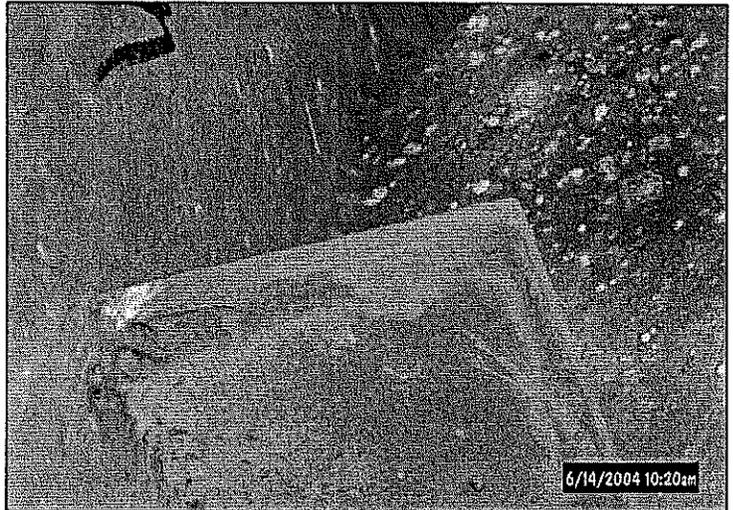
**Panel Point #13 (East Truss):**

Water from deck drains fall directly into river. [99/2002] Bottom chord gusset plate has section loss, flaking & pack rust. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners. [2004] Bottom chord member L13/L14 cracked tack weld @ diagram tab (diagram #1?). Cracked tack weld @ diagram tab member L13/U14 see photos.

Condition @Bottom Chord Connection



Member L13/L14 Cracked Tack Weld

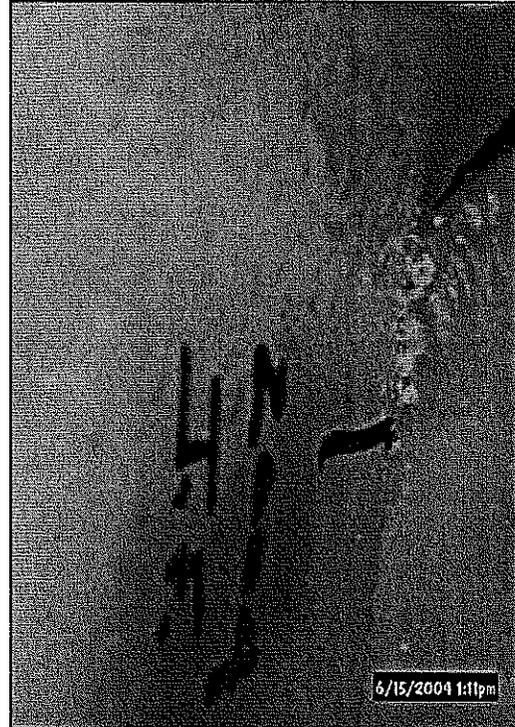


Member L13/U14 Cracked Tack Weld



**Panel Point #14 (East Truss Midspan Stringer Joint):**

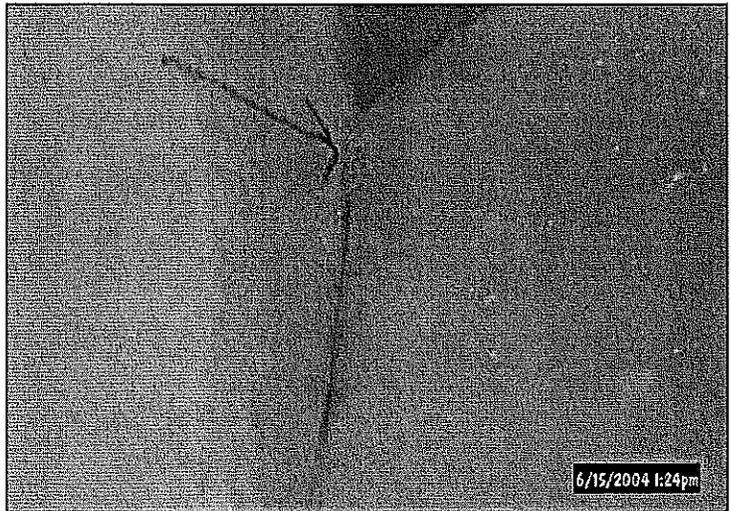
Strip seal expansion joint on the deck. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2002/03] Floorbeam bottom chord & middle bracing connection plate has 1/2" pack rust. Underside of the deck has 4 SF of delamination. [2004] Bottom chord member L14/L13' cracked tack weld at diagram tab (diagram #3?) see photo.



Member L14/L13' Cracked Tack Weld

**Panel Point #13' (East Truss):**

Floorbeam truss top chord has a ground out spot near stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener. [2003] Truss bottom chord connection plate has 1/2" pack rust. Underside of the deck has 20 SF of water saturation. [2004] Bottom chord member L13'/L12' cracked tack weld @ diagram tab (diagram #3?) see photo.



Member L13'/L12' Cracked Tack Weld

**Panel Point #12' (East Truss):**

[99/2003] Underside of the deck has 65 SF of water saturation. [1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener. [2004] Bottom chord member L12'/L11' two cracked tack weld @ diagram tab (diagram #3?) see photo.



Member L12'/L11' Cracked Tack Weld

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

[2003] Underside of the deck has 1 SF of spall with exposed rebar. Light pole, W5L3, has 1 LF crack.

**Panel Point #9' (East Truss):**

Water from deck drains fall onto the steel & directly into river. [2002] Bottom chord member L9'/L8' has section loss, flaking rust.

**Panel Point #8' (East Truss Pier #7 Stringer Joint):**

Red navigation light for Mississippi river channel. Strip seal expansion joint on the deck. [93/2003] Floorbeam truss has section loss, moderate flaking rust. North side: bolts replaced with "threaded-rod" at stringer #4, bolts replaced at stringer #5. Underside of the deck has 80 SF of water saturation.

**Pier #7 (East Bank of Mississippi):**

Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full height, leaching crack on the south face.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #7' (East Truss):**

[2003] Underside of the deck has 240 SF of water saturation, & 80 SF of delamination.

**Panel Point #6' (East Truss):**

[1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose. [2003] Underside of the deck has 10 SF of water saturation.

**Panel Point #5' (East Truss):**

[2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss Stinger Joint):**

Strip seal expansion joint on the deck. Truss diagonal member U4'/L3' has backer bars along the interior edges. [01/04] Strip seal has 3 LF of gland pulled out. Truss connection plates, the top chord, and floorbeam have moderate section loss, severe flaking rust. Bottom connection plates have 1/2" pack rust.

Top Floorbeam Truss Condition



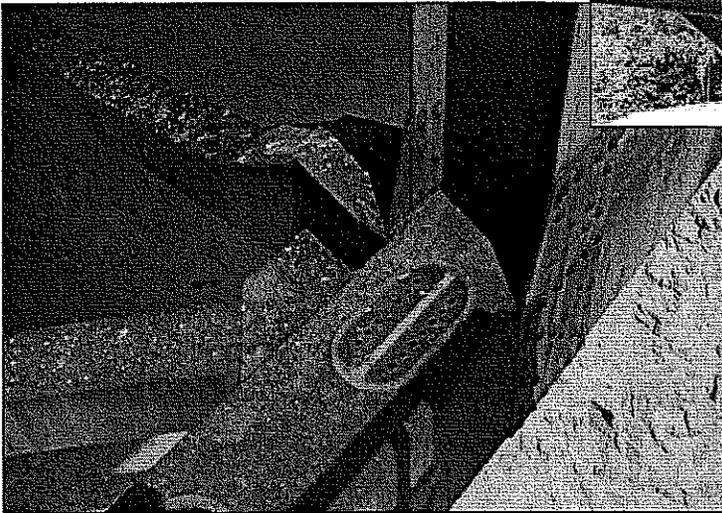
Top Floorbeam Truss Condition



Bottom Floorbeam Truss Condition



Bottom Floorbeam Truss Condition



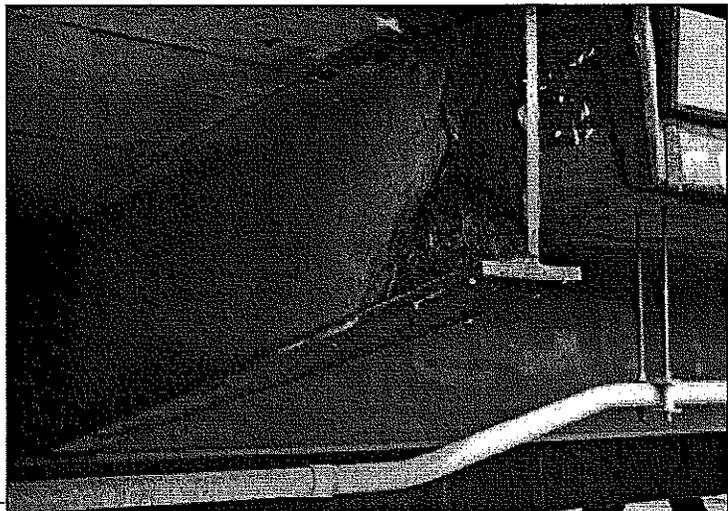
Bottom Truss Condition

**Panel Point #3' (East Truss):**

Center lane has road sensors on the deck surface. Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):**

Overhead sign mounted on exterior railings. [1999] Deck in bay #3 has 100 SF of water saturation. [2003] Bottom connection plates have flaking rust. [2004] Area underneath overhead sign has 100 SF of water saturation. [2005] North support beam (stringer ?) has severe section loss at end.



**Pier #8:**

Two "rollernest" bearing assemblies, have surface rust. [2000/05] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete "jackets" around them with vertical cracks.

**Panel Point #1' (East Truss Pier #8):**

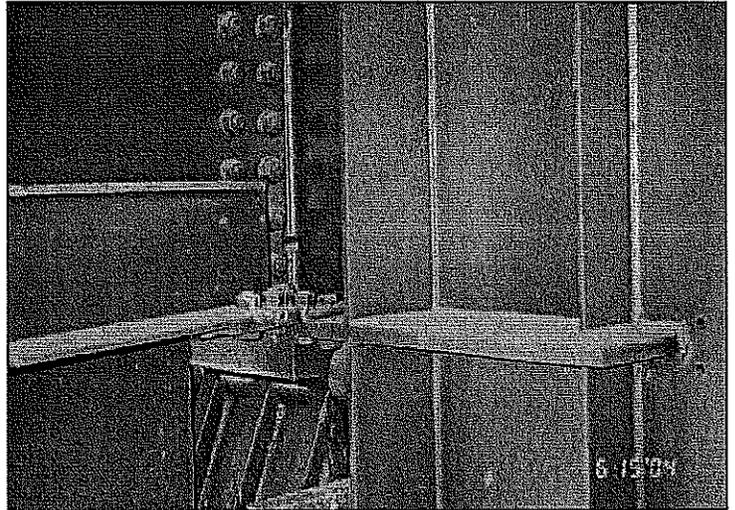
[2000] Bottom of truss above bearing has graffiti. [2005] Bottom of deck deteriorated.

**Panel Point #0' (End of East Truss):**

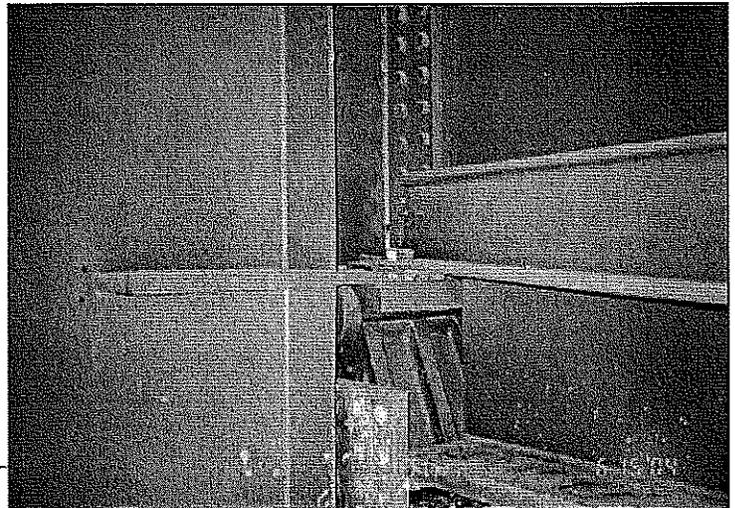
Joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris, need to be flushed. [1998/99] Floorbeam re-painted, side facing finger joint has section loss with holes in web stiffeners. [1998] North face, directly above east rocker bearing, has two horizontal welds between stiffener plates. They have cracked through entirely. [2004] Finger joint in the SB right lane and shoulder has been ground down to prevent the snow plows catching on the joint.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss, with pitting at base of stiffeners. [1992] North face has crack in the crossbeam web stiffener, above the rocker at the beam #12 connection. This was drilled out. [1997/98] North face: weld above east rocker bearing, between the horizontal & center vertical stiffener, has cracked through entirely. Weld end at the crossbeam web was partially drilled out. [1998] North face has cracks at both ends of the horizontal stiffener, above rocker bearing. They were drilled out with two small holes drilled in crossbeam web at each location. [1998] Bracing installed between crossbeam, above east rocker, and beams #3 & 5. *\*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-5/8" at 40° F.* [2005] Movement at east bearing.



Web Stiffener Crack Northwest Side



Web Stiffener Crack Northeast Side

## APPROACH SPANS (NB & SB NOTES ARE COMBINED)

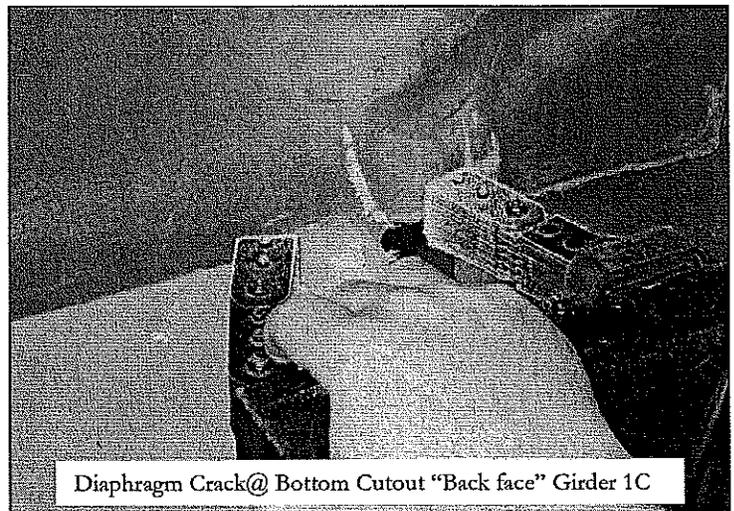
Plans have beams numbered from the east.

### Span #9 (Multi-beam):

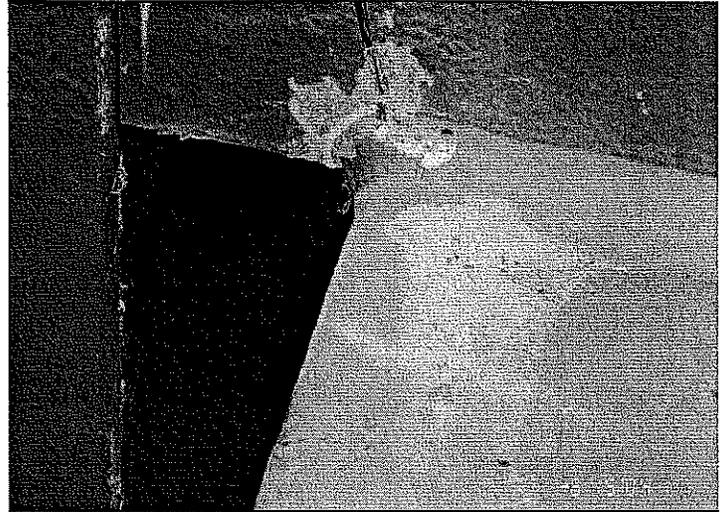
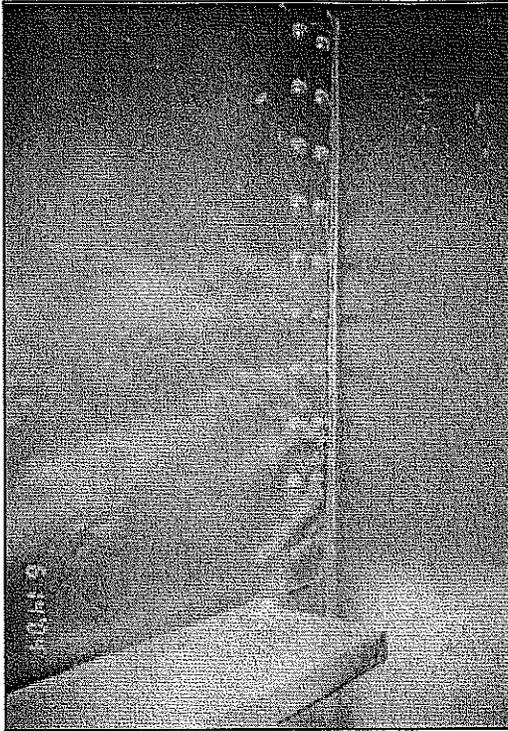
Span is 168 FT long with one floorbeam truss at pier #8, fourteen 48" deep welded plate beams bolted onto the crossbeam. Multi-beam spans resume. NB has 8 girders. SB has 7 girders. There are two active railroad tracks below. Refer to Appendix A **First Diaphragm South of Pier #9** graph for crack locations, description & repair to the diaphragm line. [1999] Girders 6, 7, 8, & 9 are re-painted. Lateral bracing welded to web & stiffener. [2003] Conduit: at east side bottom of deck. [2002/04] Underside of deck at the south end, in NBL, has 150 SF of water saturation near the spray head. The 2<sup>nd</sup> & 3<sup>rd</sup> bays from west (southbound) have 250 SF of salt and water saturation. [2004] Girder 1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("Back face"). Girder 3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). [1998??] Girder #3 has a "tear" in the girder's web at the diaphragm girder connection. The "tear" measured 42" long on one side and 12" long on the other, was caused by out of plane bending between the diaphragm and the girder. Girder Connection Lowered & Girder Web Repaired with Splice Plate



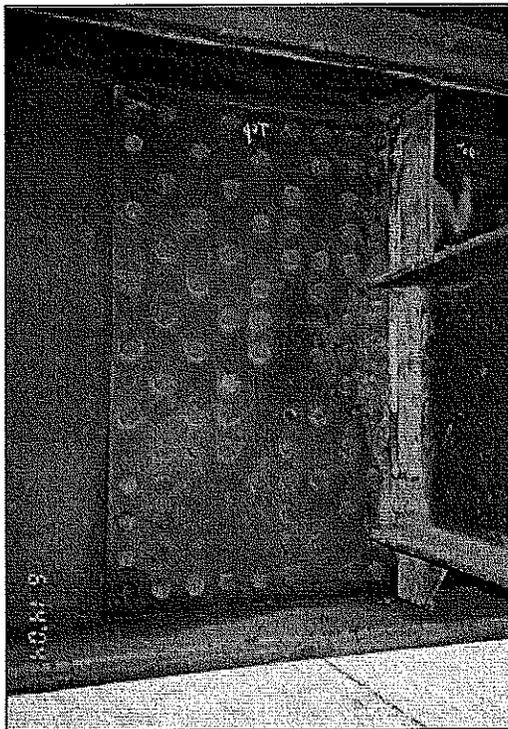
Diaphragm Crack@ Bottom Cutout "Front face" Girder 1C



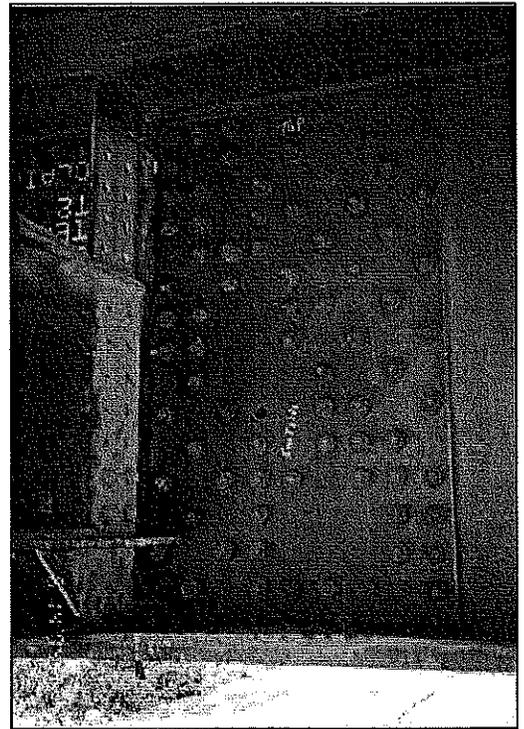
Diaphragm Crack@ Bottom Cutout "Back face" Girder 1C



Diaphragm Crack @ Bottom Cutout "Back face" Girder 3



Web "Tear" G # 3 @ Diaphragm Looking East



Web "Tear" G # 3 @ Diaphragm Looking West

**Pier #9:**

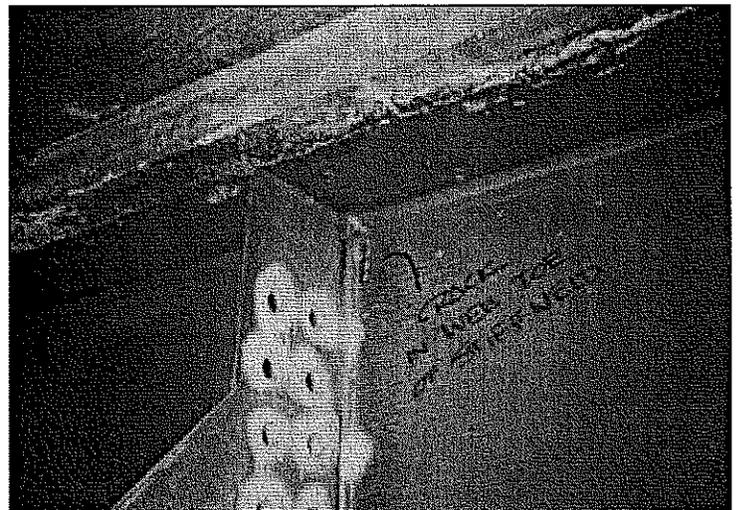
Plate bearing assemblies have 13 fixed, and four sliding. Pier consists of four columns and cap, with a railroad crash strut between the columns. Deck drain: downspout. [1969] East column damaged by train derailment - the column has minor scrapes and spalls. Downspout had to be reconnected. [1999] Bearings 6, 7, 8, & 9 were re-painted. [2004/05] West vertical & median deck drain plugged.



Median Drain Plugged Pier 9

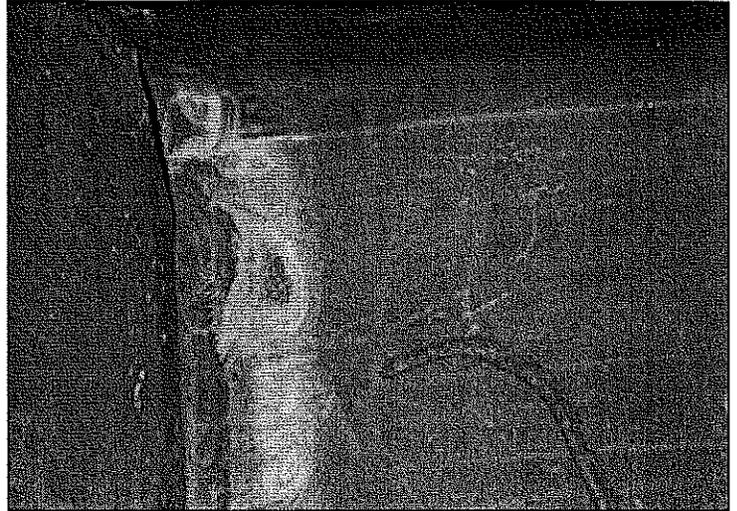
**Span #10 (Steel Multi-beam):**

Span is 94 FT long with 17 steel beams. NB has 10 beams; SB has 7 beams (the welded beams transition from 48" to 33" depth just north of pier) with active railroad tracks below. One track splits into two. Refer to Appendix A **First Diaphragm North of Pier #9** graph for crack locations, description & repair to the diaphragm line. [1999] Beams 6, 7, 8, & 9 were re-painted. Diaphragms were inverted & lowered, even though the beam connections have a "positive moment" configuration. Connections welded to top flange. [2003] Conduit: at east side bottom of deck. [2000] Beam #6 appears to be "working" at the top connection. [2004] 250LF of leaching cracks underneath



Girder #10 Vertical Stiffener/Girder Web

Girder #10 Vertical Stiffener/Girder Web



**Pier #10:**

Pier has 5 columns & cap with a railroad crash strut between the columns and 18 sliding plate expansion bearings. [1999] Bearings 6, 7, 8, & 9 were re-painted. [2003] North face of cap has 20 SF of delamination.

**Span #11 (Steel Multi-beam):**

Span is 68 ft. long with 18 steel beams. Northbound has 11 beams; southbound has 7 beams, and the parking lot below. [1999] Beams 6, 7, 8, & 9 were re-painted. Connections welded to top flange. Diaphragms were inverted & lowered, even though the beam connections have "positive moment" configuration. [2003] Conduit: east side bottom of deck. [2004] 50 SF of water saturated deck underneath.

**Pier #11:**

Beginning: NB off ramp to University Avenue. (Br. #9340A). Strip seal deck joint above. The slab span consists of 18 sliding plate bearings, (steel beams) and 15 sliding plate bearings (voided slab). The pier consists of seven columns and a cap. [95/2000] Gland is leaking in several locations (NB & SB). [1998] Extensive shotcrete repairs on pier cap. [2000] West column has 1 SF spall. [1999] Sliding plate bearings for the steel beams were re-painted. [2004] Cover plate is missing from "J" barrier east rail NBL.

**Span #12 (Concrete Voided Slab Span):**

Parking lot: below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #13 (Concrete Voided Slab Span):**

2nd St. passes below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #13:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #14 (Concrete Voided Slab Span):**

[1998] Shotcrete repairs were done along median and exterior copings.

**North Abutment:**

Strip seal deck joint above with 14 sliding plate bearing assemblies. [2000] NB joint leaking at both ends. Bearings are rusty.

**MAIN TRUSS SPANS (SOUTHBOUND, WEST TRUSS)**

Plans show stringers are numbered from the east.

**Crossbeam:**

[1998/99] Crossbeam re-painted. Side facing finger joint has section loss. [1999] Bolted connection between beam #12 and the crossbeam was re-tensioned. Connection had been "working".

- [2000] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-9/16".
- [2001/03] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-1/2".

**Panel Point #0' (End Floorbeam Beginning West of Truss):**

Open finger joint on the deck. [1996] Floorbeam/truss connection has section loss, severe corrosion with surface pitting on plates & bolts. [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [1998/99] Floorbeam re-painted. Side facing finger joint has section loss on stiffeners. [2002] High spots of fingers torched off right lane & shoulder.

**Panel Point #1' (West Truss Pier #8):****Pier #8:**

See NB notes. [1999] West truss bearing shows signs of recent movement.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [2002] Underside of the deck has 150 SF of water saturation and numerous full depth repairs.

**Panel Point #2' (West Truss):**

Overhead sign on bridge mounted on exterior railings. [2002] Bolts are "working" at stringer #11.

**Panel Point #3' (West Truss):**

The floorbeam truss, top flange of upper chord, has an ugly weld below the connection to stringer #11. [2003] Stringer #12 has connection bolts "working".

**Panel Point #4' (West Truss Stringer Joint):**

Strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges. [199?] Two cracked tack welds at elevation block underneath Stinger #11. [2003] Floorbeam truss bottom chord at Stringer #11 connection: have section loss, moderate flaking and surface rust.

**Panel Point #5' (West Truss):**

[2002] Sprayer fitting corroded.

**Panel Point #6' (West Truss):**

[96/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection. [1997] Stringer #10, the two south bolts are loose at the floorbeam connection. [99/2003] Stringer #9, south face, has one bolt loose at the floorbeam connection. [2004] Stringer #11 has one loose bolt south side.

**Panel Point #7' (West Truss):**

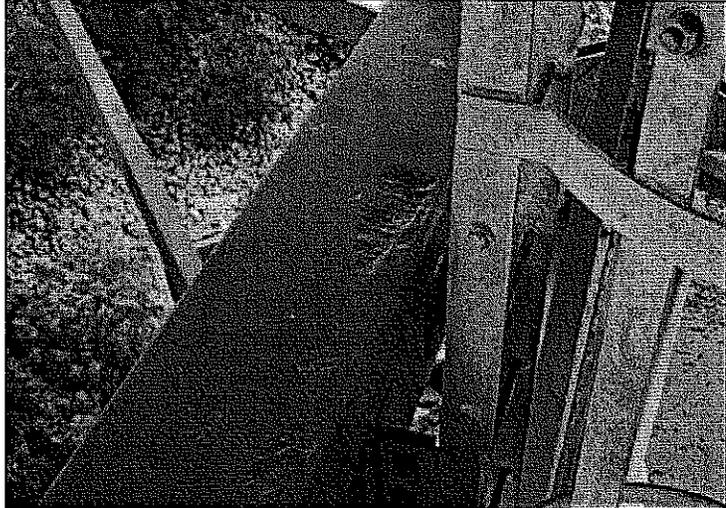
[1997] Top chord/floorbeam truss connection has a cracked tack weld on the diaphragm. [1999] Wind bracing gusset plate, at stringer #14 has loose bolts. [2002] Stringer #14 was installed crooked.

**Panel Point #8' (West Truss Pier #7 Stringer Joint):**

Strip seal deck joint above. [2005] Gland pulled out for 5 ft and is leaking onto the crossbeam below, between stringer 10 & 11 [1998] Stringer #11: bolt replaced at floorbeam truss connection. [1996] Below stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent, from original construction.

[2001] Truss bottom chord/sway frame connection (gusset plates) has section loss, heavy flaking rust.

[2004/05] Sway bracing center horizontal has 3" x 8" severe pitting & 1/2" diameter hole; bottom sway bracing has a 2" x 3" hole between stringer #11 & stringer #10 see photos. [2002] Section loss: heavy flaking rust on truss bottom chord, L8'/L9'.



Center Sway Bracing



Hole in Bottom Member of Sway Bracing

**Pier #7:**

See NB notes. [2002] West column has vertical leaching cracks.

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses.

**Panel Point #9' (West Truss):**

[2001] Truss bottom chord/sway frame connection (gusset plates) has section loss, heavy flaking rust.

**Panel Point #10' (West Truss):**

[1994] Stringer #13: loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior, 15 ft. south of U10'. [2005] Pitting bottom sway frame, 1" diameter holes intermediate & horizontal bracing.

**Panel Point #11' (West Truss):**

Nick in the truss bottom chord L11'/L12'

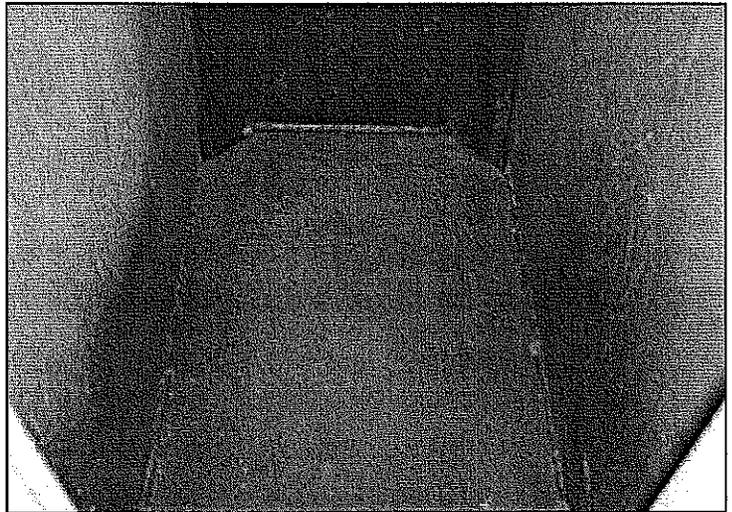
**Panel Point #12' (West Truss):**

Truss diagonal member U12'/L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #13' (West Truss):**

[2004] Upper chord member U13'/U12' (diaphragm #2) has no tabs, diaphragm is welded (full length) one side only see photo #1. Bottom chord member L13'/L12' cracked tack weld (diaphragm #1), (not @ diaphragm tab), (clean break) see photo #2.

U13'/U12' (Diaphragm #2) Photo #1

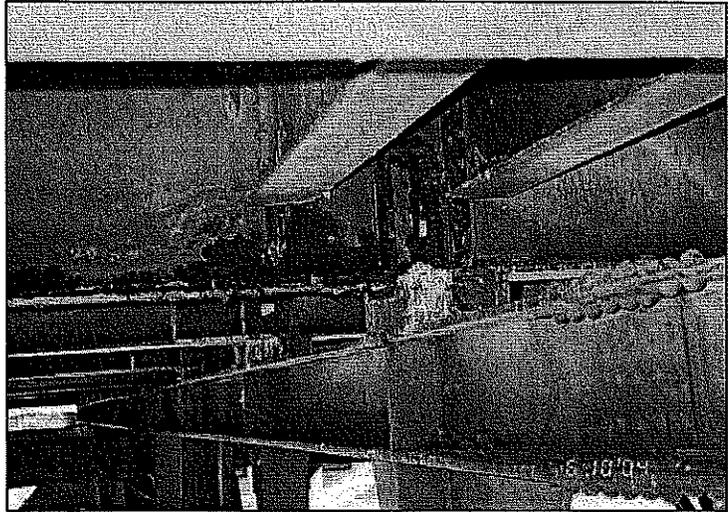


U13'/U12' (Diaphragm #1) Photo #2



**Panel Point #14 (West Truss Midspan Stringer Joint):**

Strip seal deck joint above. [2005] 10 LF of strip gland pulled out. Deck drains on both sides. [1994] Stringer #11 has section loss, flaking rust near the joint from gland pulled out above. Tack welds along the sway frame/truss, bottom chord, and gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2003] Stringer #14 connection, south side of the floorbeam, has a cracked tack weld. [2004] Upper chord member U14/U13' has internal tack welds (full length) at interior diaphragm. Bottom chord member L14/L13' has corrosion from deck drain (?) see photo.



Flaking Rust @ Stringer #11

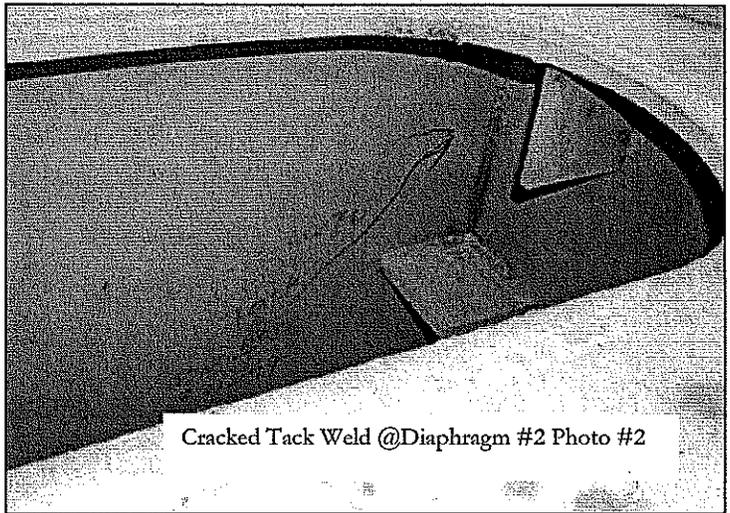


Member L14/L13' Corrosion

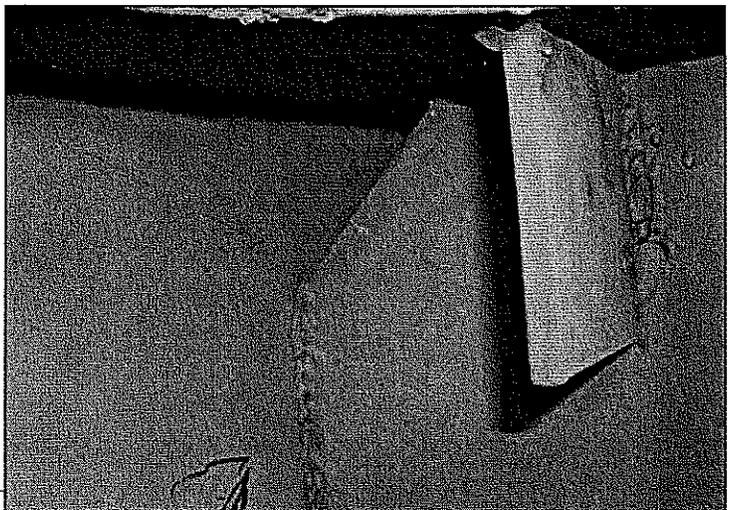
**Panel Point #13 (West Truss):**

[1999] Truss bottom chord/sway frame connection plates have 3/4" pack rust.  
[1996/99] Bottom chord member L13/L14 has cracked tack welds at two internal stiffeners. [2004] Diagonal L13/U14 has corrosion from deck drain (diaphragm #1). Cracked tack weld (diaphragm #2) (not @ diaphragm tab) see photo #2 & #3. Cracked tack weld (diaphragm #3), (not @ diaphragm tab), (entire tack weld broken cleanly) see photo #4 & #5.

L13/U14 Corrosion @Diaphragm



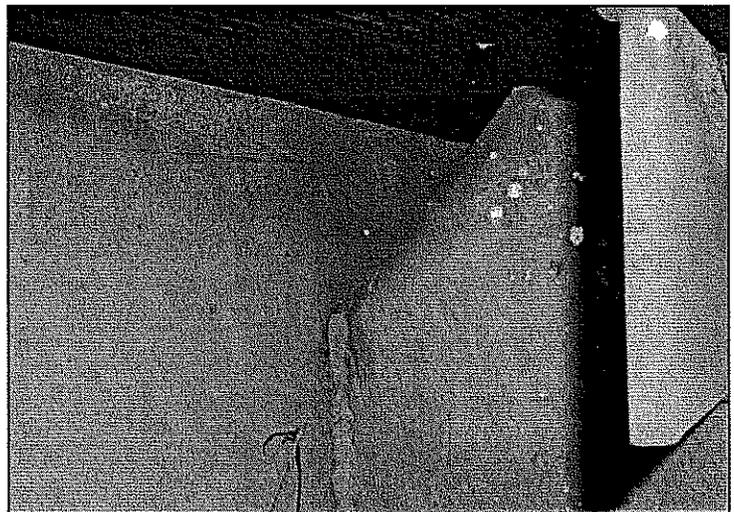
Cracked Tack Weld Diaphragm #2  
Photo #3



Cracked Tack Weld Diaphragm #3  
Photo #4

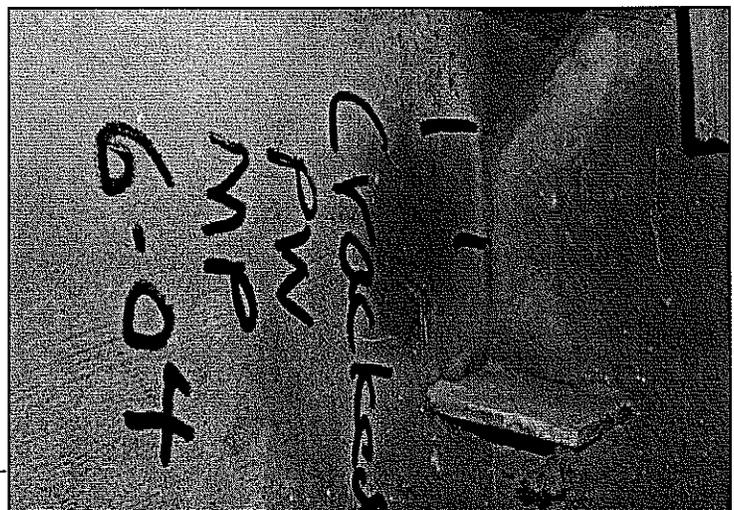


Cracked Tack Weld Diaphragm #3  
Photo #5



**Panel Point #12 (West Truss):**  
[1996] Bottom chord member L12/L13 has a cracked tack weld at the internal stiffener. [2004] Bottom chord member L12/L13 has a cracked tack weld (diagram #2), (not @ diaphragm tab) see photo.

Member L12/L13 Cracked Tack Weld  
Diaphragm #2



**Panel Point #11 (West Truss):**

[1998] Stringer #11 has three bolts replaced at the floorbeam truss connection; the SE bolt is too short with inadequate threads. Stringer has lifted 3/32" off the bearing block on the south side. Stringer #3 has tack welds ground out.

**Panel Point #10 (West Truss):**

Truss top chord U10/U9 has two spots ground out. [2005] Vertical ladder to access cat walk. Stringer #8 has some loose stool concrete.

**Panel Point #9 (West Truss):**

Truss diagonal L9/U8 has a spot ground out.

**Panel Point #8 (West Truss Pier #6 Stringer Joint):**

Strip seal expansion joint on the deck. [96/2005] Gland has 12 ft pulled out in right gutter line. Deck drains. [96/2003] Drain clogged at median, horizontal trough, standing water in east grate. [2004/05] Vertical member L8/U8, bottom chord, & floorbeam connection plates have moderate flaking & surface rust from plugged deck drain. [2005] Stringers #10 & #11 have flaking rust on the north side.

**Pier #6:**

See NB notes.

**Span #6:**

Span is 266 FT long with seven floorbeam trusses.

**Panel Point #7 (West Truss):**

[2002] Underside of the deck has 20 SF of water saturation at stringer 12 thru 14.

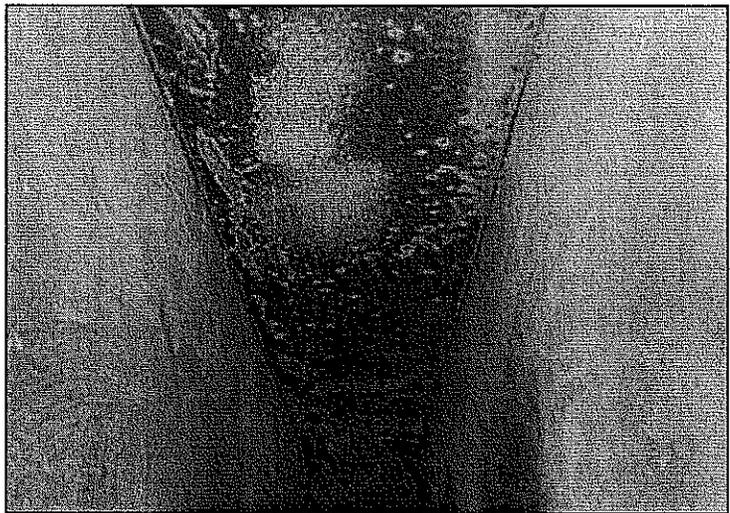
**Panel Point #6 (West Truss):**

Overhead sign mounted on railing. Floorbeam truss top chord (U5/U4) has gouges in the bottom flange at the end of the connection plate; the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice from construction.

**Panel Point #5 (West Truss):**

Top chord U5/U6 has backer bars tack welded along the top interior corners of member see photo.

[2004] Truss bottom chord, bottom lateral connection plates have spread 3/16" from pack rust.



Backer Bars Tack Welded Along Top Interior

**Panel Point #4 (West Truss Stringer Joint):**

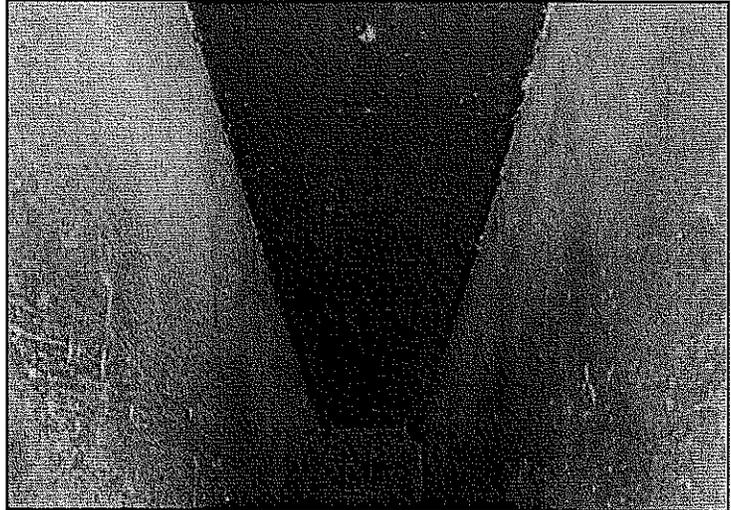
Strip seal expansion joint on the deck, Top chord U4/U5 has backer bars tack welded along the top interior corners of member see photo. Bottom chord L4/L5 has no diaphragm tabs, full weld on side and tack welds on other see photo.

[1998] Stringer #10: bolt replaced at south floorbeam, truss connection.

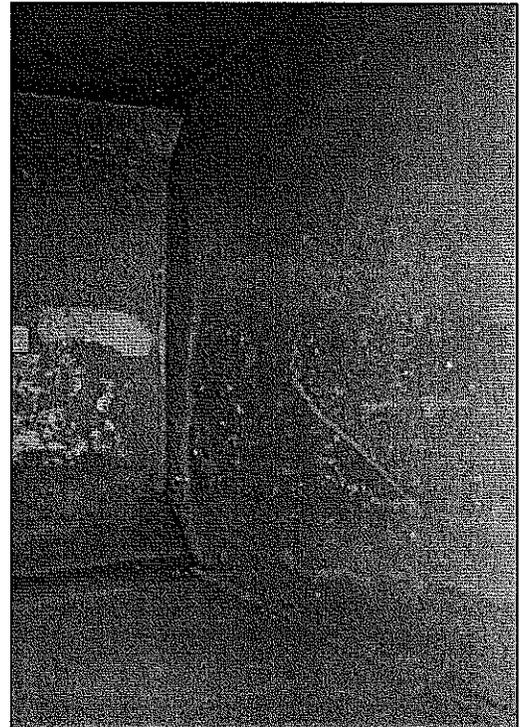
[2000] Lighting conduit is held up with tie wire. [2004] Stringer #11 floorbeam connection has moderate flaking rust.

Truss top chord has flaking rust.

Floorbeam top chord, stiffener under stringer #10 has cracked tack weld & is working.



Backer Bars Tack Welded Along Top Interior

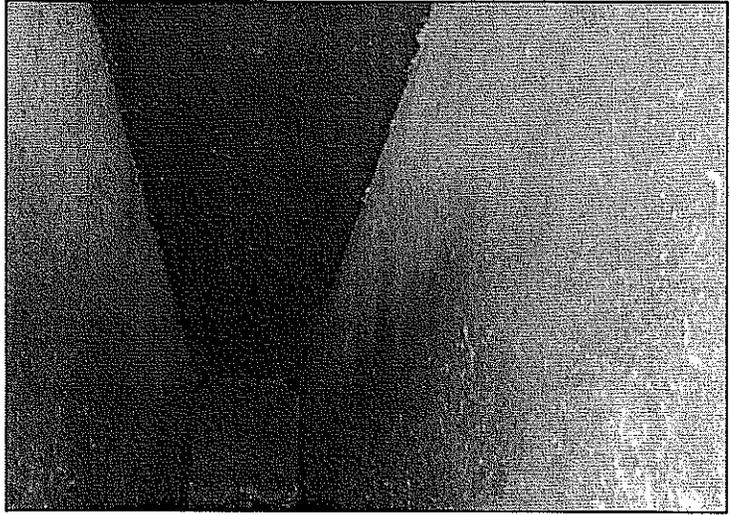


Bottom Chord Full Weld on Diaphragm

**Panel Point #3 (West Truss):**

Truss bottom chord L2/L3 has a nick. Top chord U3/U4 has backer bars tack welded along the top interior corners of member see [2004] photo. Bottom chord L4/L5 has no diaphragm tabs, full weld on side and tack welds on other see [2004] photo. Diagonal member L3/U4 has 4 diaphragms with tabs see [2004] photo.

Backer Bars Tack Welded Along Top Interior



Bottom Chord Full Weld on Diaphragm



Diaphragm @ Member L3 U4



**Panel Point #2 (West Truss):**

[1996] Floorbeam truss member L2/U3 has a welding flaw. [1997] No crack! Magnetic particle tested. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Pier #5:**

See NB notes. Access ladder to catwalk removed.

**Panel Point #1 (West Truss Pier #5):**

[1994] Diagonal brace, floorbeam to stringer, has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout, originally drained into storm sewer. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Panel Point #0 (End Floorbeam End of West Truss):**

Open finger joint on the deck. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings: filled with debris, needs to be flushed. [1997] Floorbeam horizontal stiffener is bent directly above the rocker bearing. [1998/99] Floorbeam re-painted, side facing finger joint has section loss, pitting. [2004] Truss, top chord exterior connection plate has 1/8" deep section loss with pitting. SW rocker bearing has no movement.

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Date   | Measurement |
| September, 1998                              | 16-5/8"     |
| April, 1999                                  | 17-13/16"   |
| April, 2000                                  | 18"         |
| September, 2001                              | 18-1/16"    |
| June, 2003                                   | 16-7/8"     |

\*[2004] Gap between crossbeam & floorbeam, at west end, measures 14-1/2".

\*[2000] Gap between crossbeam & floorbeam, at west end, measures 16-1/2".

**Crossbeam:**

[1997] Cracks found at the end of the horizontal crossbeam stiffener near the rocker were partially ground out. [1998/99] Crossbeam re-painted, the side facing finger joint has section loss, pitting with holes in the base of stiffeners, pitting on bottom flange at median.

**Span #5(Deck Truss Multi-beam):**

The multi-beam spans resume at panel point #0.

See NB Notes for South Approach Spans

## PREVIOUS SNOOPER INSPECTIONS

- 2004** Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Jim Flannigan, John Miller (City of Mpls)
- 2003** Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Bill Nelson
- 2002\*** Mark Pribula, Kurt Fuhrman, Pete Wilson, Jerry Oldeen, Bruce Anderson, Mike Palmer
- 2001** Mark Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer
- 2000** Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer, Wayne Tennison, Pete Wilson, George Morelli, Rebecca Lane
- 1999** Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadeegg, Pete Wilson
- 1998** Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, Jerry Anderson
- 1997\*** Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson, John Peterson
- 1996** Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994** Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993** Terry Moravec, Chas Martin, Tom Waks
- 1991** Chester Martin, Chas Martin, Jerry Anderson
- 1988** Chester Martin

**\*Denotes an "In-Depth" Inspection**

**APPENDEIX A DIAPHRAGM CRACK LOCATIONS**

| <b>DIAPHRAGM CRACK LOCATIONS</b>        |  |
|---|--|
| <b>First Diaphragm South of Pier #3</b> |  |
| <b>G1 (East Fascia NB)</b>              | [99/2000] 1/4" crack on top of interior stiffener weld. [2003] No change.  |
| <b>G2 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G3 (NB) *</b>                        | [1998] Two 1/4" intersecting diagonal holes drilled in top of stiffener welds. [2003] No crack.  |
| <b>G4 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G5 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G6 (NB)</b>                          | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web & was drilled out. Crack is contained.   |
| <b>G7 (NB)*</b>                         | [1998] One 2" hole drilled in web & other end of crack was ground out. [2003] The ground out end is cracked, visible on both sides web, should be drilled out.                                       |
| <b>G8 (SB)</b>                          |  |
| <b>G9 (SB)</b>                          |  |
| <b>G10 (SB)</b>                         |  |
| <b>G11 (SB)</b>                         |  |
| <b>G12 (SB) *</b>                       | [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out). [2003] No change.  |
| <b>G13 (SB)</b>                         |  |
| <b>G14 (West Fascia SB)*</b>            | [1998] One 2" hole drilled in web. [2000] 3/4" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack @ top of interior stiffener weld. [2003] No change. |

| <b>DIAPHRAGM CRACK LOCATIONS</b>              |  |
|---|--|
| <b>First Diaphragm North of Pier #3</b>       |  |
| <b>*Denotes original 1998 crack locations</b> |  |
| <b>G1 (East Fascia NB)</b>                    |  |
| <b>G2 (NB)</b>                                | Strain gauges on both faces.   |
| <b>G3 (NB)*</b>                               | [98/2000] West side, top flange web weld has 1/2" crack. Eastside, stiffener weld has a small crack. [2003] No change. |
| <b>G4 (NB)*</b>                               | [1999] West face, top of stiffener weld small crack. [2003] Crack is growing down toe of weld 3/4", drill out.         |
| <b>G5 (NB)*</b>                               | [2003] Small crack at the top of stiffener weld.   |
| <b>G6 (NB)*</b>                               | [1999] Small crack at top of stiffener weld. Strain gauges on the east face. [2003] No change.                         |
| <b>G7 (NB)*</b>                               | [2003] Small crack at the top of the interior stiffener weld.  |
| <b>G8 (SB)</b>                                |  |
| <b>G9 (SB)</b>                                |  |
| <b>G10 (SB)</b>                               |  |
| <b>G11 (SB)*</b>                              | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G12 (SB)*</b>                              | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G13 (SB)</b>                               |  |
| <b>G14 (West Fascia SB)*</b>                  | [1998] Two 2" holes drilled in web. Crack is contained.  |

## DIAPHRAGM CRACK LOCATIONS

| <b>First Diaphragm North of Pier #4</b> |   |
|---|---|
| *Denotes original 1998 crack locations  |   |
| <b>G1 (East Fascia NB)</b>              |   |
| <b>G2 (NB)</b>                          |   |
| <b>G3 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.   |
| <b>G4 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.   |
| <b>G5 (NB)</b>                          |   |
| <b>G6 (NB)</b>                          |   |
| <b>G7 (NB)*</b>                         | [1998] Two 2" holes drilled in web. [2001/03] Both sides, small crack at top of stiffener weld. |
| <b>G8 (SB)</b>                          |   |
| <b>G9 (SB)</b>                          |   |
| <b>G10 (SB)*</b>                        | [1998] Two 2" holes drilled in web. Crack is contained.   |
| <b>G11 (SB)</b>                         | [99/2000] Small crack at top of stiffener weld. [2003] No change.                               |
| <b>G12 (SB)*</b>                        | [1998] Two 2" holes drilled in web & 1/4" hole drilled in stiffener weld. Crack is contained.   |
| <b>G13 (SB)</b>                         | [99/2000] Small crack at top of stiffener weld. [2003] No change.                               |
| <b>G14 (West Fascia SB)</b>             | [1999] Small crack at top of interior stiffener weld. [2003] No change.                         |

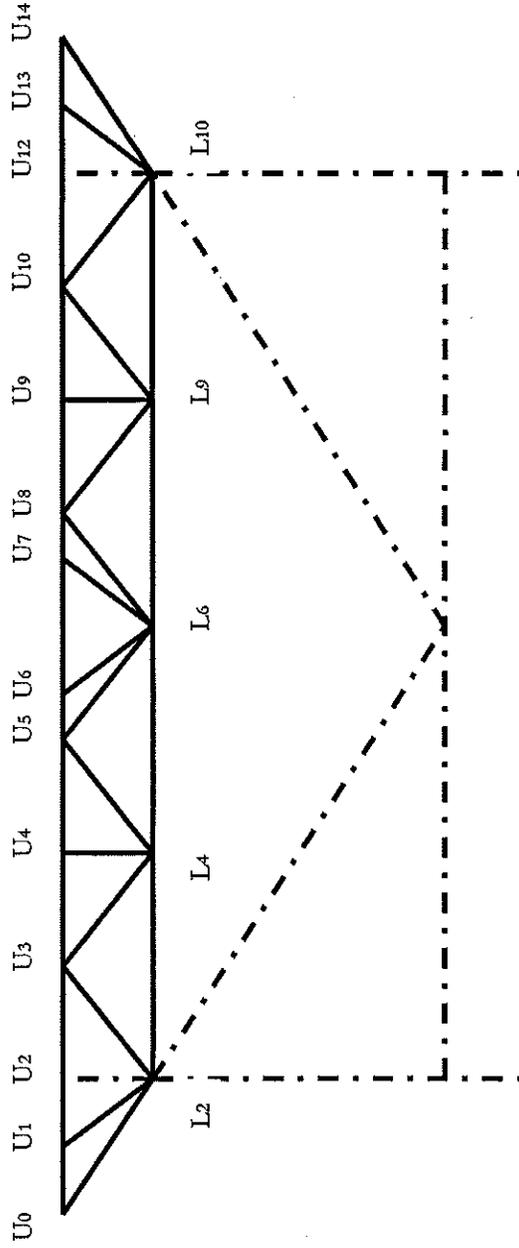
## DIAPHRAGM CRACK LOCATIONS

| <b>First Diaphragm South of Pier #9</b> |   |
|---|---|
| *Denotes original 1998 crack locations  |   |
| <b>G1 (East Fascia SB)</b>              | [2000] Exterior top flange/web weld has a 1/2" indication. [03] No change.          |
| <b>G1C (NB)</b>                         |   |
| <b>G2 (NB)*</b>                         | [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| <b>G3 (NB)</b>                          |   |
| <b>G4 (NB)*</b>                         | [98/2000] Small crack in top flange/web weld. [03] No change.                       |
| <b>G5 (NB)</b>                          |   |
| <b>G6 (NB)</b>                          |   |
| <b>G7 (NB)</b>                          |   |
| <b>G8 (SB)</b>                          |   |
| <b>G9 (SB)*</b>                         | [1998] Crack in top of stiffener weld. [2003] No change.                            |
| <b>G10 (SB)</b>                         |   |
| <b>G11 (SB)*</b>                        | [98/2000] Small crack in top of stiffener weld (east side). [03] No change.         |
| <b>G12 (SB)*</b>                        | [98/2000] Small crack in top of stiffener weld (east side). [03] No change.         |
| <b>G13 (SB):</b>                        |   |
| <b>G14 (West Fascia SB)</b>             |   |

## DIAPHRAGM CRACK LOCATIONS

| First Diaphragm North of Pier #9       |  |
|--|--|
| *Denotes original 1998 crack locations |  |
| <b>G1 (East Fascia NB)</b>             |  |
| <b>G1B (NB)</b>                        | Stiffeners are welded to the top flange (positive moment).                                     |
| <b>G1C (NB)</b>                        |  |
| <b>G1D (NB)</b>                        | Stiffeners are welded to the top flange (positive moment)                                      |
| <b>G2 (NB)</b>                         |  |
| <b>G3 (NB)</b>                         |  |
| <b>G4 (NB)*</b>                        | [2000] Two 2" holes drilled in web. Crack contained.   |
| <b>G5 (NB) *</b>                       | [2000] Two 2" holes drilled in web. Crack contained.   |
| <b>G6 (NB)</b>                         |  |
| <b>G7 (NB)</b>                         |  |
| <b>G8 (SB)</b>                         |  |
| <b>G9 (SB)*</b>                        | [98/2000] Crack in top flange/web weld & top of stiffener weld (west side).<br>[03] No change. |
| <b>G10 (SB)*</b>                       | [2000] Crack in top flange/ web weld (east side) [2005] No change.                             |
| <b>G11 (SB)*</b>                       | [2000] Two 2" holes drilled in web. Crack contained.   |
| <b>G12 (SB)*</b>                       | [2000] Two 2" holes drilled in web. Crack contained.   |
| <b>G13 (SB)</b>                        |  |
| <b>G14 (West Fascia SB)</b>            |  |

# TRUSS DIAGRAM



**Note**

- Tension Members in Red
- Compression Members in Black
- Reversal Members in Blue
- Dashed Lines are Secondary Members



Minnesota Department of Transportation  
 Bridge Inspection, Maintenance Operations Metro District

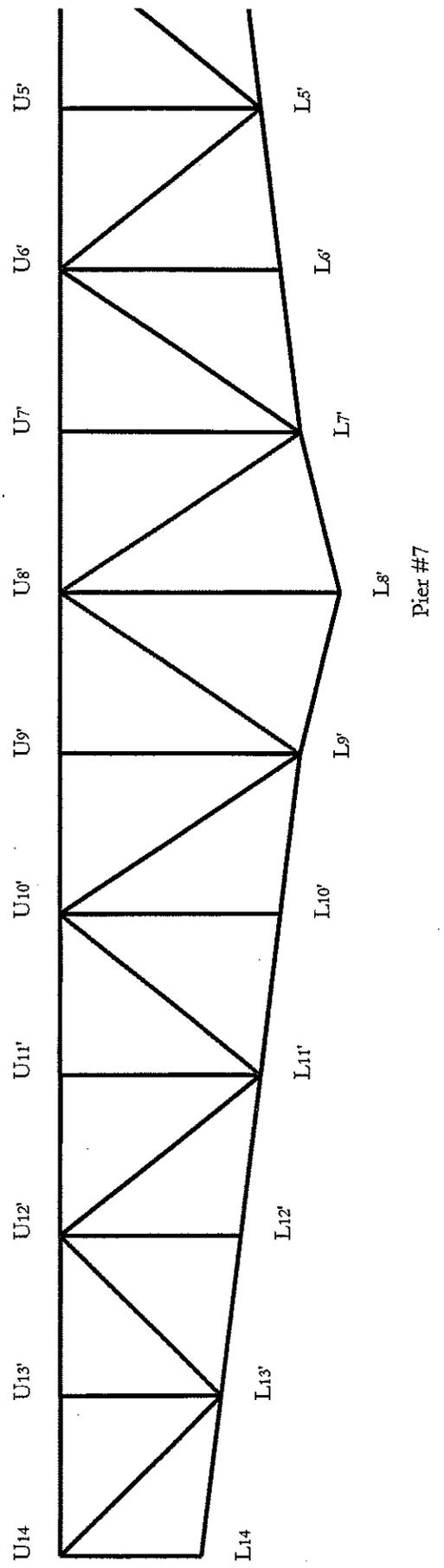
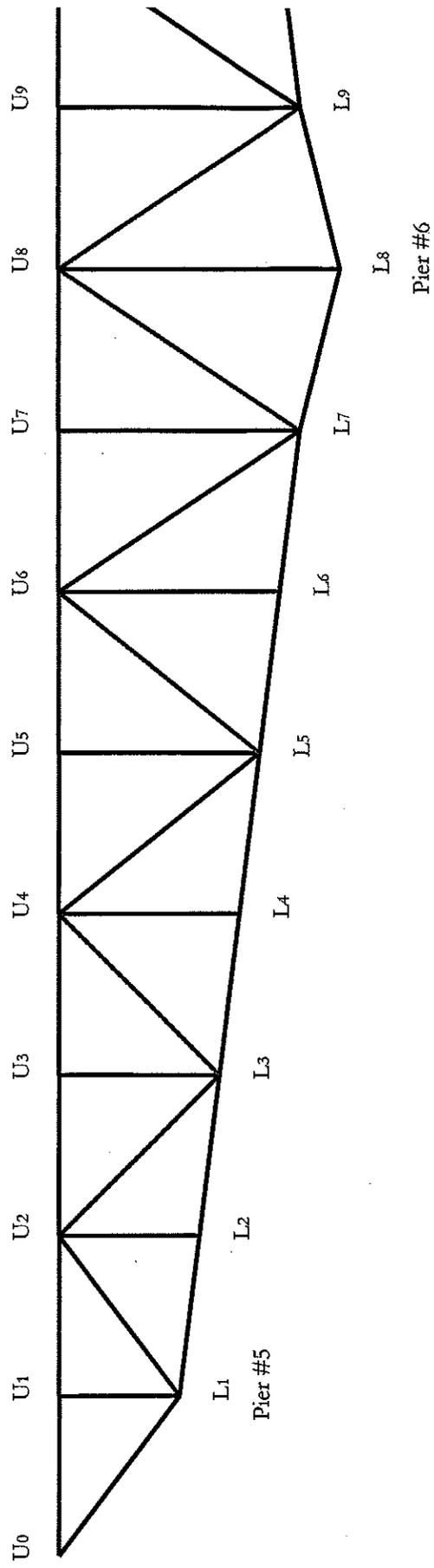
**Bridge No. 9340**

**Truss Diagram (Floor Beam)**

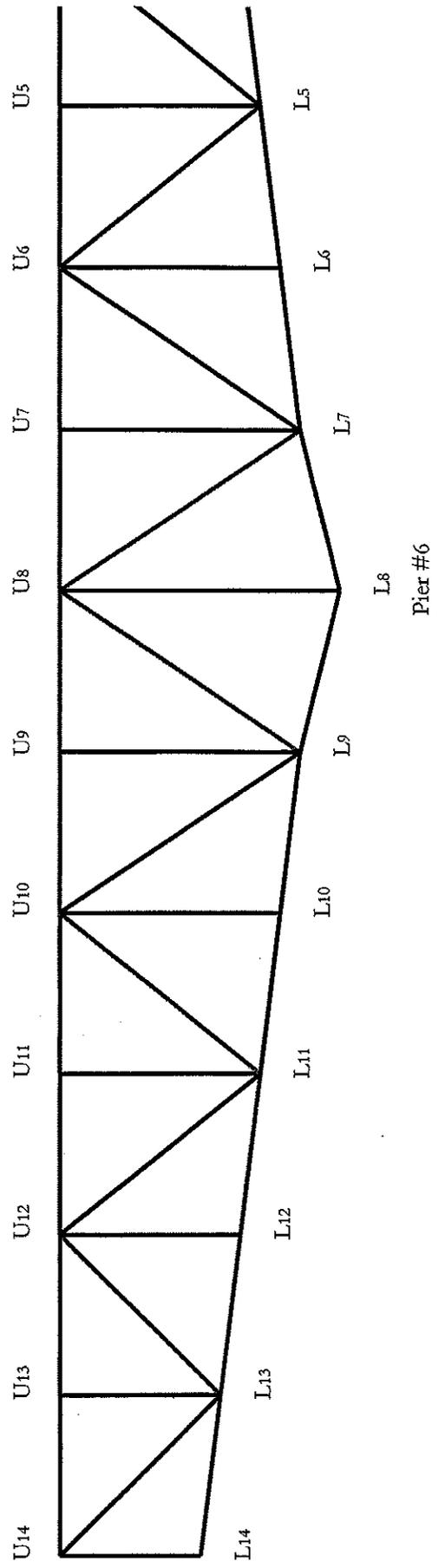
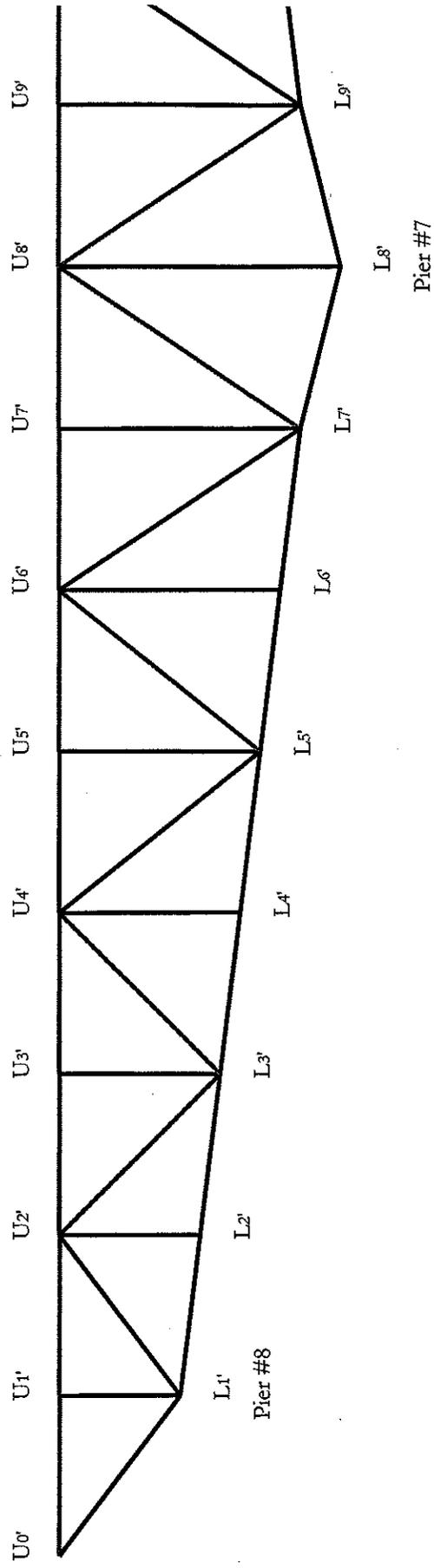
**I-35W over the Mississippi River at Minneapolis, MN**

Section 24 & 25 Township T. 29 N Range 24 W  
 County Hennepin Co. MN

# TRUSS DIAGRAM



# TRUSS DIAGRAM





Crew Number: 7627

**Mn/DOT BRIDGE INSPECTION REPORT**

Inspector: METRO

**BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 06-15-2006**

County: HENNEPIN Location: 1.0 MI NE OF JCT TH 94 Length: 1,907.0 ft  
 City: MINNEAPOLIS Route: Isth 35W Ref. Pt.: 018+00.538 Deck Width: 113.3 ft (Varies)  
 Township: Control Section: 2783 Maint. Area: METRO Rdwy. Area / Pct. Unsnd: 201,511 sq ft 6 %  
 Section: 25 Township: 029N Range: 24W Local Agency Bridge Nbr: Paint Area / Pct. Unsnd: 490,200 sq ft 15 %  
 Span Type: CSTL BEAM SPAN  
 NBI Deck: 5 Super: 4 Sub: 6 Chan: 7 Culv: N Open, Posted, Closed: OPEN  
 Appraisal Ratings - Approach: 8 Waterway: 9 MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate: 50.0  
 Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED  
 Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

**STRUCTURE UNIT: 0**

| ELEM<br>NBR   | ELEMENT NAME         | ENV | INSP. DATE | QUANTITY   | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |  |
|---|----------------------|-----|------------|------------|-------------|-------------|-------------|-------------|-------------|--|
| 22  | LS O/L (CONC DECK)   | 2   | 06-15-2006 | 201,853 SF | 0           | 0           | 201,853     | 0           | 0           |  |
|   |                      |     | 06-10-2005 | 201,853 SF | 0           | 0           | 201,853     | 0           | 0           |  |
| Notes: 3 lanes + on/off ramp each direction (2 FT shoulders). [1978] Low slump overlay (extensive full depth repairs). [1993] Spalls & patched areas along finger joints. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chalking of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound. [2001] Mill and Patch repair of deck by contract.   |                      |     |            |            |             |             |             |             |             |  |
| 48  | LS O/L (CONC SLAB)   | 2   | 06-15-2006 | 17,233 SF  | 0           | 17,233      | 0           | 0           | 0           |  |
|   |                      |     | 06-10-2005 | 17,233 SF  | 0           | 17,233      | 0           | 0           | 0           |  |
| Notes: Spans 12 - 14 have a 2 FT deep CIP concrete voided slab (continuous).  |                      |     |            |            |             |             |             |             |             |  |
| 300   | STRIP SEAL JOINT     | 2   | 06-15-2006 | 946 LF     | 852         | 0           | 94          | N/A         | N/A         |  |
|   |                      |     | 06-10-2005 | 946 LF     | 852         | 0           | 94          | N/A         | N/A         |  |
| Notes: [1978] Type H strip seal at abutments, pier 11, and stringer expansion joints (7 total). [1998] Strip gland replaced at pier 11, north abutment. South abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.  |                      |     |            |            |             |             |             |             |             |  |
| 301   | POURED DECK JOINT    | 2   | 06-15-2006 | 1,017 LF   | 1,000       | 0           | 17          | N/A         | N/A         |  |
|   |                      |     | 06-10-2005 | 1,017 LF   | 1,000       | 0           | 17          | N/A         | N/A         |  |
| Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).   |                      |     |            |            |             |             |             |             |             |  |
| 303   | ASSEMBLY DECK JOINT  | 2   | 06-15-2006 | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |  |
|   |                      |     | 06-10-2005 | 326 LF     | 191         | 110         | 25          | N/A         | N/A         |  |
| Notes: Open finger joints at truss ends and span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners).   |                      |     |            |            |             |             |             |             |             |  |
| 412   | APPR RELIEF JOINT    | 2   | 06-15-2006 | 226 LF     | 0           | 226         | 0           | N/A         | N/A         |  |
|   |                      |     | 06-10-2005 | 226 LF     | 0           | 226         | 0           | N/A         | N/A         |  |
| Notes: Relief joint at approaches. 52 LF SBL 4" wide; 52 LF NBL 3 1/2" wide; south approach. 26 LF SBL ramp 2" wide; 48 LF SBL 1" wide; 48 LF NBL 1" wide; north approach. Relief joints need re-sealing.   |                      |     |            |            |             |             |             |             |             |  |
| 321   | CONC APPROACH SLAB   | 2   | 06-15-2006 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
|   |                      |     | 06-10-2005 | 4 EA       | 0           | 4           | 0           | 0           | N/A         |  |
| Notes: [1991] All 4 approach panels have transverse cracks.   |                      |     |            |            |             |             |             |             |             |  |
| 331   | CONCRETE RAILING     | 2   | 06-15-2006 | 7,831 LF   | 7,000       | 831         | 0           | 0           | N/A         |  |
|   |                      |     | 06-10-2005 | 7,831 LF   | 7,000       | 831         | 0           | 0           | N/A         |  |
| Notes: [1998] 4018 LF Railings re-constructed. 3813 LF Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally code 12) were retrofit (32" high concrete face added, horizontal steel railings removed). Vertical cracks.  |                      |     |            |            |             |             |             |             |             |  |
| 107   | PAINTED STEEL GIRDER | 2   | 06-15-2006 | 10,596 LF  | 0           | 9,000       | 1,400       | 196         | 0           |  |
|   |                      |     | 06-10-2005 | 10,596 LF  | 0           | 9,000       | 1,400       | 110         | 86          |  |
| Notes: [1968] Bridge painted with lead base system. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have salt film, minor chalking throughout, fascia beams have section loss: pitting, flaking & surface rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound. |                      |     |            |            |             |             |             |             |             |  |

## Mn/DOT BRIDGE INSPECTION REPORT

**BRIDGE 9340 I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-15-2006**

**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 |
|--|----------------------|-----|------------|-----------|----------|----------|----------|----------|----------|
| 113  | PAINT STEEL STRINGER | 2   | 06-15-2006 | 14,896 LF | 0        | 14,000   | 700      | 196      | 0        |
|  |                      |     | 06-10-2005 | 14,896 LF | 0        | 14,700   | 0        | 150      | 46       |
| Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have section loss: pitting, flaking & surface rust corrosion at expansion joints. [1999] Median stringers re-painted. [91/2000] Stringer/floorbeam connections are "working". Several bolts are loose or missing.   |                      |     |            |           |          |          |          |          |          |
| 131  | PAINT STL DECK TRUSS | 2   | 06-15-2006 | 2,127 LF  | 0        | 1,000    | 880      | 247      | 0        |
|  |                      |     | 06-10-2005 | 2,127 LF  | 0        | 0        | 1,880    | 215      | 32       |
| Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have section loss: pitting, flaking & surface rust, severe pigeon debris, at the floorbeam & sway frame brace connections ( with pack rust & surface pitting). [1999] Pigeons screens placed on truss member openings.  |                      |     |            |           |          |          |          |          |          |
| 152  | PAINT STL FLOORBEAM  | 2   | 06-15-2006 | 3,348 LF  | 0        | 2,000    | 725      | 623      | 0        |
|  |                      |     | 06-10-2005 | 3,348 LF  | 0        | 2,000    | 725      | 600      | 23       |
| Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. Floorbeam trusses have numerous poor weld details, section loss: pitting, flaking & surface rust, some have holes, (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have salt film, chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. |                      |     |            |           |          |          |          |          |          |
| 373  | STEEL HINGE          | 2   | 06-15-2006 | 18 EA     | 0        | 4        | 0        | 14       | 0        |
|  |                      |     | 06-10-2005 | 18 EA     | 0        | 4        | 0        | 0        | 14       |
| Notes: [1986] SE crossbeam rocker hinge pin replaced. Section loss at hinges, (open finger joint) steel has moderate pitting, flaking & surface rust. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.  |                      |     |            |           |          |          |          |          |          |
| 380  | SECONDARY ELEMENTS   | 2   | 06-15-2006 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
|  |                      |     | 06-10-2005 | 1 EA      | 0        | 0        | 1        | 0        | N/A      |
| Notes: [1995] Pinned braces between floorbeam truss & stringers are working.   |                      |     |            |           |          |          |          |          |          |
| 311  | EXPANSION BEARING    | 2   | 06-15-2006 | 125 EA    | 75       | 44       | 6        | N/A      | N/A      |
|  |                      |     | 06-10-2005 | 125 EA    | 75       | 44       | 6        | N/A      | N/A      |
| Notes: [94/2000] Some abutment bearings are rusty (joints leaking). [1996] South abutment bearings are in full contraction. [1994] Main truss roller bearings have section loss: pitting, flaking & surface rust, moderate corrosion.  |                      |     |            |           |          |          |          |          |          |
| 313  | FIXED BEARING        | 2   | 06-15-2006 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
|  |                      |     | 06-10-2005 | 35 EA     | 35       | 0        | 0        | N/A      | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 205  | CONCRETE COLUMN      | 2   | 06-15-2006 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
|  |                      |     | 06-10-2005 | 52 EA     | 49       | 3        | 0        | 0        | N/A      |
| Notes: [1969] Pier 9: east column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in span 2 (south abutment bearings are in full contraction).  |                      |     |            |           |          |          |          |          |          |
| 210  | CONCRETE PIER WALL   | 2   | 06-15-2006 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
|  |                      |     | 06-10-2005 | 168 LF    | 168      | 0        | 0        | 0        | N/A      |
| Notes:   |                      |     |            |           |          |          |          |          |          |
| 215  | CONCRETE ABUTMENT    | 2   | 06-15-2006 | 255 LF    | 230      | 25       | 0        | 0        | N/A      |
|  |                      |     | 06-10-2005 | 255 LF    | 230      | 25       | 0        | 0        | N/A      |
| Notes: [1991] Both abutments have minor cracking & staining.   |                      |     |            |           |          |          |          |          |          |
| 234  | CONCRETE CAP         | 2   | 06-15-2006 | 819 LF    | 669      | 150      | 0        | 0        | N/A      |
|  |                      |     | 06-10-2005 | 819 LF    | 669      | 150      | 0        | 0        | N/A      |
| Notes: [1998] Pier 11: cap has extensive "gunnite" repairs.  |                      |     |            |           |          |          |          |          |          |

Crew Number: 7627

Inspector: METRO

**Mn/DOT BRIDGE INSPECTION REPORT****BRIDGE 9340****I 35W OVER RR, MISS R, 2ND ST & RD****INSP. DATE: 06-15-2006****STRUCTURE UNIT: 0**

| ELEM<br>NBR | ELEMENT NAME   | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|-------------|--|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 356         | FATIGUE CRACKING   | 2   | 06-15-2006 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|             | Notes: [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. [2004] Crack found in cope north approach crossbeam at beam G1C bottom flange 2 1/2" east side, 2" west side. |     |            |          |             |             |             |             |             |
| 357         | PACK RUST  | 2   | 06-15-2006 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 0           | 1           | 0           | N/A         |
|             | Notes: [1995] Truss members have flaking & surface rust corrosion at the floorbeam & sway brace connections (with pack rust & some section loss, surface pitting).   |     |            |          |             |             |             |             |             |
| 358         | CONC DECK CRACKING   | 2   | 06-15-2006 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             | Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.   |     |            |          |             |             |             |             |             |
| 359         | CONC DECK UNDERSIDE  | 2   | 06-15-2006 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 0           | 1           | 0           | 0           |
|             | Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).   |     |            |          |             |             |             |             |             |
| 360         | SETTLEMENT   | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             | Notes:   |     |            |          |             |             |             |             |             |
| 361         | SCOUR  | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             | Notes: [2004] Underwater Inspection by "Ayres Associates" found no evidence of scour or changes to structure condition.  |     |            |          |             |             |             |             |             |
| 363         | SECTION LOSS   | 2   | 06-15-2006 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 1           | 0           | 0           | N/A         |
|             | Notes: Section loss: pitting, flaking & surface rust on steel.   |     |            |          |             |             |             |             |             |
| 964         | CRITICAL FINDING   | 2   | 06-15-2006 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | N/A         | N/A         | N/A         |
|             | Notes:   |     |            |          |             |             |             |             |             |
| 966         | FRACTURE CRITICAL  | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             | Notes: See in-depth report for location of F/C members.  |     |            |          |             |             |             |             |             |
| 981         | SIGNING  | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | 0           | 0           |
|             | Notes: OH sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.  |     |            |          |             |             |             |             |             |
| 982         | GUARDRAIL  | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|             | Notes: Plate beam guardrail SE & SW corners, north & south median I 35W. [1998] Approach guardrail repaired (impact attenuator at NB off ramp).  |     |            |          |             |             |             |             |             |
| 984         | DRAINAGE   | 2   | 06-15-2006 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|             |  |     | 06-10-2005 | 1 EA     | 0           | 0           | 1           | N/A         | N/A         |
|             | Notes: Pier 6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.   |     |            |          |             |             |             |             |             |

**Mn/DOT BRIDGE INSPECTION REPORT**

**BRIDGE 9340**

**I 35W OVER RR, MISS R, 2ND ST & RD**

**INSP. DATE: 06-15-2006**

**STRUCTURE UNIT: 0**

| ELEM<br>NBR  | ELEMENT NAME    | ENV | INSP. DATE | QUANTITY | QTY<br>CS 1 | QTY<br>CS 2 | QTY<br>CS 3 | QTY<br>CS 4 | QTY<br>CS 5 |
|--|-----------------|-----|------------|----------|-------------|-------------|-------------|-------------|-------------|
| 985  | SLOPES          | 2   | 06-15-2006 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
|  |                 |     | 06-10-2005 | 1 EA     | 1           | 0           | 0           | N/A         | N/A         |
| Notes: [1994] North abutment slope paving has 20 LF of horizontal cracks.  |                 |     |            |          |             |             |             |             |             |
| 986  | CURB & SIDEWALK | 2   | 06-15-2006 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: [1993] Curb below exterior railings have spalling & delamination.   |                 |     |            |          |             |             |             |             |             |
| 988  | MISCELLANEOUS   | 2   | 06-15-2006 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
|  |                 |     | 06-10-2005 | 1 EA     | 0           | 1           | 0           | N/A         | N/A         |
| Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner). |                 |     |            |          |             |             |             |             |             |

General Notes: \*Bridge #9340, Year 2006  
 Bridge constructed in 1967.

See "Fracture Critical" report for additional information.

Inspectors: K Fuhrman, V Desens.

Inspector's Signature

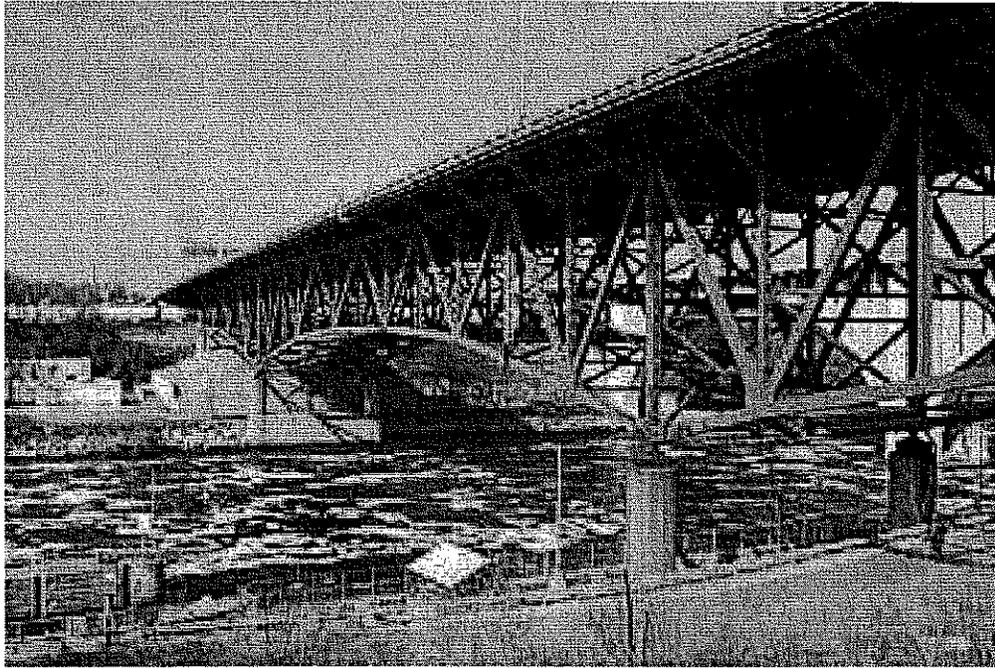
Reviewer's Signature / Date



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# **FRACTURE CRITICAL BRIDGE INSPECTION**

**In-Depth Report**



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**BRIDGE # 9340 (SQUIRT BRIDGE)**

**I-35W over the Mississippi River at Minneapolis, MN**

**JUNE 2006**

**Prepared For**  
**Minnesota Department of Transportation**  
**Office of Bridges & Structures**

**Prepared By**  
**Minnesota Department of Transportation Metro District**  
**Maintenance Operations, Bridge Inspection**



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## EXECUTIVE SUMMARY

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The "Federal Aid Highway Act of 1968" directed the establishment a national bridge inspection program. Accordingly, the Minnesota Department of Transportation, Metro Division Bridge Inspection Unit conducted an annual inspection of Bridge # 9340 over the Mississippi River at Minneapolis, MN. The bridge also crosses over several roadways, Minnesota Commercial Railroad tracks, & parking lots.

Constructed in 1967, the bridge has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction with acceleration/deceleration lanes and 2 ft. shoulders. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end. Spans #6 - 8, the main river spans, are "Fracture Critical" steel deck trusses. They are comprised of welded "built-up" members and are 988 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides and support the 27" deep rolled beam roadway stringers. At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration. The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep, welded plate beams, which transition into 33" deep welded & rolled steel beams. Connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck with spray nozzles installed in the deck and railings. The systems controls and storage tanks are located on the north end just off the freeway entrance ramp from East University to South I-35W.

- If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- Every two years the plastic pigeon screens are removed on all tension and reversal members to visually inspect the truss box girder member's internal diaphragms. Any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment.
- Fatigue cracks at girder #1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-1/2" ("back face"). Fatigue cracks a girder #3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). The cracks are located in negative moment regions where the diaphragm web stiffener was not welded to the top flange and were pervious fatigue cracks occurred and were repaired in 1998 and 1999. These areas should be inspected next year for any lengthening of the cracks and drilling of possible stress relief holes.
- Span 3, stringer #7 NB, has a 1-1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end.

- During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis.

## BRIDGE INSPECTION RECOMMENDATIONS

This recommendation listing refers to specific areas where fatigue cracks and other deficiencies were located during the 2006 inspection. Bridge inspection lists these deficiencies in the highest priority first.

### Long Term Repair Recommendations

- The long term plans for this river crossing need to be defined with replacement, re-decking, etc. Due to the "Fracture Critical" configuration of the main river spans and the problematic "crossbeam" details, and fatigue cracking in the approach spans, eventual replacement of the entire structure would be preferable.
- If bridge replacement is significantly delayed, the bridge should be re-decked. The design of the main river spans do not allow for deck widening. Any re-decking contract should also include a complete re-painting of the superstructure, elimination of the hinge joint in span #2, and reconfiguration of the deck drainage system.
- Depending on the projected date of bridge replacement, the bridge deck will eventually require a partial overlay repair contract. The expansion joints should also be replaced.

### Immediate Maintenance Recommendations

- Every two years the plastic pigeon screens are removed on all tension and reversal members to visually inspect the truss box girder member's internal diaphragms. Any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment.
- Fatigue cracks at girder #1C (NBL), crack at the diaphragm bottom cutout, NE side measures 2" ("front face") and NW side measures 2-½" ("back face"). Fatigue cracks a girder #3 (NBL), crack at the diaphragm bottom cutout, measures 1-½" (both sides). The cracks are located in negative moment regions where the diaphragm web stiffener was not welded to the top flange and were previous fatigue cracks occurred and were repaired in 1998 and 1999. These areas should be inspected next year for any lengthening of the cracks and drilling of possible stress relief holes.
- Four-stringer connection bolts, all in the NBL, need replacement. At panel point #8, stringer #2 has 2 loose bolts, and the bearing block has rotated. This will likely require jacking the superstructure. Stringer bolts also need replacement at panel point #8, stringer #4, south side, and at panel point #11, stringer #3.
- Several strip seal joints are leaking. The glands have ripped or pulled out. Attempts were made to replace these joints during the 1998 repair contract, but the steel extrusions, which anchor the gland, had severe corrosion, and new glands could not be installed. Instead, a new product was used at the, SBL, south abutment. This utilized a hot pour seal with wire mesh reinforcing. The final product looks similar to a strip seal gland. We should monitor this joint to see how well this new gland repair performs, and consider using it at other locations.

- The rubber "skirts" sections above the truss end rockers, installed in 1999, tend to fill with debris. These should be flushed out annually. The horizontal drain troughs at pier #6 have inadequate slope, and are clogged.

#### **Areas of Concern - Future Inspections**

- Span 3, stringer #7 NB, has a 1-1/2" crack in the web with one 2" hole drilled. It is recommended to drill a 2" hole at the other end.
- During the 1998 inspection, numerous fatigue cracks were found in spans #3 - 5 and #9 - 10, the approach spans. The cracks were located in negative moment regions where the diaphragm web stiffener was not welded to the top flange. At one location the web had cracked through entirely. Most existing cracks were drilled out, and the fractured beam was reinforced with bolted plates. To reduce the stress levels, the diaphragms were lowered. Due to the widespread cracking, these areas should be inspected in-depth on an annual basis.
- The truss end rocker bearings & main truss bearings should be measured for movement during each annual inspection. The truss end floor beams & approach end "crossbeams" should be closely inspected. They have section loss, had flaking rust & fatigue cracks (open finger joint).
- The hinge joint in span #2 is locked in full expansion several beam-ends are contacting, and the hinge bearings are "frozen" and no longer functioning. Consequently, pier #1 has tipped slightly to the north, and the south abutment bearings are in full contraction. This area should be thoroughly inspected.

For information that is more detailed and recommendations, please refer to the appropriate sections in the text of the report.

## BRIDGE DESCRIPTION

Bridge #9340 was constructed in 1967, and has 14 spans, with a total length of 1,907 feet. The split deck has three through lanes each direction & also acceleration/deceleration lanes. The shoulders are only 2 ft. wide. The bridge deck widens at the north end to accommodate on & off ramps, and curves slightly at the south end.

Spans #6 - 8 are "Fracture Critical" steel deck trusses, comprised of "built-up" welded members. Steel deck truss spans are 988 ft long. Span #7 is 456 ft. long. The truss is approximately 60 ft. deep at piers #6 & 7. The two main trusses are connected by welded floor beam trusses, which cantilever beyond the truss on both sides, and support the 27" deep rolled beams roadway stringers.

At each end of the main truss spans, the truss supports the adjacent approach spans with a unique "crossbeam" configuration, (open finger joint). The approach span beams frame into a "crossbeam", which is supported by rocker bearings on the cantilever truss ends. Spans #1 - 5 & 9 - 11, the approach spans, have 48" deep welded plate beams, which transition into 33" deep welded & rolled steel beams. The connections are riveted. Spans #12 - 14, the far north spans, are cast-in-place concrete voided slabs.

Due to several factors, including mist from nearby St. Anthony Falls, the bridge deck frequently ices over and becomes quite treacherous. In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings. Control room is located at the northwest approach corner.

## BRIDGE DECK: NBI CONDITION CODE 5

Split deck has 3 through lanes each direction, with acceleration/deceleration lanes. Shoulders are only 2 ft. wide. A low slump concrete overlay, with numerous full-depth deck repairs, was placed on the deck in 1978. In 1998, the median copings were replaced with steel stay-in-place forms, and the exterior copings were patched with shot-crete.

**Wearing Surface:** Overlay has some minor spalls and patched areas around the finger joints, and 3,000 LF of transverse cracks, sealed in 1998. The overlay has several patched areas, and some spalls. Additional patching is typically required each year. A partial chaining of the northbound deck in 1998 found 1,665 SF of delamination & 47 SF of spall. In 1999, the Federal Highway Administration conducted a ground penetrating radar survey, using the experimental "HERMES" system. The radar survey found the overlay to have 6.14% delamination. [2001] Overlay has 15,250 SF of concrete repair patches.

**Structural Slab:** Underside of the deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling, particularly in the south approach spans. In 1998, the median coping overhangs were replaced with steel stay-in-place forms, and the exterior copings were repaired with shotcrete. During the median slab removal, the bays adjacent to the median were damaged - some of the "stool" concrete along the stringers & beams has spalled off with exposed rebar; and in some locations, the spalling extends into the underside of the deck. [2001] Structural slab has 1,200 SF full depth repair patches.

**Open Finger Expansion Joints:** Deck has three open finger joints, one above the hinge joint in span #2, & one at each end of the truss spans. In 1999, rubber "skirts" were installed below the truss end finger joints & the drain troughs were removed.

**Strip Seal Expansion Joints:** Strip seal, type "H" joints at the abutments, pier #11, and at five stringer joints in the main truss spans. These were installed in 1978. Strip seal glands have pulled out, with joints leaking, in several locations. Steel extrusions, which anchor the glands, have severe section loss, making gland replacement impossible. In 1998, the south abutment, SBL, gland was patched using an experimental system. Hot poured seal with wire mesh reinforcement.

**Poured Deck Joints:** The deck has several transverse poured joints, from staged deck construction. All of these joints are leaching below; & at some joints the deck is spalling below.

**Exterior Railings:** The original exterior code #12 railings were retrofit in 1998. A 32" high concrete face was installed in front of the existing concrete rail base. The horizontal steel rails were removed. The curb along the railing has moderate cracking, delamination and spalling. The curb has 800 LF reconstructed in 2001.

**Median Railings:** Code #22, type "J"-rail, was installed along the split median in 1998. The railings above the truss spans have removable pre-cast concrete caps, which are intended to prevent further corrosion damage to the superstructure below.

## **BRIDGE SUPERSTRUCTURE: NBI CONDITION CODE 4**

**Paint System:** Bridge was originally painted with a lead base system in 1968. In 1999, the bridge was partially re-painted with a zinc system. Areas painted included the entire superstructure below and along the open median, and below the open finger deck joints.

Currently, the overall paint system is approximately 15% unsound. The truss members have surface rust corrosion and pack rust at the floorbeam & sway frame connections, and there is paint failure & surface rust corrosion in scattered locations. The floorbeam trusses & stringer ends have surface rust corrosion at the stringer expansion joints. Some of the areas re-painted in 1999 have severe section loss. This includes the sections of the floorbeam trusses & sway bracing located below the median, and the truss end floor beams & "crossbeams", located below the open finger joints.

**Main Truss Members** The two steel deck trusses are comprised of "built-up" welded members; connections include both rivets and bolts. While most truss members are welded box beams, some tension vertical & diagonal members are welded "H" beams. The truss members have numerous poor weld details. The vertical "H" beam truss members have transverse welds at the floor beam connections. The box beam truss members have welded interior stiffeners. Some of these have tack-welded tabs. Many of these tack welds have cracked. Some box beams have tack welds, or tack welded backer bars along the interior corners. The truss members have surface rust corrosion at the floor beam and sway frame connections. Pack rust is forming between the connection plates. There is paint failure,

surface rust, and section loss, flaking rust in scattered locations. The interiors of the box members have severe pigeon debris. In 1999, screens were placed over openings in the truss members to prevent pigeon access. This unfortunately prevents inspection of the interiors. During the 2004 inspection, & every two years after, the plastic pigeon screens are removed on all tension and reversal members to visually inspect the member's internal diaphragms. Any questionable welding flaws discovered during this inspection were tested with magnetic particle equipment.

**Floor Beam Trusses:** There are 27 floorbeam trusses connecting the main deck trusses. These trusses are comprised of rolled H-beams with welded connections. The floorbeam trusses cantilever beyond the main truss on both sides. They are connected to the main truss, vertical members with bolts & rivets. The floorbeam truss members have numerous poor welding details, including plug welded web reinforcement plates, and tack welds & welded connection plates located in tension zones. Some of the top chord splices are offset vertically, up to 1/2" – from original construction. The splice plates are bent. The floorbeam trusses below stringer joints have section loss, severe flaking rust. There is pack rust and surface pitting at the main truss connections. In 1999, the floor beam sections below the median were re-painted. Some areas have section loss with holes.

**Stringers:** There are 14 steel stringers, 27" deep rolled beams, bearing on the floorbeam trusses. They are continuous except for five stringer expansion joints. The stringer ends have surface rust corrosion at the expansion joints. The stringers adjacent to the median were re-painted in 1999. The bolted connections to the floorbeam trusses are "working" and some bolts are loose or missing. [2006] Fascia stringers have minor section loss, with moderate flaking rust along the bottom flange.

**Lateral & Sway Bracing:** The main deck trusses have both upper and lower horizontal diagonal bracing. There is also a vertical sway frame running below each floorbeam truss - the median portion of these sway frames were re-painted in 1999, some areas have section loss with holes. Each floorbeam truss has 2 diagonal braces, which connect the bottom chord to stringers #4 & 11. The pinned connections on these braces are "working" and at least one cotter pin is missing.

**Truss Bearing Assemblies:** The truss spans have six "geared roller-nest" bearing assemblies, and two fixed bearing assemblies. The truss bearings have section loss, flaking & surface rust; moderate corrosion, the bearings at piers #5 & 8 are functioning properly. They are checked during each annual inspection. The bearings at pier #6 show no obvious signs of movement, difficult to reach with snoopers.

**End Floor Beams & Crossbeams:** At each end of the main truss, the multi-beam approach spans terminate by framing into a "crossbeam". The crossbeams are supported by rocker bearings mounted on the cantilever truss ends. There is an open finger expansion joint above these members, severe section loss on steel. This area was re-painted in 1998 - 1999, and rubber "skirts" were installed below the finger joint in an attempt to prevent future corrosion damage.

**End Floor Beams:** The two end floor beams are welded plate girders. They connect the main truss ends. The end floor beams were re-painted in 1998/1999. The sides facing the open finger joints have extensive section loss with surface pitting at the base of the web, and

holes in the base of the vertical stiffeners. In 1998, fatigue cracks were found in two stiffener welds directly above the NE rocker bearing.

**Crossbeams & Rocker Bearings:** The two "cross-beams" are welded plate girders each one is supported by two "rocker" bearings attached to the cantilever ends of the main truss. These rocker bearings are built into the crossbeam web except the southeast rocker, which, due to the bridge super-elevation, connects to the bottom flange of the crossbeam. The crossbeams & rocker bearings were re-painted in 1998/1999. The faces exposed to the finger joints have extensive surface pitting with some areas of severe section loss with holes at the base of stiffeners. The rocker bearings are measured & checked for movement during each annual inspection. All four bearings appear to be functioning. They show obvious signs of movement.

In 1986, the southeast rocker bearing "froze", resulting in damage to the crossbeam with two cracked vertical web stiffeners. The rocker-bearing pin was replaced. This required closing I - 35W and jacking up the span. The crossbeam was repaired and the cracks in the web stiffeners were welded, crack ends drilled out, and stiffeners reinforced with angle plates. Installing braces between the crossbeam and beams #2 & 3 also reinforced the connection.

In 1992, a crack was found in a crossbeam stiffener weld above the northeast rocker bearing, which was drilled out. In 1997, at the same location, a weld between a vertical & horizontal stiffener was found cracked through entirely. Cracks were also discovered at the end of horizontal stiffeners near the northeast & southwest rocker bearings. Strain gauges were installed to analyze stresses, crack ends were drilled out, and installing bracing between the crossbeam and 2 stringers reinforced the northeast connection.

**Steel Multi-Beam Approach Spans (spans #1 - 5 & #9 - 11):** The approach spans have welded beams - the depth transitions from 48" to 33". Connections are riveted. The south span has 33" deep rolled beams with welded cover plates (square ends). Spans #1 - 5 have 14 beams (with a hinge joint in span #2). In spans-#9 - 11, the deck widens from 15 to 18 beams. The fascia beams have minor section loss, with moderate flaking rust along the bottom flange - the beams adjacent to the median were re-painted in 1999.

In 1998, fatigue cracks were found in several beam webs. These cracks were located in negative moment regions at the top of the diaphragm connections. At one location the web had cracked through entirely and was caused by out of plane bending in locations where the web stiffener was not rigidly connected to the top flange. After strain gauge analysis by the University of Minnesota, the diaphragm connections were modified. They were lowered, using only four bolts at each connection. Most existing cracks were drilled out. Some were too small to reach, and the fractured beam was reinforced with bolted plates.

In span #2, multi-beam approach span, there is a cantilever expansion hinge with sliding plate bearings. The joint is closed beyond tolerable limits, possibly due to substructure movement & pavement thrust and is no longer functioning. Some beam-ends are contacting, and some bearing plates have tipped, preventing the joint from reopening. The hinge area, with open finger joint above, was re-painted in 1999. The beam-ends have section loss, moderate surface pitting.

The north approach spans have lateral & diagonal bracing welded to the web.

**Approach Span Bearings:** The steel beam approach spans have a total of 90 sliding plate bearing assemblies and 33 fixed plate bearing assemblies. The piers with fixed bearings have expansion bearings on the fascias.

**Voided Concrete Slab North Approach Spans (Spans #12 – 14):** The far north approach spans consist of cast-in-place concrete continuous “voided” slabs. They are 2 ft deep. Northbound off ramp splits off to form Bridge #9340A. The slab rests on sliding plate bearings at pier #11 and the north abutment. There are 29 bearing assemblies. Piers #12 & #13 are cast directly into the slab with no bearings. These spans are in generally good condition. Spalling along the exterior and median copings was patched with shotcrete in 1998. [2001] Light fixtures at Metal Matic Incorporated parking lot.

## **BRIDGE SUBSTRUCTURE: NBI CONDITION CODE 6**

**Abutments:** The abutments have vertical cracking, with some staining from leaking deck joints.

**Truss Span Piers:** Piers #6 & 7, main river span, have two concrete columns resting on a pier wall. The west column on pier #7 has a minor vertical crack. Piers #5 & 8 have two concrete columns connected with an upper strut. The column on pier #8 has been reinforced with a concrete “jacket”. [2001] Underwater inspection conducted by Collins Engineers, Inc. in 2000 found pier 7 to be in good condition with no defects of structural significance. A 3 x 3 foot area of light scaling, with a maximum of 1" of penetration was observed on the south side of the upstream pier nose. Collins recommends inspecting the substructure unit at the normal 5 year inspection interval. [2004] The concrete surfaces below the water are in good condition. Minor scaling was found above the, but not of the quantity or depth as noted in the previous report the total area was 2 feet square and ¼" deep penetration. No significant changes in the structure or channel condition since last inspection by Ayres Associates.

**Approach Span Piers:** Piers #1 - 5 & #9 - 11, piers supporting the steel spans, consist of concrete columns with a cap. Those adjacent to railroad tracks have lower struts. The pier columns supporting the voided slab spans (piers #12 & 13) are cast directly into the slab with no cap. Pier #1 has tipped slightly to the north. This is related to the hinge failure in span #2. The east column on pier #9 has minor scrapes & spalls from a train derailment in 1969. Pier #11 has extensive shotcrete repairs from leaking deck joint above.

## OTHER BRIDGE ELEMENTS

**Approach Panels:** All approach panels are concrete. Each approach panel has a transverse crack, and there are some minor spalls at the joints. The relief joints need to be resealed. North approach, SBL and on ramp, has no relief joint. [2001] South approach panel was scarified and a low slump overlay was installed.

**Channel & Protection:** NBI code #8 which is very good condition. The bridge is located just downstream from the Lower St. Anthony Lock & falls - the flow is very turbulent. At normal river level, clearance below the truss is approximately 60 feet. Pier #7 is the only pier in the channel, along the east bank. Typically, the water depth along the west face is only 1 - 2 feet. Mn/Dot does not conduct underwater inspections. Due to the extreme turbulence, sonar readings of the channel cross-section cannot be taken.

**Signing:** There is an overhead sign bridge structure running across the entire deck, mounted on the exterior railings at truss panel point #2' at north end of truss. There is a signpost mounted on the west railing at truss panel point #6 at south end of truss.

**Guardrail:** In 1998, the approach guardrails were repaired. Impact attenuator was installed at the northbound off ramp to University Avenue. Both approach medians of I-35W & the SE, SW corners have plate beam guardrail.

**Drainage:** Several deck drains drop directly into the river. The drain troughs at pier #6 have inadequate slope, and tend to fill up with debris. In 1998-99, the drain troughs below the arch end finger joints were removed, and replaced with rubber "skirts". The skirt sections above the truss end rockers tend to fill with debris. These should be flushed annually.

**Slope Protection:** The concrete slope paving, at both abutments, is in good condition.

**Lighting:** Rail mounted deck lighting, under deck lighting in span #13, and river navigation lighting. "Metal-Matic Inc." maintains the lighting above the parking lots in spans #11 & 12. A light post, W 5/3 L, on the west railing, has a 6" vertical split from plow damage.

**Miscellaneous:** The former "U of M" parking lot area below spans #2 - 5 has been barricaded from use while the parking lot area below spans #11 & 12 continues to be used by Metal Matic Inc employees. The U.S. Army Corps of Engineers is stockpiling river debris material below span #8 this material is approximately 10 to 15 feet below the bottom truss diagonals (2003). The navigation light maintenance catwalk, which is below the median of the truss spans, is being accessed by graffiti "artists" at pier #5.

**De-icing System:** In 1999, an automated de-icing system was installed on the deck, with spray nozzles installed in the deck and railings and a pump house/control room was constructed at the NW approach corner.

## BRIDGE SNOOPER FIELD INVESTIGATION

Northbound & southbound inspection notes are combined. Plans have beams numbered from the east. Exterior of west rail, east & west coping have conduit full length of bridge.

### South Abutment:

Type H: strip seal deck joint above. [1995] Bearings are corroded and in full contraction from hinge failure in span #2, and tipping of pier #1. The seat area is cracked and discolored. [1998] SBL Gland was patched using an experimental joint, hot poured seal with wire mesh reinforcement, and fourteen sliding plate bearing assemblies. [2003] South abutment has 72 LF of random cracks.

### Span #1 (Steel Multi-beam):

Span is 53 FT long with 14 beams, 33" deep rolled beams, with welded cover plates with square ends. [1978] 3 West bays have 300 SF full depth deck patches. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted. [2003] Surface rust: on the beams. [96/2005] East fascia beam has section loss, flaking & surface rust on bottom flange.

### Pier #1:

10 Fixed; & 4 sliding plate bearing assemblies. Pier consists of 4 concrete columns and cap, with a railroad crash strut between the columns. [1996] Pier has tipped slightly to the north (measured with plumb bob). [1999] Bearings 6, 7, 8, & 9 were re-painted.

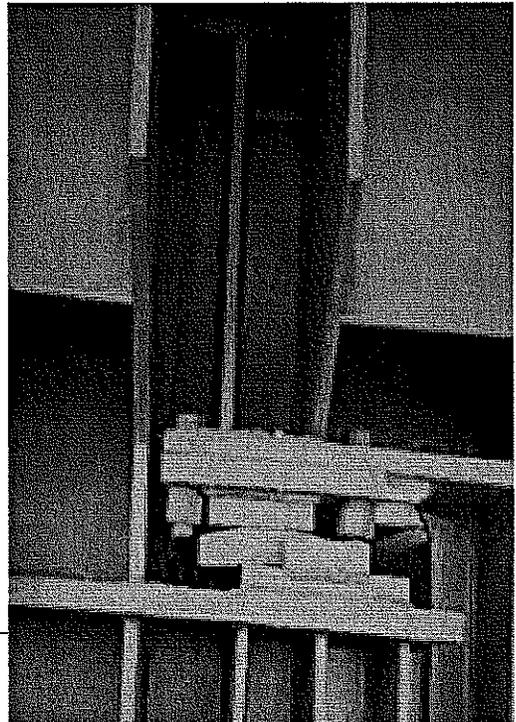
### Span #2 (Steel Multi-beam):

Span is 72 FT long with 14 beams; 33" rolled beams with welded cover plates, some with square end welded cover plates, the beams transition to 48" welded beams north of the hinge joint. [1978] 350 SF: full depth deck repairs. [1997] Conduit is loose below median. [1998] "Stool" concrete is spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 were re-painted. [96/2003] Bottom flange at girder transitions & at hinge has section loss, flaking rust. [2005] East fascia beam has section loss, flaking & surface rust on bottom flange. Beam #11 has peeling paint on the bottom flange.

### Hinge Joint (12 ft. South of Pier #2):

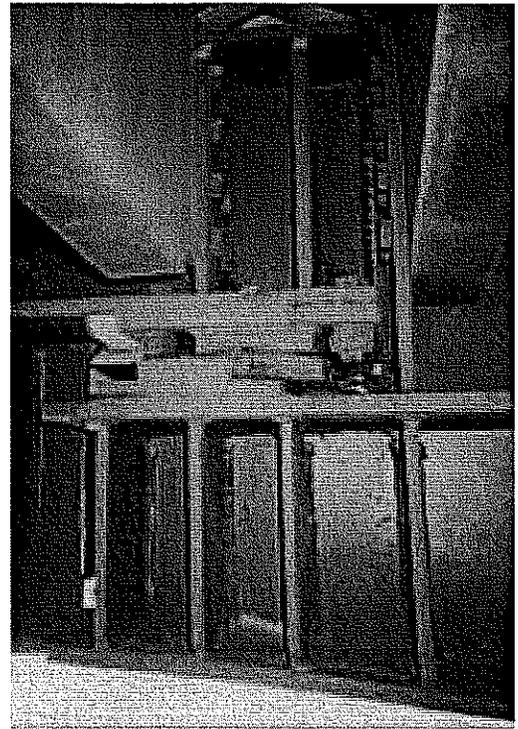
Hinge joint has open finger joint above. [1999] Hinge area re-painted. [2000] Beam-ends have section loss, moderate surface pitting; debris has begun to build up on hinge area. Additionally, the tops of the beam ends are contacting at the top flange or at the web along this joint. [94/2005] All hinge assemblies are expanded beyond tolerance; sliding plates extend 4" or more beyond the base plates, reducing bearing capacity. At beam #10, the sliding plate has tipped, falling off the base plate, and is preventing the joint from opening. [2005] Hinges should be flushed.

Sliding Plate @ West Fascia





Sliding Plate @ Beam 5 NBL



Sliding Plate @ Beam 6 NBL

**Pier #2:**

Pier consists of four concrete columns, 14 sliding plate bearing assemblies, and cap, with a railroad crash strut between the columns. [97/2000] Bearings have surface rust corrosion; east end of cap has 6 SF of delamination. [1999] Bearings 6, 7, 8, & 9 re-painted. [2003] East end of cap, on south face has 2 SF of delamination, & 10 SF of map cracking.

**Span #3 (Steel Multi-beam):**

Over Bluff St. Span is 110 FT long with fourteen, 48" deep welded plate beams. [1978] The 3 west bays have some full depth deck patches. [1997] Second bay from east has 20 SF of leaching map cracks. [1998] "Stool" concrete: spalling off adjacent to median beams. [1999] Beams 6, 7, 8, & 9 re-painted. Diaphragm line: north of pier #2, diaphragms were lowered, although the connections have a "positive moment" configuration stiffeners welded to the top flange, no cracks. Refer to Appendix "A" **First Diaphragm South of Pier #3** graph for crack locations, description & repair to the diaphragm line. [2005] East & west fascia beam has section loss, flaking & surface rust on bottom flange.

**Pier #3:**

10 fixed plate, and four sliding plate bearing assemblies. Pier has four concrete columns and a cap. [1999] Bearings 6, 7, 8, & 9 were re-painted. Vertical stiffener working; at girder 11.

**Span #4 (Steel Multi-beam):**

Over contract parking lot (no access) & Bluff St. Span is 110 FT long with fourteen 48" deep welded plate beams. [1978] Second & third bays from the east have full depth deck repairs. [1998] Underside of deck has 200 LF of transverse leaching cracks, 200 SF of spall with exposed rebar below a transverse poured joint, full width of deck. [1999] Beams 6, 7, 8, & 9 were re-painted. Diaphragms lowered, even though the connections have a "positive moment" configuration. Stiffeners are welded to the top flange. Refer to Appendix "A" **First Diaphragm North of Pier #3** graph for crack locations, description & repair to the diaphragm line. [1998/99] Diaphragms lowered with strain gauges placed on beams #2 & 6 (*first diaphragm line south of Pier #4*). [2000] Fourth bay from west has 20 SF of severe leaching. [2005] East fascia beam has section loss, flaking & surface rust on bottom flange.



Water Saturation SBL Bays 9 & 10

**Pier #4:**

14 Sliding plate expansion bearing assemblies. [1997] Bearings have surface rust. Pier consists of 4 concrete columns and cap. [1999] Bearings 6, 7, 8, & 9 were re-painted.

**Span #5 (Multi-beam/Deck Truss):**

Over contract parking lot; span is 109 FT long with fourteen, 48" deep welded plate beams bolted onto the crossbeam. [1978] Underside of deck is leaching at the finger joint, has two full depth patches in the west bays. [1996] 4 conduit clamps missing on NB fascia beam. Median girder has impact damage from parking lot below. [1998] Bay just east of median has severe spalling on "stool" and the adjacent deck is cracked. [1999] Beams 6, 7, 8, & 9 were re-painted. Refer to Appendix "A" **First Diaphragm North of Pier #4** graph for crack locations, description & repair to the diaphragm line.



Water Saturation NBL Bays 2, 3 & 4

Multi-beam Spans Looking South



**MAIN TRUSS (EAST TRUSS)**

**Crossbeam:**

[1986] The SE rocker bearing froze, damaging the east end of the crossbeam, resulting in cracked web stiffeners. The bridge was jacked up. I-35W was closed to traffic. SE rocker pin was replaced, cracks in two stiffeners were welded and drilled out, and bracing was added between the crossbeam and beams #3 & 4.

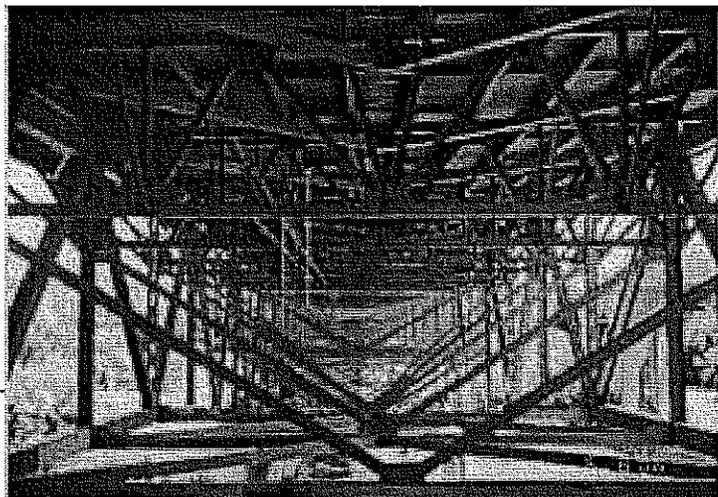
[1998/99] Crossbeam was repainted; the side facing the finger joint has section loss.

| CROSSBEAM & FLOORBEAM GAP (EAST END) |             |
|--------------------------------------|-------------|
| Date                                 | Measurement |
| September, 1998                      | 16-5/8"     |
| April, 1999                          | 17-13/16"   |
| April, 2000                          | 18"         |
| September, 2001                      | 18-1/16"    |
| June, 2003                           | 16-7/8"     |

**Panel Point #0 (Beginning of East Truss):**

Expansion joint has open finger joint above. [1998] Drain troughs removed. [1998/99] End floorbeam was repainted; pitting at connection, section loss at the base of the stiffeners. [1999]

Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [2002] Panel points 0 to 1 there is water saturation between stringers 2 thru 4. [2005] Stringers 2 & 3 have flaking & surface rust.



Deck Truss Looking North

**Panel Point #1 (East Truss, Pier #5):**

[2005] Bottom of truss diagonal L1U0 has flaking & surface rust.

**Pier #5:**

Bearing assemblies have two "rollernest". Climbing onto the pier strut at this location accesses the catwalk. Debris piled at pier strut base allow for unauthorized access. [2002] Bearings show signs of recent movement.

**Span #6 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1997] West River Parkway constructed below bridge. [1999] Floorbeam truss's, sway bracing located below the median and beams 6, 7, 8, & 9 were re-painted.

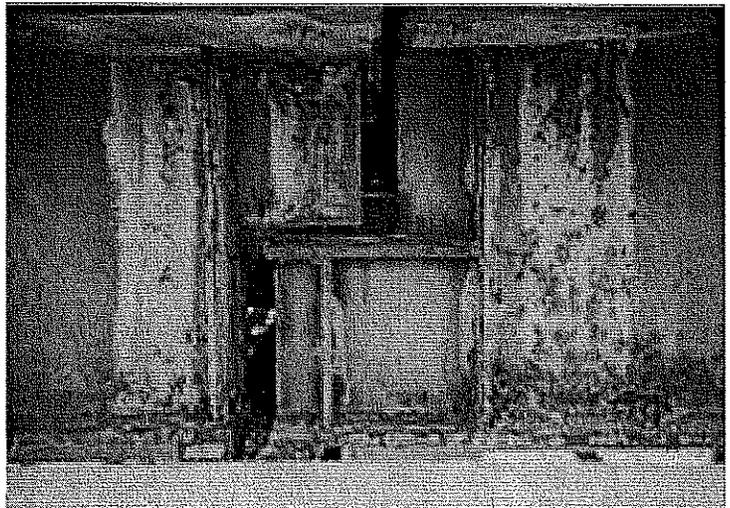
**Panel Point #2 (East Truss):**

**Panel Point #3 (East Truss):**

Floorbeam truss, near center, has an undercut weld in the flange.

**Panel Point #4 (East Truss Stringer Joint):**

Type H: strip seal deck joint above. [1996] Floorbeam truss bottom chord/vertical member connection gusset plate has a weld overlap. [1999] Gland has 1 LF of gland pulled out at centerline. Junction box cover is missing at catwalk. [2000] Joint gland at east end has concrete in. [2005] Pitting, flaking & surface rust exterior east truss.



Flaking & Surface Rust Exterior East Truss

**Panel Point #5 (East Truss):**

[1997] Cracked tack weld between the floorbeam truss top chord and a stringer bearing pedestal. [1999] Tack welds ground out at stringer #3, cracked tack welds remain at stringer #4.

**Panel Point #6 (East Truss):**

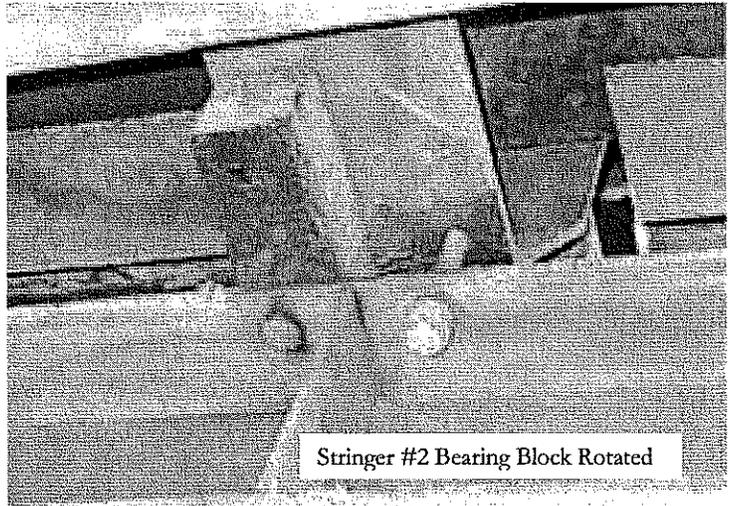
[1994] Floorbeam truss top chord, bottom flange, has a poor quality weld at the end of a connection plate. [1999] Stringer #5 bearing pedestal has a cracked tack weld. [2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #7 (East Truss):**

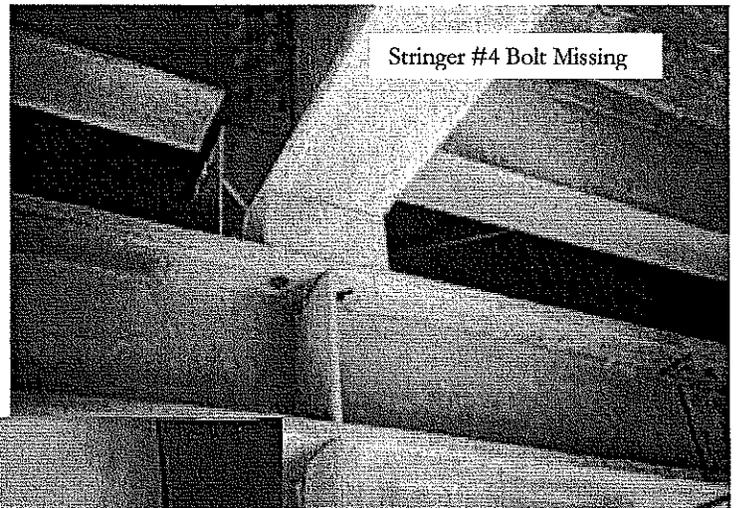
[2003] Top chord of the floorbeam truss, just east of east truss, has an old dent on the top flange.

**Panel Point #8 (East Truss Pier #6 Stringer Joint):**

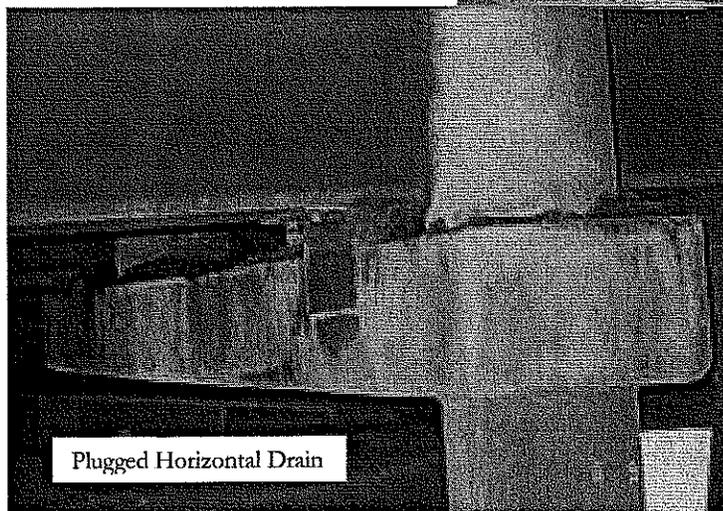
Type H: strip seal and deck drain above. [1999] Missing bolt replaced. Vertical truss member has pitting, section loss, moderate flaking rust. Floorbeam bottom chord & middle bracing connection plate has pitting, moderate section loss, severe flaking rust. Middle bracing connection plate has 1/2" spread from pack rust. Underside of the deck has 50 SF of water saturation. [94/2003] Joint is leaking, small hole & membrane has pulled out. Stringer #4: one bolt broken off at south floorbeam connection. Stringer #2 (south side): bearing block has rotated 90°.



Stringer #2 Bearing Block Rotated



Stringer #4 Bolt Missing



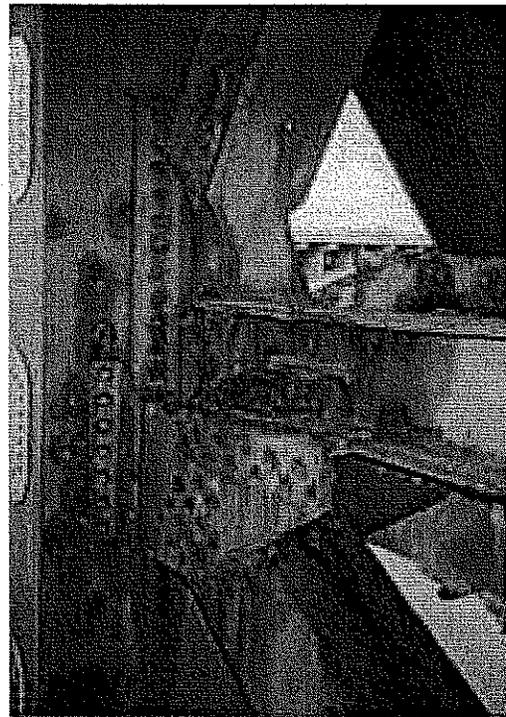
Plugged Horizontal Drain

Median Drain Plugged



**Pier #6 (Downtown, West Bank of Mississippi):**

Pier consists of two concrete columns with a pier wall at the base, two “rollernest” bearing assemblies. [1997] Bearings have surface rust, moderate corrosion and show no signs of movement. Deck drain downspouts are clogged, top & bottom at median. [2004] Typical condition & rust at floorbeam connection near deck drain at connection L8.



Floorbeam Truss Condition

**Span #7 (Deck Truss):**

Span is 456 FT long with 12 floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #9 (East Truss):**

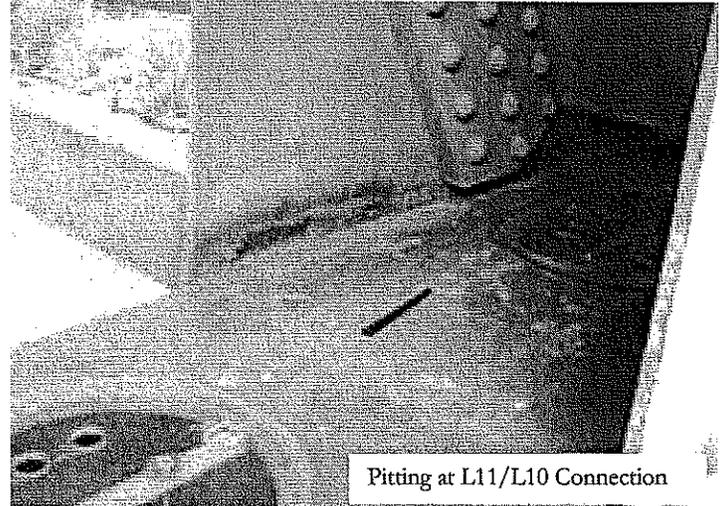
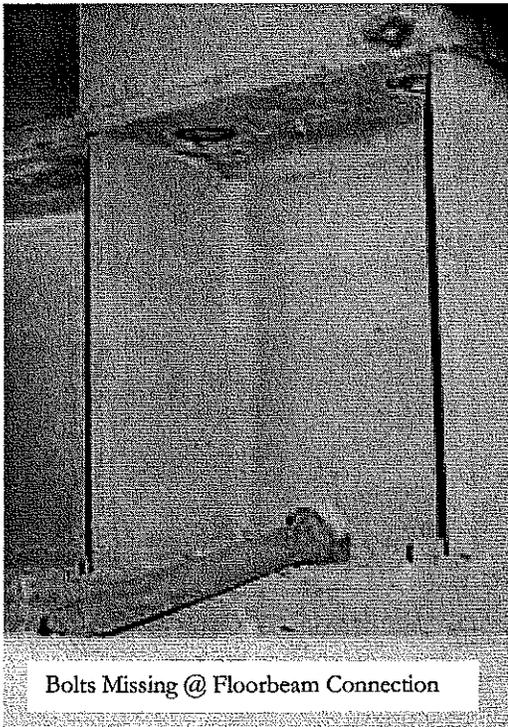
[2003] Floorbeam bottom chord connection plate has a cracked tack weld on the south side. Underside of the deck has 20 SF of water saturation.

**Panel Point #10 (East Truss):**

Red navigation light for Mississippi river channel. [1999] Strain gauges installed on truss top chord member U9/U10, L9/U10 & L9/L10 from U of M research project.

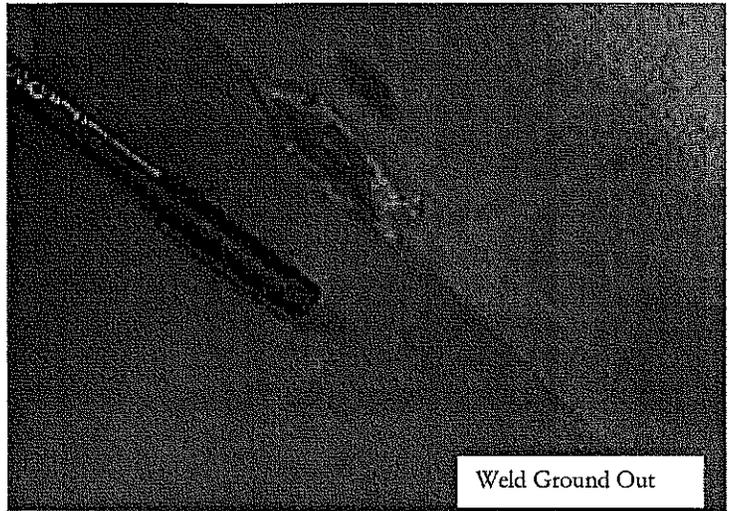
**Panel Point #11 (East Truss):**

Section loss: at gusset plate bottom chord. [2004] Pitting: inside gusset plate connection at L11 toward L10. [2000/05] Stringer #3 has two bolts missing at the floorbeam connection.



**Panel Point #12 (East Truss):**

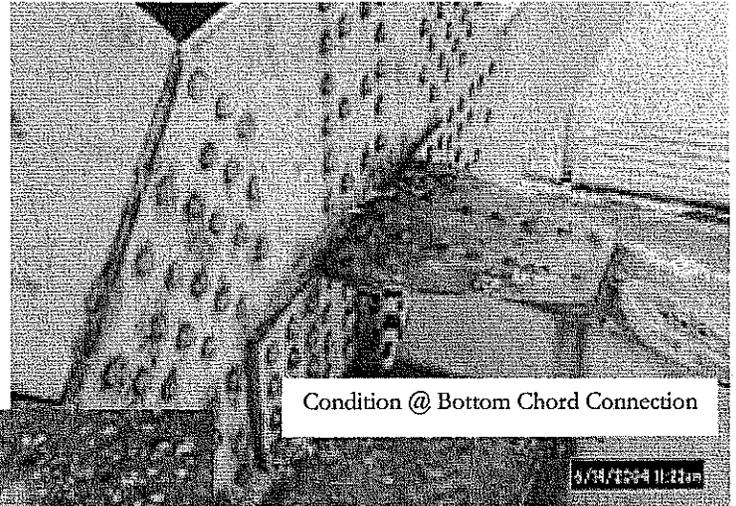
[1999] Truss bottom chord member L12/L13 has a cracked tack weld at an interior stiffener. [2004] Ground out pit from past inspection.



Weld Ground Out

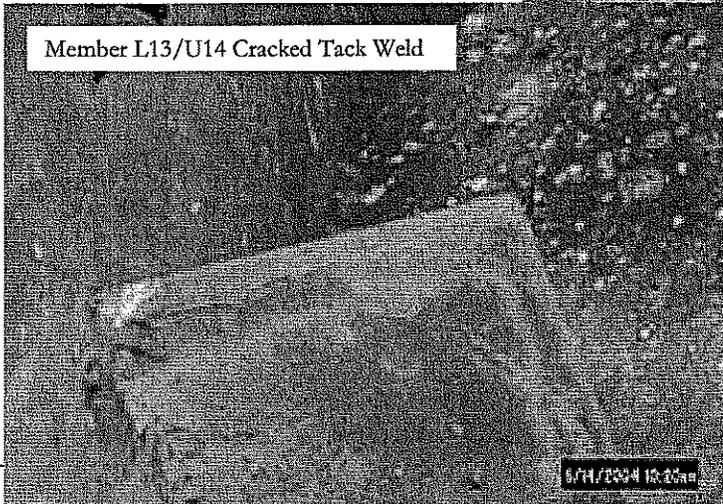
**Panel Point #13 (East Truss):**

Water from deck drains fall directly into river. [1999] Truss bottom chord member L13/L14 has cracked tack welds at two interior stiffeners. [99/2002] Bottom chord gusset plate has section loss, flaking & pack rust. [2004] Bottom chord member L13/L14 has cracked tack weld at diaphragm tab. Cracked tack weld at diaphragm tab member L13/U14. See photos. [2006] Bottom chord member L13/L14 has a missing bird cover.



Condition @ Bottom Chord Connection

5/14/2004 11:21am

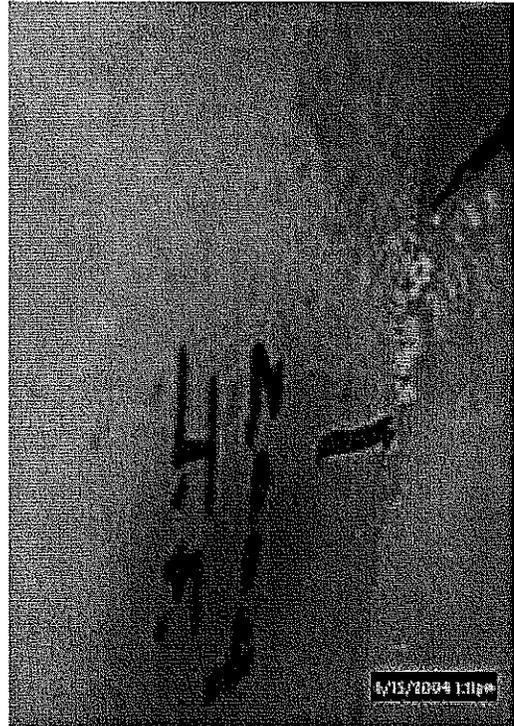


Member L13/U14 Cracked Tack Weld

5/14/2004 10:45am

**Panel Point #14 (East Truss Midspan Stringer Joint):**

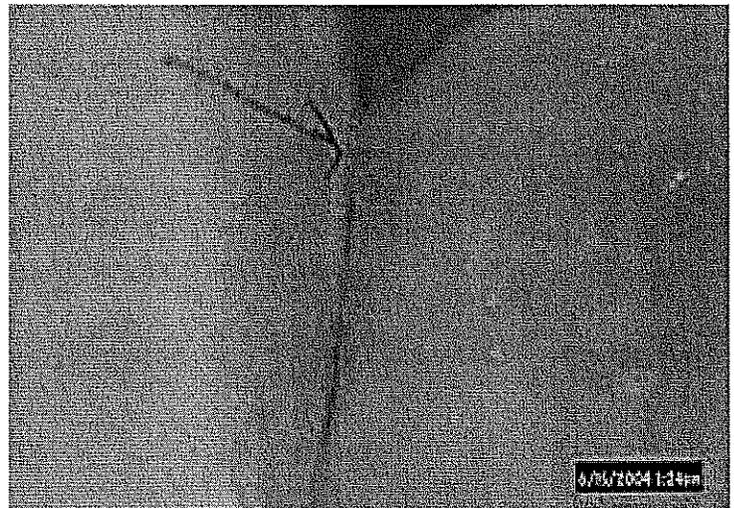
Strip seal expansion joint on the deck. Sway frame rusty. [1999] Truss bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2002/03] Floorbeam bottom chord & middle bracing connection plate has 1/2" pack rust. Underside of the deck has 4 SF of delamination. [2004] Bottom chord member L14/L13' cracked tack weld at diaphragm tab.



Member L14/L13' Cracked Tack Weld

**Panel Point #13' (East Truss):**

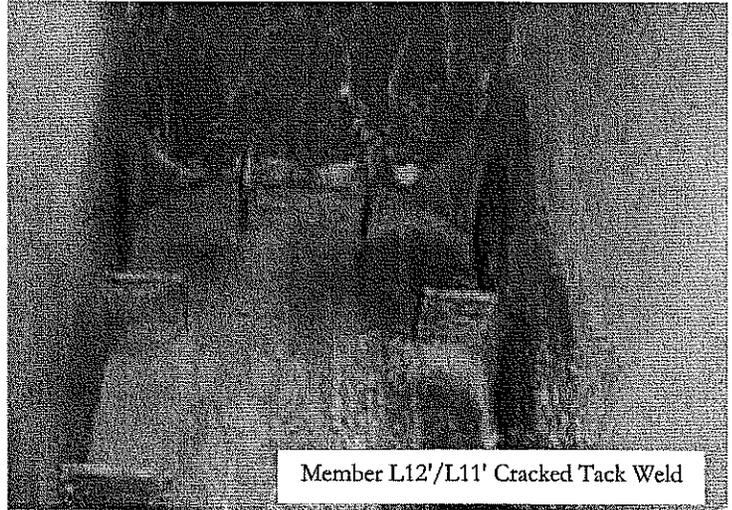
Floorbeam truss top chord has a ground out spot near stringer #4. [1996] Truss bottom chord member L13'/L12' has a cracked tack weld at an interior stiffener. [2003] Truss bottom chord connection plate has 1/2" pack rust. Underside of the deck has 20 SF of water saturation. [2004] Bottom chord member L13'/L12' has cracked tack weld at diaphragm tab.



Member L13'/L12' Cracked Tack Weld

**Panel Point #12' (East Truss):**

[1998] Truss bottom chord member L12'/L11' has a cracked tack weld at an interior stiffener.  
[99/2003] Underside of the deck has 65 SF of water saturation. [2004] Bottom chord member L12'/L11' two cracked tack weld at diaphragm tab.



Member L12'/L11' Cracked Tack Weld

**Panel Point #11' (East Truss):**

**Panel Point #10' (East Truss):**

[2003] Underside of the deck has 1 SF of spall with exposed rebar. Light pole, W5L3, has 1 LF crack.

**Panel Point #9' (East Truss):**

Water from deck drains fall onto the steel & directly into river. [2002] Bottom chord member L9'/L8' has section loss, flaking rust.

**Panel Point #8' (East Truss Pier #7 Stringer Joint):**

Red navigation light for Mississippi river channel. Type H: strip seal expansion joint on the deck. [93/2003] Floorbeam truss has section loss, moderate flaking rust. North side: bolts replaced with "threaded-rod" at stringer #4, bolts replaced at stringer #5. Underside of the deck has 80 SF of water saturation.

**Pier #7 (East Bank of Mississippi):**

Two fixed bearing assemblies. Pier consists of two concrete columns with a pier wall at the base. [1997] West column has a full height, leaching crack on the south face.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [1999] Floorbeam truss's, sway bracing located below the median and the beams 6, 7, 8, & 9 were re-painted.

**Panel Point #7' (East Truss):**

[2003] Underside of the deck has 240 SF of water saturation, & 80 SF of delamination.

**Panel Point #6' (East Truss):**

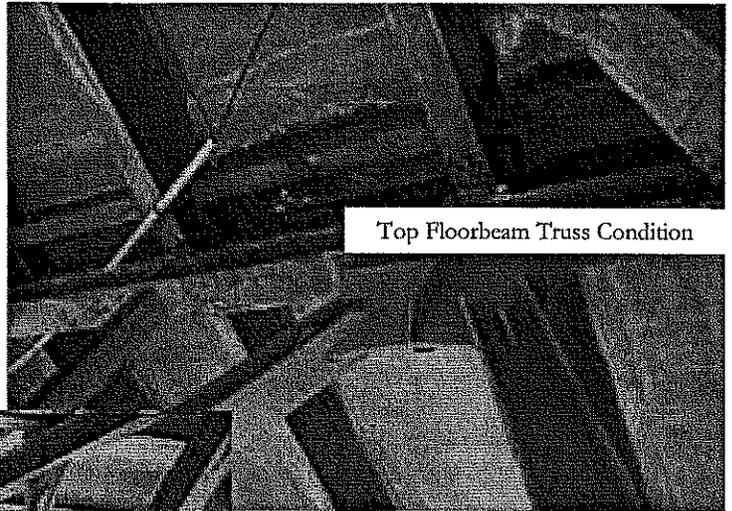
[1996/98] Stinger #4 connection to the floorbeam truss is "working". The SW bolt is loose. [2003] Underside of the deck has 10 SF of water saturation.

**Panel Point #5' (East Truss):**

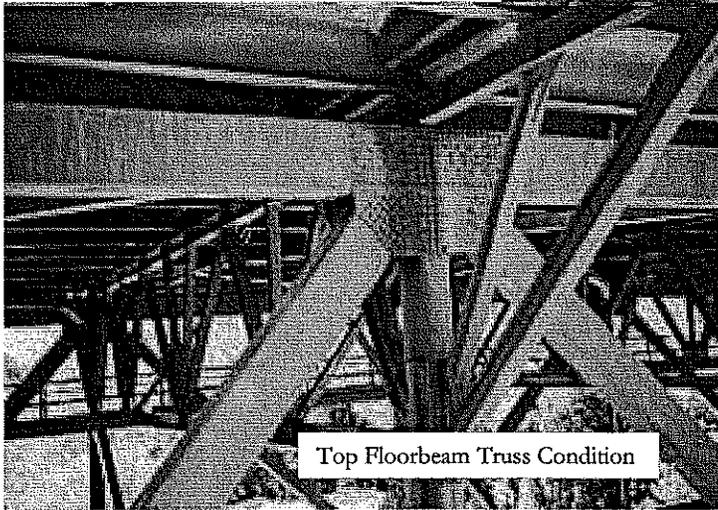
[2001] Underside of the deck has 30 SF of water saturation.

**Panel Point #4' (East Truss Stinger Joint):**

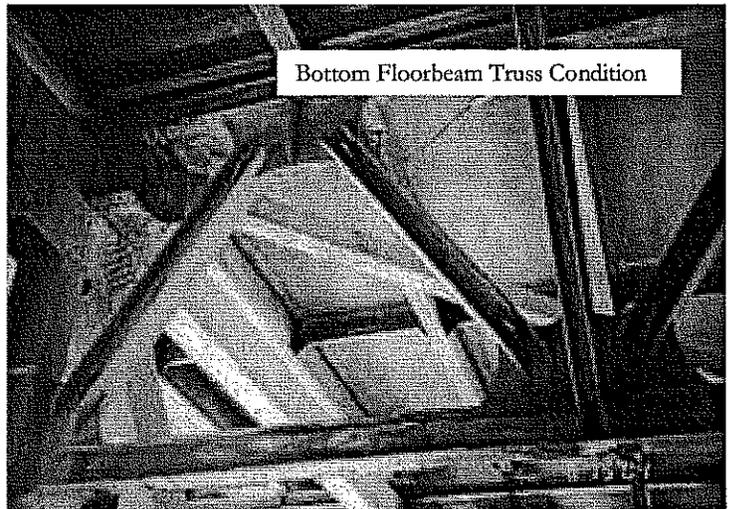
Type H: strip seal expansion joint on the deck. Truss diagonal member U4'/L3' has backer bars along the interior edges. [01/04] Strip seal has 3 LF of gland pulled out. Truss connection plates, the top chord, and floorbeam have moderate section loss, severe flaking rust. Bottom connection plates have 1/2" pack rust.



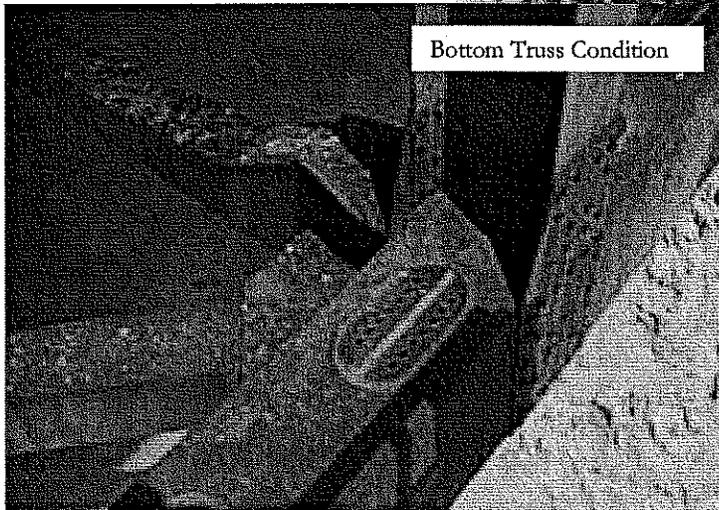
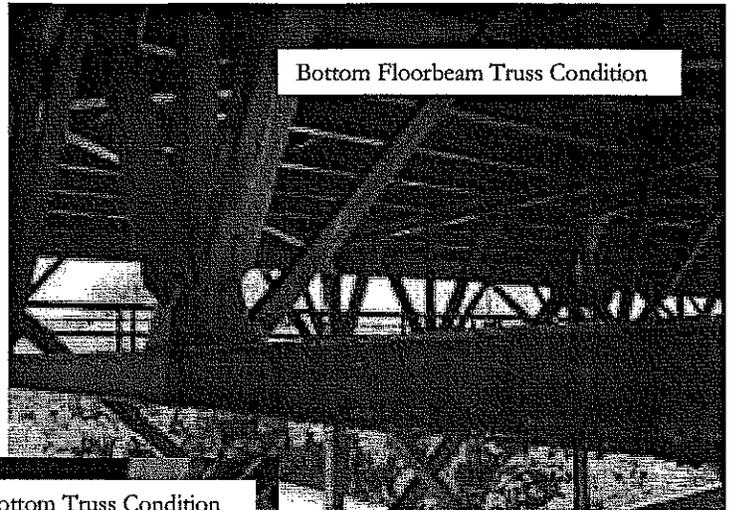
Top Floorbeam Truss Condition



Top Floorbeam Truss Condition



Bottom Floorbeam Truss Condition



**Panel Point #3' (East Truss):**

Center lane has road sensors on the deck surface. Top chord of the floorbeam truss has an "incomplete" weld along the top edge of the web reinforcement plate.

**Panel Point #2' (East Truss):**

Overhead sign mounted on exterior railings. [1999] Deck in bay #3 has 100 SF of water saturation. [2003] Bottom connection plates have flaking rust. [2004] Area underneath overhead sign has 100 SF of water saturation. [2005] North support beam stringer has severe section loss at end.



North Support Beam Stringer

**Pier #8:**

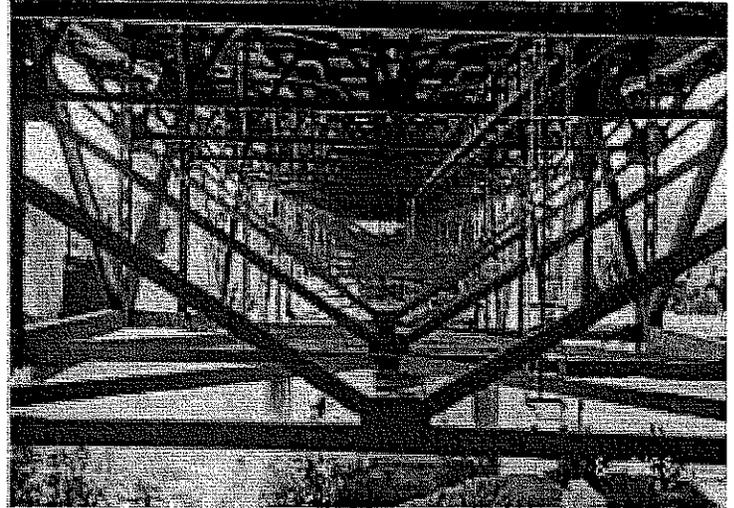
Two “rollernest” bearing assemblies, have surface rust. [2000/05] East truss rocker shows recent movement. Pier consists of two concrete columns connected by an upper strut. Columns have concrete “jackets” around them with vertical cracks.

**Panel Point #1' (East Truss Pier #8):**

[2000] Bottom of truss above bearing has graffiti. [2005] Bottom of deck deteriorated.

**Panel Point #0' (End of East Truss):**

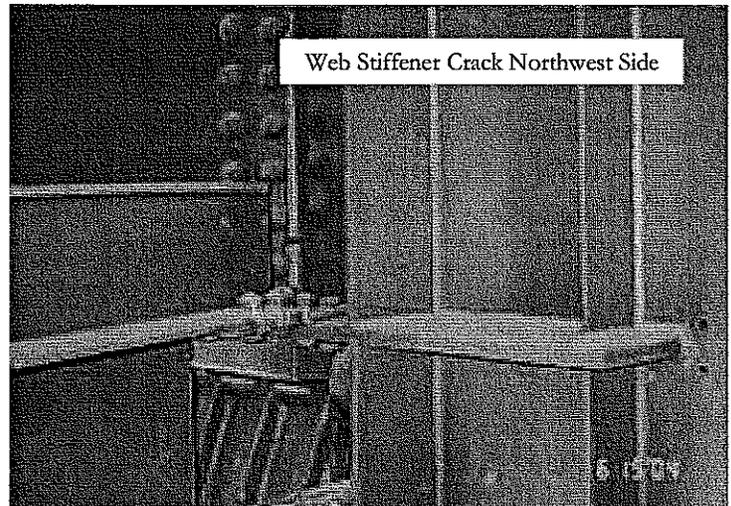
Joint has open finger joint above. [1998] Drain troughs removed. [1999] Rubber “skirts” installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris, need to be flushed. [1998/99] Floorbeam re-painted, side facing finger joint has section loss with holes in web stiffeners. [1998] North face, directly above east rocker bearing, has two horizontal welds between stiffener plates. They have cracked through entirely. [2004] Finger joint in the SB right lane and shoulder has been ground down to prevent the snow plows catching on the joint.

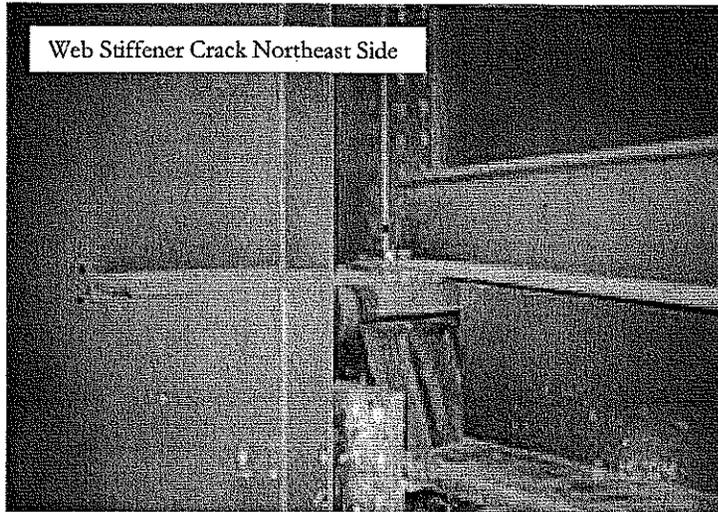


Deck Truss Looking South

**Crossbeam:**

[1992] North face has crack in the crossbeam web stiffener, above the rocker at the beam #12 connection. This was drilled out. [1997/98] North face: weld above east rocker bearing, between the horizontal & center vertical stiffener, has cracked through entirely. Weld end at the crossbeam web was partially drilled out. [1998] North face has cracks at both ends of the horizontal stiffener, above rocker bearing. They were drilled out with two small holes drilled in crossbeam web at each location. Bracing installed between crossbeam, above east rocker, and beams #3 & 5. [1998/99] Crossbeam re-painted. Side facing finger joint has section loss, with pitting at base of stiffeners. [1999] Bolted connection between beam #12 and the crossbeam was re-tensioned. Connection had been “working” \*\* [2000] Gap between crossbeam & floorbeam (at rocker bearing) was 3-1/8" at 40° F. [2001003] Gap between crossbeam & floorbeam (at rocker bearing) was 3-1/2". [2005] Movement at east bearing.





Web Stiffener Crack Northeast Side

**MAIN TRUSS SPAN (WEST TRUSS)**

**Panel Point #0 (End Floorbeam End of West Truss):**

Open finger joint on the deck. [1998] Drain troughs removed. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings: filled with debris, needs to be flushed. [1997] Floorbeam horizontal stiffener is bent directly above the rocker bearing. [1998/99] Floorbeam re-painted, side facing finger joint has section loss, pitting. [2004] Truss, top chord exterior connection plate has 1/8" deep section loss with pitting. SW rocker bearing has no movement. \*[2000] Gap between crossbeam & floorbeam, at west end, measures 16-1/2". \*[2004] Gap between crossbeam & floorbeam, at west end, measures 14-1/2".

| Gap between Crossbeam & Floorbeam (East End) |             |
|--|-------------|
| Date   | Measurement |
| September, 1998                              | 16-5/8"     |
| April, 1999                                  | 17-13/16"   |
| April, 2000                                  | 18"         |
| September, 2001                              | 18-1/16"    |
| June, 2003                                   | 16-7/8"     |

**Panel Point #1 (West Truss Pier #5):**

[1994] Diagonal brace, floorbeam to stringer, has a cotter pin missing at the floorbeam truss connection. [1998] Deck drain detached from downspout, originally drained into storm sewer. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Pier #5:**

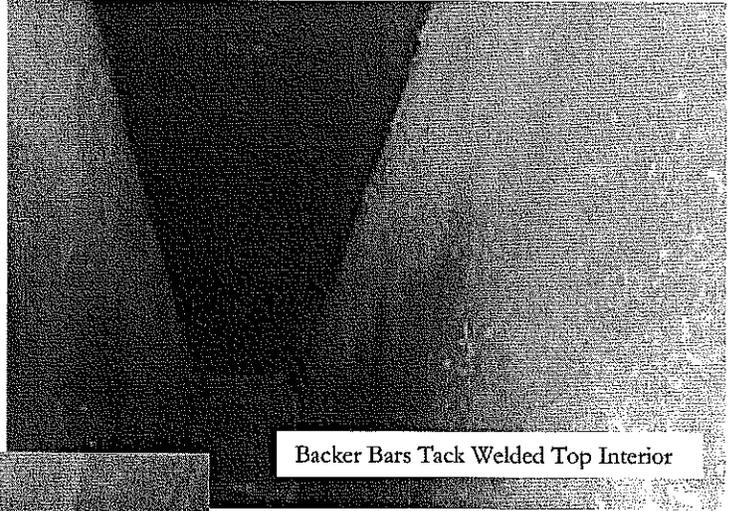
See NB notes. Access ladder to catwalk removed.

**Panel Point #2 (West Truss):**

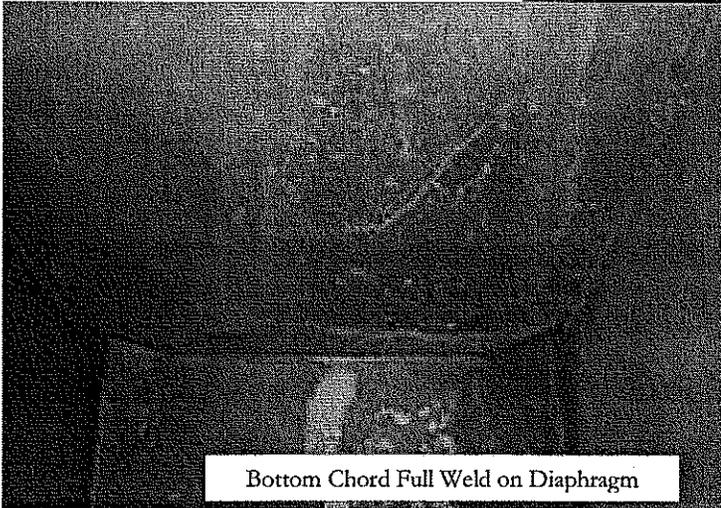
[1996] Floorbeam truss member L2/U3 has a welding flaw. [1997] No crack! Magnetic particle tested. [2004] Truss & floorbeam top chords & interior diaphragms have flaking rust.

**Panel Point #3 (West Truss):**

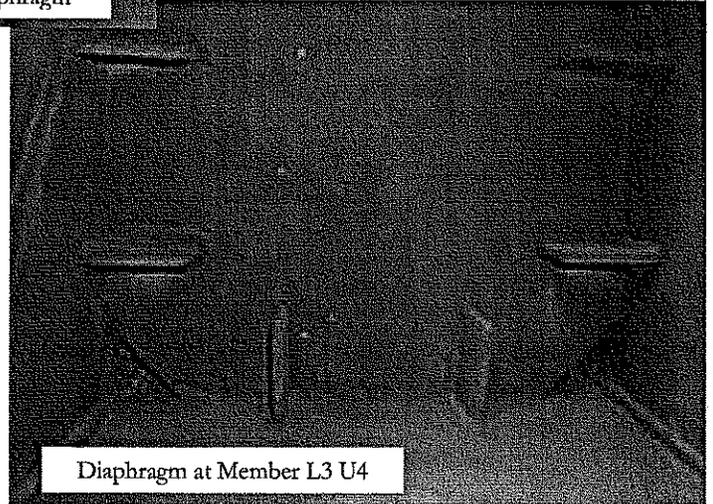
[2004] Truss bottom chord L2/L3 has a nick. Top chord U3/U4 has backer bars tack welded along the top interior corners of member. See photo. Bottom chord L4/L5 has no diaphragm tabs, full weld on side & tack welds on other. See photo. Diagonal member L3/U4 has 4 diaphragms with tabs. See photo.



Backer Bars Tack Welded Top Interior



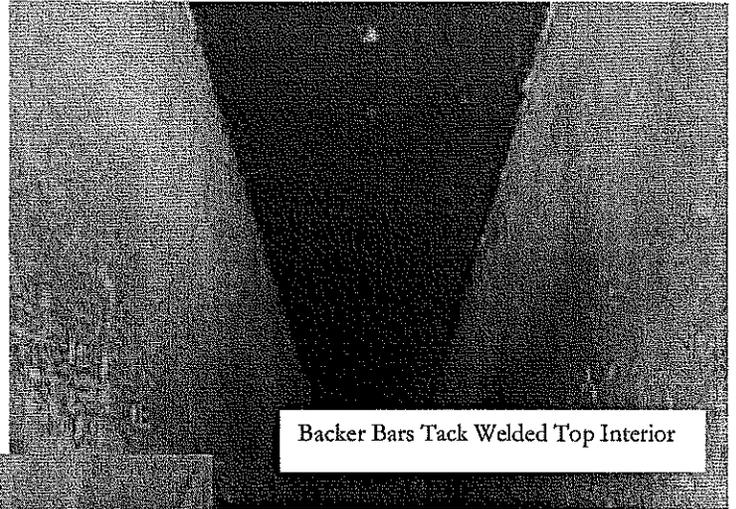
Bottom Chord Full Weld on Diaphragm



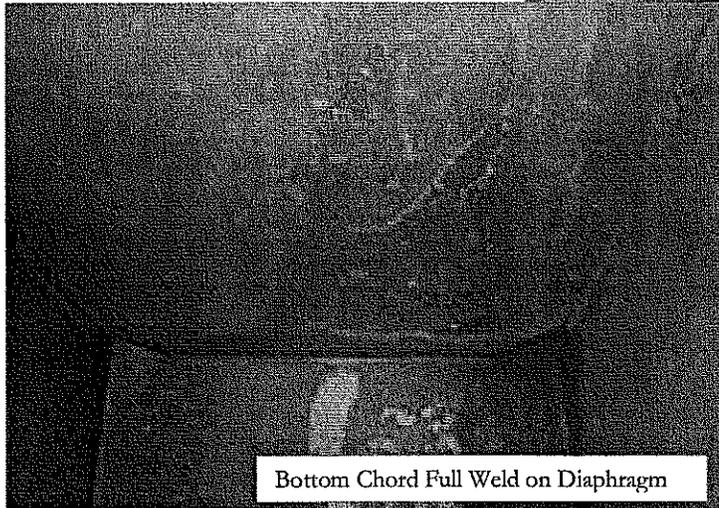
Diaphragm at Member L3 U4

**Panel Point #4 (West Truss Stringer Joint):**

Strip seal expansion joint on the deck, [1998] Stringer #10: bolt replaced at south floorbeam, truss connection. [2000] Lighting conduit is held up with tie wire. [2004] Stringer #11 floorbeam connection has moderate flaking rust. Truss top chord has flaking rust. Floorbeam top chord, stiffener under stringer #10 has cracked tack weld & is working. Top chord U4/U5 has backer bars tack welded along the top interior corners of member. See photo. Bottom chord L4/L5 has no diaphragm tabs, full weld on side and tack welds on other. See photo.



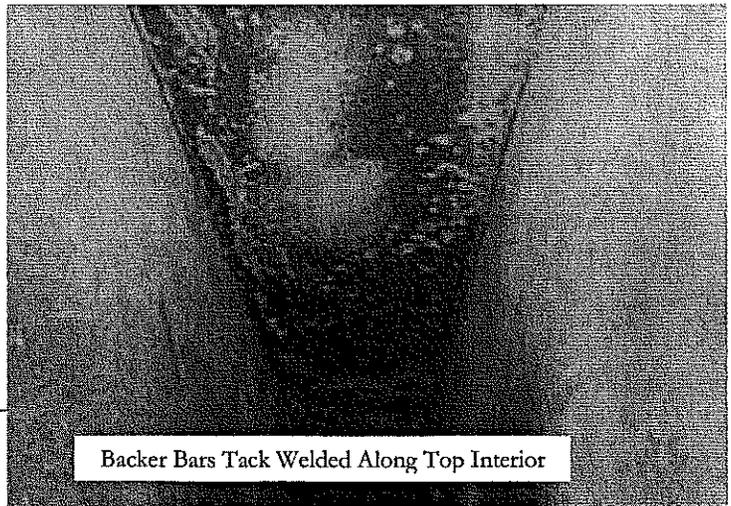
Backer Bars Tack Welded Top Interior



Bottom Chord Full Weld on Diaphragm

**Panel Point #5 (West Truss):**

Top chord U5/U6 has backer bars tack welded along the top interior corners of member. [2004] Truss bottom chord, bottom lateral connection plates have spread 3/16" from pack rust.



Backer Bars Tack Welded Along Top Interior

**Panel Point #6 (West Truss):**

Overhead sign mounted on railing. Floorbeam truss top chord (U5/U4) has gouges in the bottom flange at the end of the connection plate; the bottom chord of the floorbeam truss has 3 spots ground out. Floorbeam truss top chord is offset vertically 1/4" at the splice from construction.

**Panel Point #7 (West Truss):**

[2002] Underside of the deck has 20 SF of water saturation at stringer 12 thru 14.

**Span #6:**

Span is 266 FT long with seven floorbeam trusses.

**Pier #6:**

See NB notes.

**Panel Point #8 (West Truss Pier #6 Stringer Joint):**

Type H: strip seal expansion joint on the deck. Deck drains. [96/2003] Drain clogged at median, horizontal trough, standing water in east grate. [96/2005] Strip seal gland has 12 LF pulled out in right gutter line. [2004/05] Vertical member L8/U8, bottom chord, & floorbeam connection plates have moderate flaking & surface rust from plugged deck drain. [2005] Stringers #10 & #11 have flaking rust on the north side.

**Panel Point #9 (West Truss):**

Truss diagonal L9/U8 has a spot ground out.

**Panel Point #10 (West Truss):**

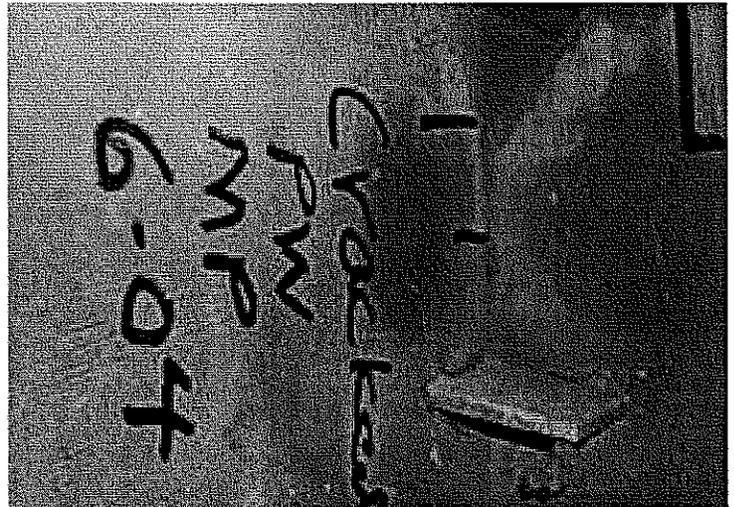
Truss top chord U10/U9 has two spots ground out. [2005] Vertical ladder to access cat walk. Stringer #8 has some loose stool concrete.

**Panel Point #11 (West Truss):**

[1998] Stringer #11 has three bolts replaced at the floorbeam truss connection; the SE bolt is too short with inadequate threads. Stringer has lifted 3/32" off the bearing block on the south side. Stringer #3 has tack welds ground out.

**Panel Point #12 (West Truss):**

[1996] Bottom chord member L12/L13 has a cracked tack weld at the internal stiffener. [2004] Bottom chord member L12/L13 has a cracked tack weld (diaphragm #2), (not at diaphragm tab). See photo.

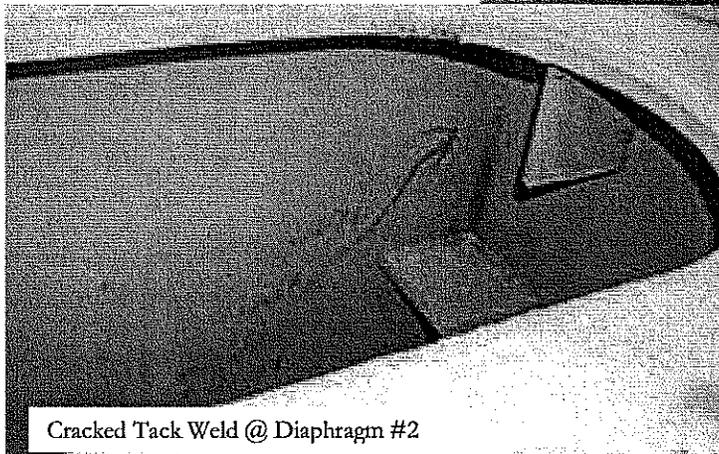


Cracked Tack Weld @ Diaphragm #2

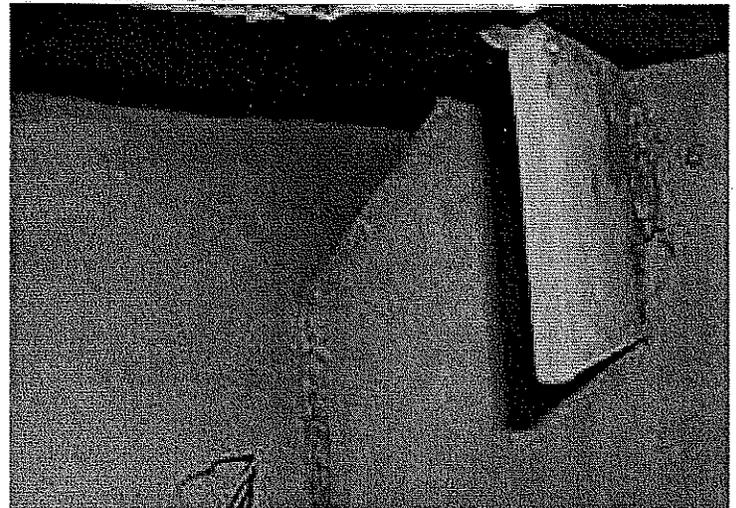
**Panel Point #13 (West Truss):**

[1996/99] Bottom chord member L13/L14 has cracked tack welds at two internal stiffeners [1999] Truss bottom chord/sway frame connection plates have 3/4" pack rust. [2004] Diagonal L13/U14 has corrosion from deck drain. Cracked tack weld (not at diaphragm tab). Cracked tack weld: (diaphragm #3), (not at diaphragm tab), (entire tack weld broken cleanly).

L13/U14 Corrosion @ Diaphragm

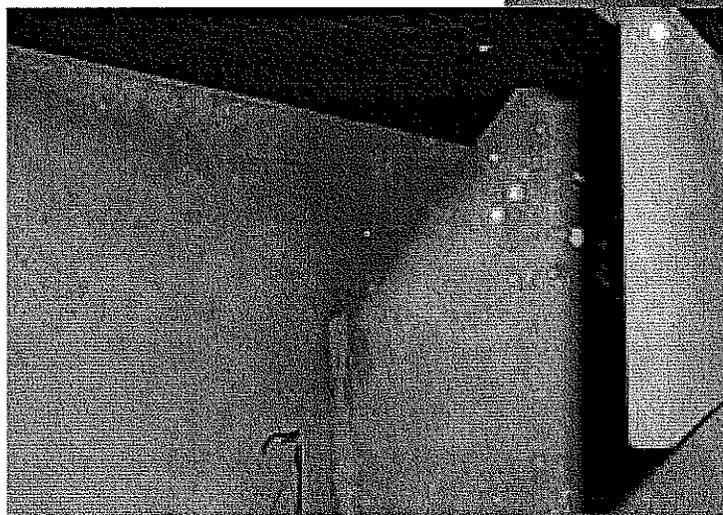


Cracked Tack Weld @ Diaphragm #2



Cracked Tack Weld @ Diaphragm #2

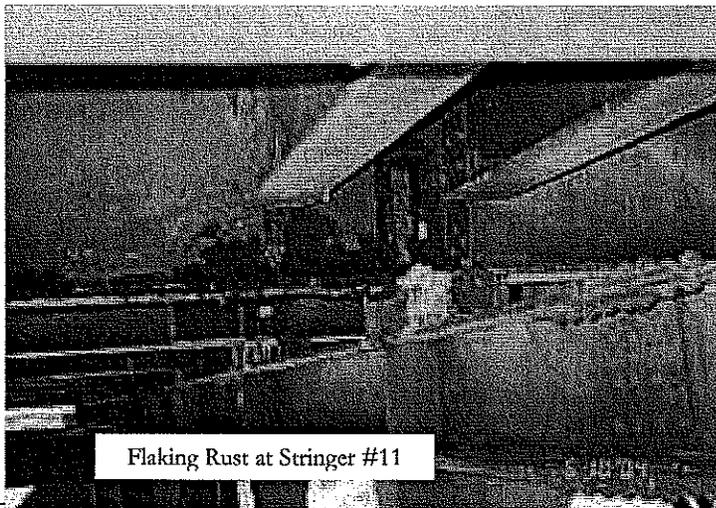
Cracked Tack Weld @ Diaphragm #3



Cracked Tack Weld @ Diaphragm #3

**Panel Point #14 (West Truss Midspan Stringer Joint):**

Type H: strip seal deck joint above. Deck drains on both sides. [1994] Stringer #11 has section loss, flaking rust near the joint from gland pulled out above. Tack welds along the sway frame/truss, bottom chord, and gusset plate. [1999] Bottom chord member L14/L13' has a cracked tack weld at an interior stiffener. [2003] Stringer #14 connection, south side of the floorbeam, has a cracked tack weld. [2004] Bottom chord member L14/L13' has internal tack welds (full length) at interior diaphragm. Upper chord member U14/U13' has corrosion from deck drain. See photo. [2005] Strip seal gland has 10 LF pulled out. [2006] Reversible diagonal member U14/L13 has section loss with severe flaking rust.

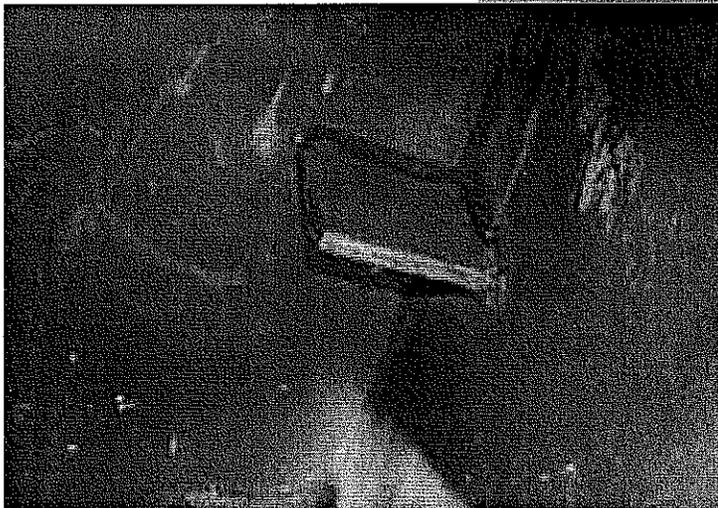
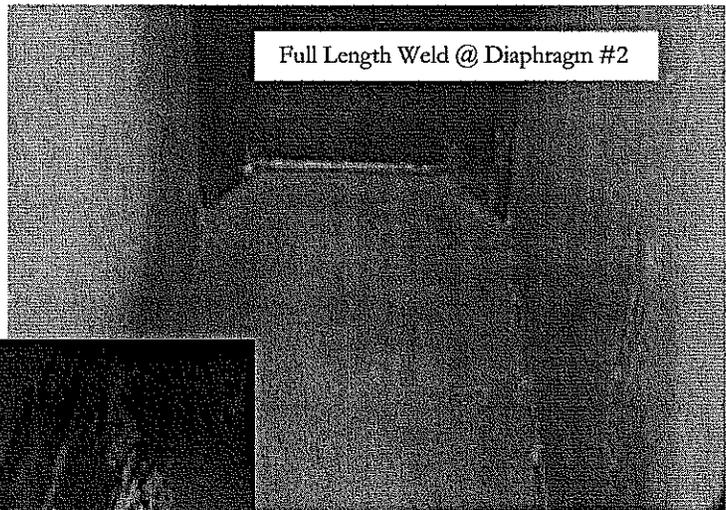


Flaking Rust at Stringer #11



**Panel Point #13' (West Truss):**

[2004] Upper chord member U13'/U12' (diaphragm #2) has no tabs, diaphragm is welded (full length) one side only. Bottom chord member L13'/L12': cracked tack weld (diaphragm #1), (not at diaphragm tab), (clean break). See photo #2.



**Panel Point #12' (West Truss):**

Truss diagonal member U12'/L13' has 3 "nicks". The truss bottom chord L12'/L13' has a nick.

**Panel Point #11' (West Truss):**

Nick in the truss bottom chord L11'/L12'

**Panel Point #10' (West Truss):**

[1994] Stringer #13: loose bolt at floorbeam truss connection. Top chord (U10'/U11') has 6 nicks on the exterior, 15 ft. south of U10'. [2005] Pitting bottom sway frame, 1" diameter holes intermediate & horizontal bracing.

**Panel Point #9' (West Truss):**

[2001] Truss bottom chord/sway frame connection (gusset plates) has section loss, pitting, heavy flaking rust.

**Span #7 (Deck Truss):**

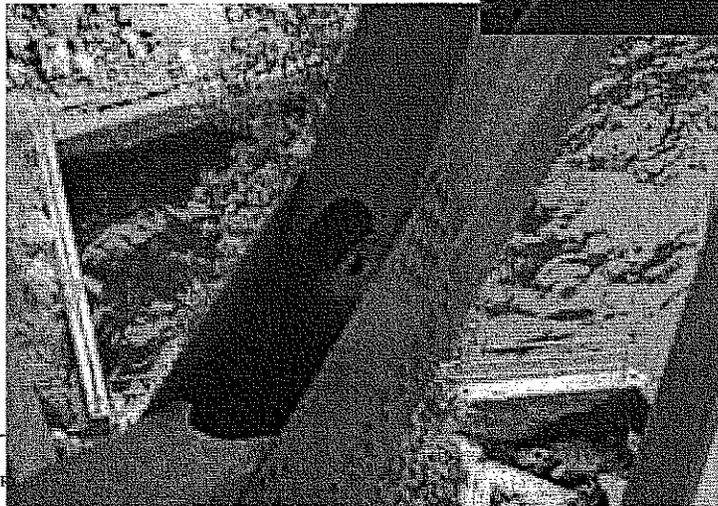
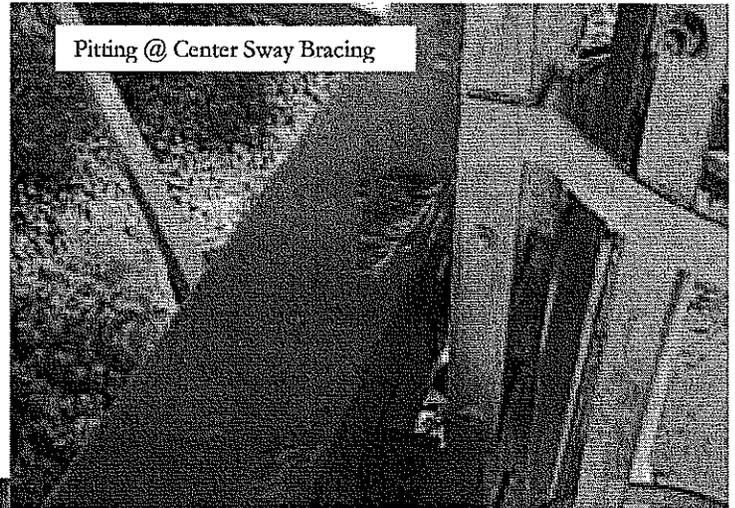
Span is 456 FT long with 12 floorbeam trusses.

**Pier #7:**

See NB notes. [2002] West column has vertical leaching cracks.

**Panel Point #8' (West Truss Pier #7 Stringer Joint):**

Type H: strip seal deck joint above. [1996] Below stringer #13, the diagonal brace between top and bottom chord of the floorbeam truss is bent, from original construction. [1998] Stringer #11: bolt replaced at floorbeam truss connection. [2001] Truss bottom chord/sway frame connection (gusset plates) has section loss with heavy flaking rust. [2002] Truss bottom chord, L8'/L9', has section loss with heavy flaking rust. [2004/05] Sway bracing center horizontal has 3" x 8" severe pitting & 1/2" diameter hole; bottom sway bracing has a 2" x 3" hole between stringer #11 & stringer #10. See photos. [2005] Strip seal gland has 5 LF pulled out & is leaking onto the crossbeam below, between stringer 10 & 11.



Hole in Bottom Member of Sway Bracing

METS

**Panel Point #7' (West Truss):**

[1997] Top chord/floorbeam truss connection has a cracked tack weld on the diaphragm. [1999] Wind bracing gusset plate, at stringer #14 has loose bolts. [2002] Stringer #14 was installed crooked.

**Panel Point #6' (West Truss):**

[96/98] Stringer #11, one bolt replaced in 1998 at the floorbeam connection. [1997] Stringer #10, the two south bolts are loose at the floorbeam connection. [99/2003] Stringer #9, south face, has one bolt loose at the floorbeam connection. [2004] Stringer #11 has one loose bolt south side. [2006] Vertical truss tension member L6'/U6'; flanges show out of plan bending.

**Panel Point #5' (West Truss):**

[2002] Sprayer fitting corroded.

**Panel Point #4' (West Truss Stringer Joint):**

Type H: strip seal deck joint above. Truss diagonal member U4'/L3' has backer bars along interior edges. [1999] Two cracked tack welds at elevation block underneath Stringer #11. [2003] Floorbeam truss bottom chord at Stringer #11 connection: have section loss, pitting, moderate flaking and surface rust.

**Panel Point #3' (West Truss):**

The floorbeam truss, top flange of upper chord, has an ugly weld below the connection to stringer #11. [2003] Stringer #12 has connection bolts "working".

**Panel Point #2' (West Truss):**

Overhead sign on bridge, mounted on exterior railings. [2002] Bolts are "working" at stringer #11.

**Span #8 (Deck Truss):**

Span is 266 FT long with seven floorbeam trusses. [2002] Underside of the deck has 150 SF of water saturation and numerous full depth repairs.

**Pier #8:**

See NB notes. [1999] West truss bearing shows signs of recent movement.

**Panel Point #1' (West Truss Pier #8):**

**Panel Point #0' (End Floorbeam Beginning West of Truss):**

Open finger joint on the deck. [1996] Floorbeam/truss connection has section loss, severe corrosion with surface pitting on plates & bolts. [1997] Conduit running along catwalk is hanging loose, and has pulled out at the floorbeam. [1998] Drain troughs removed. [1998/99] Floorbeam re-painted. Side facing finger joint has section loss on stiffeners. [1999] Rubber "skirts" installed below the finger joint. [2000] Rubber trough above rocker bearings filled with debris; needs to be flushed. [2002] High spots of fingers torched off right lane & shoulder.

**Crossbeam:**

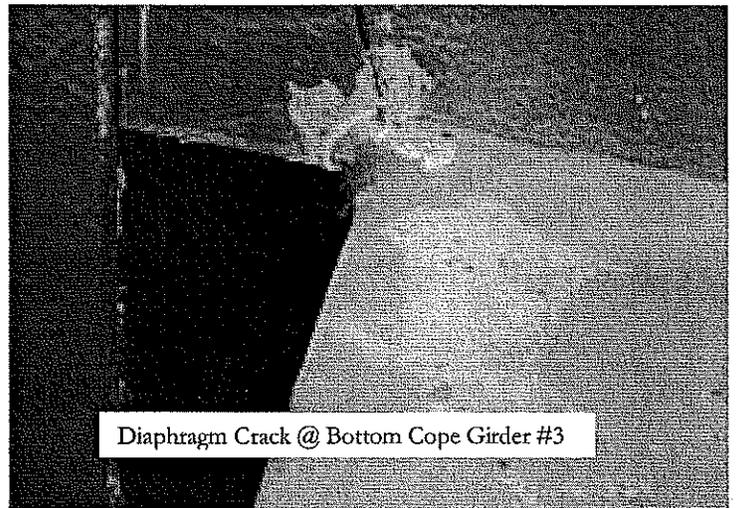
[1998/99] Crossbeam re-painted. Side facing finger joint has section loss. [1999] Bolted connection between beam #12 and the crossbeam was re-tensioned. Connection had been "working". [2000] *Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-9/16". [2001/03] Gap between crossbeam & floorbeam, at rocker bearing, measured at 3-1/2".*

**Span #9 (Multi-beam):**

Span is 168 FT long with one floorbeam truss at pier #8, fifteen 48" deep welded plate girders bolted onto the crossbeam. Multi-beam spans resume. NB has 8 girders. SB has 7 girders. There are two active railroad tracks below. [1999] Refer to Appendix "A" **First Diaphragm South of Pier #9** graph for crack locations, description & repair to the diaphragm line. Girders 6, 7, 8, 9, & 10 are re-painted. Lateral bracing welded to web & stiffener. [2003] Bottom of deck has conduit on the east side. [2004] Girder 1C (NBL), crack at the diaphragm bottom cope, NE side measures 2" ("front face") and NW side measures 2-1/2" ("Back face"). Girder 3 (NBL), crack at the diaphragm bottom cutout, measures 1-1/2" (both sides). [1998/2004] Girder #3 has a "tear" in the girder's web at the diaphragm girder connection. The "tear" measured 42" long on one side and 12" long on the other, was caused by out of plane bending between the diaphragm and the girder. Girder Connection Lowered & Girder Web Repaired with Splice Plate. [2002/06] Underside of deck has 260 SF of water saturation, & 4 SF of delamination. [2006] Girder #12 has paint failure from leaking de-icing system.



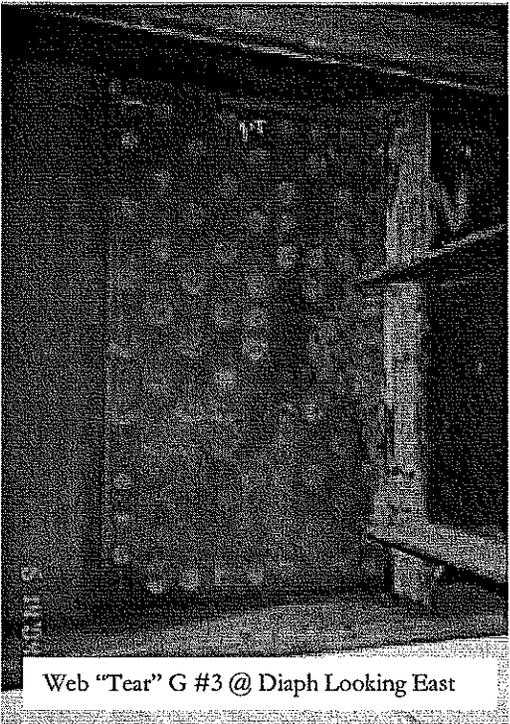
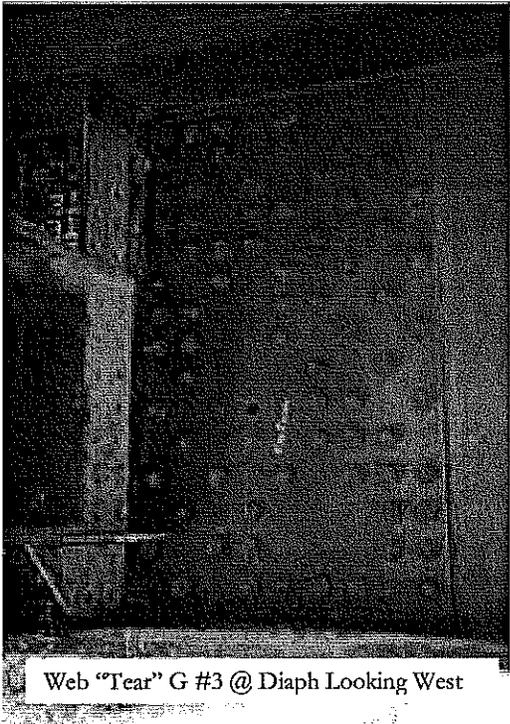
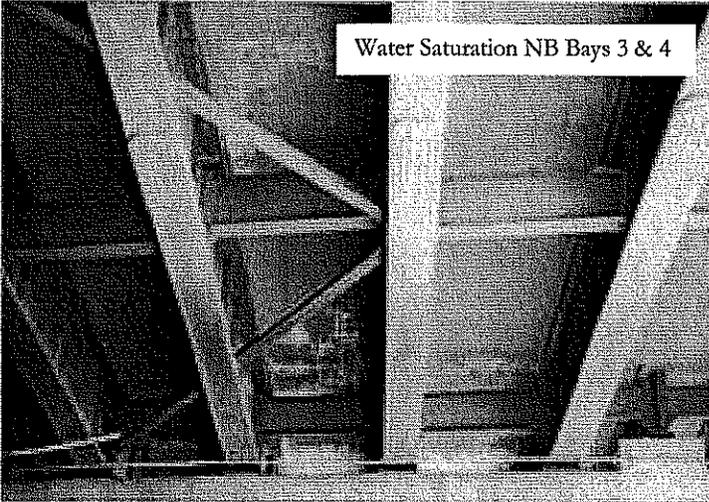
Diaphragm Crack @ Bottom Cope Girder #1C



Diaphragm Crack @ Bottom Cope Girder #3

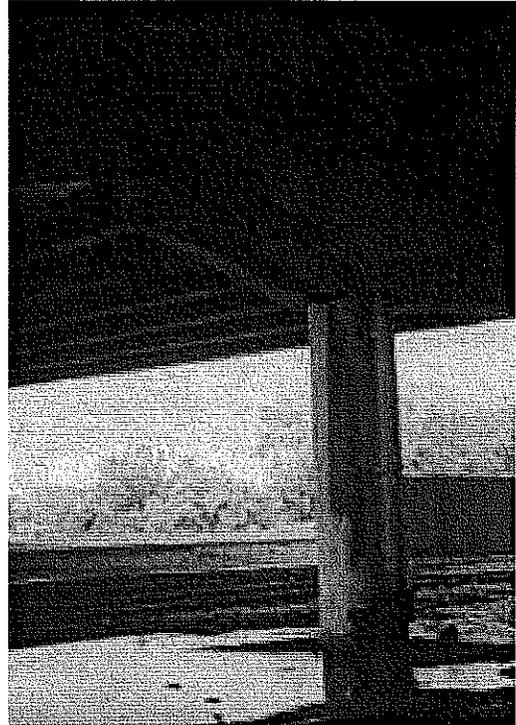


Water Saturation SB Bays 12, 13 & 14



**Pier #9:**

Plate bearing assemblies have 13 fixed, and four sliding. Pier consists of four columns and cap, with a railroad crash strut between the columns. 2 Deck drain: downspouts. [1969] East column damaged by train derailment: the column has minor scrapes and spalls, downspout had to be reconnected. [1999] Bearings 9, 10, 11, &. 12 were re-painted. [2004/05] West vertical & median deck drain plugged.



Median Drain Plugged Pier 9

**Span #10 (Steel Multi-beam):**

Span is 94 FT long with 17 steel beams. NB has 10 beams; SB has 7 beams (the welded beams transition from 48" to 33" depth just north of pier #9) with active railroad tracks below. One track splits into two. Refer to Appendix "A" **First Diaphragm North of Pier #9** graph for crack locations, description & repair to the diaphragm line. [1999] Beams 9, 10, 11, & 12 were re-painted. Diaphragms were inverted & lowered, even though the beam connections have a "positive moment" configuration. Connections welded to top flange. [2003] Conduit: at east side bottom of deck. [2000] Beam #6 appears to be "working" at the top connection. [2004/06] Underside of the deck has 550 LF of transverse leaching cracks, 500 SF of water saturation, & 8 SF of delamination.



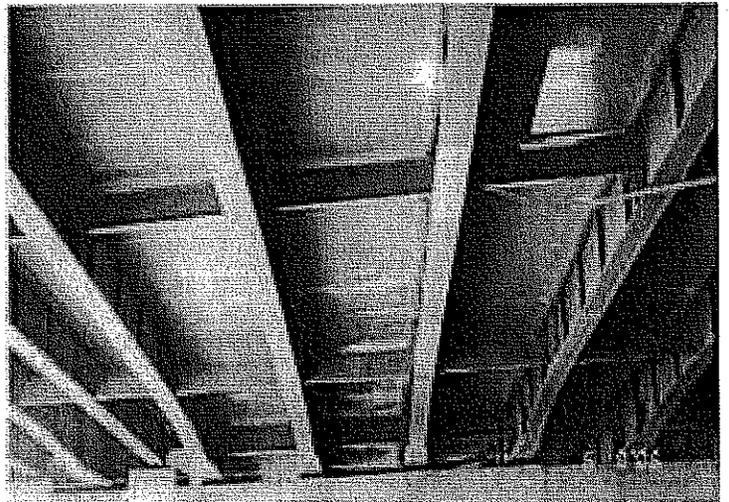
Girder #10 Vertical Stiffener/Girder Web

Girder #10 Vertical Stiffener/Girder Web



Water Saturation SB Bays 12, 13 & 14

Water Saturation NB Bays 5, 6 & 7

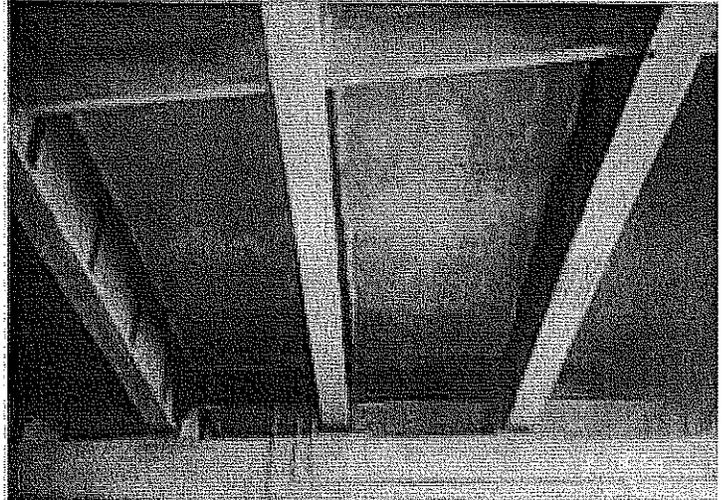


**Pier #10:**

Pier has 5 columns & cap with a railroad crash strut between the columns and 18 sliding plate expansion bearings. [1999] Bearings 9, 10, 11, & 12 were re-painted. [2003] North face of cap has 20 SF of delamination.

**Span #11 (Steel Multi-beam):**

Span is 68 ft. long with 18 steel beams. Northbound has 11 beams; southbound has 7 beams, and the parking lot below. [1999] Beams 9, 10, 11, & 12 were re-painted. Connections welded to top flange. Diaphragms were inverted & lowered, even though the beam connections have "positive moment" configuration. [2003] Conduit: east side bottom of deck. [2004] 50 SF of water saturated deck underneath.



Water Saturation SB bays 15 & 16

**Pier #11:**

Beginning: NB off ramp to University Avenue. (Br. #9340A starts here). Type H: strip seal deck joint above. The pier consists of seven columns & cap and 18 sliding plate expansion bearings. [1998] Extensive shotcrete repairs on pier cap, water stained. [1999] Sliding plate bearings for the steel beams were re-painted. [95/2000] Gland is leaking in several locations (NB & SB). [2000] West column has 1 SF spall. [2004] Cover plate is missing from "J" barrier east rail NBL. [2006] Strip seal is closed to 3/4". Shotcrete repair is map cracking. All bearings have moderate corrosion. 3 Under deck lights north face cap.

**Span #12 (Concrete Voids Slab Span):**

The slab span consists of 15 sliding plate bearings (voided slab). Parking lot: below. [1998] Shotcrete repairs along the median and exterior copings.

**Pier #12:**

Pier consists of 6 columns (integral with the slab span deck, no bearings). 3 Under deck lights south face cap.

**Span #13 (Concrete Voids Slab Span):**

2nd St. below, under deck light EB. [1998] Shotcrete repairs along the median and exterior copings. [2006] Underside of the deck has 10 SF of water saturation.

**Pier #13:**

Pier consists of 6 columns (integral with the slab span deck, no bearings).

**Span #14 (Concrete Voids Slab Span):**

North slope is below. [1998] Shotcrete repairs were done along median and exterior copings. [2006] Underside of the deck has 12 SF of water saturation & 4 SF of delamination. 2 Under deck lights.

**North Abutment:**

Type H: strip seal deck joint above with 14 sliding plate bearing assemblies. [2000] NB joint leaking at both ends. Bearings are rusty. [2006] Strip seal is closed to 3/4".

**PREVIOUS SNOOPER INSPECTIONS**

- 2005 Ken Rand, Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Mike Palmer
- 2004 Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Jim Flannigan,  
John Miller (City of Mpls)
- 2003 Mark Pribula, Kurt Fuhrman, Vance Desens, Pete Wilson, Bill Nelson
- 2002\* Mark Pribula, Kurt Fuhrman, Pete Wilson, Jerry Oldeen, Bruce Anderson,  
Mike Palmer
- 2001 Mark Pribula, Kurt Fuhrman, Vance Desens, Ken Rand, Mike Palmer
- 2000 Mark Pribula, Kurt Fuhrman, Pete Wilson, Marc Beucler, Mike Palmer,  
Wayne Tennison Pete Wilson, George Morelli, Rebecca Lane
- 1999 Kurt Fuhrman, Bill Nelson, Ken Rand, Mike Schadegg, Pete Wilson
- 1998 Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson,  
Jerry Anderson
- 1997\* Mark Pribula, Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson,  
John Peterson
- 1996 Terry Moravec, Eric Evens, Kurt Fuhrman, Pete Wilson
- 1994 Terry Moravec, Kurt Fuhrman, Pete Wilson
- 1993 Terry Moravec, Chas Martin, Tom Waks
- 1991 Chester Martin, Chas Martin, Jerry Anderson
- 1988 Chester Martin

**\*Denotes an "In-Depth" Inspection**

**APPENDEIX A DIAPHRAGM CRACK LOCATIONS**

| <b>DIAPHRAGM CRACK LOCATIONS</b>        |  |
|---|--|
| <b>First Diaphragm South of Pier #3</b> |  |
| <b>G1 (East Fascia NB)</b>              | [99/2000] ¼" crack on top of interior stiffener weld. [2006] No change.  |
| <b>G2 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G3 (NB) *</b>                        | [1998] Two ¼" intersecting diagonal holes drilled in top of stiffener welds. [2003] No crack.  |
| <b>G4 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G5 (NB)*</b>                         | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G6 (NB)</b>                          | [1998] One 2" hole drilled in web. [2000] Other end of crack is turning downward into the web & was drilled out. Crack is contained.   |
| <b>G7 (NB)*</b>                         | [1998] One 2" hole drilled in web & other end of crack was ground out. [2003] The ground out end is cracked, visible on both sides web, should be drilled out. [2006] ½" crack exterior beyond drilled hole. |
| <b>G8 (SB)</b>                          |  |
| <b>G9 (SB)</b>                          |  |
| <b>G10 (SB)</b>                         |  |
| <b>G11 (SB)</b>                         |  |
| <b>G12 (SB) *</b>                       | [1998] Two 2" holes drilled in web & 1 hole drilled in stiffener. [1999] Crack extends 1" beyond the hole (ground out). [2003] No change.  |
| <b>G13 (SB)</b>                         |  |
| <b>G14 (West Fascia SB)*</b>            | [1998] One 2" hole drilled in web. [2000] ¾" horizontal crack on exterior flange/web weld (may eventually need drilling), small diagonal crack @ top of interior stiffener weld. [2003] No change.           |

| <b>DIAPHRAGM CRACK LOCATIONS</b>              |  |
|---|--|
| <b>First Diaphragm North of Pier #3</b>       |  |
| <b>*Denotes original 1998 crack locations</b> |  |
| <b>G1 (East Fascia NB)</b>                    |  |
| <b>G2 (NB)</b>                                | Strain gauges on both faces.   |
| <b>G3 (NB)*</b>                               | [98/2000] West side, top flange web weld has ½" crack. Eastside, stiffener weld has a small crack. [2003] No change. |
| <b>G4 (NB)*</b>                               | [1999] West face, top of stiffener weld small crack, drill out.  |
| <b>G5 (NB)*</b>                               | [2003] Small crack at the top of stiffener weld.   |
| <b>G6 (NB)*</b>                               | [1999] Small crack at top of stiffener weld. Strain gauges on the east face. [2003] No change.                       |
| <b>G7 (NB)*</b>                               | [2003] Small crack at the top of the interior stiffener weld.  |
| <b>G8 (SB)</b>                                |  |
| <b>G9 (SB)</b>                                |  |
| <b>G10 (SB)</b>                               |  |
| <b>G11 (SB)*</b>                              | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G12 (SB)*</b>                              | [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G13 (SB)</b>                               |  |
| <b>G14 (SB)</b>                               |  |
| <b>G15 (West Fascia SB)*</b>                  | [1998] Two 2" holes drilled in web. Crack is contained.  |

## DIAPHRAGM CRACK LOCATIONS

### First Diaphragm North of Pier #4

\*Denotes original 1998 crack locations

|   |
|---|
| <b>G1 (East Fascia NB)</b>  |
| <b>G2 (NB)</b>  |
| <b>G3 (NB)*</b> [1998] Two 2" holes drilled in web. Crack is contained.   |
| <b>G4 (NB)*</b> [1998] Two 2" holes drilled in web. Crack is contained.   |
| <b>G5 (NB)</b>  |
| <b>G6 (NB)</b>  |
| <b>G7 (NB)*</b> [1998] Two 2" holes drilled in web. [2001/03] Both sides, small crack at top of stiffener weld. |
| <b>G8 (SB)</b>  |
| <b>G9 (SB)</b>  |
| <b>G10 (SB)*</b> [1998] Two 2" holes drilled in web. Crack is contained.  |
| <b>G11 (SB)</b> [99/2000] Small crack at top of stiffener weld. [2003] No change.                               |
| <b>G12 (SB)*</b> [1998] Two 2" holes drilled in web & ¼" hole drilled in stiffener weld. Crack is contained.    |
| <b>G13 (SB)</b> [99/2000] Small crack at top of stiffener weld. [2003] No change.                               |
| <b>G14 (West Fascia SB)</b> [1999] Small crack at top of interior stiffener weld. [2003] No change.             |

## DIAPHRAGM CRACK LOCATIONS

### First Diaphragm South of Pier #9

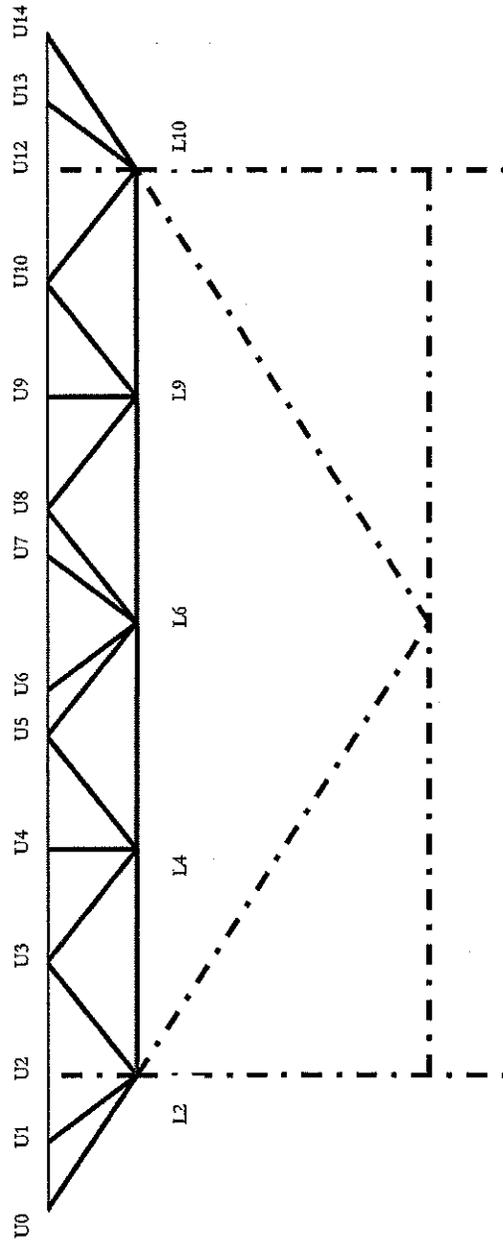
\*Denotes original 1998 crack locations

|   |
|---|
| <b>G1 (East Fascia NB)</b> [2000] Exterior top flange/web weld has a ½" indication. [03] No change. |
| <b>G1C (NB)</b>   |
| <b>G2 (NB)*</b> [1998] 4 ft. long inverted "U" shaped crack in web (reinforced with bolted plates). |
| <b>G3 (NB)</b>  |
| <b>G4 (NB)*</b> [98/2000] Small crack in top flange/web weld. [03] No change.                       |
| <b>G5 (NB)</b>  |
| <b>G6 (NB)</b>  |
| <b>G7 (NB)</b>  |
| <b>G8 (SB)</b>  |
| <b>G9 (SB)*</b> [1998] Crack in top of stiffener weld. [2003] No change.                            |
| <b>G10 (SB)</b>   |
| <b>G11 (SB)*</b> [98/2000] Small crack in top of stiffener weld (east side). [03] No change.        |
| <b>G12 (SB)*</b> [98/2000] Small crack in top of stiffener weld (east side). [03] No change.        |
| <b>G13 (SB):</b>  |
| <b>G14 (West Fascia SB)</b>   |

## DIAPHRAGM CRACK LOCATIONS

| First Diaphragm North of Pier #9       |  |
|--|--|
| *Denotes original 1998 crack locations |  |
| <b>G1 (East Fascia NB)</b>             |  |
| <b>G1B (NB)</b>                        | Stiffeners are welded to the top flange (positive moment).           |
| <b>G1C (NB)</b>                        |  |
| <b>G1D (NB)</b>                        | Stiffeners are welded to the top flange (positive moment)            |
| <b>G2 (NB)</b>                         |  |
| <b>G3 (NB)</b>                         |  |
| <b>G4 (NB)*</b>                        | [2000] Two 2" holes drilled in web. Crack contained.                 |
| <b>G5 (NB)*</b>                        | [2000] Two 2" holes drilled in web. Crack contained.                 |
| <b>G6 (NB)</b>                         |  |
| <b>G7 (NB)</b>                         |  |
| <b>G8 (SB)</b>                         | [2006] Top of west stiffener is working.                             |
| <b>G9 (SB)*</b>                        | [98/2000] Crack in top flange/web weld & top of west stiffener weld. |
| <b>G10 (SB)*</b>                       | [2000] Crack in top flange/ web weld (east side) [2005] No change.   |
| <b>G11 (SB)*</b>                       | [2000] Two 2" holes drilled in web. Crack contained.                 |
| <b>G12 (SB)*</b>                       | [2000] Two 2" holes drilled in web. Crack contained.                 |
| <b>G13 (SB)</b>                        |  |
| <b>G14 (West Fascia SB)</b>            |  |

# TRUSS DIAGRAM



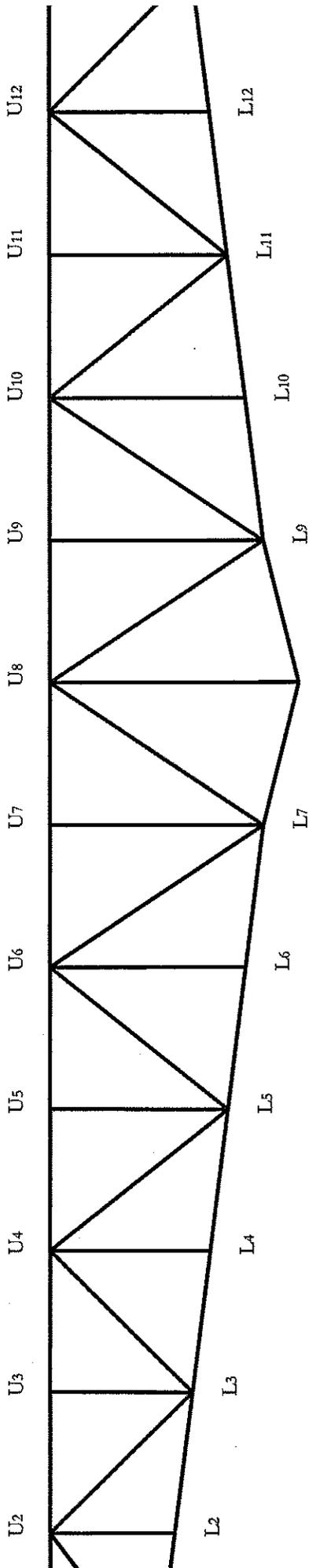
**Note**

Tension Members in Red  
 Compression Members in Blue  
 Reversal Members in Orange  
 Black Dashed Lines are Secondary Members

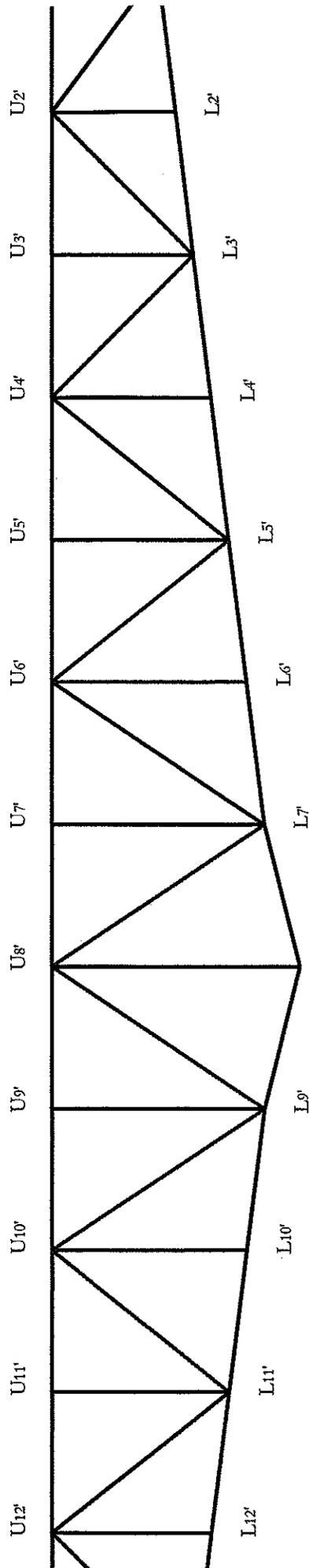


Minnesota Department of Transportation  
 I-35W over Mississippi River at Mpls., MN  
 Bridge No. 9340

## Floorbeam Truss Diagram

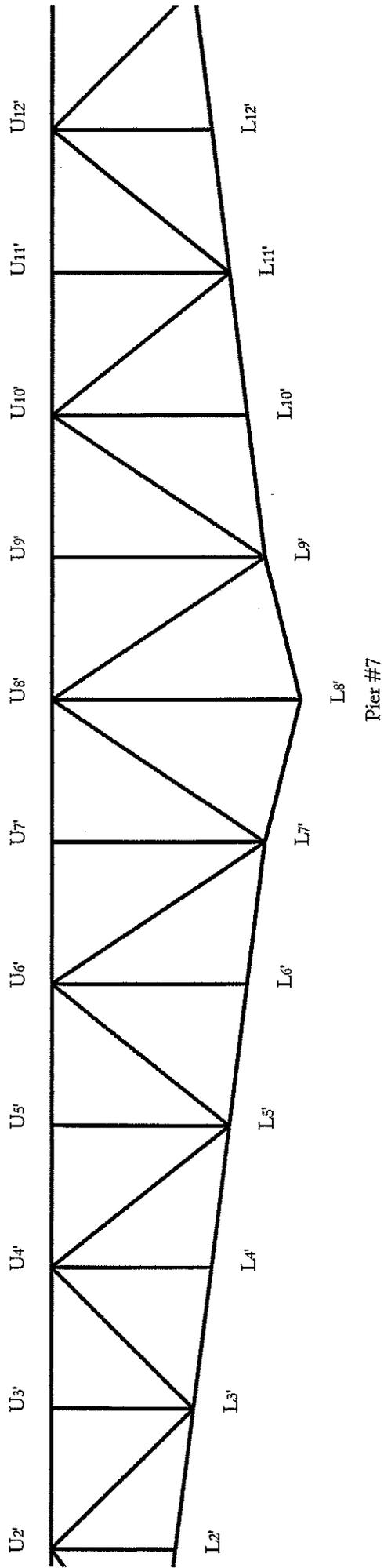


Pier #6

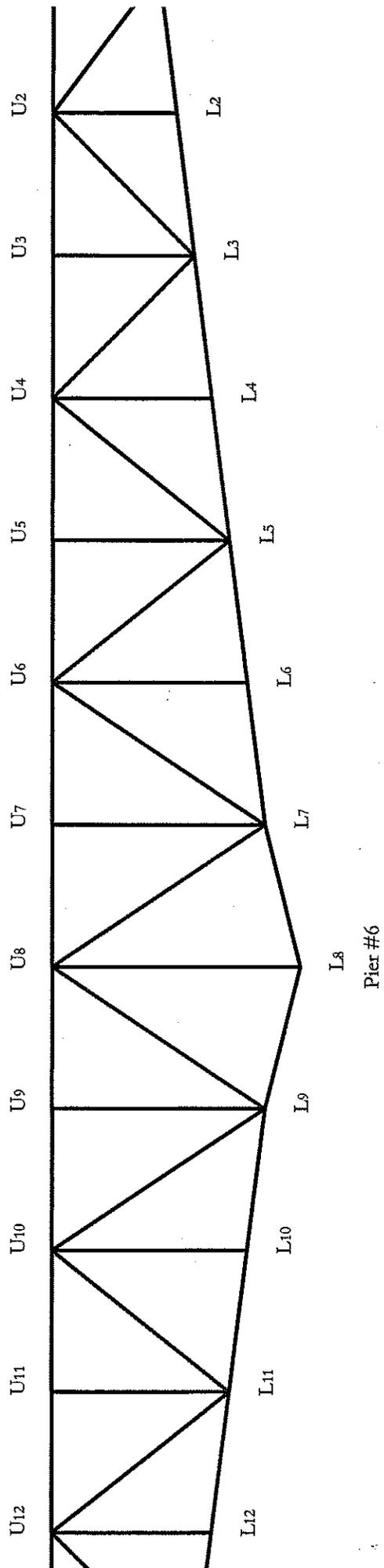


Pier #7

1  
1  
1



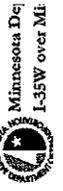
Pier #7



Pier #6

Note

Tension Members in Red  
Compression Members in Blue



Minnesota Dept  
I-35W over MI

