

# 2016 UNDERWATER BRIDGE INSPECTION REPORT



## BRIDGE # 7170 CSAH 12 over CROW WING RIVER

DISTRICT: District 3

COUNTY: Wadena

CITY/TOWNSHIP: Nimrod

STATE: Minnesota

Date of Inspection: 06/05/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Stromberg, Dan

Report Written By: Dan Stromberg

Report Reviewed By:

Final Report Date:



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## UNDERWATER INSPECTION

### REPORT SUMMARY

The substructure units inspected at Bridge No. 7170, Piers 1 and 2, were found to be in satisfactory condition with no defects of structural significance below water. The concrete columns exhibited minor scaling with exposed aggregate on all of the faces. Minor scour was present at the upstream and downstream columns of Pier 1 and at the upstream column of Pier 2, but there was no footing exposure.

### INSPECTION FINDINGS

(A) The concrete pier columns exhibited scaling from the waterline to 2 feet below the waterline with up to 1 inch of penetration and exposed aggregate.

(B) The channel bottom consisted of 1 foot diameter and smaller rock allowing no probe rod penetration at Pier 1. The channel bottom at Pier 2 consisted of sandy gravel allowing up to 3 inches of probe rod penetration.

(C) A scour depression with a radius of 5 feet and up to 2 feet deep was present at the upstream column nose of Pier 1.

(D) Scour depressions with radii up to 5 feet and up to 2 feet deep were present at the upstream and downstream columns of Pier 2.

### RECOMMENDATIONS

(A) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Contractor: Collins Engineers, Inc.

Contractor Job Number: 9687

## UNDERWATER INSPECTION

### 1. BRIDGE DATA

Bridge #: 7170  
Feature Intersected: CROW WING RIVER  
Facility Carried: CSAH 12  
District: District 3  
County: 080 - Wadena

#### Bridge Description:

The superstructure consists of a three span, multiple steel girders bridge supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The pier and abutment footings are founded on timber piles. The piers are numbered 1 and 2 starting from the west.

### 2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg  
Inspection Diver: Daniel G. Stromberg  
Date of Underwater Inspection: 06/05/2016  
Weather Conditions: Partly Cloudy, 77°F  
Underwater Visibility (feet): 1.0 foot  
Waterway Velocity (ft/sec): 1 ft/sec

### 3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Piers 1 and 2

#### General Shape:

The piers consists of two hexagonal shafts/columns supporting a rectangular pier cap. Each pier shaft is supported on a rectangular footing founded on timber piles.

Maximum Water Depth at Substructure(s) Inspected (feet): 3.0 feet

### 4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream end of Pier 2.  
Waterline Elevation (feet): 1316.38 feet  
Description: The waterline was located approximately 8.0 feet below the reference.

### 5. NBIS CODING INFORMATION

(Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code: 5  
Item 61: Channel and Channel Protection: Code: 7  
Item 62: Culvert: Code:  
Item 92B: Underwater Inspection: Code: Y 48 06/2016

Item 113: Scour Critical Bridge:

Code: U

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

Yes

No

(Mark your selection with an X)

6. STRUCTURAL ELEMENT CONDITION RATING

ELEM #	Element Description	Quantity	Unit	Conditions			
				CS1	CS2	CS3	CS4
205	Reinforced Concrete Column	4	EA	2	2		
885	Scour	1	EA		1		

## UNDERWATER INSPECTION

### INSPECTION PROCEDURES

The routine underwater inspection of Bridge 7170 (CSAH 12 over Crow Wing River) was completed on June 5, 2016. The underwater inspection was conducted from shore. The inspection was conducted by a team consisting of a Professional Engineer Diver with a valid MnDOT Team Leader certification, a backup diver and dive tender. Due to waterway conditions at the time of the inspection, the inspection could be accomplished by wading in accordance with OSHA regulations. Channel bottom profiles were taken along the upstream and downstream faces of the bridge and around the periphery of substructure units to determine the presence, location and area of scour.

The bridge elements inspected consisted of two piers. According to the bridge inventory, Piers 1 and 2 are founded on timber piles supporting a rectangular footing and each column is supporting a reinforced concrete cap. Inspection procedures followed FHWA guidance and the MnDOT Bridge and Structure Inspection Program Manual with channel bottom probing to search for foundations. The maximum routine underwater inspection frequency is recommended to remain at 60 months based on those findings and risk factors. Also, inspection procedures should continue to follow the above approach and standard guidance with 100% Level I and 10% Level II intensity efforts.

# Minnesota Structure Inventory Report

Bridge ID: 7170

CSAH 12 over CROW WING RIVER

Date: 08/19/2016

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
<b>Agency Br. No.</b> Crew <b>District</b> 03 <b>Maint. Area</b> <b>County</b> 080 - Wadena <b>City</b> Nimrod <b>Township</b> <b>Desc. Loc.</b> 0.1 MI E OF JCT TH227 <b>Sect., Twp., Range</b> 32 - 137N - 33W <b>Latitude</b> 46 ° 38 ' 23.63 " <b>Longitude</b> 94 ° 52 ' 48.13 " <b>Custodian</b> 02 - County Highway Agency <b>Owner</b> 02 - County Highway Agency <b>BMU Agreement</b> <b>Year Built</b> 1958 <b>MN Year Reconstructed</b> 2013 <b>FHWA Year Reconstructed</b> <b>MN Temporary Status</b> <b>Bridge Plan Location</b> 3 - COUNTY <b>Date Opened to Traffic</b> <b>On - Off System</b> 1 - ON <b>Legislative District</b> 10B <b>Potential ABC</b> 2 - N/A	<b>Bridge Match ID (TIS)</b> 0 <b>Roadway O/U Key</b> Route On Structure <b>Route Sys</b> 04 - CSAH <b>Number</b> 12 <b>Roadway Name or Description</b> CSAH 12 <b>Level of Service</b> 1 - MAINLINE <b>Roadway Type</b> 2 - 2-way traffic <b>Control Section (TH Only)</b> <b>Reference Point</b> 000+00.080 <b>Detour Length</b> 7.0 mi. <b>Lanes</b> <b>ON</b> 2 <b>UNDER</b> 0 <b>ADT</b> 710 <b>YEAR</b> 2008 <b>HCA DT</b> <b>ADTT</b> % <b>Functional Class</b> 07 - Rural - Major Collector	<b>Userkey</b> 120 <b>Structurally Deficient</b> N <b>Functionally Obsolete</b> N <b>Sufficiency Rating</b> 88.6 <b>Routine Inspection Date</b> 05/24/2016 <b>Routine Inspection Frequency</b> 12 <b>Inspector Name</b> Stromberg, Dan <b>Status</b> A - Open																				
		+ NBI CONDITION RATINGS +																				
		<b>Deck</b> 7 <b>Unsound Deck %</b> <b>Superstructure</b> 5 <b>Substructure</b> 5 <b>Channel</b> 7 <b>Culvert</b> N																				
		+ NBI APPRAISAL RATINGS +																				
		<b>Structure Evaluation</b> 5 <b>Deck Geometry</b> 6 <b>Underclearances</b> N <b>Waterway Adequacy</b> 7 <b>Approach Alignment</b> 7																				
		+ SAFETY FEATURES +																				
		<b>Bridge Railing</b> 1 - MEETS STANDARDS <b>GR Transition</b> N - NOT REQUIRED <b>Appr. Guardrail</b> N - NOT REQUIRED <b>GR Termini</b> N - NOT REQUIRED																				
		+ IN DEPTH INSP. +																				
		<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Y/N</th> <th style="width: 15%; text-align: center;">Freq</th> <th style="width: 15%; text-align: center;">Date</th> </tr> </thead> <tbody> <tr> <td><b>Frac. Critical</b></td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>Underwater</b></td> <td style="text-align: center;">Y</td> <td style="text-align: center;">60</td> <td style="text-align: center;">06/05/2016</td> </tr> <tr> <td><b>Pinned Asbly.</b></td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>Spec. Feat.</b></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Y/N	Freq	Date	<b>Frac. Critical</b>				<b>Underwater</b>	Y	60	06/05/2016	<b>Pinned Asbly.</b>				<b>Spec. Feat.</b>			
	Y/N	Freq	Date																			
<b>Frac. Critical</b>																						
<b>Underwater</b>	Y	60	06/05/2016																			
<b>Pinned Asbly.</b>																						
<b>Spec. Feat.</b>																						
		+ WATERWAY +																				
		<b>Drainage Area (sq. mi.)</b> <b>Waterway Opening (sf.)</b> 2316 <b>Navigation Control</b> 0 - No nav. control on <b>Pier Protection</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td><b>Nav. Clr. (ft.)</b></td> <td><b>Vert.</b> 0.0</td> <td><b>Horiz.</b> 0.0</td> </tr> </table> <b>Nav. Vert. Lift Bridge Clear. (ft.)</b> <b>MN Scour Code</b> U - CRIT - <del>PROTECTED</del> <b>Year</b> 1996	<b>Nav. Clr. (ft.)</b>	<b>Vert.</b> 0.0	<b>Horiz.</b> 0.0																	
<b>Nav. Clr. (ft.)</b>	<b>Vert.</b> 0.0	<b>Horiz.</b> 0.0																				
		+ CAPACITY RATINGS +																				
		<b>Design Load</b> 4 - H 20 <b>Operating Rating</b> 2 - HS TRUCK 37.2 <b>Inventory Rating</b> 2 - HS TRUCK 22.3 <b>Posting VEH:</b> <b>SEMI:</b> <b>DBL:</b> <b>Rating Date</b> 05/18/2012 <b>Overweight Permit Codes</b> <b>A</b> N - N/A <b>B</b> N - N/A <b>C</b> N - N/A																				
+ STRUCTURE +	+ RDWY DIMENSIONS +																					
<b>Service On</b> 1 - Highway <b>Service Under</b> 5 - Waterway <b>Main Span Type</b> 3 - Steel <b>Main Span Design</b> 01 - Beam Span <b>Main Span Detail</b> <b>Appr. Span Type</b> <b>Appr. Span Design</b> <b>Appr. Span Detail</b> <b>Skew</b> 0 <b>Culvert Type</b> <b>Barrel Length</b> <b>Cantilever ID</b>  <b>Number of Spans</b> <b>MAIN:</b> 3 <b>APPR:</b> 0 <b>TOTAL:</b> <b>Main Span Length</b> 66.0 ft. <b>Structure Length</b> 200.0 ft. <b>Deck Width (Out-to-Out)</b> 36.3 ft. <b>Deck Material</b> 1 - Concrete Cast-in-Place <b>Wear Surf Type</b> 1 - Monolithic Concrete <b>Wear Surf Install Year</b> 2013 <b>Wear Course/Fill Depth</b> 0.16 ft. <b>Deck Membrane</b> 0 - None <b>Deck Rebars</b> 0 - None <b>Deck Rebars Install Year</b> 2013 <b>Structure Area (Out-to-Out)</b> 7260 sq. ft. <b>Roadway Area (Curb-to-Curb)</b> 6600 sq. ft. <b>Sidewalk Width</b> <b>50A. Lt</b> 0.0 ft. <b>50B. Rt</b> 0.0 ft. <b>Curb Height</b> <b>Lt</b> 0.00 ft. <b>Rt</b> 0.00 ft. <b>Rail Type</b> <b>Lt</b> 51 <b>Rt</b> 51	<b>If Divided</b> <b>NB-EB</b> <b>SB-WB</b> <b>Roadway Width</b> 33.0 ft. ft. <b>Vertical Clearance</b> ft. ft. <b>Max. Vert. Clear.</b> ft. ft. <b>Horizontal Clear.</b> ft. ft. <b>Lateral Clearance</b> ft. ft. <b>Appr. Surface Width</b> 30.0 ft. <b>Bridge Roadway Width</b> 33.0 ft. <b>Median Width On Bridge</b> ft.																					
		+ MISC. BRIDGE DATA +																				
		<b>Structure Flared</b> 0 - No flare <b>Parallel Structure</b> N - No parallel structure <b>Field Conn. ID</b> <b>Abutment Foundation (Material/Type)</b> 1 - CONC 3 - FTG PILE <b>Pier Foundation (Material/Type)</b> 1 - CONC 3 - FTG PILE <b>Historic Status</b> 5 - Not eligible																				
		+ PAINT +																				
		<b>Year Painted</b> 1958 <b>Unsound Paint %</b> <b>Painted Area</b> sq. ft. <b>Primer Type</b> <b>Finish Type</b>																				
		+ BRIDGE SIGNS +																				
		<b>Posted Load</b> 0 - Not Required <b>Traffic</b> 0 - Not Required <b>Horizontal</b> 1 - Object Markers <b>Vertical</b> N - Not Applicable																				

**MINNESOTA BRIDGE INSPECTION REPORT**

10/14/2016

Inspector: CO Bridge

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

County: Wadena	Location: 0.1 MI E OF JCT TH227	Length: 200.0 ft.
City: Nimrod	Route: 04 - CSAH 12 Ref. Pt.: 000+00.080	Deck Width: 36.3 ft.
Township:	Control Section:	Rdwy. Area/ Pct. Unsnd: 6600 sq. ft. / %
Section: 32 Township: 137N Range: 33W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 3 - Steel 2 - Stringer/Multi-beam or Girder	Local Agency Bridge Nbr.:	Culvert: N/A
List:		Postings:
NBI Deck: 7 Super: 5 Sub: 5 Chan: 7 Culv: N		
	Open, Posted, Closed: A - Open	
	MN Scour Code: U - CRIT - PROT REQD	
Appraisal Ratings - Approach: 7 Waterway: 7		Unofficial Structurally Deficient N
Required Bridge Signs - Load Posting: 0 - Not Required	Traffic: 0 - Not Required	Unofficial Functionally Obsolete N
Horizontal: 1 - Object Markers	Vertical: N - Not Applicable	Unofficial Sufficiency Rating 88.6

ELEM					QTY	QTY	QTY	QTY
NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	CS 1	CS 2	CS 3	CS 4

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
12	Reinforced Concrete Deck	Underwater	08/19/2016	7260 SF	7260	0	0	0
		Routine	05/24/2016	7260 SF	7260	0	0	0

Notes: [2016] Migrator assumed CS1. No change from previous report. No changes to report at time of inspection. - 2016

Rehab appears to have stalled areas of deterioration. 2014 - 2015

No change from previous report. - 2013

Cracking and delamination present at joints between spans and adjacent to the east and west abutments. - 2011

Efflorescence present at cracking near west abbutment. - 2009

No Change. - 2008

NO CHANGE - 2007

Minor cracking and efflorescence present. At SW Corner of underside of deck there is 1 crack 4'-6" long and 2 cracks 3'-5" in length. 2006.

Minor cracking and efflorescence present. At SW Corner of underside of deck there is 1 crack 4'-6" long and 2 cracks 3'-5" in length. 2005.

159. OK. 2001.

510 - Wearing Surfaces	Underwater	08/19/2016	6600 SF	6600	0	0	0
	Routine	05/24/2016	6600 SF	6600	0	0	0

Notes: Deck surface remains in excellent condition, minor cracking is stable and appears to have stopped progressing. Low spot along south curbline causing minor birdbath. - 2016

Top of Concrete Deck with Uncoated Rebar Notes: [2015]

Concrete deck driving surface remains in good condition. Minor cracking at base of railing curbs. - 2014

The concrete Deck surface was milled off and all remaining spalled and unsound concrete areas were removed. The wearing surface was overlaid with low-slump concrete pavement during fall of 2012 - 2013.

Concrete delamination and spalling has advanced. Approximately 25% of the deck surface is unsound. - 2011

Continued delamination of the concrete, mostly along the edges of past deck repairs. One small spalled area near CL Span 1. - 2009

"Soundings" indicate delamination occuring primarily along prior deck repairs. Spalled area near CL in Span 1. - 2008

NO CHANGES - 2007

Only minor cracking evident. 2006.

Deck was repaired in 2004. Only minor cracking evident. 2005.

There are some minor spalled areas and cracks. 112. THERE ARE SOME MINOR SPALLED AREAS. 2001.

Low Slump Overlay with Uncoated Rebar Notes: Concrete deck driving surface remains in good condition. Minor cracking at base of railing curbs. - 2014

Concrete deck overlay installed in 2012 under project SAP 080-612-007. Concrete surface is sound with no cracking. - 2013

Low Slump Overlay with Epoxy Rebar Notes: [2015] ELEMENT ADDED BY BRIDGE OFFICE.

Overlay remains in good condition. Some minor residual cracking (continuous from concrete rail cracking). - 2015

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
107	Steel Open Girder/Beam	Underwater	08/19/2016	1001 LF	0	901	100	0
		Routine	05/24/2016	1001 LF	0	901	100	0
<p>Notes: Rusting in deck joint areas has been arrested, however, rusted areas should be repainted. - 2016</p> <p>No changes from 2013 - 2015</p> <p>No changes from 2011. - 2013</p> <p>Additional rusting and corrosion has effected aproximately 25% of the steel beam surface area and lower flanges. - 2011</p> <p>The steel beams are sound, but showing spots of rust on the webs. Top and bottom flanges are rusting in the vicinity of floor drains. intermediate diaphragms are rusting due to placement beneath leaky deck joints. - 2009</p> <p>Top falnges of the beams are rusting where in contact with the deck. Debris is also present causing accelerated rusting at these locations.- 2008</p> <p>STEEL GIRDERS HAVE ACTIVE CORROSION - 2007</p> <p>The steel girders have some minor active corrosion and also some surface rust and freckling is present. The paint is chalking, peeling and curling. There is some exposed metal adjacent to the concrete. 2006.</p> <p>The steel girders have some minor active corrosion and also some surface rust and freckling is present. The paint is chalking, peeling and curling. There is some exposed metal adjacent to the concrete. 2005.</p> <p>The steel girders have some minor active corrosion and also some surface rust and freckling is present. The paint is chalking, peeling and curling. There is some exposed metal adjacent to the concrete. 8. THE STEEL GIRDERS HAVE SOME MINOR ACTIVE CORROSION, ALSO SOME SURFACE AND FRECKLED RUST HAS FORMED. THE PAINT IS CHALKING, PEELING AND CURLING AND IS SHOWING SOME EARLY EVIDENCE OF PAINT DISTRESS. THERE IS SOME EXPOSED METAL ADJACENT TO THE CONCRETE. 2001.</p> <p>Pack Rust Notes: Rust below deck drains appears to have stalled due to installation of new drain design as part of rehab in 2012. - 2015</p> <p>No changes from 2011. - 2013</p> <p>No changes from previous report. - 2011</p> <p>Many areas of rust, some significant spots on bearings, diaphragms and flanges below deck drains and/or leaking joints. - 2009</p> <p>No Change. - 2008</p> <p>BEARINGS OVER THE PIERS SHOW SIGNS OF SIGNIFICANT RUST - 2007</p> <p>The fixed and moveable bearings over the piers show some signs of rust between the steel plates. 2006.</p> <p>The fixed and moveable bearings over the piers show some signs of rust between the steel plates. 2005.</p> <p>The fixed and moveable bearings over the piers show some signs of rust between the steel plates. 157. The fixed and moveable bearings over the piers show some signs of rust between the steel plates. 2001.</p>								
515	Steel Protective Coating	Underwater	08/19/2016	9075 SF	8076	0	650	349
		Routine	05/24/2016	9075 SF	8076	0	650	349
<p>Notes: All steel beam surface area AND steel diaphragm surface area is included in this quantity. Areas of rust and damaged protective coating is mostly a result damage done previous to the bridge rehab project in 2012. - 2016</p>								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
205	Reinforced Concrete Column	Underwater	08/19/2016	4 EA	2	2	0	0
		Routine	05/24/2016	4 EA	2	2	0	0
<p>Notes: Columns difficult to inspect from the vantage point of slopes - should be inspected from a boat in the next few years. - 2016</p> <p>No apparent changes. Should be inspected closer with boat or other access tools. 2014-2015</p> <p>No changes from 2011. - 2013</p> <p>Minor concrete delamination below the pier cap on both piers. - 2011</p> <p>No major cracks or visible rebar. Concrete is discolored at water line. - 2009</p> <p>No Changes - 2008</p> <p>NO CHANGE - 2007</p> <p>The columns at the piers have minor deterioration above and below the water line as well as some discoloration. 2006.</p> <p>The columns at the piers have minor deterioration above and below the water line as well as some discoloration. 2005.</p> <p>The columns at the piers have minor deterioration above and below the water line as well as some discoloration. 58. THE CONCRETE PIER COLUMNS HAVE MINOR DETERIORATION ABOVE AND BELOW THE WATER LINE AS WELL AS SOME DISCOLORATION. 2001.</p>								
215	Reinforced Concrete Abutment	Underwater	08/19/2016	112 LF	100	12	0	0
		Routine	05/24/2016	112 LF	100	12	0	0
<p>Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:40 CS2:0 CS3:0 CS4:0). No visible changes to note, abutment and wingwalls remain in good stable condition. - 2016</p> <p>Abutments in good condition, no new cracks or spalls to report. 2014-2015</p> <p>No changes from 2011. - 2013</p> <p>No changes from previous report. - 2011</p> <p>No visible change - 2009</p> <p>"Sounded" in good condition. Rust stains at beam bearing locations. - 2008</p> <p>NO CHANGE - 2007</p> <p>The abutments have minor visible deterioration, discoloration and superficial cracking. 2006.</p> <p>The abutments have minor visible deterioration, discoloration and superficial cracking. 2005.</p> <p>The abutments have minor visible deterioration, discoloration and superficial cracking. 62. THE ABUTMENTS HAVE MINOR VISIBLE DETERIORATION, DISCOLORATION AND SUPERFICIAL CRACKING. 2001.</p> <p>Wingwall notes: Spall has been stable since last inspection. - 2015</p> <p>New spall area at top of S.E. wingwall (approx. 5" x 6") at connection area with new construction. Appears to have been done during construction. - 2014</p> <p>No changes from 2011. - 2013</p> <p>No changes from previous report. - 2011</p> <p>Minimal cracking. Good condition - 2009</p> <p>No Changes - 2008</p> <p>NO CHANGE - 2007</p> <p>The wingwalls have minor deterioration. There is some discoloration and superficial cracking. 2006.</p> <p>The wingwalls have minor deterioration. There is some discoloration and superficial cracking. 2005.</p> <p>The wingwalls have minor deterioration. There is some discoloration and superficial cracking. 71. THE WINGWALLS HAVE MINOR DETERIORATION. THERE IS SOME DISCOLORATION AND SUPERFICIAL CRACKING. 2001.</p>								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
234	Reinforced Concrete Pier Cap	Underwater	08/19/2016	70 LF	35	25	10	0
		Routine	05/24/2016	70 LF	35	25	10	0

Notes: No visible changes from the point of inspection at bridge slopes. Top of piers are covered with debris that has fallen thru joints and remnants of wildlife activity, these should be cleaned to help protect pier caps from accelerated decomposition. - 2016

No apparent changes. Should be inspected closer with boat or other access tools. 2014-2015

No changes from 2011. - 2013

Two lateral cracks extending from the bearing seats to the bottom of the cap are present in the west pier. Concrete delamination and spalling is present in both pier caps on the south side of the bridge. - 2011

One Spalled area at Pier 1. - 2009

No Change. - 2008

NO CHANGE - 2007

The pier caps have minor deterioration. There is some discoloration, efflorescence and superficial cracking. 2006.

The pier caps have minor deterioration. There is some discoloration, efflorescence and superficial cracking. 2005.

The pier caps have minor deterioration. There is some discoloration, efflorescence and superficial cracking which does not appear to affect their strength or serviceability. 41. THE CONCRETE PIER CAPS HAVE MINOR DETERIORATION. THERE IS SOME DISCOLORATION, EFFLORESCENCE AND SUPERFICIAL CRACKING WHICH DOES NOT EFFECT THEIR STRENGTH OR SERVICEABILITY. 2001.

301	Pourable Joint Seal	Underwater	08/19/2016	144 LF	144	0	0	0
		Routine	05/24/2016	144 LF	144	0	0	0

Notes: Joints appear to be operation from deck surface, underside of joint reveals that approx 30% of cork filler has fallen out of the east joint over pier #2. - 2016

West deck joint has some deterioration around southern area of joint. - 2015

Joints in good condition and functioning. Appear to be sealed well. - 2014

Transverse joints seals were removed and replaced with cork joint filler and sealed as part of rehab during fall of 2012. - 2013

No change from previous report. - 2011

Sealant is missing. Concrete is deteriorating along the joints and deterioration is expected to continue. - 2009

Sealant is missing causing concrete to deteriorate. - 2008

LEAKAGE EVIDENT. NEEDS REPAIR - 2007

The joints show minor deterioration. There are no visible signs of leakage. 2006.

The joints show minor deterioration. There are no visible signs of leakage. 2005.

The joints show minor deterioration. There are no visible signs of leakage. 91. THE JOINTS SHOW MINOR DETERIORATION. THEY WERE SEALED IN Spring, 2001. ADHESION OF THE POURED JOINT SEALANT IS SOUND AND THERE IS NO VISIBLE SIGNS OF LEAKAGE OR COHESION CRACKS. 2001.

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
311	Movable Bearing	Underwater	08/19/2016	15 EA	5	10	0	0
		Routine	05/24/2016	15 EA	5	10	0	0
<p>Notes: All bearings need to have rust cleaned from surface and anchorages to determine extent of decay, cannot be determined from the slope vantage point so should be inspected by an alternative method. - 2016</p> <p>No changes from 2013 - 2015</p> <p>No changes from 2011. - 2013</p> <p>Expansion bearings on the east and west piers have debris and pack rust buildup. All appear to be at their maximum limit for expansion and contraction. Bearings on the east pier appear to be frozen. - 2011</p> <p>Bearings are rusting as a result of salt water leaking through the deck joints, condition is worse at Pier 1 - 2009</p> <p>No Changes - 2008</p> <p>PLATES HAVE ACTIVE CORROSION AND PACK RUST - 2007</p> <p>The moveable steel bearing plates are rusty and corroded but both the vertical and the horizontal alignment appear ok. 2006.</p> <p>The moveable steel bearing plates are rusty and corroded but both the vertical and the horizontal alignment appear ok. 2005.</p> <p>The moveable steel bearing plates are rusty and corroded but both the vertical and the horizontal alignment appear ok. THE MOVEABLE STEEL BEARING PLATES ARE RUSTY AND CORRODED, BUT BOTH THE VERTICAL AND HORIZONTAL ALIGNMENT APPEAR TO BE O.K. 2001.</p>								

313	Fixed Bearing	Underwater	08/19/2016	15 EA	0	10	0	5
		Routine	05/24/2016	15 EA	0	10	0	5
<p>Notes: All bearings need to have rust cleaned from surface and anchorages to determine extent of decay, cannot be determined from the slope vantage point so should be inspected by an alternative method. - 2016</p> <p>No changes from 2013 - 2015</p> <p>No changes from 2011. - 2013</p> <p>Considerable pack rust and builduip is present. Anchorages on the east pier are bent over. Bearings on the abutments appear to be in - 2011</p> <p>Continued corrosion. - 2009</p> <p>Rusting is result of salt water leakage from deck. condition is worst at pier 1. - 2008</p> <p>No Changes - 2008</p> <p>BEARING PLATES ON ALL PIER CAPS HAVE ACTIVE CORROSION AND PACK RUST - 2007</p> <p>The fixed steel bearing plates on the east pier cap is rusty and corroded. Horizontal and vertical alignment appear ok. 2006.</p> <p>The fixed steel bearing plates on the east pier cap is rusty and corroded. Horizontal and vertical alignment appear ok. 2005.</p> <p>The fixed steel bearing plates on the east pier cap is rusty and corroded. Horizontal and vertical alignment appear ok. 98. THE FIXED STEEL BEARING PLATES, LOCATED ON THE EAST CONCTETE PIER CAP, IS RUSTY AND CORRODED, BUT BOTH THE VERTICAL AND HORIZONTAL ALIGNMENT APPEAR TO BE O.K. 2001.</p>								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
330	Metal Bridge Railing	Underwater	08/19/2016	400 LF	400	0	0	0
		Routine	05/24/2016	400 LF	400	0	0	0
<p>Notes: [2016] Migrator assumed concrete/metal combination type rail. Railing in good condition, no damage to report.</p> <p>Cracking is stable since last inspection. - 2015</p> <p>Cracking has appeared at all metal rail connection areas and several areas in between. Cracks are hair width. Structural tube railing in good condition. - 2014</p> <p>Railing was replaced consisting of concrete barrier and structural tube rail during fall of 2012 - 2013. Type P-2 (TL-4)</p> <p>No change from previous report. - 2011</p> <p>Metal in good condition. Concrete base shows some cracking and efflorescence. - 2009</p> <p>Good Condition - 2008</p> <p>BOTTOM HALF OF RAILING CONCRETE - GOOD CONDITION TOP HALF OF RAILING ALUMINUM - GOOD CONDITION - 2007</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas. 2006.</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas. 2005.</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas but it does not appear that these would affect the strength or serviceability. 104. THE STEEL PORTION OF THE BRIDGE RAILING HAS NO VISIBLE SIGNS OF DETERIORATION. THE CONCRETE PORTION OF THE BRIDGE RAILING HAS SOME MINOR CRACKS AND SPALLED AREAS, BUT DOES NOT EFFECT THE STRENGTH OR SERVICEABILITY. 2001.</p>								
515 - Steel Protective Coating		Underwater	08/19/2016	841 SF	809	0	32	0
		Routine	05/24/2016	841 SF	809	0	32	0
<p>Notes: Protective coating has been damaged by what appears to be "drag" marks across the top of the rail, both sides, looks like someone scratched something along the length of the rail. Protective coating completely off drag marks but undercoating remains in place. - 2016</p>								
331	Reinforced Concrete Bridge Railing	Underwater	08/19/2016	400 LF	400	0	0	0
		Routine	05/24/2016	400 LF	400	0	0	0
<p>Notes: [2016] Migrator assumed concrete/metal combination type rail. No new cracking or worsening of existing cracks. No damage from plows or traffic. Concrete in good condition.</p> <p>Cracking is stable since last inspection. - 2015</p> <p>Cracking has appeared at all metal rail connection areas and several areas in between. Cracks are hair width. Structural tube railing in good condition. - 2014</p> <p>Railing was replaced consisting of concrete barrier and structural tube rail during fall of 2012 - 2013. Type P-2 (TL-4)</p> <p>No change from previous report. - 2011</p> <p>Metal in good condition. Concrete base shows some cracking and efflorescence. - 2009</p> <p>Good Condition - 2008</p> <p>BOTTOM HALF OF RAILING CONCRETE - GOOD CONDITION TOP HALF OF RAILING ALUMINUM - GOOD CONDITION - 2007</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas. 2006.</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas. 2005.</p> <p>The steel portion of the bridge railing has no visible signs of deterioration. The concrete portion of the bridge railing has some minor cracks and spalled areas but it does not appear that these would affect the strength or serviceability. 104. THE STEEL PORTION OF THE BRIDGE RAILING HAS NO VISIBLE SIGNS OF DETERIORATION. THE CONCRETE PORTION OF THE BRIDGE RAILING HAS SOME MINOR CRACKS AND SPALLED AREAS, BUT DOES NOT EFFECT THE STRENGTH OR SERVICEABILITY. 2001.</p>								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
800	Critical Deficiencies or Safety Hazards	Underwater	08/19/2016	1 EA	1	0	0	0
		Routine	05/24/2016	1 EA	1	0	0	0
Notes: NO CRITICAL FINDINGS OBSERVED DURING THE LAST INSPECTION.								
810	Concrete Decks - Cracking & Sealing	Underwater	08/19/2016	0 LF	0	0	0	0
		Routine	05/24/2016	0 LF	0	0	0	0
Notes: No visible changes from previous inspection. - 2016								
Minor cracks are appearing near base of rail curb (extend from rail cracking). 2014-2015								
No deck cracking present on new overlay. - 2013								
Numerous unsealed cracks are present in the deck surface. Concrete spalling over 10% of the deck area. "D" cracking and delamination is present along the south fascia and adjacent to the ends of each span. - 2011								
No changes. Cracking has not visibly worsened. - 2009								
3 diagonal cracks with efflorescence near west abutment. -2008								
822	Bituminous Approach Roadway	Underwater	08/19/2016	2 EA	2	0	0	0
		Routine	05/24/2016	2 EA	2	0	0	0
Notes: No apparent settlement and/or potholes. - 2016								
Approaches appear to be in good condition. No settlement apparent. No potholes. 2014 - 2015								
Approaches milled and re-surfaced with bituminous as part of rehab project during the fall of 2012. - 2013								
Approaches have minor settlement and cracking. Minor potholes have been filled. - 2011								
855	Secondary Members (Superstructure)	Underwater	08/19/2016	2 EA	0	1	1	0
		Routine	05/24/2016	2 EA	0	1	1	0
Notes: ( 1 each = steel diaphragms; 1 each = concrete diaphragms; Steel Protective Coating quantity included with steel beams) Rusting is at steel diaphragm connections to beams, much of it at outermost deck beams where old drains were located. After changing of the type of drains used, rusting has been greatly slowed. No visible changes in concrete shear cracking. - 2016								
No changes from 2013 - 2015								
No changes from 2011. - 2013								
24 - 8' Steel intermediate diaphragms between beams. Steel is pitted with corrosion, minor rust and minor pack rust at beam connections. 16 - 8' integrated reinforced concrete intermediate pier web diaphragms; concrete shear cracks present adjacent to beam connections. - 2011								
883	Concrete Shear Cracking	Underwater	08/19/2016	1 EA	1	0	0	0
		Routine	05/24/2016	1 EA	1	0	0	0
Notes: Use this element to monitor the presence of shear cracking on concrete elements. Pay particular attention to the concrete pier caps.								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
885	Scour	Underwater	08/19/2016	1 EA	0	1	0	0
		Routine	05/24/2016	1 EA	1	0	0	0

Notes: Minor scour present at upstream and downstream column of Pier 1 and at the upstream column of Pier 2. - 2016 U/W

Very little riprap still in place. Slopes are in danger of eroding and need to be protected. Scour is more probable if slopes are not protected with new riprap. - 2016

No new evidence of scour. Should be looked at closer with boat or other access tools. 2014-2015

No changes from 2011. Appears to be stable- 2013

Field Scour Survey and evaluation was updated in 2011. Report located in bridge file.

Minor scour occurring along pier no. 1. Scour survey performed in August, 2011. No changes from previous report. 2011

No change - 2009

No significant signs of scour. - 2008

SLIGHT SCOUR OCCURRING - 2007

There is no evidence of scour at this site. 2006.

There is no evidence of scour at this site. 2005.

There is no evidence of scour at this site. 162. There is no evidence of scour at this site. 2001.

891	Other Bridge Signing	Underwater	08/19/2016	1 EA	1	0	0	0
		Routine	05/24/2016	1 EA	1	0	0	0

Notes: Signs in good condition. - 2016

Signs in good condition. Need new bridge # sign. - 2015

All signs in good condition, several are new. - 2014

No changes from 2011. - 2013 New hazard markers were installed following the completion of SAP 080-612-007 in October, 2012.

No changes. - 2011

Delineators in place, no notable changes. - 2009

No change - 2008

NO CHANGE - 2007

Delineators OK. 2005.

181. Delineators OK. 2001.

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
892	Slopes & Slope Protection	Underwater	08/19/2016	1 EA	0	1	0	0
		Routine	05/24/2016	1 EA	0	1	0	0
<p>Notes: Very little riprap still in place. Slopes are in danger of eroding and need to be protected. - 2016</p> <p>Riprap replacement still needed at both East &amp; West ends. - 2015</p> <p>Need new riprap placed under deck. Side slopes are stable and have been brushed. - 2014</p> <p>Good vegetation growth. - 2013</p> <p>Park area has been re-seeded. - no changes from previous report. - 2011</p> <p>Slopes "ok". Minor erosion on SW slope due to heavy traffic in park area. - 2009</p> <p>No Changes - 2008</p> <p>NEEDS SOME REPLACEMENT/REINFORCING - 2007</p> <p>Riprap in functioning well. 2006.</p> <p>185. Wadena County forces placed some riprap in 2001. 2001.</p>								
894	Deck & Approach Drainage	Underwater	08/19/2016	1 EA	1	0	0	0
		Routine	05/24/2016	1 EA	1	0	0	0
<p>Notes: Drains remain in good condition and functioning well. - 2016</p> <p>Drains are functioning as intended. No blockage observed. 2014 - 2015</p> <p>All drains have been replaced as part of the rehab project during the fall of 2012 with drain s extending to below the existing beams to help minimize rust damage. All existing drains were sealed. - 2013</p> <p>No changes from previous report. - 2011</p> <p>Drains functioning well. - 2009</p> <p>No Change. - 2008</p> <p>NO CHANGE - 2007</p> <p>Drains functioning well. Only minor erosion at this site. 2006.</p> <p>Drains functioning well. Only minor erosion at this site. 2005.</p> <p>Drains functioning well. Only minor erosion at this site. 184. Drains functioning well. Only minor erosion at this site. 2001.</p>								
895	Sidewalk, Curb, & Median	Underwater	08/19/2016	1 EA	1	0	0	0
		Routine	05/24/2016	1 EA	1	0	0	0
<p>Notes: No new cracking or worsening of existing cracks. No damage from plows or traffic. Concrete in good condition. - 2016</p> <p>Walkway (widened) areas have minor cracks present that appear to extend from railing cracking (also noted with element 377 above). 2014 - 2015</p> <p>Curb and walkway areas were removed as part of rehab and deck widening project during the fall of 2012 - 2013</p> <p>Curb facias have some additional cracking and delamination present at transverse joints. - 2011</p> <p>Continued cracking in walkway area. - 2009</p> <p>Rail in good condition. Walkway shows signs of cracking and efflorescence, worsening at pier joints. - 2008</p> <p>NO CHANGE - 2007</p> <p>The curbs have some minor cracks, spalls and scuffed areas. 2006.</p> <p>The curbs have some minor cracks, spalls and scuffed areas. 2005.</p> <p>The curbs have some minor cracks, spalls and scuffed areas. 186. The curbs have some minor cracks, spalls and scuffed areas. 2001.</p>								

**BRIDGE 7170 CSAH 12 OVER CROW WING RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
900	Protected Species	Underwater	08/19/2016	1 EA	0	1	0	0
		Routine	05/24/2016	1 EA	0	1	0	0

Notes: Use this element to track the presence of protected species living on this structure.

Cliff swallow nests present on the underside of this structure. - 2016

General Notes: See note for 2014. Also new Bridge number sign is needed. - 2015

All elements are in good condition. There are a few more cracks along the length of both concrete rail portions. The cracks extend into paving portion of the deck but do not appear on the underside of the deck. Overall the bridge and approaches are functioning well. - 2014

The rehab project completed during the fall of 2012 was considered a success. The project included deck widening with new curb and railings. Also to repair approaches and overlay the deck with a low-slump concrete. All new and rehabed areas and/or items appear to be functioning well. There are minor surface cracks along both railings appearing approx. every 4-6 ft. - 2013. Project Number SAP 080-612-007.

Potholes in approaches have been filled. No changes from previous reports. - 2011

Pothole in West approach. Joints still have not been cleaned and/or resealed. - 2009  
Joints should all be cleaned and resealed. - 2008

DAMAGED JOINTS NEED TO BE RESEALED - 2007 PACK RUST AND SCOUR ON THIS STRUCTURE NEEDS TO BE REVIEWED AT A TIME WHEN IT CAN BE CHECKED AND/OR TESTED IN A MORE THOROUGH MANNER - 2007

The river banks are covered with vegetation except where canoeists enter and exit. Area seems stable. PONTIS inspection comments - PONTIS inspection comments - Inspected by William A. Ness on 09-25-2001. 180. THE RIVER BANKS UP AND DOWN STREAM ARE COVERED WITH VEGETATION AND TREES. THEY APPEAR TO BE IN STABLE CONDITION EXCEPT WHERE THE CANOES ARE PUT IN AND TAKE OUT OF THE RIVER. 2001.

58. Deck NBI: This bridge was remodeled in the fall of 2012. Work included removal of the original railing and widening of the deck driving surface. Concrete bridge deck overlay followed the removal of any delaminated concrete. The original deck surface was milled down 2 inches and replaced with the concrete overlay. 52 existing Floor Deck Drains were sealed and 20 drains were modified to Type B702 with extensions.

The Deck surface is in poor to fair condition. The surface was chained in 2011 to detect concrete delamination which was about 25 %. Numerous spalled areas and pot holes have formed. Most have been filled with bituminous patch

36A. Brdg Railings NBI: The new railings installed are a concrete Type P-2 (TL-4). Inspection Code 51.

36B. Transitions NBI: 30 MPH Posted Speed Zone within the City Limits of Nimrod, MN.

36C. Appr Guardrail NBI:

36D. Appr Guardrail Terminal NBI:

59. Superstructure NBI: Steel has moderate rust and deterioration present. Bearings have moved and do not appear to be fully functional and are heally corroded. - 2011

60. Substructure NBI: No Changes from previous report. - 2011

61. Channel NBI:

62. Culvert NBI:

71. Waterway Adeq NBI:

72. Appr Roadway Alignment NBI: Approaches were re-surfaced in October, 2012 under SAP 080-612-007. - 2013

Inventory Notes:

Inspector's Signature

Reviewer's Signature

# Pictures



Photo 1 - Upstream Fascia. Looking Southeast



Photo 2 - Downstream Fascia, Looking Northwest

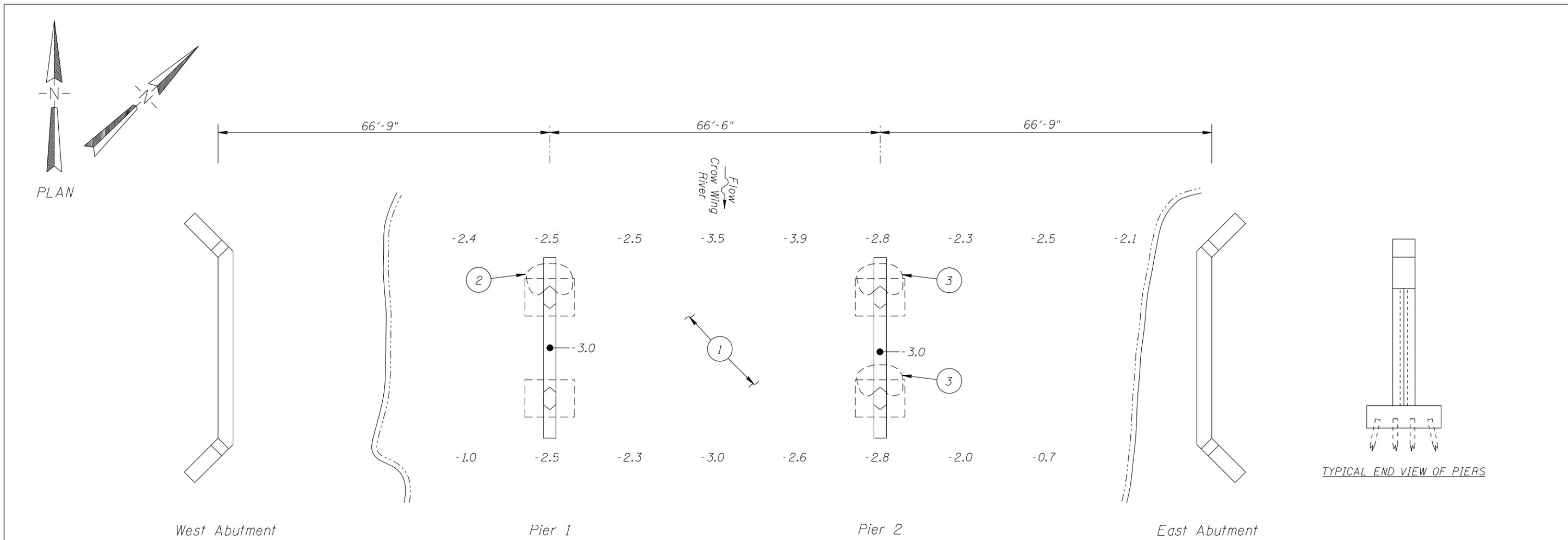
## Pictures



Photo 3 - Pier 1, Looking Southeast



Photo 4 - Pier 2, Looking Southwest



SOUNDING PLAN

GENERAL NOTES:

- Pier 1 and 2 were inspected underwater.
- At the time of inspection, on June 5, 2012, the waterline was located approximately 8.0 feet below the top of the pier cap at upstream end of Pier 1. This corresponds with a waterline elevation of 1316.38 feet based on bridge plans dated November 12, 1956.
- The concrete pier columns exhibited scaling from the waterline to 2 feet below the waterline with up to 1 inch of penetration and exposed aggregate.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to upstream and downstream fascias at 1/4 point intervals between substructure units.

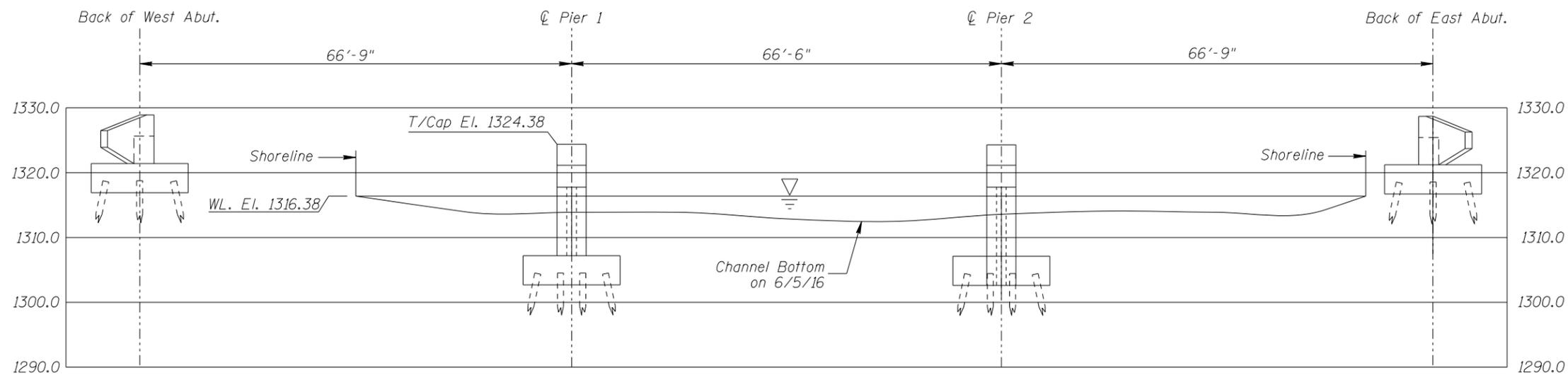
INSPECTION NOTES:

- The channel bottom consisted of 1 foot diameter and smaller rock allowing no probe rod penetration at Pier 1. The channel bottom at Pier 2 consisted of sandy gravel allowing up to 3 inches of probe rod penetration.
- A scour depression with a radius of 5 feet and up to 2 feet deep was present at the upstream column nose of Pier 1.
- Scour depressions with radii up to 5 feet and up to 2 feet deep were present at the upstream and downstream columns of Pier 2.

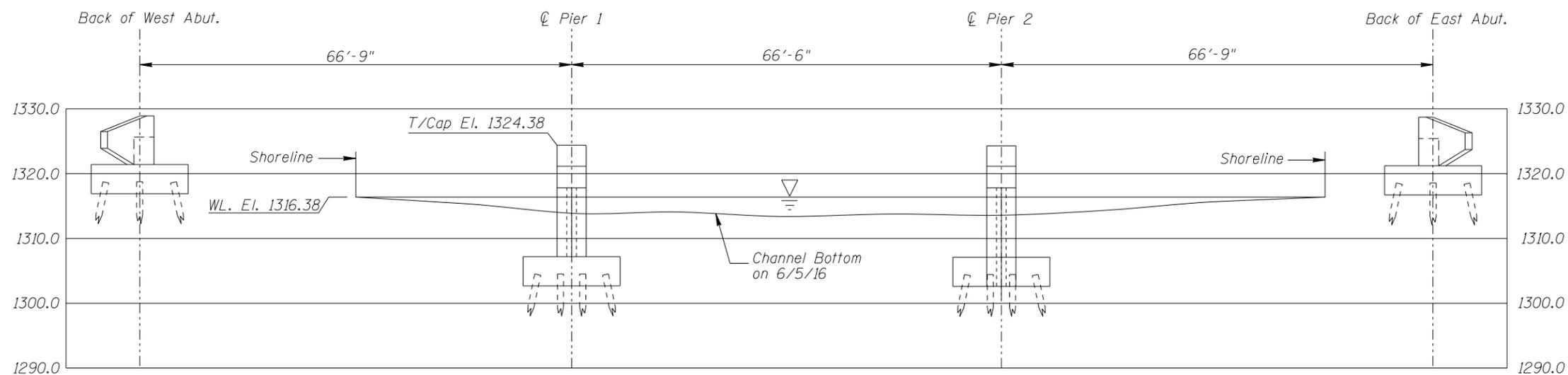
Legend

- 0.4 Sounding Depth (6/5/16)
- Scour Depression

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7170 OVER THE CROW WING RIVER DISTRICT 3, WADENA COUNTY		
INSPECTION AND SOUNDING PLAN		
DRAWN BY: ELN	<b>COLLINS ENGINEERS</b> <small>133 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 5, 2016
CHECKED BY: DGS		SCALE: NTS
CODE: 96877170		FIGURE NO.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

*Note:*  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7170 OVER THE CROW WING RIVER DISTRICT 3, WADENA COUNTY <b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
DRAWN BY: ELN	<b>COLLINS ENGINEERS</b>	DATE: JUNE 5, 2016
CHECKED BY: DGS		SCALE: 1"=20'-0"
CODE: 96877170		FIGURE NO.: 2