

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 57502 CSAH 24 over RED LAKE RIVER

DISTRICT: District 2

COUNTY: Pennington

CITY/TOWNSHIP: HIGH LANDING

STATE: Minnesota

Date of Inspection: 09/27/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Schroeder, Brian

Report Written By: Brian Schroeder

Report Reviewed By:

Final Report Date:



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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge 57502, Piers 1 and 2, were in good condition with no defects of structural significance observed. The channel bottom is in stable condition with no evidence of scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS

- (A) The concrete was smooth and sound with random minor areas of poor consolidation with up to ¼ inch penetration on the faces of Piers 1 and 2.
- (B) Minor scaling was observed from the channel bottom to 2 feet above the waterline (bottom of hammerhead pier cap) with up to ¼ inch maximum penetration on the upstream noses of Piers 1 and 2.
- (C) The channel bottom material around Pier 1 consisted of sand with 3 inches of maximum probe rod penetration; and around Pier 2, the bottom consisted of silty sand with 12 inches of maximum probe rod penetration

RECOMMENDATIONS

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

Contractor: Ayres Associates & Collins Engineers, Inc.

Contractor Job Number: 9687

UNDERWATER INSPECTION

1. BRIDGE DATA

Bridge #: 57502
Feature Intersected: RED LAKE RIVER
Facility Carried: CSAH 24
District: District 2
County: 057 - Pennington

Bridge Description:

The superstructure consists of three spans of multiple steel beams supporting a reinforced concrete deck. The superstructure is supported by two concrete abutments and two concrete piers, with the piers numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Brian K. Schroeder, P.E.
Inspection Diver: Brian K. Schroeder, P.E.
Date of Underwater Inspection: 09/27/2016
Weather Conditions: Partly Cloudy, 43°F
Underwater Visibility (feet): 1.0
Waterway Velocity (ft/sec): 3.0

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Pier 1 and Pier 2

General Shape:

The piers consist of an oblong rectangular concrete shaft with rounded noses supporting a hammerhead pier cap. Design plans with foundation information were not available.

Maximum Water Depth at Substructure(s) Inspected (feet): 5.1

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the west side of Pier 2
Waterline Elevation (feet): 89.6
Description: The waterline was approximately 10.4 feet below reference

5. NBIS CODING INFORMATION

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

Item 60: Substructure: Code: 7
Item 61: Channel and Channel Protection: Code: 8
Item 62: Culvert: Code:
Item 92B: Underwater Inspection: Code: Y 48 09/2016

Item 113: Scour Critical Bridge:

Code: I

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	2	EA	2			
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 57502 (CSAH No. 24 over the Red Lake River) was completed on September, 27, 2016. The underwater inspection was conducted from shore. The inspection was conducted by a team consisting of a PE-Diver with a valid MnDOT Team leader certification, a backup diver and a dive tender. The inspection utilized commercial dive equipment and techniques (SSA and/or SCUBA) in accordance with OSHA regulations. 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 reinforced concrete piers. According to the bridge inventory or design drawings, the piers are founded on pile supported concrete footings. Inspection procedures followed FHWA guidance and the MnDOT Bridge and Structure Inspection Program Manual with channel bottom probing to search for foundations. The 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: 57502

CSAH 24 over RED LAKE RIVER

Date: 01/05/2017

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
Agency Br. No. Crew District 02 Maint. Area County 057 - Pennington City Township 57007 - HIGH LANDING Desc. Loc. 1.1 MI S OF JCT CSAH 6 Sect., Twp., Range 28 - 153N - 40W Latitude 48 ° 2' 55.08 " Longitude 95 ° 48' 31.71 " Custodian 02 - County Highway Agency Owner 02 - County Highway Agency BMU Agreement Year Built 1969 MN Year Reconstructed FHWA Year Reconstructed MN Temporary Status Bridge Plan Location 3 - COUNTY Date Opened to Traffic On - Off System 1 - ON Legislative District 02B Potential ABC 2 - N/A	Bridge Match ID (TIS) 0 Roadway O/U Key Route On Structure Route Sys 04 - CSAH Number 24 Roadway Name or Description CSAH 24 Level of Service 1 - MAINLINE Roadway Type 2 - 2-way traffic Control Section (TH Only) Reference Point 001+00.960 Detour Length 6.0 mi. Lanes ON 2 UNDER 0 ADT 490 YEAR 2008 HCA DT ADTT % Functional Class 06 - Rural - Minor Arterial	Userkey 97 Structurally Deficient N Functionally Obsolete N Sufficiency Rating 94.2 Routine Inspection Date 10/23/2014 Routine Inspection Frequency 24 Inspector Name Schroeder, Brian Status A - Open																				
		+ NBI CONDITION RATINGS +																				
		Deck 7 Unsound Deck % Superstructure 8 Substructure 7 Channel 8 Culvert N																				
		+ NBI APPRAISAL RATINGS +																				
		Structure Evaluation 6 Deck Geometry 6 Underclearances N Waterway Adequacy 8 Approach Alignment 8																				
		+ SAFETY FEATURES +																				
		Bridge Railing 0 - SUBSTANDARD GR Transition N - NOT REQUIRED Appr. Guardrail N - NOT REQUIRED GR Termini 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>Frac. Critical</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Underwater</td> <td></td> <td style="text-align: center;">60</td> <td style="text-align: center;">09/27/2016</td> </tr> <tr> <td>Pinned Asbly.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Spec. Feat.</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Y/N	Freq	Date	Frac. Critical				Underwater		60	09/27/2016	Pinned Asbly.				Spec. Feat.			
	Y/N	Freq	Date																			
Frac. Critical																						
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Spec. Feat.																						
		+ WATERWAY +																				
		Drainage Area (sq. mi.) Waterway Opening (sf.) 1812 Navigation Control 0 - No nav. control on Pier Protection 1 - Not required Nav. Clr. (ft.) Vert. 0.0 Horiz. 0.0 Nav. Vert. Lift Bridge Clear. (ft.) MN Scour Code I - LOW RISK Year																				
		+ CAPACITY RATINGS +																				
		Design Load 4 - H 20 Operating Rating 2 - HS TRUCK 26.2 Inventory Rating 2 - HS TRUCK 15.8 Posting VEH: SEMI: DBL: Rating Date 10/12/2009 Overweight Permit Codes A N - N/A B N - N/A C N - N/A																				
+ STRUCTURE +	+ RDWY DIMENSIONS +																					
Service On 1 - Highway Service Under 5 - Waterway Main Span Type 4 - Steel Continuous Main Span Design 01 - Beam Span Main Span Detail Appr. Span Type Appr. Span Design Appr. Span Detail Skew 55 LEFT Culvert Type Barrel Length Cantilever ID Number of Spans MAIN: 3 APPR: 0 TOTAL: Main Span Length 73.0 ft. Structure Length 194.6 ft. Deck Width (Out-to-Out) 33.0 ft. Deck Material 1 - Concrete Cast-in-Place Wear Surf Type 1 - Monolithic Concrete Wear Surf Install Year Wear Course/Fill Depth 0.00 ft. Deck Membrane 0 - None Deck Rebars 0 - None Deck Rebars Install Year Structure Area (Out-to-Out) 6422 sq. ft. Roadway Area (Curb-to-Curb) 5920 sq. ft. Sidewalk Width 50A. Lt 0.00 ft. 50B. Rt 0.00 ft. Curb Height Lt 0.00 ft. Rt 0.00 ft. Rail Type Lt 02 Rt 02	If Divided NB-EB SB-WB Roadway Width 30.40 ft. ft. Vertical Clearance ft. ft. Max. Vert. Clear. ft. ft. Horizontal Clear. ft. ft. Lateral Clearance ft. ft. Appr. Surface Width 26.0 ft. Bridge Roadway Width 30.4 ft. Median Width On Bridge ft.																					
		+ MISC. BRIDGE DATA +																				
		Structure Flared 0 - No flare Parallel Structure N - No parallel structure Field Conn. ID Abutment Foundation (Material/Type) 1 - CONC 3 - FTG PILE Pier Foundation (Material/Type) 1 - CONC 3 - FTG PILE Historic Status 5 - Not eligible																				
		+ PAINT +																				
		Year Painted Unsound Paint % Painted Area sq. ft. Primer Type Finish Type																				
		+ BRIDGE SIGNS +																				
		Posted Load 0 - Not Required Traffic 0 - Not Required Horizontal 1 - Object Markers Vertical N - Not Applicable																				

MINNESOTA BRIDGE INSPECTION REPORT

02/02/2017

BRIDGE 57502 CSAH 24 OVER RED LAKE RIVER

County: Pennington Location: 1.1 MI S OF JCT CSAH 6 Length: 194.6 ft.
 City: Route: 04 - CSAH 24 Ref. Pt.: 001+00.960 Deck Width: 33.0 ft.
 Township: 57007 - HIGH LANDING Control Section: Rdwy. Area/ Pct. Unsnd: 5920 sq. ft. / %
 Section: 28 Township: 153N Range: 40W Maint. Area: Paint Area/ Pct. Unsnd: sq. ft. / %
 Span Type: 4 - Steel Continuous 2 - Local Agency Bridge Nbr.: Culvert: N/A
 List: Stringer/Multi-beam or Girder Postings:
 NBI Deck: 7 Super: 8 Sub: 7 Chan: 8 Culv: N
 Open, Posted, Closed: A - Open
 MN Scour Code: 1 - LOW RISK

Appraisal Ratings - Approach: 8 Waterway: 8 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 94.2

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	09/27/2016	6422 SF	6294	0	128	0
		Migrated Values		6422 SF	6294	0	128	0
	Notes: A FEW HAIRLINE CRACKS AND MINOR LEACHING OUTSIDE OF OUTER BEAMS. NO CHG. (2010) Minor spalling NE corner by abutment. (2012) Concrete at top of beam broke at East beam and 3rd from East beam does not warrant structural analysis. No change (2012) No Chg (2014)							
	510 - Wearing Surfaces	Underwater	09/27/2016	5920 SF	5920	0	0	0
		Migrated Values		5920 SF	5920	0	0	0
	Notes: Top of Concrete Deck with Uncoated Rebar Notes: APPEAR TO BE IN GOOD CONDITION. (2010) No Chg (2014)							
107	Steel Open Girder/Beam	Underwater	09/27/2016	778 LF	778	0	0	0
		Migrated Values		778 LF	778	0	0	0
	Notes: NO CHG. (2010) Outside beams paint blistering in spot on top of bottom flange. (2014)							
	515 - Steel Protective Coating	Underwater	09/27/2016	999 SF	999	0	0	0
		Migrated Values		999 SF	999	0	0	0
	Notes: [2016] Migrator assumed quantity of 999 SF and estimated the condition states.							
205	Reinforced Concrete Column	Underwater	09/27/2016	2 EA	0	2	0	0
		Migrated Values		2 EA	0	2	0	0
	Notes: [2016] The concrete was typically smooth and sound with random minor areas of poor consolidation with up to 1/4 inch penetration on the faces of Piers 1 and 2.							
215	Reinforced Concrete Abutment	Underwater	09/27/2016	109 LF	109	0	0	0
		Migrated Values		109 LF	109	0	0	0
	Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:40 CS2:0 CS3:0 CS4:0). SOUTH ABUTMENT BETWEEN BEAMS 2 & 3 CRACK 0.030 THOUSAND VERT. (2010) No CHG (2012) No Chg (2014)							
	Wingwall notes: APPEARS TO BE IN GOOD CONDITION (2010) No Chg (2014)							
234	Reinforced Concrete Pier Cap	Underwater	09/27/2016	66 LF	66	0	0	0
		Migrated Values		66 LF	66	0	0	0
301	Pourable Joint Seal	Underwater	09/27/2016	180 LF	180	0	0	0
		Migrated Values		180 LF	180	0	0	0
	Notes: APPEAR TO BE IN GOOD CONDITION. (2010) No Chg (2014)							

BRIDGE 57502 CSAH 24 OVER RED LAKE 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	09/27/2016	16 EA	16	0	0	0
		Migrated Values		16 EA	16	0	0	0
	Notes: ALL BEARING APPEAR TO BE GOOD CONDITION (2010) No Chg (2014)							
330	Metal Bridge Railing	Underwater	09/27/2016	387 LF	387	0	0	0
		Migrated Values		387 LF	387	0	0	0
	Notes: GOOD CONDITION (2010)(2014)							
	515 - Steel Protective Coating	Underwater	09/27/2016	999 SF	999	0	0	0
		Migrated Values		999 SF	999	0	0	0
	Notes: [2016] Migrator assumed CS1 and a quantity of 999 SF.							
800	Critical Deficiencies or Safety Hazards	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: No critical structural deficiencies or serious safety hazards are present on this structure.							
810	Concrete Decks - Cracking & Sealing	Underwater	09/27/2016	0 LF	0	0	0	0
		Migrated Values		0 LF	0	0	0	0
	Notes: Minor CRACKING WITH INSIGNIFICANT SIZE. NO CHG. (2010) No CHG. (2012)No Chg (2014)							
822	Bituminous Approach Roadway	Underwater	09/27/2016	2 EA	2	0	0	0
		Migrated Values		2 EA	2	0	0	0
	Notes: SOUTH EDGE BIT. SPALLING OUT BY DECK. (2010) No change (2012) OTHER WISE APPROACHES APPEAR TO BE IN GOOD CONDITION. (2010) No change (2012) Both approaches settling and Bit. cracking (2014)							
855	Secondary Members (Superstructure)	Underwater	09/27/2016	24 EA	24	0	0	0
		Migrated Values		24 EA	24	0	0	0
883	Concrete Shear Cracking	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		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.							
885	Scour	Underwater	09/27/2016	1 EA	1	0	0	0
891	Other Bridge Signing	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: SE END MARKER - 2 BULLET HOLES MINOR LOST (2010) SW END MARKER - MISSING BOLT, SIGN GOOD. (2010) NW END MARKER - GOOD (2010) NE END MARKER - 1 BULLET HOLE (2010) No Change (2012) No Chg (2014)							
892	Slopes & Slope Protection	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: BOTH SLOPES MINOR TO MOD. SETTLING. (2010) No CHG (2012) SOUTH SLOPE EROSION INLET FROM SE DECK DRAIN (2010) No CHG (2012) No Chg (2014)							
894	Deck & Approach Drainage	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: MINOR SETTLING BEHIND WING WALLS (2010) No CHG (2012)No Chg (2014)							

BRIDGE 57502 CSAH 24 OVER RED LAKE RIVER

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
895	Sidewalk, Curb, & Median	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: NE END OF CURB 18"X10 1/2" CRACKED AWAY AT DECK END. (2010) No CHG (2012) NW end of curb chip out, NW railing end concrete post minor spalling. (2014)								
899	Miscellaneous Items	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: SOUTH SLOPE SMALL TREES (2010)No CHG (2012) NORTH SLOPE SMALL TREES (2010)No CHG (2012) Removed (2014)								
900	Protected Species	Underwater	09/27/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: Use this element to track the presence of protected species living on this structure.								

General Notes:

11-19-06 - NO CHANGES SINCE PREVIOUS INSPECTION. JJ NO CHG. (2010)
See Elements (2012) Added Underwater Bridge Inspection Report, Aug 27,2012.

58. Deck NBI:

36A. Brdg Railings NBI:

36B. Transitions NBI:

36C. Appr Guardrail NBI:

36D. Appr Guardrail
Terminal NBI:

59. Superstructure NBI:

60. Substructure NBI:

61. Channel NBI:

62. Culvert NBI:

71. Waterway Adeq NBI:

72. Appr Roadway
Alignment NBI:

Inspector's Signature

Reviewer's Signature

Pictures

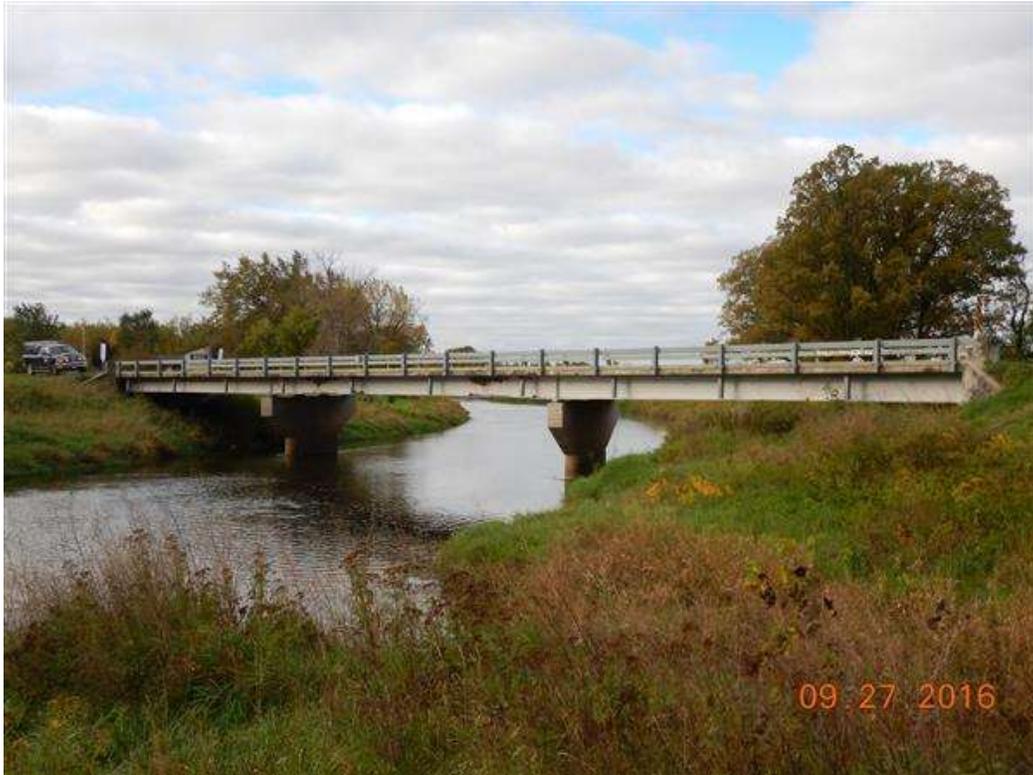


Photo 1 - Upstream Profile



Photo 2 - Downstream Profile

Pictures

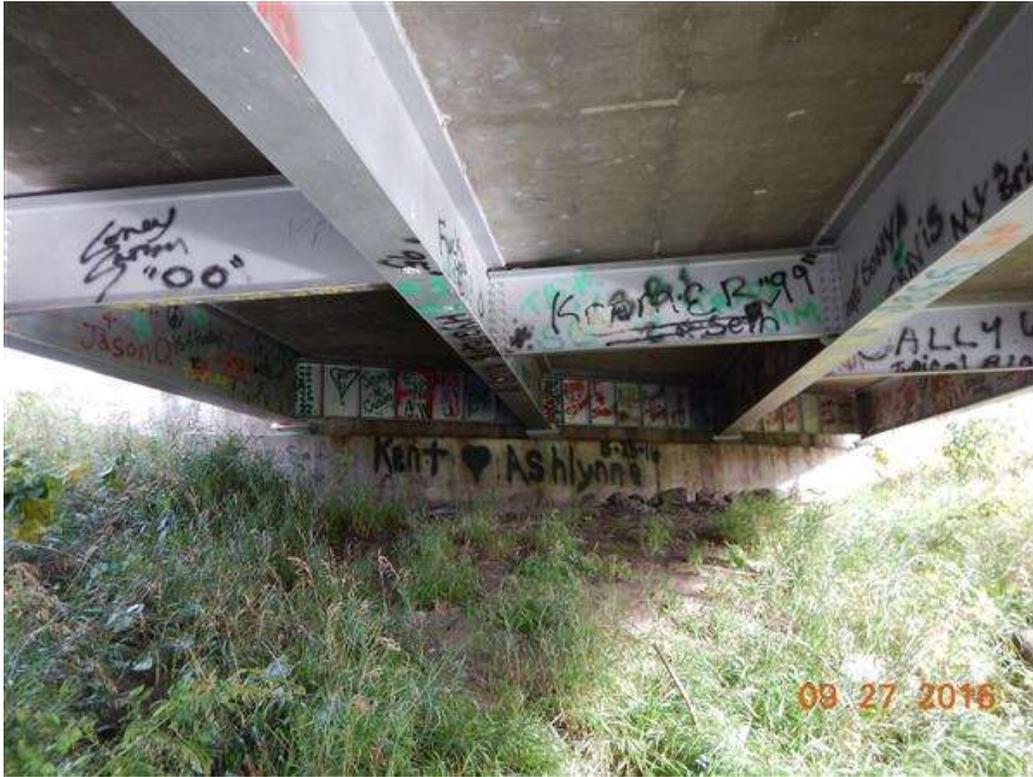


Photo 3 - North Abutment



Photo 4 - South Abutment

Pictures



Photo 5 - Pier 1 North Face



Photo 6 - Pier 2 North Face

Pictures



Photo 7 - Pier 1 South Face



Photo 8 - Pier 2 South Face

Pictures



Photo 9 - Typical Condition at Waterline

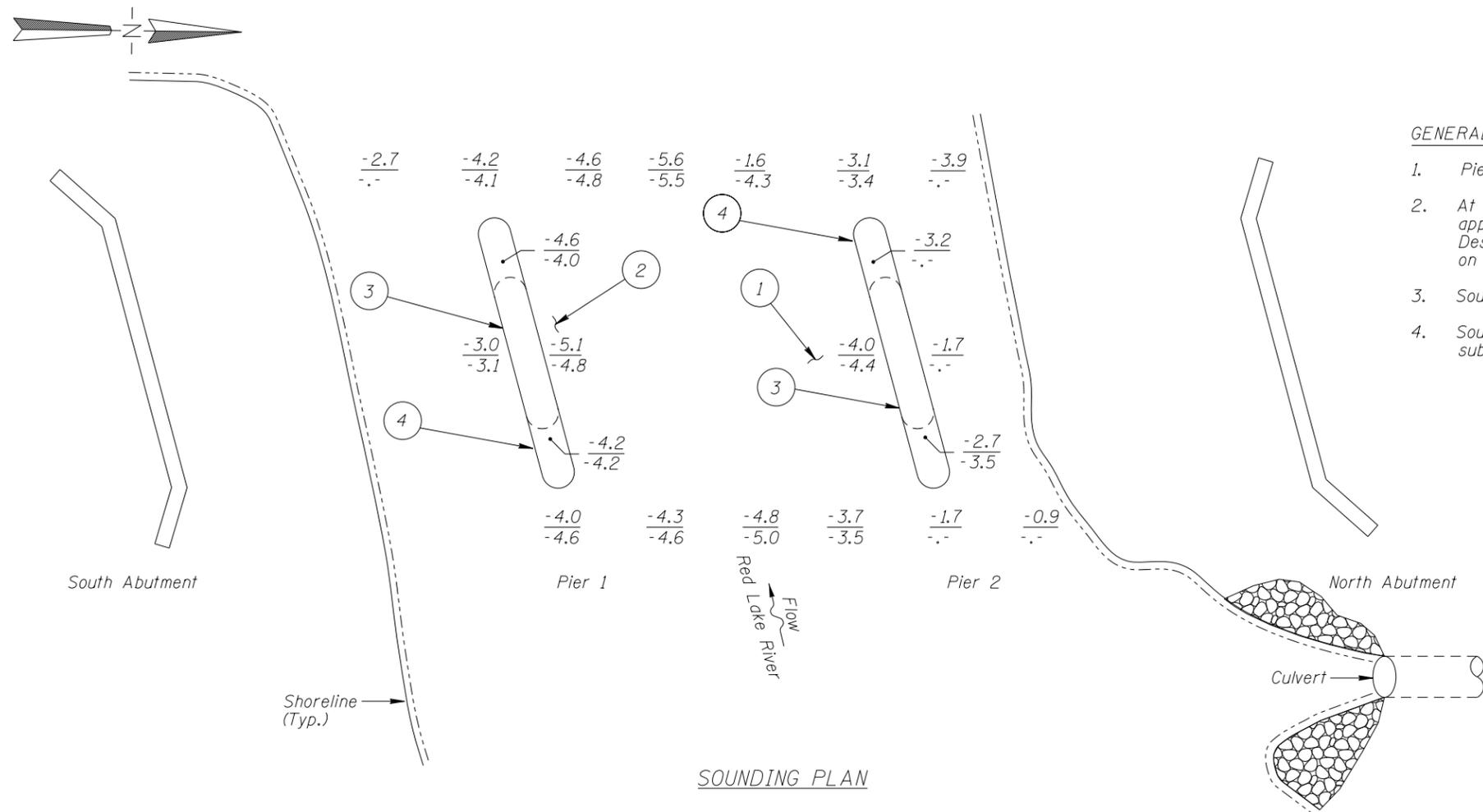


Photo 10 - Upstream Channel

Pictures



Photo 11 - Downstream Channel



GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on September 27, 2016 the waterline was located approximately 10.4 feet below the top of the pier cap on the downstream end of Pier 2. Design plans were not available, therefore a reference of 100.0 was assumed. Based on the assumed reference the waterline elevation was 89.6.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

- 1 The channel bottom material around Pier 2 consisted of silty sand with up to 12 inches maximum probe rod penetration.
- 2 The channel bottom material around Pier 1 consisted of sand with 3 inches of maximum probe rod penetration.
- 3 The concrete was typically smooth and sound with random minor areas of poor consolidation with up to 1/4 inch penetration on the faces of Piers 1 and 2.
- 4 Minor scaling was observed from the channel bottom to 2 feet above the waterline (bottom of hammerhead pier cap) with up to 1/4 inch maximum penetration on the upstream noses of Piers 1 and 2.

Legend

- 2.0 Sounding Depth (9/27/16)
- 5.2 Sounding Depth (8/27/12)
- .- Sounding Depth Not Previously Taken

 Riprap

Note:

All soundings based on 2016 waterline location.

TYPICAL END VIEW OF PIERS



**MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 57502
OVER THE RED LAKE RIVER
DISTRICT 2, PENNINGTON COUNTY

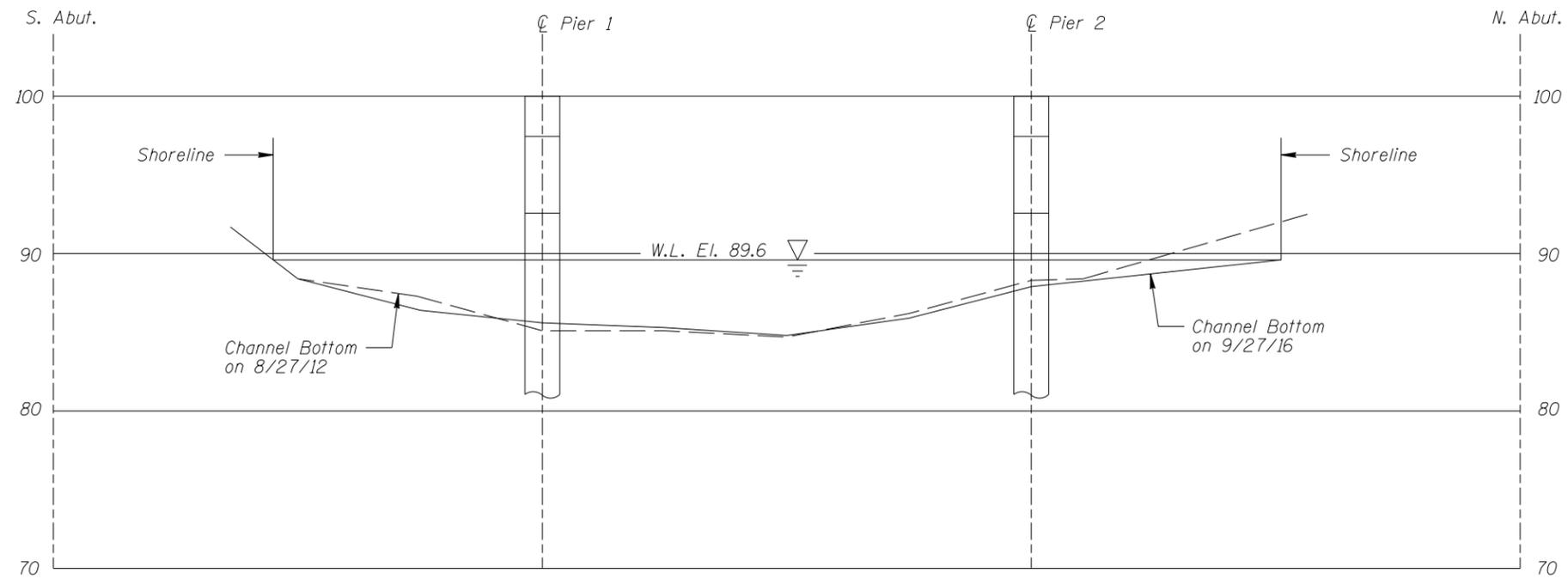
INSPECTION AND SOUNDING PLAN

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Suite 206
St. Paul, MN 55104
(651) 646-8502
www.collinsengr.com

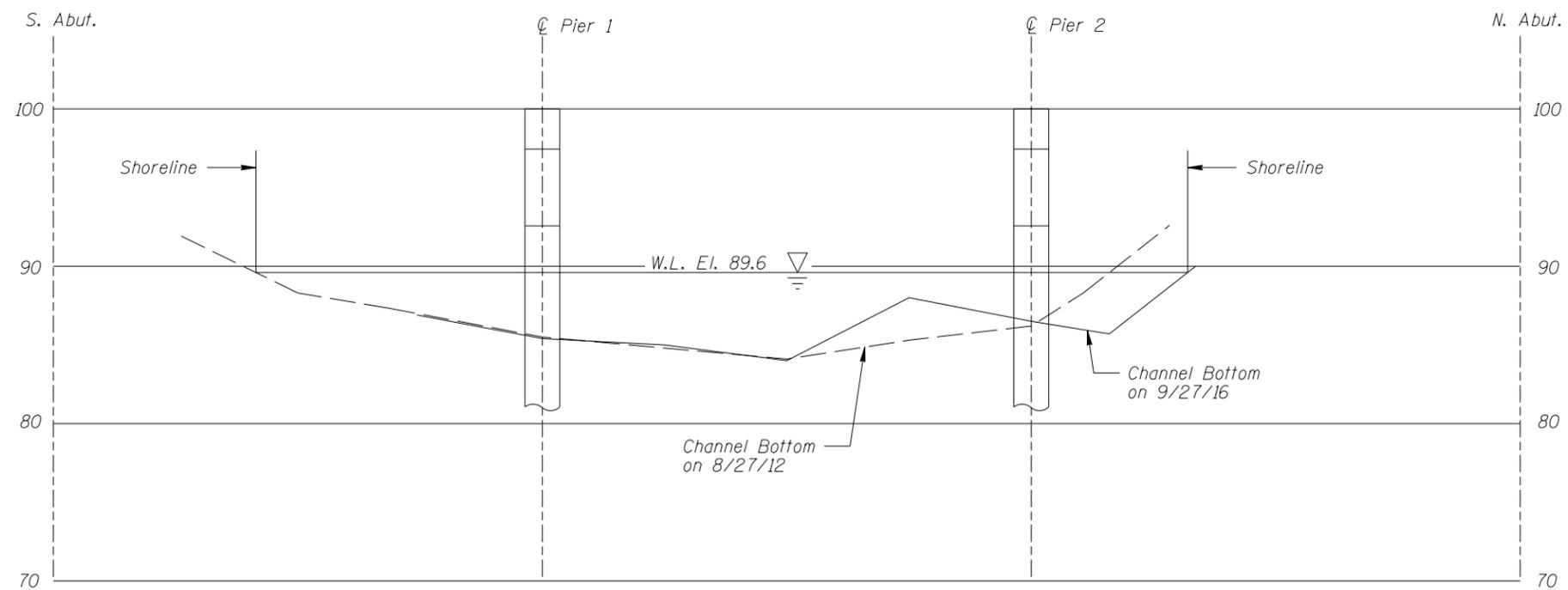
Drawn By: JJM
Checked By: BKS
Project: 63-9687

AYRES ASSOCIATES
3433 Oakwood Hills Parkway
Eau Claire, WI 54701
www.AyresAssociates.com

Date: SEPT, 2016
Scale: NTS
Figure No.: 1



UPSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"



DOWNSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 57502 OVER THE RED LAKE RIVER DISTRICT 2, PENNINGTON COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: JJM	AYRES ASSOCIATES <small>3433 Oakwood Hills Parkway Eau Claire, WI 54701 www.AyresAssociates.com</small>	Date: SEPT, 2016
Checked By: BKS		Scale: NTS (U.O.N.)
Project: 63-9687		Figure No.: 2

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