

# 2016 UNDERWATER BRIDGE INSPECTION REPORT



## BRIDGE # 7164 CSAH 5 over N FK CROW RIVER

DISTRICT: District 3

COUNTY: Wright

CITY/TOWNSHIP: MIDDLEVILLE

STATE: Minnesota

Date of Inspection: 05/27/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Owens, Garrett

Report Written By: Garrett Owens

Report Reviewed By:

Final Report Date:



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## UNDERWATER INSPECTION

### REPORT SUMMARY

The substructure units inspected at Bridge No. 7164, Piers 1, 2, 3 and 4, were found to be generally in satisfactory condition with minor to moderate deterioration. The timber pilings displayed moderate weathering and minor decay. Timber debris was found at the south face of Piers 2 and 3.

### INSPECTION FINDINGS

(A) The bottom of the channel, at Piers 2 and 3, was found to be sandy organic material with up to 12 inches of probe rod penetration.

(B) The bottom at Piers 1 and 4 was made up of organic material with up to 12 inches of probe rod penetration.

(C) Light timber debris was found along the south face of both Piers 2 and 3.

### 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 #: 7164  
Feature Intersected: N FK CROW RIVER  
Facility Carried: CSAH 5  
District: District 3  
County: 086 - Wright  
Bridge Description:

The superstructure consisted of a 5 span timber beam bridge. The deck was made of timber with a bituminous overlay. The substructure consisted of 4 piers with six, 12 inch timber piles and 7 timber piles at each abutment.

### 2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt R. Lovelace, P.E.  
Inspection Diver: Barritt R. Lovelace, P.E.  
Date of Underwater Inspection: 05/27/2016  
Weather Conditions: Cloudy/Rainy, 65° F  
Underwater Visibility (feet): 1.0  
Waterway Velocity (ft/sec): 2.5

### 3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Piers 1 – 4  
General Shape:  
The Piers consist of 12 inch timber piles with timber crossbracing.

Maximum Water Depth at Substructure(s) Inspected (feet): 8.5

### 4. WATERLINE DATUM

Water Level Reference: Bottom of pier cap at downstream end of Pier 2 with an elevation of 1063.0 feet from plans dated 1956.  
Waterline Elevation (feet): 1053.7  
Description: The waterline was approximately 9.3 feet below reference.

### 5. NBIS CODING INFORMATION

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

Item 60: Substructure: Code: 6  
Item 61: Channel and Channel Protection: Code: 6  
Item 62: Culvert: Code:

Item 92B: Underwater Inspection: Code: Y 48 05/2016

Item 113: Scour Critical Bridge: Code: K

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
228	Timber Piling	38	EA		17	21	
885	Scour	1	EA	1			

## **UNDERWATER INSPECTION**

### INSPECTION PROCEDURES

The routine underwater inspection of Bridge 7164 (County Road 5 over the North Fork of the Crow River) was completed on May 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 four timber pile bent piers. According to the bridge inventory or design drawings, Piers 1-4 were founded on 12 inch timber piles. 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 a maximum of 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: 7164

CSAH 5 over N FK CROW RIVER

Date: 08/31/2016

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
<b>Agency Br. No.</b> Crew <b>District</b> 03 <b>Maint. Area</b> <b>County</b> 086 - Wright <b>City</b> <b>Township</b> 86012 - MIDDLEVILLE <b>Desc. Loc.</b> 1.7 MI NW OF JCT CR125 <b>Sect., Twp., Range</b> 8 - 119N - 27W <b>Latitude</b> 45 ° 7 ' 35.04 " <b>Longitude</b> 94 ° 6 ' 52.21 " <b>Custodian</b> 02 - County Highway Agency <b>Owner</b> 02 - County Highway Agency <b>BMU Agreement</b> <b>Year Built</b> 1956 <b>MN Year Reconstructed</b> <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> 0 - OFF <b>Legislative District</b> 18B <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> 5 <b>Roadway Name or Description</b> CSAH 5 <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> 011+00.200 <b>Detour Length</b> 1.0 mi. <b>Lanes</b> <b>ON</b> 2 <b>UNDER</b> 0 <b>ADT</b> 840 <b>YEAR</b> 2008 <b>HCA DT</b> <b>ADTT</b> % <b>Functional Class</b> 08 - Rural - Minor Collector	<b>Userkey</b> 126 <b>Structurally Deficient</b> N <b>Functionally Obsolete</b> N <b>Sufficiency Rating</b> 55.0 <b>Routine Inspection Date</b> 10/13/2015 <b>Routine Inspection Frequency</b> 24 <b>Inspector Name</b> Owens, Garrett <b>Status</b> P - Posted for Load																				
	<b>+ RDWY DIMENSIONS +</b>	<b>+ NBI CONDITION RATINGS +</b>																				
	<b>If Divided</b> <b>NB-EB</b> <b>SB-WB</b> <b>Roadway Width</b> 24.00 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> 24.0 ft. <b>Median Width On Bridge</b> ft.	<b>Deck</b> 5 <b>Unsound Deck %</b> <b>Superstructure</b> 7 <b>Substructure</b> 5 <b>Channel</b> 6 <b>Culvert</b> N																				
<b>+ STRUCTURE +</b>	<b>+ MISC. BRIDGE DATA +</b>	<b>+ NBI APPRAISAL RATINGS +</b>																				
<b>Service On</b> 1 - Highway <b>Service Under</b> 5 - Waterway <b>Main Span Type</b> 7 - Timber <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: 5 APPR: 0 TOTAL:</b> <b>Main Span Length</b> 25.0 ft. <b>Structure Length</b> 127.0 ft. <b>Deck Width (Out-to-Out)</b> 26.0 ft. <b>Deck Material</b> 8 - Wood or Timber <b>Wear Surf Type</b> 6 - Bituminous <b>Wear Surf Install Year</b> <b>Wear Course/Fill Depth</b> 0.66 ft. <b>Deck Membrane</b> 0 - None <b>Deck Rebars</b> N - Not Applicable (no deck) <b>Deck Rebars Install Year</b> <b>Structure Area (Out-to-Out)</b> 3302 sq. ft. <b>Roadway Area (Curb-to-Curb)</b> 3046 sq. ft. <b>Sidewalk Width</b> <b>50A. Lt</b> 0.00 ft. <b>50B. Rt</b> 0.00 ft. <b>Curb Height</b> <b>Lt</b> 0.67 ft. <b>Rt</b> 0.67 ft. <b>Rail Type</b> <b>Lt</b> 37 <b>Rt</b> 37	<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> 2 - TIMBER 4 - PILE BENT <b>Pier Foundation (Material/Type)</b> 2 - TIMBER 4 - PILE BENT  <b>Historic Status</b> 5 - Not eligible	<b>Structure Evaluation</b> 5 <b>Deck Geometry</b> 4 <b>Underclearances</b> N <b>Waterway Adequacy</b> 6 <b>Approach Alignment</b> 8																				
	<b>+ PAINT +</b>	<b>+ SAFETY FEATURES +</b>																				
	<b>Year Painted</b> 1977 <b>Unsound Paint %</b> <b>Painted Area</b> sq. ft. <b>Primer Type</b> <b>Finish Type</b>	<b>Bridge Railing</b> 0 - SUBSTANDARD <b>GR Transition</b> 0 - SUBSTANDARD <b>Appr. Guardrail</b> 0 - SUBSTANDARD <b>GR Termini</b> 0 - SUBSTANDARD																				
	<b>+ BRIDGE SIGNS +</b>	<b>+ IN DEPTH INSP. +</b>																				
	<b>Posted Load</b> 2 - Vehicle & Semi (Type R12-5) <b>Traffic</b> 0 - Not Required <b>Horizontal</b> 1 - Object Markers <b>Vertical</b> N - Not Applicable	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 30%; text-align: center;">Y/N</th> <th style="width: 20%; text-align: center;">Freq</th> <th style="width: 20%; 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></td> <td></td> <td style="text-align: right;">05/27/2016</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>			05/27/2016	<b>Pinned Asbly.</b>				<b>Spec. Feat.</b>			
	Y/N	Freq	Date																			
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<b>Pinned Asbly.</b>																						
<b>Spec. Feat.</b>																						
		<b>+ WATERWAY +</b>																				
		<b>Drainage Area (sq. mi.)</b> <b>Waterway Opening (sf.)</b> 1694 <b>Navigation Control</b> 0 - No nav. control on <b>Pier Protection</b> ! <b>Nav. Clr. (ft.)</b> <b>Vert.</b> 0.0 <b>Horiz.</b> 0.0 <b>Nav. Vert. Lift Bridge Clear. (ft.)</b> <b>MN Scour Code</b> K - LIMITED <b>Year</b> 2006																				
		<b>+ CAPACITY RATINGS +</b>																				
		<b>Design Load</b> 2 - H 15 <b>Operating Rating</b> 2 - HS TRUCK 19.7 <b>Inventory Rating</b> 2 - HS TRUCK 12.7 <b>Posting VEH:</b> 24 <b>SEMI:</b> 40 <b>DBL:</b> 40 <b>Rating Date</b> 07/26/2011  <b>Overweight Permit Codes</b> <b>A</b> N - N/A <b>B</b> N - N/A <b>C</b> N - N/A																				

# MINNESOTA BRIDGE INSPECTION REPORT

09/26/2016

Inspector: CO Bridge

## BRIDGE 7164 CSAH 5 OVER N FK CROW RIVER

County: Wright	Location: 1.7 MI NW OF JCT CR125	Length: 127.0 ft.
City:	Route: 04 - CSAH 5 Ref. Pt.: 011+00.200	Deck Width: 26.0 ft.
Township: 86012 - MIDDLEVILLE	Control Section:	Rdwy. Area/ Pct. Unsnd: 3046 sq. ft. / %
Section: 8 Township: 119N Range: 27W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 7 - Wood or Timber 2 -	Local Agency Bridge Nbr.:	Culvert: N/A
List: Stringer/Multi-beam or Girder		Postings: 24 40 40

NBI Deck: 5 Super: 7 Sub: 5 Chan: 6 Culv: N  
 Open, Posted, Closed: P - Posted for Load  
 MN Scour Code: K - LIMITED RISK

Appraisal Ratings - Approach: 8	Waterway: 6	Unofficial Structurally Deficient	N
Required Bridge Signs - Load Posting: 2 - Vehicle & Semi (Type R12-5)	Traffic: 0 - Not Required	Unofficial Functionally Obsolete	N
Horizontal: 1 - Object Markers	Vertical: N - Not Applicable	Unofficial Sufficiency Rating	55.0

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
31	Timber Deck	Underwater	08/31/2016	3302 SF	3302	0	0	0
		Migrated Values		3302 SF	3302	0	0	0
Notes: [2016] Migrator assumed CS1.								
	510 - Wearing Surfaces	Underwater	08/31/2016	3046 SF	2985	0	61	0
		Migrated Values		3046 SF	2985	0	61	0
Notes: [8-5-14] Bit. overlay has several transverse cracks, and areas of patching. [10-13-15] Bit. overlay has several transverse cracks, and areas of patching.								
111	Timber Open Girder/Beam	Underwater	08/31/2016	1526 LF	1500	26	0	0
		Migrated Values		1526 LF	1500	26	0	0
Notes: [8-5-14] [10-13-15] beams are in overall good condition with isolated deterioration.								
216	Timber Abutment	Underwater	08/31/2016	92 LF	52	40	0	0
		Migrated Values		92 LF	52	40	0	0
Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:0 CS2:40 CS3:0 CS4:0). [8-5-14] [10-13-15]  Wingwall notes: [8-5-14] [10-13-15] wing walls are substantially buried and can not be fully viewed.								
228	Timber Pile	Underwater	08/31/2016	38 EA	0	17	15	6
		Migrated Values		38 EA	0	17	15	6
Notes: [10-13-15] south abutment piling; #1,2,6 in cs3. #3-5 & 7 in cs2. Pier #1 piling; #1 & 3-6 in cs2. #2 in cs3. pier #2 piling; #1 in cs2. #2-6 in cs3. pier #3 piling; #1,2,4,6 in cs4. #3,5 in cs3. pier #4 piling; #1,4 in cs4. #2,3,5,6 in cs3. north abutment; #1-7 in cs2								
235	Timber Pier Cap	Underwater	08/31/2016	157 LF	157	0	0	0
		Migrated Values		157 LF	157	0	0	0
Notes: [8-5-14] [10-13-15]								

**BRIDGE 7164 CSAH 5 OVER N FK CROW 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	08/31/2016	253 LF	0	253	0	0
		Migrated Values		253 LF	0	253	0	0
Notes: [2016] Migrator assumed metal rail/timber post combination type rail. [8-5-14] [10-13-15] integral timber curb is in poor condition. Some anchorages are coming loose.								
515 -	Steel Protective Coating	Underwater	08/31/2016	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.								
332	Timber Bridge Railing	Underwater	08/31/2016	42 LF	0	42	0	0
		Migrated Values		42 LF	0	42	0	0
Notes: [2016] Migrator assumed metal rail/timber post combination type rail. Post spacing assumed to be 5LF, each post 1LF. [8-5-14] [10-13-15] integral timber curb is in poor condition. Some anchorages are coming loose.								
800	Critical Deficiencies or Safety Hazards	Underwater	08/31/2016	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.								
822	Bituminous Approach Roadway	Underwater	08/31/2016	2 EA	1	1	0	0
		Migrated Values		2 EA	1	1	0	0
Notes: [10-13-15] North approach has sight dip coming off of deck.								
855	Secondary Members (Superstructure)	Underwater	08/31/2016	16 EA	12	0	0	4
		Migrated Values		16 EA	12	0	0	4
Notes: [8-5-14]* diaphragm tipped out of position (second span from south, 4th diaphragm from east). * north span has broken rail blocking on east side. * diaphragm tipped out of position (second diaphragm from west) (third diaphragm is missing)								
885	Scour	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [2006] K - Limited risk. Monitoring required. [8-5-14]								
890	Load Posting or Vertical Clearance Signing	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [2016] Structure requires a vertical clearance sign or load posting sign.								
891	Other Bridge Signing	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [10-13-15]								
892	Slopes & Slope Protection	Underwater	08/31/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
Notes: slope protection needs repair. Riprap displaced. (11-8-2010) [8-5-14] South slope is in need of repair. The south slope has slumped out of shape. Up and down stream on south side needs more protection. [10-13-15] both slopes have rip rap displaced and can use maintenance.								
893	Guardrail	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [10-13-15]								

**BRIDGE 7164 CSAH 5 OVER N FK CROW RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
894	Deck & Approach Drainage	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [10-13-15]								
899	Miscellaneous Items	Underwater	08/31/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [10-13-15] conduit attached to east railing.								
900	Protected Species	Underwater	08/31/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
Notes: [2016] Migrator determined the presence of swallows on this structure based on data in the inventory or comments in the general/miscellaneous notes.								

General Notes: Cracks & Splits in all timer elements. Most severe cracking located in pier columns. Drawing & pictures of locations in bridge file. Inspector: Hans A. Engstrom PONTIS inspection comments - PONTIS inspection comments - Inspector William S. Augustin Certification BSI 1011

Insp. Mike McCann BSI# 96130 and Nick Carlson. (2-4-2009)

Insp. Mike McCann BSI# 96130 and Nick Carlson. (11-8-2010)

assistant inspector Brian Severson.[10-13-15]

58. Deck NBI: [8-5-14]

[10-13-15] Deck has several transverse and longitudinal cracks with areas of patching.

36A. Brdg Railings NBI: [8-5-14] Wood posts & steel beam rail.

[10-13-15] Wood posts & steel beam rail.

36B. Transitions NBI: [8-5-14]

[10-13-15] substandard railing connection, post spacing.

36C. Appr Guardrail NBI: [8-5-14]

[10-13-15] Not long enough.

36D. Appr Guardrail Terminal NBI: [8-5-14]

[10-13-15] turn down terminals.

59. Superstructure NBI: [8-5-14]

[10-13-15]

60. Substructure NBI: [8-5-14]

[10-13-15] several piling with extensive weathering and splitting.

61. Channel NBI: [8-5-14] South slope is slumping & protection needs repair.

[10-13-15] Both slopes have rip rap displaced and need maintenance.

62. Culvert NBI: [8-5-14]

[10-13-15]

71. Waterway Adeq NBI: [8-5-14]

[10-13-15]

72. Appr Roadway Alignment NBI: [8-5-14]

[10-13-15]

Inventory Notes:

Inspector's Signature

Reviewer's Signature

# Pictures



Photo 1 - East Elevation, Looking Northwest



Photo 2 - West Elevation, Looking Southeast

## Pictures



Photo 3 - View of North Shoreline and Pier 4, Looking Southeast



Photo 4 - View of Pier 3, Looking South

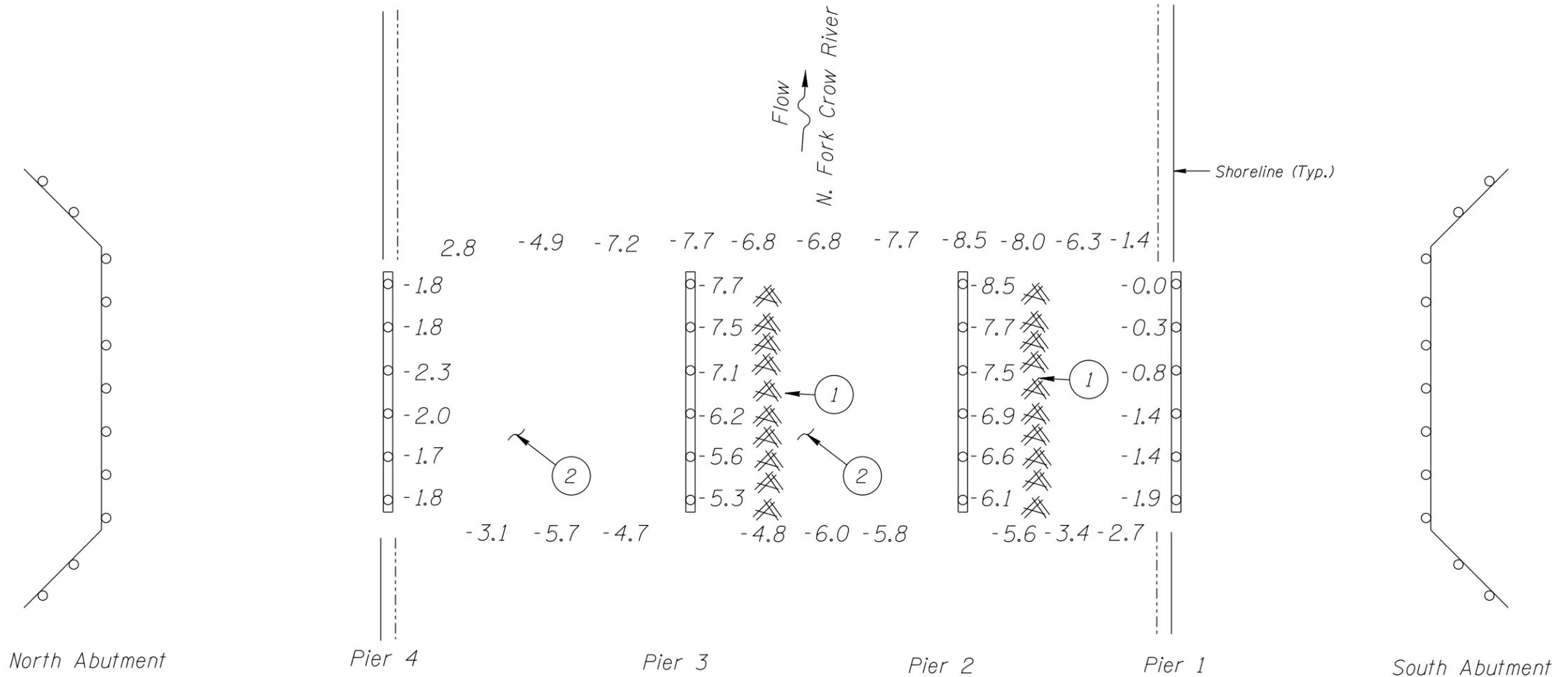
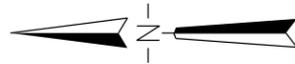
## Pictures



Photo 5 - View of Pier 2, Looking North



Photo 6 - View of South Shore and Pier 1, Looking North



TYPICAL END VIEW  
OF BENTS

GENERAL NOTES:

1. Timber Piers 1-4 were inspected underwater.
2. At the time of inspection on May 27, 2016, the waterline was located approximately 9.3 feet below the bottom of the pier cap on the downstream end of Pier 2. This corresponds to a waterline elevation of 1054.7 feet, based on a reference elevation of 1064.0 feet at the bottom of the pier cap of Pier 2.
3. Soundings were taken at 1/4 points of the spans and at each pile.
4. Soundings indicate the water depth at the time of inspection and are measured in feet.
5. The first underwater inspection was performed in 2016, and no previous sounding information is available.

INSPECTION NOTES:

- ① Light timber debris is present along the south face of Pier 2 and Pier 3.
- ② The bottom consists of sand and organic material with up to 12 inches of penetration.

Legend

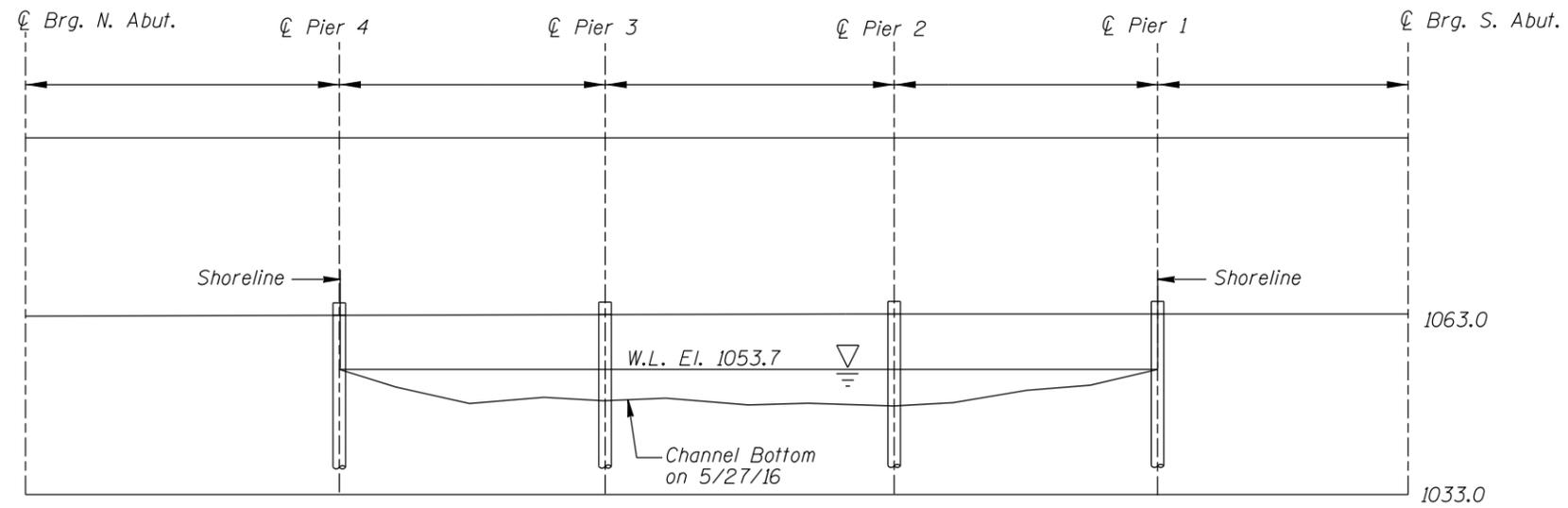
- 2.0 Sounding Depth (5/27/16)
- ⊗ Timber Debris
- Timber Pile (Typ.)

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

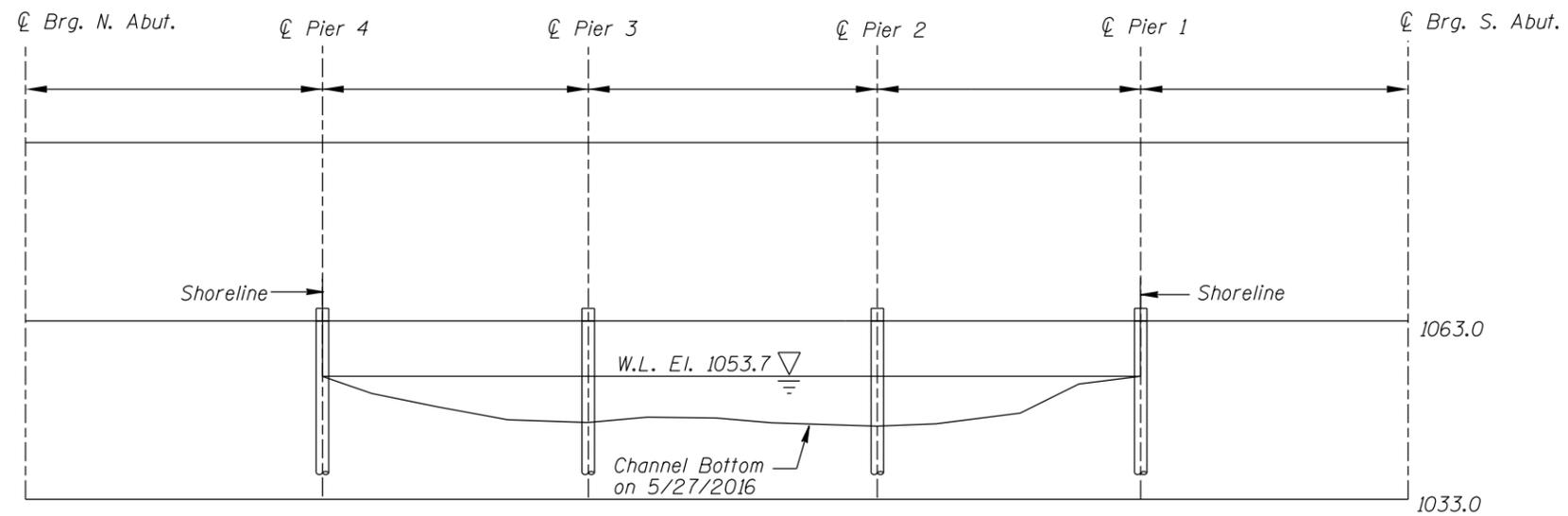
STRUCTURE NO. 7164  
OVER THE N. FORK CROW RIVER  
DISTRICT 3, WRIGHT COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: LBH	<b>COLLINS ENGINEERS</b>	1599 Selby Avenue Suite 206 St. Paul, MN 55104 (651) 646-8502 www.collinsengr.com	Date: May 2016
Checked By: BRL			Scale: NTS
Project: 63-9687			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. 7164 OVER THE N. FORK CROW RIVER DISTRICT 3, WRIGHT COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: LBH	<b>COLLINS ENGINEERS</b> <small>1599 Selby Avenue Suite 206 St. Paul, MN 55104 (651) 646-8502 www.collinsengr.com</small>	Date: May 2016
Checked By: BRL		Scale: 1"=30'
Project: 63-9687		Figure No.: 2