

# 2016 UNDERWATER BRIDGE INSPECTION REPORT



## BRIDGE # 93290 CR 336 over PRAIRIE RIVER

DISTRICT: District 1

COUNTY: Itasca

CITY/TOWNSHIP: BALSAM

STATE: Minnesota

Date of Inspection: 06/01/2016

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. 93290, Pier 1 and 2, were found to be in good to satisfactory condition below water with no defects of structural significance. The channel bottom was firm silty sand with scattered 2 foot diameter and smaller rock. All of the timber piles and cross bracing were in good to satisfactory condition with only minor deterioration.

### INSPECTION FINDINGS

(A) The channel bottom material consisted of firm silty sand with scattered 2-foot-diameter and smaller rock allowing up to 3 inches of probe rod penetration. (B) The lower diagonal cross brace at Pile 1 of Pier 2 had a ½ inch wide split, 2½ feet long and runs through the fastener creating an ineffective connection. (C) Pile 3 of Pier 1 had a softer outer surface from 2 feet above the waterline to 1 foot below water indicating minor decay. (D) The majority of the timber piling was in satisfactory condition with random checking up to 1/8 inch wide. All of the timber cross bracing was in good condition and all of the connections were secure unless otherwise noted. (E) The east shoreline exhibited bank erosion with vertical cuts up to 6 feet tall. The west shoreline also had bank erosion with vertical cuts up to 3 feet tall predominately on the downstream side.

### RECOMMENDATIONS

(A) Repair/reinforce the cross brace connection at Pile 1 of Pier 2 during routine maintenance. (B) 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 #: 93290  
Feature Intersected: PRAIRIE RIVER  
Facility Carried: CR 336  
District: District 1  
County: 031 - Itasca  
Bridge Description:

The bridge superstructure consists of three spans of timber deck. The superstructure is supported by two timber piers and two timber pile abutments. The substructure units are designated Piers 1 and 2 with Pier 1 being the easternmost pier and the abutments are designated south and north abutments.

### 2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg  
Inspection Diver: Daniel G. Stromberg  
Date of Underwater Inspection: 06/01/2016  
Weather Conditions: Cloudy, 53°F  
Underwater Visibility (feet): 1.0 foot  
Waterway Velocity (ft/sec): 0.5 ft/sec

### 3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Piers 1 and 2  
General Shape:

Both piers consist of a single row of five timber piles under a common cap with timber cross bracing between the piles.

Maximum Water Depth at Substructure(s) Inspected (feet): 7.5 feet

### 4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream end of Pier 1.  
Waterline Elevation (feet): 91.5 feet  
Description: The waterline was located approximately 8.5 feet below the 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: 5  
Item 62: Culvert: Code:  
Item 92B: Underwater Inspection: Code: Y 48 06/2016

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	10	EA	10			
856	Secondary Members - Substructure	1	EA	1			
885	Scour	1	EA	1			

## UNDERWATER INSPECTION

### INSPECTION PROCEDURES

The routine underwater inspection of Bridge 93290 (CR 336 over Prairie River) was completed on June 1, 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. The inspection utilized commercial dive equipment and techniques (SSA and/or SCUBA) 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 timber piers. According to the bridge inventory, Piers 1 and 2 are founded on 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 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: 93290

CR 336 over PRAIRIE RIVER

Date: 08/04/2016

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
<b>Agency Br. No.</b> 1 <b>Crew</b> <b>District</b> 01 <b>Maint. Area</b> <b>County</b> 031 - Itasca <b>City</b> <b>Township</b> 31004 - BALSAM <b>Desc. Loc.</b> 1.1 MI W OF JCT CSAH 8 <b>Sect., Twp., Range</b> 36 - 058N - 24W <b>Latitude</b> 47 ° 27 ' 43.60 " <b>Longitude</b> 93 ° 20 ' 36.87 " <b>Custodian</b> 02 - County Highway Agency <b>Owner</b> 02 - County Highway Agency <b>BMU Agreement</b> <b>Year Built</b> 1977 <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> 1/1/1977 <b>On - Off System</b> 0 - OFF <b>Legislative District</b> 03A <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> 07 - CNTY <b>Number</b> 336 <b>Roadway Name or Description</b> CNTY 336 <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> 007+00.510 <b>Detour Length</b> 2.0      mi. <b>Lanes</b> <b>ON</b> 2 <b>UNDER</b> 0 <b>ADT</b> 235 <b>YEAR</b> 2005 <b>HCA DT</b> <b>ADTT</b> % <b>Functional Class</b> 09 - Rural - Local	<b>Userkey</b> 71 <b>Structurally Deficient</b> N <b>Functionally Obsolete</b> N <b>Sufficiency Rating</b> 98.0 <b>Routine Inspection Date</b> 10/14/2015 <b>Routine Inspection Frequency</b> 24 <b>Inspector Name</b> Stromberg, Dan <b>Status</b> P - Posted for Load																				
		<b>+ NBI      CONDITION      RATINGS +</b>																				
		<b>Deck</b> 7 <b>Unsound Deck %</b> <b>Superstructure</b> 7 <b>Substructure</b> 6 <b>Channel</b> 5 <b>Culvert</b> N																				
	<b>+ RDWY      DIMENSIONS +</b>	<b>+ NBI      APPRAISAL      RATINGS +</b>																				
	<b>If Divided</b> <b>NB-EB</b> <b>SB-WB</b> <b>Roadway Width</b> 32.20 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> 32.0 ft. <b>Bridge Roadway Width</b> 32.2 ft. <b>Median Width On Bridge</b> ft.	<b>Structure Evaluation</b> 6 <b>Deck Geometry</b> 7 <b>Underclearances</b> N <b>Waterway Adequacy</b> 6 <b>Approach Alignment</b> 4																				
<b>+ STRUCTURE +</b>	<b>+ MISC.      BRIDGE      DATA +</b>	<b>+ SAFETY      FEATURES +</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> 09 - Slab 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> 26.0 ft. <b>Structure Length</b> 78.0 ft. <b>Deck Width (Out-to-Out)</b> 33.5 ft. <b>Deck Material</b> 8 - Wood or Timber <b>Wear Surf Type</b> 8 - Gravel <b>Wear Surf Install Year</b> <b>Wear Course/Fill Depth</b> 0.25 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> 2613 sq. ft. <b>Roadway Area (Curb-to-Curb)</b> 2508 sq. ft. <b>Sidewalk Width</b> 50A. Lt 0.00 ft.      50B. Rt 0.00 ft. <b>Curb Height</b> Lt 0.67 ft.      Rt 0.67 ft. <b>Rail Type</b> Lt 37      Rt 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>Bridge Railing</b> 0 - SUBSTANDARD <b>GR Transition</b> N - NOT REQUIRED <b>Appr. Guardrail</b> N - NOT REQUIRED <b>GR Termini</b> N - NOT REQUIRED																				
	<b>+ PAINT +</b>	<b>+ IN      DEPTH      INSP. +</b>																				
	<b>Year Painted</b> <b>Unsound Paint %</b> <b>Painted Area</b> sq. ft. <b>Primer Type</b> <b>Finish Type</b>	<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: 10%; 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;">06/01/2016</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>			06/01/2016	<b>Pinned Asbly.</b>				<b>Spec. Feat.</b>			
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<b>Spec. Feat.</b>																						
	<b>+ BRIDGE      SIGNS +</b>	<b>+ WATERWAY +</b>																				
	<b>Posted Load</b> 1 - Vehicle Only (Type R12-1A) <b>Traffic</b> 0 - Not Required <b>Horizontal</b> 1 - Object Markers <b>Vertical</b> N - Not Applicable	<b>Drainage Area (sq. mi.)</b> <b>Waterway Opening (sf.)</b> 812 <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> 2014																				
		<b>+ CAPACITY      RATINGS +</b>																				
		<b>Design Load</b> 5 - HS 20 <b>Operating Rating</b> 2 - HS TRUCK      28.6 <b>Inventory Rating</b> 2 - HS TRUCK      20.2 <b>Posting VEH:</b> 36 <b>SEMI:</b> <b>DBL:</b> <b>Rating Date</b> 05/14/2013 <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

08/17/2016

Inspector: CO Bridge

## BRIDGE 93290 CR 336 OVER PRAIRIE RIVER

County: Itasca	Location: 1.1 MI W OF JCT CSAH 8	Length: 78.0 ft.
City:	Route: 07 - CNTY 336 Ref. Pt.: 007+00.510	Deck Width: 33.5 ft.
Township: 31004 - BALSAM	Control Section:	Rdwy. Area/ Pct. Unsnd: 2508 sq. ft. / %
Section: 36 Township: 058N Range: 24W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 7 - Wood or Timber 1 - Slab	Local Agency Bridge Nbr.: 1	Culvert: N/A
List:		Postings: 36

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

Appraisal Ratings - Approach: 4	Waterway: 6	Unofficial Structurally Deficient	N
Required Bridge Signs - Load Posting: 1 - Vehicle Only (Type R12-1A)	Traffic: 0 - Not Required	Unofficial Functionally Obsolete	N
Horizontal: 1 - Object Markers	Vertical: N - Not Applicable	Unofficial Sufficiency Rating	98.0

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
54	Timber Slab	Underwater	08/04/2016	2613 SF	2613	0	0	0
		Migrated Values		2613 SF	2613	0	0	0
Notes: [2016] Migrator assumed CS1.								
510 -	Wearing Surfaces	Underwater	08/04/2016	2508 SF	2458	0	50	0
		Migrated Values		2508 SF	2458	0	50	0
Notes: [2015] No changes since last notes. [2009] Some bituminous cracks, put on list for resurfacing. [2013] Timber Slab looks good, newer Bit with cracks over piers.								
156	Timber Floor Beam	Underwater	08/04/2016	99 LF	99	0	0	0
		Migrated Values		99 LF	99	0	0	0
Notes: [2011-2015] No real issues, couple nuts look to need tightening, if they can be.								
216	Timber Abutment	Underwater	08/04/2016	106 LF	0	106	0	0
		Migrated Values		106 LF	0	106	0	0
Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:0 CS2:40 CS3:0 CS4:0). [2011-2015] No changes since last notes. [2009] To short of backing planks, which will allow undermining or embankment pushing, by design. Wingwall notes: [2011-2015] No changes since last note. [2009] Wing caps starting to rot.								
228	Timber Pile	Underwater	08/04/2016	24 EA	0	24	0	0
		Migrated Values		24 EA	0	24	0	0
Notes: [2011-2015] No changes since last notes. [2008-2009] All look good, some have minor checks and splits.								
235	Timber Pier Cap	Underwater	08/04/2016	135 LF	0	135	0	0
		Migrated Values		135 LF	0	135	0	0
Notes: [2011-2015] No changes since last notes. [2009] South east pier cap bows down about 1/2 to 3/4 of an inch at southern most pile.								
330	Metal Bridge Railing	Underwater	08/04/2016	157 LF	0	157	0	0
		Migrated Values		157 LF	0	157	0	0
Notes: [2016] Migrator assumed metal rail/timber post combination type rail. [2008-2015] No issues. [W plate beam on timber posts, code 37]								
515 -	Steel Protective Coating	Underwater	08/04/2016	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.								

**BRIDGE 93290 CR 336 OVER PRAIRIE RIVER**

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
332	Timber Bridge Railing	Underwater	08/04/2016	26 LF	0	26	0	0
		Migrated Values		26 LF	0	26	0	0
Notes: [2016] Migrator assumed metal rail/timber post combination type rail. Post spacing assumed to be 5LF, each post 1LF. [2008-2015] No issues. [W plate beam on timber posts, code 37]								
800	Critical Deficiencies or Safety Hazards	Underwater	08/04/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: NO CRITICAL FINDINGS OBSERVED DURING THE LAST INSPECTION.								
822	Bituminous Approach Roadway	Underwater	08/04/2016	2 EA	0	2	0	0
		Migrated Values		2 EA	0	2	0	0
Notes: [2008-2015] Some settlement looks to be continuing due to relatively short abutment systems and high water flows.								
885	Scour	Underwater	08/04/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: 03/26/2014: K - Limited risk. Monitoring required. No found, looks good for high water year, 2011, 2013, 2014, 2015.								
890	Load Posting or Vertical Clearance Signing	Underwater	08/04/2016	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	08/04/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: New signs in place. Posted 36 Tons 2013 and now 32 Tons 2015.								
892	Slopes & Slope Protection	Underwater	08/04/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
Notes: [2009-2015] Some minor erosion over the years, mainly west side, river banks looks good with natural vegetation.								
894	Deck & Approach Drainage	Underwater	08/04/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: Use this element to rate the condition, function, and adequacy of the drainage system.								
900	Protected Species	Underwater	08/04/2016	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: Postings -20 M.P.H. curve and road intersection , fishing area and posted 36 Tons SHV, 2013 and now 32 tons Jan 2015, because of twin bridges, 100 ft. away.  
 Inspected by Tony Ridlon [2008-2015]  
 06/01/2016 Underwater Inspection - Collins Engineers

58. Deck NBI: Newer bituminous in good shape, minor cracks in bit mostly over piers, Timber Slab

36A. Brdg Railings NBI:

36B. Transitions NBI:

36C. Appr Guardrail NBI:

36D. Appr Guardrail Terminal NBI:

59. Superstructure NBI: All looks good, no issues.

60. Substructure NBI: [2008-2015] All looks good and stable, no changes since last inspection.

61. Channel NBI: [2015] West side, river migration continues, water elevation changes fairly fast depending on rain fall amounts and winter melt.

**BRIDGE 93290 CR 336 OVER PRAIRIE RIVER**

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

71. Waterway Adeq NBI: [2015] The gravel road that approaches bridge does overtop, almost annually.

72. Appr Roadway Alignment NBI: It is what it can be, has good as it gets.

Inventory Notes:

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Inspector's Signature

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Reviewer's Signature

## Pictures



Photo 1 - Upstream Fascia, Looking Southwest



Photo 2 - Downstream Fascia, Looking Northeast

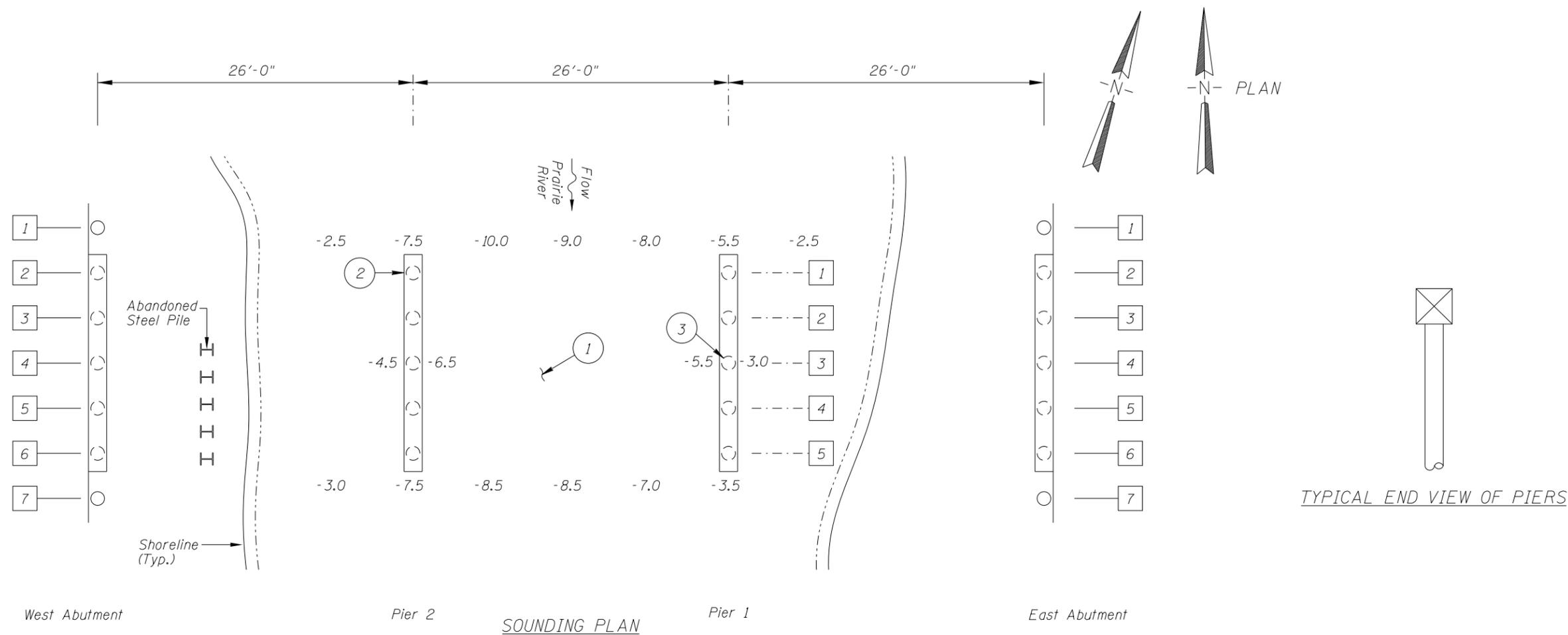
# Pictures



Photo 3 - Pier 1, Looking Southeast



Photo 4 - Pier 2, Looking Southwest



**GENERAL NOTES:**

- Piers 1 and 2 were inspected underwater.
- At the time of inspection, on June 1, 2016, the waterline was located approximately 8.5 feet below the top of the pier cap at the upstream end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 91.5.
- The majority of the timber piling was in satisfactory condition with random checking up to 1/8 inch wide. All of the timber cross bracing was in good condition and all of the connections were secure unless otherwise noted.
- The east shoreline exhibited bank erosion with vertical cuts up to 6 feet tall. The west shoreline also had bank erosion with vertical cuts up to 3 feet tall predominately on the downstream side.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

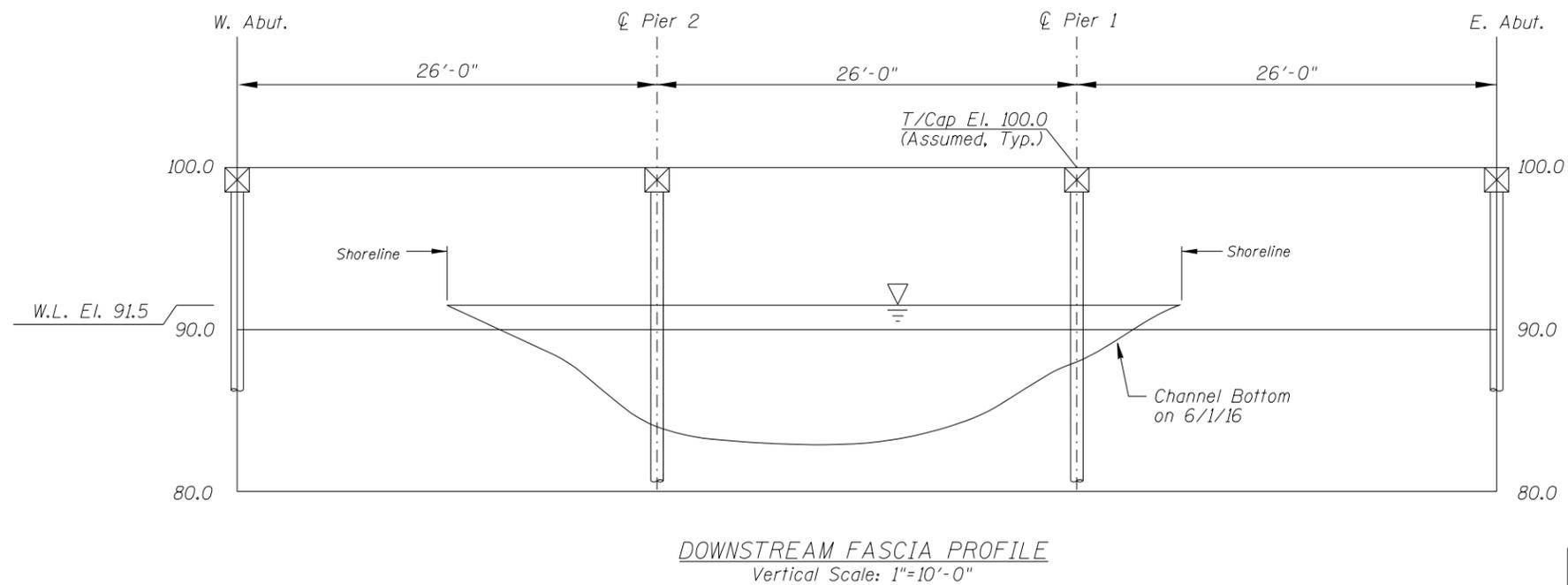
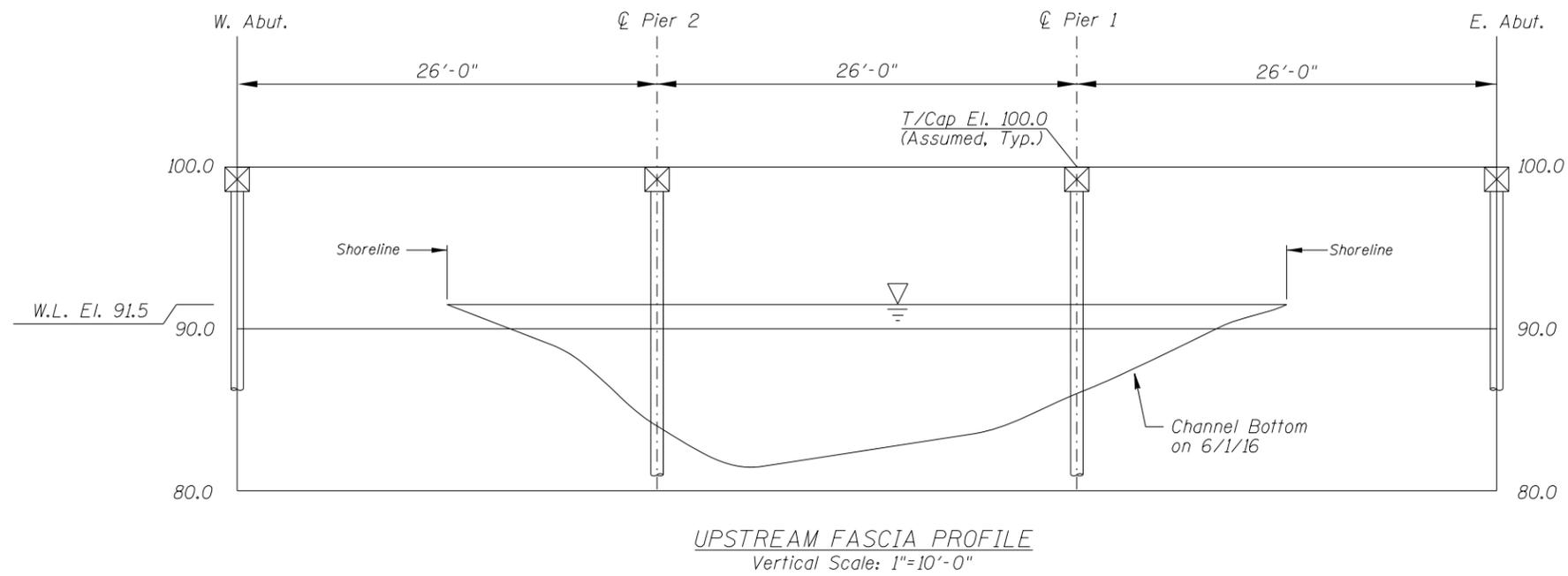
**INSPECTION NOTES:**

- The channel bottom material consisted of firm silty sand with scattered 2-foot-diameter and smaller rock allowing up to 3 inches of probe rod penetration.
- The lower diagonal cross brace at Pile 1 of Pier 2 had a 1/2 inch wide split, 2-1/2 feet long and runs through the fastener creating an ineffective connection.
- Pile 3 of Pier 1 had a softer outer surface from 2 feet above the waterline to 1 foot below water indicating minor decay.

**Legend**

- 5.5 Sounding Depth (6/1/16)
- Timber Pile
- ⊖ Timber Pile
- I Old Abandoned Steel Pile
- 5 Pile Number Designation
- Timber Debris

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 93290 OVER THE PRAIRIE RIVER DISTRICT I, ITASCA COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
DRAWN BY: ELN	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 1, 2016
CHECKED BY: DGS		SCALE: NTS
CODE: 968793290		FIGURE NO.: 1



Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 93290 OVER THE PRAIRIE RIVER DISTRICT I, ITASCA COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
DRAWN BY: ELN	<b>COLLINS ENGINEERS</b>	DATE: JUNE 1, 2016
CHECKED BY: DGS		SCALE: NTS (U.O.N.)
CODE: 968793290		FIGURE NO.: 2