

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 91949 MUN 28 over RIVER DR/OTTER TAIL RIVE

DISTRICT: District 4

COUNTY: Becker

CITY/TOWNSHIP: Frazee

STATE: Minnesota

Date of Inspection: 10/17/2016

Equipment Used:

Owner: City or Municipal Highway Agency

Inspected By: Schroeder, Brian

Report Written By: Brian Schroeder

Report Reviewed By:

Final Report Date:



TABLE OF CONTENTS

	PAGE NUMBER
UNDERWATER SUMMARY	3
UNDERWATER INSPECTION	4
UNDERWATER INSPECTION PROCEDURES	6
STRUCTURE INVENTORY	7
ELEMENTS	8
PICTURES	11
DRAWING	14

UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge No. 91949, Culvert Barrels 1 through 3 and the wingwalls, were found to be generally in good condition with no defects of structural significance observed. The concrete was smooth and south. The south barrel floor was silted over, while the middle and north barrel floors were bare.

INSPECTION FINDINGS

- (A) The floor of Culvert Barrel 1 was silted over at the time of inspection.
- (B) The floors of Culvert Barrel 2 and Culvert Barrel 3 were bare at the time of inspection.
- (C) The aprons were not exposed at either end of the culvert, and the floor was covered with silt at the ends of the inlet and outlet.
- (D) Light debris was found at the culvert inlet.

RECOMMENDATIONS

- (A) Remove debris at inlet.
- (B) 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 #: 91949
Feature Intersected: RIVER DR/OTTER TAIL RIVE
Facility Carried: MUN 28
District: District 4
County: 003 - Becker
Bridge Description:

The structure consists of a three-cell reinforced concrete box culvert. The culvert barrels are number 1 through 3 starting from the south.

2. INSPECTION DATA

Professional Engineer/Team Leader: Brian K. Schroeder, P.E.
Inspection Diver: Brian K. Schroeder, P.E.
Date of Underwater Inspection: 10/17/2016
Weather Conditions: Cloudy, 35°F
Underwater Visibility (feet): None/Negligible
Waterway Velocity (ft/sec): 0.5

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Culvert Barrels 1 through 3 and wingwalls
General Shape:

Maximum Water Depth at Substructure(s) Inspected (feet): 7.4

4. WATERLINE DATUM

Water Level Reference: Top of north parapet at the center of the middle barrel span.
Waterline Elevation (feet): 94.0
Description: The waterline was approximately 6.0 feet below reference.

5. NBIS CODING INFORMATION

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

Item 60: Substructure: Code:
Item 61: Channel and Channel Protection: Code: 7
Item 62: Culvert: Code: 6
Item 92B: Underwater Inspection: Code: Y 48 10/2016

Item 113: Scour Critical Bridge:

Code: E

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
241	Concrete Culvert	223	LF		223		
870	Culvert End Treatments	2	EA		2		
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 91949 (MUN over the River DR/Otter Tail River) was completed on October 17, 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 three reinforced concrete box culvert barrels. According to the bridge inventory or design drawings, the structure consists of three reinforced concrete box culvert barrels. 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: 91949

MUN 28 over RIVER DR/OTTER
TAIL RIVE

Date: 01/26/2017

+ GENERAL +	+ ROADWAY +	+ INSPECTION +		
Agency Br. No. Crew District 04 Maint. Area County 003 - Becker City Frazee Township Desc. Loc. 0.1 MI NE OF JCT CSAH 10 Sect., Twp., Range 35 - 138N - 40W Latitude 46 ° 43' 15.09 " Longitude 95 ° 41' 52.24 " Custodian 04 - City or Municipal Highway Owner 04 - City or Municipal Highway BMU Agreement Year Built 1982 MN Year Reconstructed FHWA Year Reconstructed MN Temporary Status Bridge Plan Location 3 - COUNTY Date Opened to Traffic On - Off System 0 - OFF Legislative District 02A Potential ABC 2 - N/A	Bridge Match ID (TIS) 0 Roadway O/U Key Route On Structure Route Sys 10 - MUN Number 28 Roadway Name or Description MUN 28 Level of Service 1 - MAINLINE Roadway Type 2 - 2-way traffic Control Section (TH Only) Reference Point 000+00.051 Detour Length 1.0 mi. Lanes ON 2 UNDER 0 ADT 40 YEAR 1981 HCADT ADTT % Functional Class 09 - Rural - Local	Userkey 43 Structurally Deficient N Functionally Obsolete N Sufficiency Rating 97.0 Routine Inspection Date 09/21/2016 Routine Inspection Frequency 24 Inspector Name Schroeder, Brian Status A - Open		
		+ NBI	CONDITION	RATINGS +
		Deck	N	Unsound Deck %
		Superstructure	N	
		Substructure	N	
		Channel	7	
		Culvert	6	
		+ NBI	APPRAISAL	RATINGS +
		Structure Evaluation	6	
		Deck Geometry	N	
		Underclearances	N	
		Waterway Adequacy	7	
		Approach Alignment	7	
		+ SAFETY	FEATURES +	
		Bridge Railing	0 - SUBSTANDARD	
		GR Transition	0 - SUBSTANDARD	
		Appr. Guardrail	0 - SUBSTANDARD	
		GR Termini	0 - SUBSTANDARD	
		+ IN	DEPTH	INSP. +
			Y/N	Freq Date
		Frac. Critical		
		Underwater	60	10/17/2016
		Pinned Asbly.		
		Spec. Feat.		
		+ WATERWAY +		
		Drainage Area (sq. mi.)	326.0	
		Waterway Opening (sf.)	240	
		Navigation Control	0 - No nav. control on	
		Pier Protection	-	
		Nav. Clr. (ft.)	Vert. 0.0	Horiz. 0.0
		Nav. Vert. Lift Bridge Clear. (ft.)		
		MN Scour Code	E - CULVERT Year 1991	
		+ CAPACITY	RATINGS +	
		Design Load	9 - HS 25 (OR GREATER)	
		Operating Rating	2 - HS TRUCK 33.0	
		Inventory Rating	2 - HS TRUCK 22.0	
		Posting VEH:	SEMI:	DBL:
		Rating Date	11/2/2005	
		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 5 - Prestress or Precast Main Span Design 13 - Box Culvert Main Span Detail Appr. Span Type Appr. Span Design Appr. Span Detail Skew 63 LEFT Culvert Type C108T Barrel Length 89 Cantilever ID Number of Spans MAIN: 3 APPR: 0 TOTAL: Main Span Length 24.8 ft. Structure Length 75.3 ft. Deck Width (Out-to-Out) 0.0 ft. Deck Material N - Not Applicable Wear Surf Type 1 - Monolithic Concrete Wear Surf Install Year Wear Course/Fill Depth 0.00 ft. Deck Membrane N - Not Applicable (applies Deck Rebars N - Not Applicable (no deck) Deck Rebars Install Year Structure Area (Out-to-Out) 0 sq. ft. Roadway Area (Curb-to-Curb) sq. ft. Sidewalk Width 50A. Lt 0.00 ft. 50B. Rt 0.00 ft. Curb Height Lt 0.25 ft. Rt 0.25 ft. Rail Type Lt 08 Rt 08	If Divided NB-EB SB-WB Roadway Width 28.00 ft. ft. Vertical Clearance ft. ft. Max. Vert. Clear. ft. ft. Horizontal Clear. ft. ft. Lateral Clearance ft. ft. Appr. Surface Width 28.0 ft. Bridge Roadway Width 0.0 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) N - N/A Pier Foundation (Material/Type) N - N/A N - N/A 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 0 - Not Required			

MINNESOTA BRIDGE INSPECTION REPORT

02/06/2017

BRIDGE 91949 MUN 28 OVER RIVER DR/OTTER TAIL RIVE

County: Becker Location: 0.1 MI NE OF JCT CSAH 10 Length: 75.3 ft.
 City: Frazee Route: 10 - MUN 28 Ref. Pt.: 000+00.051 Deck Width: 0.0 ft.
 Township: Control Section: Rdwy. Area/ Pct. Unsnd: sq. ft. / %
 Section: 35 Township: 138N Range: 40W Maint. Area: Paint Area/ Pct. Unsnd: sq. ft. / %
 Span Type: 1 - Concrete 19 - Culvert (includes Local Agency Bridge Nbr.: Culvert: C108T
 List: frame culverts) Postings:
 NBI Deck: N Super: N Sub: N Chan: 7 Culv: 6
 Open, Posted, Closed: A - Open
 MN Scour Code: E - CULVERT

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: 0 - Not Required Unofficial Sufficiency Rating 97.0

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
241	Reinforced Concrete Culvert	Underwater	10/17/2016	223 LF	0	223	0	0
		Routine	09/21/2016	223 LF	0	223	0	0
Notes: [2012] Exterior surface (top) of all three pipes have multiple hairline cracks. Low water conditions and frozen channel allowed inspectors to view the upper portion of pipe interiors. [2013-2016] Some minor cracks noted on the interior of the pipes.								
330	Metal Bridge Railing	Underwater	10/17/2016	37 LF	0	37	0	0
		Routine	09/21/2016	37 LF	0	37	0	0
Notes: Pipe ends have steel safety railings for people using the fishing area located near the ends of the box culvert. [2013-2016] Metal railing has minor deterioration. Minor surface corrosion with no section loss. Connections and anchorages are intact.								
515	Steel Protective Coating	Underwater	10/17/2016	119 SF	119	0	0	0
		Routine	09/21/2016	119 SF	119	0	0	0
Notes: [2016] Migrator assumed CS1 and a quantity of 999 SF. [2016] 4' X 15' = 60 SF. and 2.7' X 22' = 59 SF. Total = 119 SF.								
331	Reinforced Concrete Bridge Railing	Underwater	10/17/2016	138 LF	0	138	0	0
		Routine	09/21/2016	138 LF	0	138	0	0
Notes: [1998-2013] Some cracks noted in the concrete bridge rails. [2014-2016] SW corner of concrete bridge rail, west two sections contain minor to moderate deterioration, staining and scaling.								
800	Critical Deficiencies or Safety Hazards	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: NO CRITICAL FINDINGS OBSERVED DURING THE LAST INSPECTION.								
822	Bituminous Approach Roadway	Underwater	10/17/2016	2 EA	1	1	0	0
		Routine	09/21/2016	2 EA	1	1	0	0
Notes: [1996-1997] Roadway approaches to the culvert have settled and are uneven. Some fine aggregate overlay material should be placed in the depressions to correct the problem. [1998] Bituminous fill material has been placed in the depressions on the bridge approaches. However, there are some potholes developing in the same area. [2001] West approach resurfaced and in good repair. [2001-2006] East approach rough and uneven due to settling and potholes. [2008] East approach under construction. Westerly roadway approach has 2 inch lip along west edge of the culvert. [2010] East approach newly surfaced. West approach has 2 inch lip along the edge of the culvert. [2012] West approach has been repaired with bituminous patch material. East approach has rough spots developing in the bituminous near the edge of the concrete pipe. [2013] Both bituminous roadway approaches have little or no settlement and they are smooth and even. [2014] West approach okay. East approach has minor to moderate deterioration along seam between concrete box culvert and bituminous road approach. [2016] Seams have been filled with a tar like sealer. West approach in good repair. East approach has deteriorating bituminous and 1-2 inch settlement.								

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
870	Culvert End Treatment	Underwater	10/17/2016	2 EA	0	2	0	0
		Routine	09/21/2016	2 EA	0	2	0	0
Notes: [2013-2016] Concrete end treatments contain a number of cracks and some minor deterioration.								
871	Roadway Over Culvert	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: Roadway wearing surface over the box culvert is the concrete top of the 3-cell poured inplace box culvert.								
885	Scour	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
890	Load Posting or Vertical Clearance Signing	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: [1996] Vertical clearance signs should be installed for the railroad bridge (L8213) located above the Box Culvert (91949). (11/5/96 Field checked the vertical clearance 14.4 ft.) [2006-2008] No vertical clearance signs in place. [2010-2012] Vertical clearance signs (14'4") are in place on both roadway approaches. [2013-2016] Advance warning, vertical clearance signs are in place on both roadway approaches.								
891	Other Bridge Signing	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: [1996] Replace two missing delineators on the westerly end of the structure. [1998] Plow markers installed at the ends of the guardrails. [1998] Delineators have been replaced. [1999] Plow markers for the guardrail at the east end of the bridge are missing. [1999-2001] Four black and yellow delineators are now in place. However they are mounted on short posts. [2001] Plow markers for the guardrail ends are in place at both roadway approaches. [2002-2005] Four black and yellow delineators are in place. [2006-2008] Both delineators on the east end of the culvert are defaced. Westerly 2 delineators are okay. [2013-2016] Four delineators are in place. Plow marker signs are in place near the guardrail ends.								
892	Slopes & Slope Protection	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
893	Guardrail	Underwater	10/17/2016	1 EA	0	1	0	0
		Routine	09/21/2016	1 EA	0	1	0	0
Notes: Guardrail is 3 feet high and 108 feet long. Contains 8 wood posts and turned down ends. [1987] Guardrail has moderate damage and deterioration, but it is still functioning as intended to protect vehicles from impacting the bridge. [2016] Plate beam guard rail scraped and bent. Some decay present on the wood post.								
894	Deck & Approach Drainage	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
899	Miscellaneous Items	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: [2006] Some wood debris & beaver cuttings in stream near culvert inlet. Does not appear to be obstructing flow. [2012] Low water conditions. [2013] Painted graffiti on concrete bridge rails. [2013] Consider divers for underwater inspection of this structure. [2014-2016] All three culvert cells clean and free from debris. [2016] High water conditions.								
900	Protected Species	Underwater	10/17/2016	1 EA	1	0	0	0
		Routine	09/21/2016	1 EA	1	0	0	0
Notes: Use this element to track the presence of protected species living on this structure.								

General Notes: Additional data and photos for this structure are available in the office file. LJH
[9/23/13] Inspected by LJH.
[9/17/14] Inspected by LJH and JJW.

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
	[9/21/16] Inspected by LJH.							
	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 - West Profile



Photo 2 - East Profile

Pictures



Photo 3 - Condition at Waterline

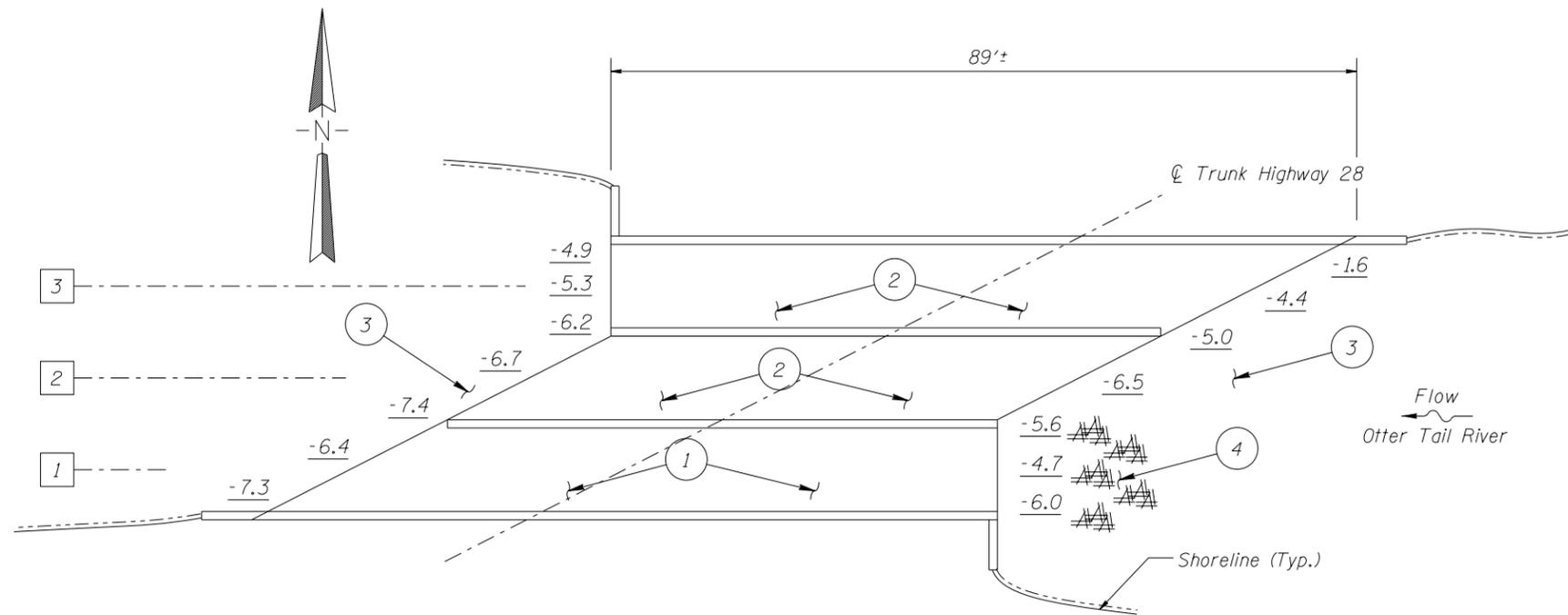


Photo 4 - Upstream Channel

Pictures



Photo 5 - Downstream Channel



INSPECTION NOTES:

- 1 The floor of Culvert Barrel 1 was silted over at the time of inspection.
- 2 The floors of Culvert Barrel 2 and Culvert Barrel 3 were bare at the time of inspection.
- 3 The apron or toe was not exposed at either end of the culvert and the floor was covered with silt at the edges of the inlet and outlet.
- 4 Light debris was found at the culvert inlet.

GENERAL NOTES:

1. The three barrel box culvert and its wingwalls were inspected underwater.
2. At the time of inspection on October 17, 2016 the waterline was located approximately 6.0 feet below the top of the east parapet above the middle of Culvert Barrel 2. No plans are available for this structure. A benchmark elevation of 100.0 feet was assumed. This corresponds with a waterline elevation of 94.0 feet.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the highway at the upstream and downstream openings of the culvert.

Legend

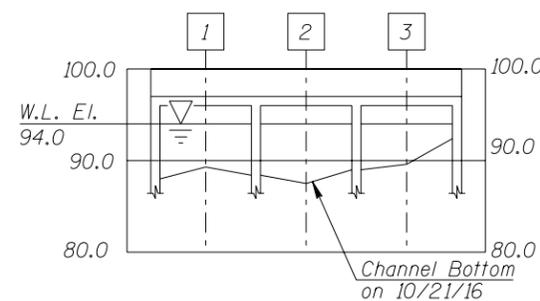
-4.8 Sounding Depth from Waterline (10/17/16)

1 Culvert Barrel Identification Designation

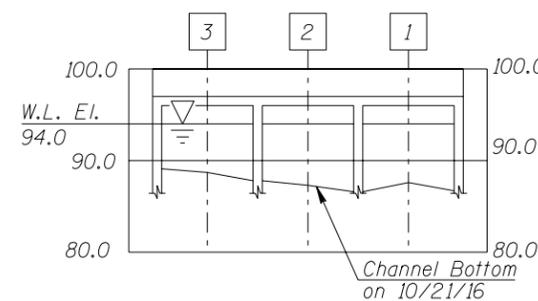
Timber Debris

Note:

All soundings based on 2016 waterline location.



UPSTREAM OPENING PROFILE
(Looking West)
Scale: 1" = 10'-0"



DOWNSTREAM OPENING PROFILE
(Looking East)
Scale: 1" = 10'-0"

COLLINS ENGINEERS
1599 Selby Avenue
Suite 206
St. Paul, MN 55104
(651) 646-8502
www.collinsengr.com

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

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

Date: OCT. 2016
Scale: As Noted
Figure No.: 1

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 91949
OVER THE OTTER TRAIL RIVER
DISTRICT 4, BECKER COUNTY

INSPECTION AND SOUNDING PLAN UPSTREAM AND DOWNSTREAM OPENING PROFILES