

2017 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 88696 IRR 120 over SIMIAN CREEK

DISTRICT: District 1

COUNTY: St. Louis

CITY/TOWNSHIP: BREVATOR

STATE: Minnesota

Date of Inspection: 09/16/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Parker, Marc

Report Written By: Marc Parker

Report Reviewed By:

Final Report Date:



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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure unit inspected at Bridge No. 88696, the precast concrete box culvert was found to be in fair condition below water, with minor defects of structural significance. The concrete exhibited light scaling up to 1/8 inch penetration throughout and some areas of spalling and poor consolidation were present. Two areas of spalling were present near the upstream and downstream openings with exposed reinforcing steel that exhibited 25 percent section loss and up to 1.5 inches of penetration. An area of poor consolidation with exposed reinforcing steel and up to 1 inch of penetration was also present near the upstream headwall. The culvert floor was exposed during the inspection, but no apron or toe exposure was observed.

INSPECTION FINDINGS

- (A) The channel bottom material consisted of silt with up to 1 foot of probe rod penetration and scattered rocks up to 1 foot in diameter.
- (B) The concrete typically exhibited light scaling with up to 1/8 inch of penetration.
- (C) A spall 1 foot long by 4 inches wide and up to 1 inch of penetration with 1 exposed reinforcing bar that exhibited up to 25 percent section loss was located on the ceiling near the north wall approximately 1 foot from the upstream opening.
- (D) An area of poor consolidation, 2 feet by 3 feet and up to 1 inch of penetration with 3 exposed reinforcing bars that exhibited up to 25 percent section loss was present on the ceiling near the south wall approximately 1 foot from the upstream opening.
- (E) The top of the floor throughout the box was exposed and free of any channel bottom material aggradation.
- (F) A spall measuring 3 feet by 3 feet with 3 exposed reinforcing bars that exhibited 25 percent section loss and up to 1.5 inches of penetration was present on the ceiling at the downstream opening near the south wall.

RECOMMENDATIONS

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

Contractor: Collins Engineers, Inc.

Contractor Job Number: 9687

UNDERWATER INSPECTION

1. BRIDGE DATA

Bridge #: 88696
Feature Intersected: SIMIAN CREEK
Facility Carried: IRR 120
District: District 1
County: 069 - St. Louis
Bridge Description:
The bridge consists of one concrete box culvert.

2. INSPECTION DATA

Professional Engineer/Team Leader: Marc Parker
Inspection Diver: Marc Parker
Date of Underwater Inspection: 09/16/2016
Weather Conditions: Rain, 65°
Underwater Visibility (feet): 1.0 foot
Waterway Velocity (ft/sec): 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Culvert
General Shape:
Concrete box culvert 10 feet wide by 6 feet high.

Maximum Water Depth at Substructure(s) Inspected (feet): 5.0 feet

4. WATERLINE DATUM

Water Level Reference: The top of the upstream headwall.
Waterline Elevation (feet): 8.10 feet according to the water gauge located in the upstream channel.
Description: The waterline was located approximately 3.0 feet below the 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: 5
Item 92B: Underwater Inspection: Code: Y 48 09/2016

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	34	LF		28	6	
870	Culvert End Treatment	2	EA		2		
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 88696 (IRR 120 over Simian Creek) was completed on September 16, 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 in accordance with OSHA regulations. Channel bottom profiles were taken along the upstream and downstream openings to determine the presence, location and area of scour. The bridge element inspected was the precast concrete box culvert. 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: 88696

IRR 120 over SIMIAN CREEK

Date: 01/13/2017

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
Agency Br. No. 245 Crew District 01 Maint. Area County 069 - St. Louis City Township 69012 - BREVATOR Desc. Loc. 0.5 MI N OF CO LINE Sect., Twp., Range 31 - 050N - 17W Latitude 46 ° 46 ' 25.91 " Longitude 92 ° 33 ' 16.60 " Custodian 02 - County Highway Agency Owner 02 - County Highway Agency BMU Agreement Year Built 1921 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 08A Potential ABC 2 - N/A	Bridge Match ID (TIS) 0 Roadway O/U Key Route On Structure Route Sys 13 - IND Number 120 Roadway Name or Description CR 863 Level of Service 1 - MAINLINE Roadway Type 2 - 2-way traffic Control Section (TH Only) Reference Point 008+00.038 Detour Length 3.0 mi. Lanes ON 2 UNDER 0 ADT 200 YEAR 2007 HCA DT ADTT % Functional Class 09 - Rural - Local	Userkey 109 Structurally Deficient N Functionally Obsolete N Sufficiency Rating 73.0 Routine Inspection Date 08/11/2016 Routine Inspection Frequency 24 Inspector Name Parker, Marc Status A - Open																				
	+ RDWY DIMENSIONS +	+ NBI CONDITION RATINGS +																				
	If Divided NB-EB SB-WB Roadway Width 30.00 ft. ft. Vertical Clearance ft. ft. Max. Vert. Clear. ft. ft. Horizontal Clear. ft. ft. Lateral Clearance ft. ft. Appr. Surface Width 27.0 ft. Bridge Roadway Width 0.0 ft. Median Width On Bridge ft.	Deck N Unsound Deck % Superstructure N Substructure N Channel 7 Culvert 5																				
+ STRUCTURE +	+ MISC. BRIDGE DATA +	+ NBI APPRAISAL RATINGS +																				
Service On 1 - Highway Service Under 5 - Waterway Main Span Type 1 - Concrete Main Span Design 13 - Box Culvert Main Span Detail Appr. Span Type Appr. Span Design Appr. Span Detail Skew 0 Culvert Type W106 Barrel Length 34 Cantilever ID Number of Spans MAIN: 1 APPR: 0 TOTAL: Main Span Length 10.0 ft. Structure Length 11.3 ft. Deck Width (Out-to-Out) 0.0 ft. Deck Material N - Not Applicable Wear Surf Type 8 - Gravel Wear Surf Install Year Wear Course/Fill Depth 0.50 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 0.00 ft. Rt 0.00 ft. Rail Type Lt NN Rt NN	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 Historic Status 5 - Not eligible	Structure Evaluation 5 Deck Geometry N Underclearances N Waterway Adequacy 7 Approach Alignment 7																				
	+ PAINT +	+ SAFETY FEATURES +																				
	Year Painted Unsound Paint % Painted Area sq. ft. Primer Type Finish Type	Bridge Railing N - NOT REQUIRED GR Transition N - NOT REQUIRED Appr. Guardrail 0 - SUBSTANDARD GR Termini 0 - SUBSTANDARD																				
	+ BRIDGE SIGNS +	+ IN DEPTH INSP. +																				
	Posted Load 0 - Not Required Traffic 0 - Not Required Horizontal 0 - Not Required Vertical N - Not Applicable	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Y/N</th> <th style="text-align: center;">Freq</th> <th style="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;">09/16/2016</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	09/16/2016	Pinned Asbly.				Spec. Feat.			
	Y/N	Freq	Date																			
Frac. Critical																						
Underwater		60	09/16/2016																			
Pinned Asbly.																						
Spec. Feat.																						
		+ WATERWAY +																				
		Drainage Area (sq. mi.) Waterway Opening (sf.) 60 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																				
		+ CAPACITY RATINGS +																				
		Design Load 0 - Other/Unknown Operating Rating 1 - H TRUCK 16.0 Inventory Rating 1 - H TRUCK 12.0 Posting VEH: SEMI: DBL: Rating Date 2/1/1991 Overweight Permit Codes A N - N/A B N - N/A C N - N/A																				

MINNESOTA BRIDGE INSPECTION REPORT

02/02/2017

BRIDGE 88696 IRR 120 OVER SIMIAN CREEK

County: St. Louis	Location: 0.5 MI N OF CO LINE	Length: 11.3 ft.
City:	Route: 13 - IND 120 Ref. Pt.: 008+00.038	Deck Width: 0.0 ft.
Township: 69012 - BREVATOR	Control Section:	Rdwy. Area/ Pct. Unsnd: sq. ft. / %
Section: 31 Township: 050N Range: 17W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 1 - Concrete 19 - Culvert (includes frame culverts)	Local Agency Bridge Nbr.: 245	Culvert: W106
List:		Postings:
NBI Deck: N Super: N Sub: N Chan: 7 Culv: 5		
	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	Unofficial Functionally Obsolete N
Horizontal: 0 - Not Required	Unofficial Sufficiency Rating 73.0
Traffic: 0 - Not Required	
Vertical: N - Not Applicable	

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	01/13/2017	34 LF	0	28	6	0
		Routine	08/11/2016	33 LF	0	30	3	0
Notes: [2016] Water within 13" of culvert top of east end. [2014] Water within 2' of top of culvert. [2013] Culvert is in fair condition. Rebar is exposed at both ends of pipe on the top. HONEYCOMB 1' SQUARE IN ROOF N. END. REBAR EXPOSED WEST END.								
800	Critical Deficiencies or Safety Hazards	Underwater	01/13/2017	1 EA	1	0	0	0
		Routine	08/11/2016	1 EA	1	0	0	0
Notes: [2016-2013] No critical deficiencies or safety hazards found during this inspection.								
870	Culvert End Treatment	Underwater	01/13/2017	2 EA	0	2	0	0
		Routine	08/11/2016	2 EA	0	2	0	0
Notes: [2016-2013] Minor scaling along wetted perimeter. Minor spalling on east headwall.								
871	Roadway Over Culvert	Underwater	01/13/2017	1 EA	0	1	0	0
		Routine	08/11/2016	1 EA	0	1	0	0
Notes: [2016] North bound lane was repaved after flooding in 2012. South bound lane has more cracking than north. [2014] Minor cracking in roadway that is not sealed. [2013] No signs of settlement or undermining. Bituminous.								
885	Scour	Underwater	01/13/2017	1 EA	1	0	0	0
891	Other Bridge Signing	Underwater	01/13/2017	1 EA	1	0	0	0
		Routine	08/11/2016	1 EA	1	0	0	0
Notes: [2016-2013] All signs present with no deterioration. 4 Culvert markers.								
892	Slopes & Slope Protection	Underwater	01/13/2017	1 EA	0	1	0	0
		Routine	08/11/2016	1 EA	0	1	0	0
Notes: [2016] Bituminous has been placed on NE slope to stop erosion. Minor Erosion behind SW wing due to roadway drainage. [2014] Minor erosion NE slope. [2013] No notable erosion. Slopes are protected by vegetation.								

BRIDGE 88696 IRR 120 OVER SIMIAN CREEK

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	01/13/2017	1 EA	0	1	0	0
		Routine	08/11/2016	1 EA	0	1	0	0

Notes: [2016] Bituminous has been place behind NE wing to stop shoulder erosion. West shoulder washing down slope behind SW wing.
 [2014] Erosion behind NE wing due to drainage. shoulder wash down slope.
 [2013] There is no notable ponding or drainage-related slope erosion.

900	Protected Species	Underwater	01/13/2017	1 EA	1	0	0	0
		Routine	08/11/2016	1 EA	1	0	0	0

Notes: [2016] No evidence of protected species present.

General Notes: SLC District 5
 Inspected by: [2016] CG, ES : [2014-2013] BH, CG.
 [2014-2013] Candidate for addition to underwater inspections.
 No Guardrail.

58. Deck NBI:

36A. Brdg Railings NBI:

36B. Transitions NBI:

36C. Appr Guardrail NBI: Based on Minnesota rule 8820.9920 for ADT 150 - 749 culvert headwall is inside of recovery area of 37'. Back of headwall is 18' from centerline.

36D. Appr Guardrail Terminal NBI: Based on Minnesota rule 8820.9920 for ADT 150 - 749 culvert headwall is inside of recovery area of 37'. Back of headwall is 18' from centerline.

59. Superstructure NBI:

60. Substructure NBI:

61. Channel NBI: [2016] Deterioration of channel banks due to frequently high water, probably due to beaver activity.

62. Culvert NBI: [2016] Water within 13" of culvert top of east end.
 [2014] Water within 2' of top of culvert.
 [2013] Culvert is in fair condition. Rebar is exposed at both ends of pipe on the top. HONEYCOMB 1' SQUARE IN ROOF N. END. REBAR EXPOSED WEST END.

71. Waterway Adeq NBI: [2016] Roadway overtopped during flooding of 2012 which was greater than 500 year event.
 [2014] 2' of freeboard in culvert plus 0.5' of fill.

72. Appr Roadway Alignment NBI: [2016-2014] Hill to the north affecting sight distance. No speed reduction required.

Inspector's Signature

Reviewer's Signature

Pictures



Photo 1 - Upstream Opening, Looking Northeast



Photo 2 - Downstream Opening, Looking Southwest

Pictures



Photo 3 - Area of Poor Consolidation Near the Upstream Headwall, Looking East

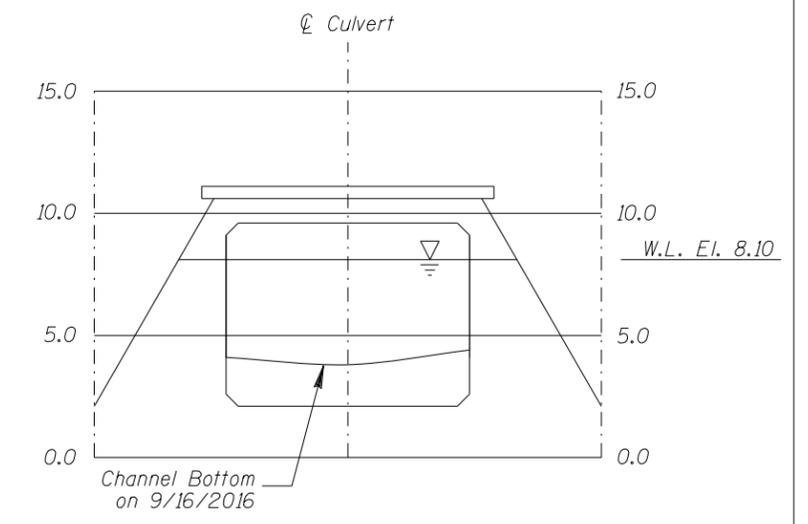
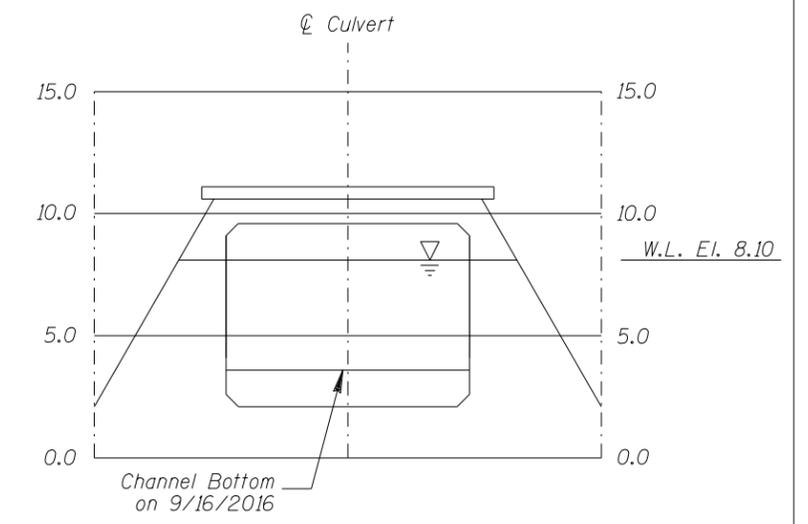
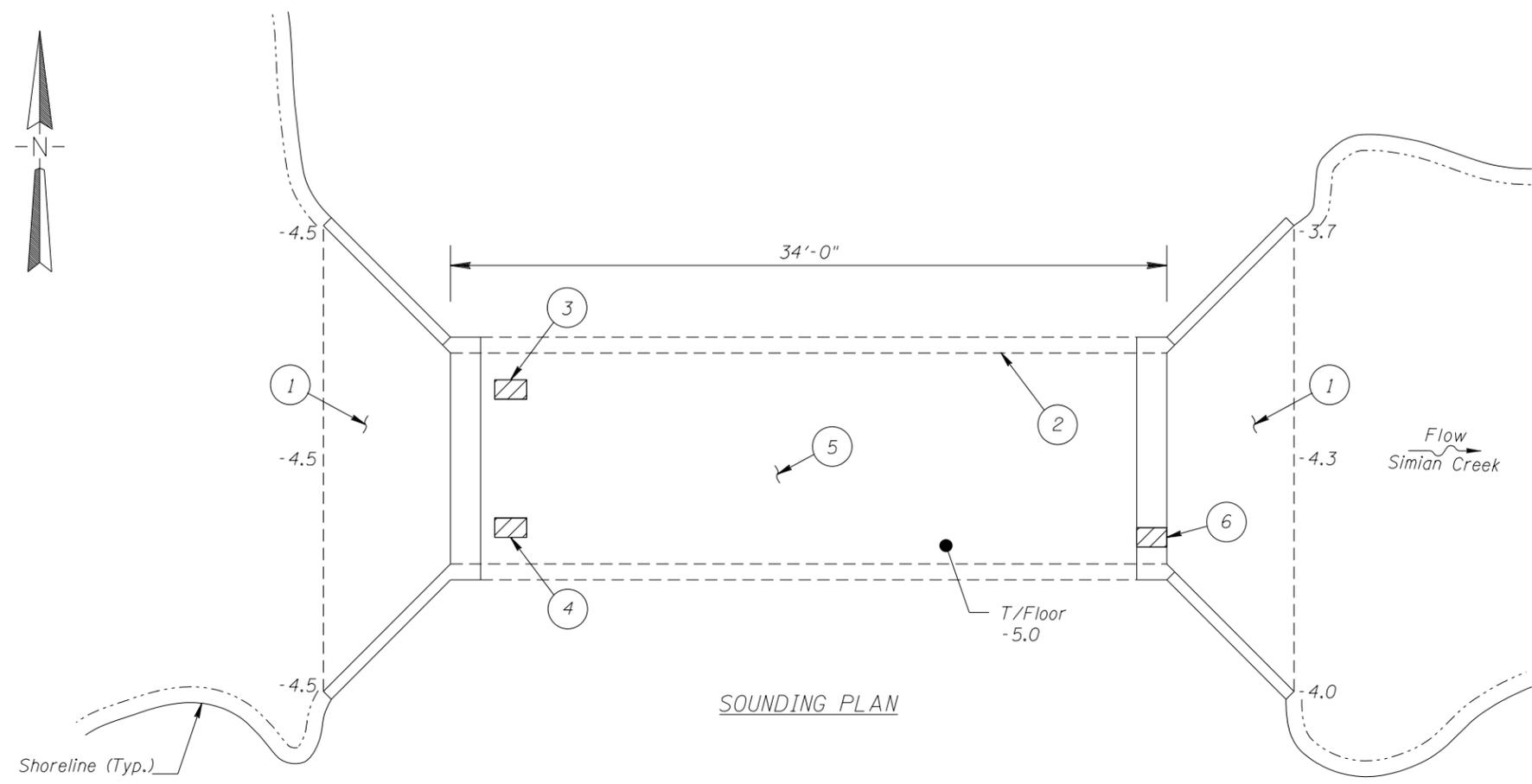


Photo 4 - Spall at the Downstream Headwall, Looking Southwest

Pictures



Photo 5 - Typical Concrete Condition at the Waterline, Looking South



GENERAL NOTES:

1. The culvert was inspected underwater.
2. At the time of inspection, on September 16, 2016, the waterline was located approximately 3.0 feet below the top of the upstream headwall. According to the water gauge located in the upstream channel this corresponds to a waterline elevation of 8.10.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.

Legend

- 2.5 Sounding Depth (9/16/2016)
- Concrete Spall

INSPECTION NOTES:

1. The channel bottom material consisted of silt with up to 1 foot of probe rod penetration and scattered rocks up to 1 foot in diameter.
2. The concrete typically exhibited light scaling with up to 1/8 inch of penetration.
3. A spall 1 foot long by 4 inches wide and up to 1 inch of penetration with 1 exposed reinforcing bar that exhibited up to 25% section loss was located on the ceiling near the north wall approximately 1 foot from the upstream opening.
4. An area of poor consolidation, 2 feet by 3 feet and up to 1 inch of penetration with 3 exposed reinforcing bars that exhibited up to 25% section loss was present on the ceiling near the south wall approximately 1 foot from the upstream opening.
5. The top of the floor throughout the box was exposed and free of any channel bottom material aggradation.
6. A spall measuring 3 feet by 3 feet and up to 1.5 inches of penetration with 3 exposed reinforcing bars that exhibited 25% section loss was present on the ceiling at the downstream opening near the south wall.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 88696 IRR 120 OVER SIMIAN CREEK DISTRICT 1, ST. LOUIS COUNTY INSPECTION, SOUNDING PLAN, AND FASCIA PROFILES		
DRAWN BY: ELN	COLLINS ENGINEERS	DATE: SEPT 16, 2016
CHECKED BY: MBP	<small>133 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	SCALE: NTS
CODE: 968788696		FIGURE NO.: 1