

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 96224 CR 720 over BEAVER CREEK

DISTRICT: District 1

COUNTY: St. Louis

CITY/TOWNSHIP: LINDEN GROVE

STATE: Minnesota

Date of Inspection: 06/20/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Janulis, Lukas

Report Written By: Lukas Janulis

Report Reviewed By:

Final Report Date:



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UNDERWATER INSPECTION

REPORT SUMMARY

The culvert (Bridge No. 96224) was found to be in good condition with no defects of structural significance below water. The concrete exhibited light scaling with up to 1/16 inch penetration from 2.5 feet above the waterline to the channel bottom. At the time of the inspection, no appreciable scour was observed.

INSPECTION FINDINGS

- (A) The channel bottom material consisted of soft silt allowing 18 inches of probe rod penetration.
- (B) The concrete floor was typically covered by 6 inches to 1.5 foot thick layer of silt infill.
- (C) The concrete was typically sound along the entire interior of the culvert. Light scaling with 1/16 inch of penetration extended from the channel bottom to 2.5 feet above the waterline.
- (D) Minor deterioration of concrete grout was observed along the seams of the individual culvert segments.
- (E) Minor erosion was present along the southwest bank with up to a 5 foot vertically cut bank.

RECOMMENDATIONS

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

Contractor: Collins Engineers, Inc.

Contractor Job Number: 9687

UNDERWATER INSPECTION

1. BRIDGE DATA

Bridge #: 96224
Feature Intersected: BEAVER CREEK
Facility Carried: CR 720
District: District 1
County: 069 - St. Louis
Bridge Description:
The structure consists of one precast concrete arch culvert.

2. INSPECTION DATA

Professional Engineer/Team Leader: Lukas Janulis
Inspection Diver: Lukas Janulis
Date of Underwater Inspection: 06/20/2016
Weather Conditions: Sunny, 63° F
Underwater Visibility (feet): 0.5 feet
Waterway Velocity (ft/sec): 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Culvert
General Shape:
Precast pipe arch.

Maximum Water Depth at Substructure(s) Inspected (feet): 2.5 feet

4. WATERLINE DATUM

Water Level Reference: The bottom of the arch at the downstream end of the culvert.
Waterline Elevation (feet): 94.2 feet
Description: The waterline was located approximately 5.8 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: 6
Item 62: Culvert: Code: 7
Item 92B: Underwater Inspection: Code: Y 48 06/2016

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	69	LF	64	5		
870	Culvert End Treatment	2	EA	1	1		
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 96224 (C.R. 720 over Beaver Creek) was completed on June 20, 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. Due to waterway conditions at the time of the inspection, the inspection could be accomplished by wading in accordance with OSHA regulations. Channel bottom profiles were taken along the upstream and downstream openings of the culvert to determine the presence, location and area of scour.

The bridge element inspected was the precast pipe arch 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: 96224

CR 720 over BEAVER CREEK

Date: 08/26/2016

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
Agency Br. No. 681 Crew District 01 Maint. Area County 069 - St. Louis City Township 69042 - LINDEN GROVE Desc. Loc. 0.2 MI S OF JCT CSAH 114 Sect., Twp., Range 5 - 062N - 20W Latitude 47 ° 53 ' 27.33 " Longitude 92 ° 55 ' 25.09 " Custodian 02 - County Highway Agency Owner 02 - County Highway Agency BMU Agreement Year Built 1985 MN Year Reconstructed FHWA Year Reconstructed MN Temporary Status Bridge Plan Location 3 - COUNTY Date Opened to Traffic 11/1/1985 On - Off System 0 - OFF Legislative District 06A Potential ABC 2 - N/A	Bridge Match ID (TIS) 0 Roadway O/U Key Route On Structure Route Sys 07 - CNTY Number 720 Roadway Name or Description CNTY 720 Level of Service 1 - MAINLINE Roadway Type 2 - 2-way traffic Control Section (TH Only) Reference Point 003+00.300 Detour Length 7.0 mi. Lanes ON 2 UNDER 0 ADT 20 YEAR 2003 HCA DT ADTT % Functional Class 09 - Rural - Local	Userkey 109 Structurally Deficient N Functionally Obsolete N Sufficiency Rating 100.0 Routine Inspection Date 09/14/2015 Routine Inspection Frequency 48 Inspector Name Janulis, Lukas Status A - Open																				
		+ NBI CONDITION RATINGS +																				
		Deck N Unsound Deck % Superstructure N Substructure N Channel 6 Culvert 7																				
	+ RDWY DIMENSIONS +	+ NBI APPRAISAL RATINGS +																				
	If Divided NB-EB SB-WB Roadway Width 26.00 ft. ft. Vertical Clearance ft. ft. Max. Vert. Clear. ft. ft. Horizontal Clear. ft. ft. Lateral Clearance ft. ft. Appr. Surface Width 22.0 ft. Bridge Roadway Width 0.0 ft. Median Width On Bridge ft.	Structure Evaluation 7 Deck Geometry N Underclearances N Waterway Adequacy 9 Approach Alignment 7																				
+ STRUCTURE +	+ MISC. BRIDGE DATA +	+ SAFETY FEATURES +																				
Service On 1 - Highway Service Under 5 - Waterway Main Span Type 5 - Prestress or Precast Main Span Design 15 - Pipe Arch Main Span Detail Appr. Span Type Appr. Span Design Appr. Span Detail Skew 30 LEFT Culvert Type 169"x107" Barrel Length 70 Cantilever ID Number of Spans MAIN: 1 APPR: 0 TOTAL: Main Span Length 16.2 ft. Structure Length 18.2 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 10.00 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 0.00 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	Bridge Railing N - NOT REQUIRED GR Transition N - NOT REQUIRED Appr. Guardrail N - NOT REQUIRED GR Termini N - NOT REQUIRED																				
	+ PAINT +	+ IN DEPTH INSP. +																				
	Year Painted Unsound Paint % Painted Area sq. ft. Primer Type Finish Type	<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></td> <td style="text-align: right;">06/20/2016</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			06/20/2016	Pinned Asbly.				Spec. Feat.			
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Underwater			06/20/2016																			
Pinned Asbly.																						
Spec. Feat.																						
	+ BRIDGE SIGNS +	+ WATERWAY +																				
	Posted Load 0 - Not Required Traffic 0 - Not Required Horizontal 0 - Not Required Vertical N - Not Applicable	Drainage Area (sq. mi.) Waterway Opening (sf.) 99 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 5 - HS 20 Operating Rating 2 - HS TRUCK 33.0 Inventory Rating 2 - HS TRUCK 22.0 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

09/06/2016

Inspector: CO Bridge

BRIDGE 96224 CR 720 OVER BEAVER CREEK

County: St. Louis	Location: 0.2 MI S OF JCT CSAH 114	Length: 18.2 ft.
City:	Route: 07 - CNTY 720 Ref. Pt.: 003+00.300	Deck Width: 0.0 ft.
Township: 69042 - LINDEN GROVE	Control Section:	Rdwy. Area/ Pct. Unsnd: sq. ft. / %
Section: 5	Township: 062N Range: 20W Maint. Area:	Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 1 - Concrete 19 - Culvert (includes frame culverts)	Local Agency Bridge Nbr.: 681	Culvert: 169"X107"
List:		Postings:
NBI Deck: N Super: N Sub: N Chan: 6 Culv: 7		
	Open, Posted, Closed: A - Open	
	MN Scour Code: E - CULVERT	
Appraisal Ratings - Approach: 7 Waterway: 9		Unofficial Structurally Deficient N
Required Bridge Signs - Load Posting: 0 - Not Required	Traffic: 0 - Not Required	Unofficial Functionally Obsolete N
Horizontal: 0 - Not Required	Vertical: N - Not Applicable	Unofficial Sufficiency Rating 100.0

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	08/26/2016	69 LF	64	5	0	0
		Migrated Values		69 LF	64	5	0	0
	Notes: [2015] Chipping on barrel sections 4,6,9,13, and 14 from installation. Joint leakage on barrel sections 12-15 and from lift holes. Light scale along wetted perimeter. [2013] Some chips at joints from installation. No signs of joint leakage. Ties loose NE & NW.							
800	Critical Deficiencies or Safety Hazards	Underwater	08/26/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: [2015-2013] No critical findings found during this inspection.							
870	Culvert End Treatment	Underwater	08/26/2016	2 EA	1	1	0	0
		Migrated Values		2 EA	1	1	0	0
	Notes: [2015] Light scale on wetted perimeter. Minor chipping on top edge of east apron. [2013] Aprons. W. apron shifted/separated.							
871	Roadway Over Culvert	Underwater	08/26/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: [2015-2013] No sign of settlement or undermining. Gravel.							
885	Scour	Underwater	08/26/2016	1 EA	1	0	0	0
891	Other Bridge Signing	Underwater	08/26/2016	1 EA	0	0	1	0
		Migrated Values		1 EA	0	0	1	0
	Notes: [2015-2013] No culvert markers present.							
892	Slopes & Slope Protection	Underwater	08/26/2016	2 EA	0	2	0	0
		Migrated Values		2 EA	0	2	0	0
	Notes: [2015] Banks are slumping on both ends of barrel. [2013] Base of NW slope has minor slumping.							
894	Deck & Approach Drainage	Underwater	08/26/2016	2 EA	2	0	0	0
		Migrated Values		2 EA	2	0	0	0
	Notes: [2015-2013] No notable ponding or drainage-related slope erosion.							

BRIDGE 96224 CR 720 OVER BEAVER CREEK

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
900	Protected Species	Underwater	08/26/2016	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: SLC District 3
 Inspected by: [2015] CG, TM : [2013] CG, BH.
 No Guardrail.
 [2015] Able to walk through culvert after destruction of beaver dam 20' from the end of the west apron.
 [2013] Water with 2' of top of culvert due to beaver activity, possible addition to underwater inspection.

58. Deck NBI:

36A. Brdg Railings NBI:

36B. Transitions NBI:

36C. Appr Guardrail NBI: Roadway meets minimum requirements for Minnesota rule 8820.9920 for ADT < 50. No guardrail present.

36D. Appr Guardrail Terminal NBI: Roadway meets minimum requirements for Minnesota rule 8820.9920 for ADT < 50. No guardrail present.

59. Superstructure NBI:

60. Substructure NBI:

61. Channel NBI: [2015] Sediment at east end of culvert. Beaver dam located 20' west of culvert outlet restricting flow in channel. Channel banks have some slumping.

62. Culvert NBI: [2015] Chipping on barrel sections 4,6,9,13, and 14 from installation. Joint leakage on barrel sections 12-15 and from lift holes. Light scale along wetted perimeter.
 [2013] Some chips at joints from installation. No signs of joint leakage.

71. Waterway Adeq NBI: [2015] High water mark in culvert is about 2' from top of culvert plus 10' of fill over culvert, remote chance of overtopping.

72. Appr Roadway Alignment NBI: [2015-2013] Hill to the north and slight hill to south affecting sight distance. No speed reduction required.

Inventory Notes:

 Inspector's Signature

 Reviewer's Signature

Pictures



Photo 1 - Upstream Opening, Looking Northwest



Photo 2 - Downstream Opening, Looking Southeast

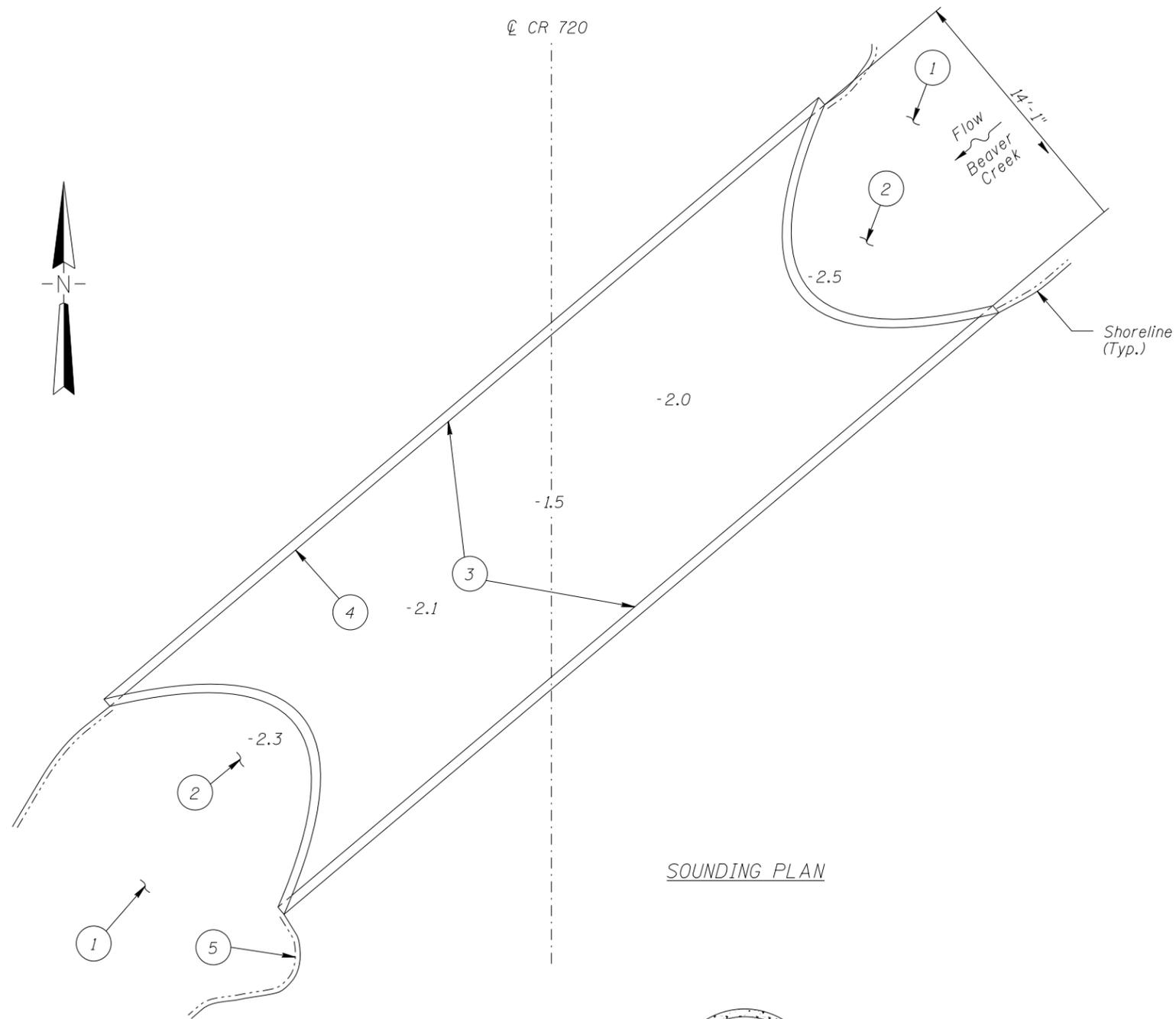
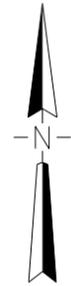
Pictures



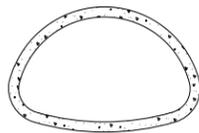
Photo 3 - Grout Deterioration along Seam, Looking South



Photo 4 - Southeast Bank Erosion, Looking Southwest



SOUNDING PLAN



TYPICAL END VIEW OF PIPE

GENERAL NOTES:

1. Precast pipe arch culvert was inspected underwater.
2. At the time of inspection on June 20, 2016, the waterline was located approximately 5.8 foot below the bottom of the arch at the downstream end of the culvert. Since elevation information was not available, a reference elevation of 100.0 was assume. Based on the assumed reference the waterline elevation was 94.2.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the culvert at the upstream and downstream ends and at the quarter-points along the center of the structure.

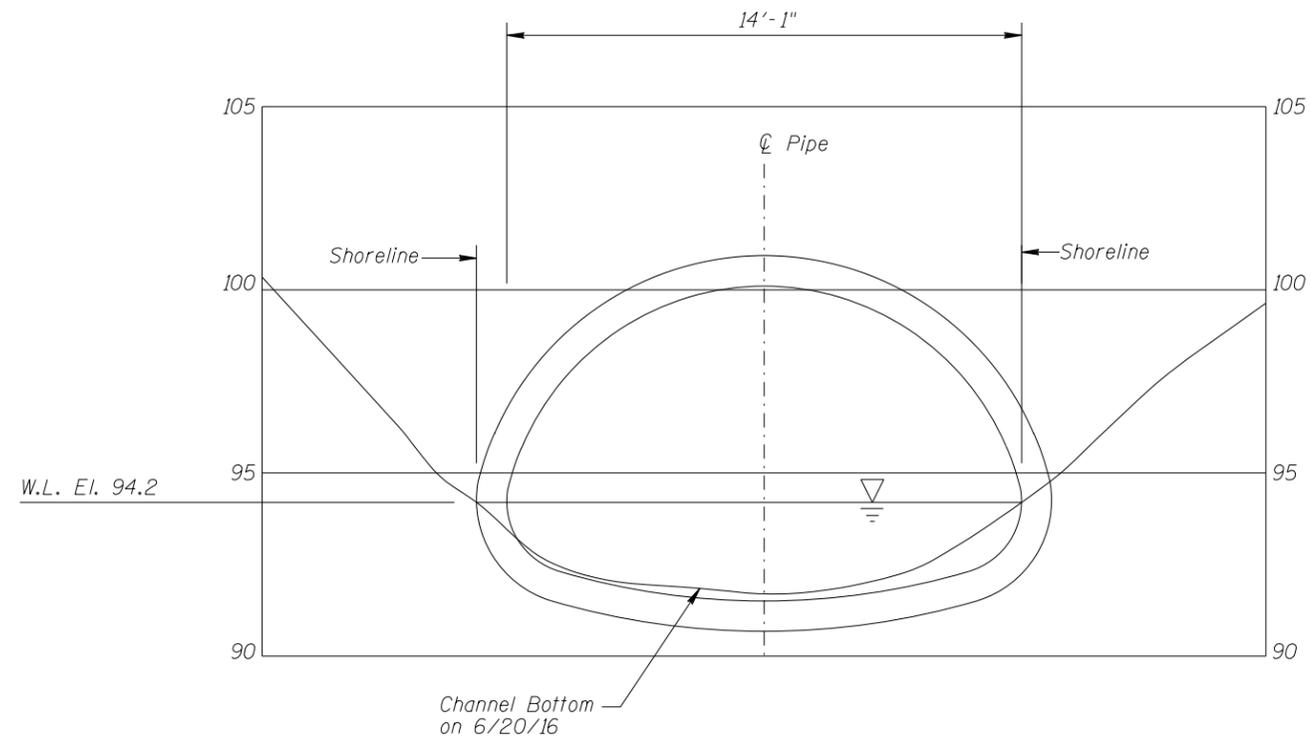
INSPECTION NOTES:

- ① Channel bottom material consisted of soft silt allowing 18 inches of probe rod penetration.
- ② Concrete floor was typically covered by 6 inches to 1.5 foot thick layer of silt infill.
- ③ Concrete was typically sound along the entire interior of the culvert. Light scaling with 1/16 inch of penetration extended from the channel bottom to 2.5 feet above the waterline.
- ④ Minor deterioration of concrete grout was observed along the seams of the individual culvert segments.
- ⑤ Minor erosion was present along the southwest bank with up to a 5 foot vertically cut bank.

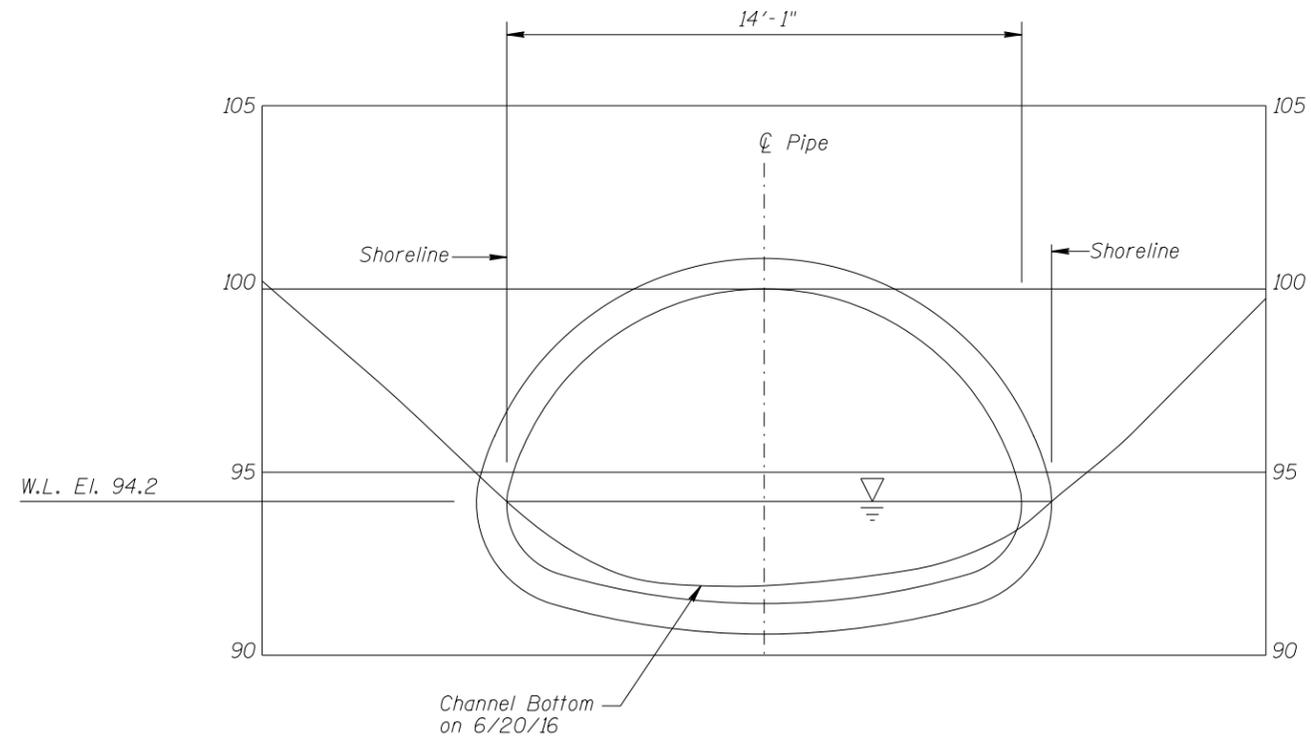
Legend

- 5.8 Sounding Depth from Waterline (6/20/16)
- Timber Debris

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 96224 CR 720 OVER BEAVER CREEK DISTRICT 1, ST. LOUIS COUNTY		
INSPECTION AND SOUNDING PLAN		
DRAWN BY: PRH	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 20, 2016
CHECKED BY: LJ		SCALE: NTS
CODE: 968796224		FIGURE NO.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note: _____

Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 96224 CR 720 OVER BEAVER CREEK DISTRICT I, ST. LOUIS COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
DRAWN BY: PRH	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 20, 2016
CHECKED BY: LJ		SCALE: 1"=5'-0"
CODE: 968796224		FIGURE NO.: 2