

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 91725 CR 52 over CALDWELL BROOK

DISTRICT: District 1 COUNTY: Koochiching CITY/TOWNSHIP: T - 151 R - 27
STATE: Minnesota

Date of Inspection: 06/04/2016

Equipment Used:

Owner: County Highway Agency

Inspected By: Stromberg, Dan

Report Written By: Dan Stromberg

Report Reviewed By:

Final Report Date:

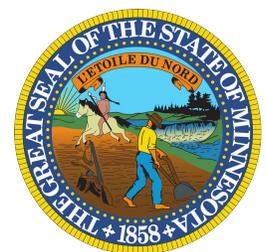


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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge No. 91725, Culverts 1, 2, and 3, were found to be in good condition below water with no defects of structural significance. The concrete was typically in good condition with only light scaling having up to 1/2 inch maximum penetration on the culvert walls from 3 feet above the waterline to the channel bottom. All of the joints were tight with no evidence of escaping backfill.

INSPECTION FINDINGS

(A) The channel bottom of Culvert 1 consisted of 6 inches of silt and scattered rocks which extended 15 feet in from the east end: the rest of the culvert was clean with bare concrete floor exposed.

(B) An area of section loss 18 inches in diameter with an exposed corroded reinforcing bar and up to 1.5 inches of penetration was present at the joint approximately 7 feet from the west end of Culvert 2.

(C) The concrete floor of Culvert 2 was exposed 15 feet in from the east end and extended to the west end of the culvert. The remaining channel bottom throughout Culvert 2 consisted of 3 to 6 inches of silt.

(D) The channel bottom was level with the floor in Culvert 3 at the west end and 6 inches of silty sand and scattered rocks was present from the eastern opening to approximately 15 feet into the culvert.

(E) At the west opening of Culvert 1 the south half of the culvert floor slab toe exhibited a maximum vertical exposure of 1 foot while the northern half of the culvert exhibited no vertical exposure.

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 #: 91725
Feature Intersected: CALDWELL BROOK
Facility Carried: CR 52
District: District 1
County: 036 - Koochiching
Bridge Description:
The bridge consists of three precast pipe culverts.

2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg
Inspection Diver: Daniel G. Stromberg
Date of Underwater Inspection: 06/04/2016
Weather Conditions: Overcast, 64°F
Underwater Visibility (feet): 1.0 feet
Waterway Velocity (ft/sec): 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Culverts 1 through 3
General Shape:
154"x97" precast pipe arches.

Maximum Water Depth at Substructure(s) Inspected (feet): 3.0 feet

4. WATERLINE DATUM

Water Level Reference: The top of the South Culvert arch at the west end
Waterline Elevation (feet): 94.0 feet
Description: The waterline was located approximately 6.0 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: 9
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	121	LF		121		
870	Culvert End Treatment	6	EA	6			
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 91725 (C.R. 52 over Caldwell Brook) was completed on June 4, 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 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 culverts to determine the presence, location and area of scour. The bridge element inspected consisted of three precast pipe arch culverts. 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: 91725

CR 52 over CALDWELL BROOK

Date: 08/09/2016

+ GENERAL +	+ ROADWAY +	+ INSPECTION +																				
Agency Br. No. Crew District 01 Maint. Area County 036 - Koochiching City Township 36004 - T - 151 R - 27 Desc. Loc. 0.3 MI S OF JCT CSAH 25 Sect., Twp., Range 2 - 151N - 27W Latitude 47 ° 55 ' 35.93 " Longitude 94 ° 4 ' 12.55 " Custodian 02 - County Highway Agency Owner 02 - County Highway Agency BMU Agreement Year Built 1978 MN Year Reconstructed FHWA Year Reconstructed MN Temporary Status Bridge Plan Location 3 - COUNTY Date Opened to Traffic 8/1/1978 On - Off System 0 - OFF Legislative District 03A Potential ABC 2 - N/A	Bridge Match ID (TIS) 0 Roadway O/U Key Route On Structure Route Sys 07 - CNTY Number 52 Roadway Name or Description CNTY 52 Level of Service 1 - MAINLINE Roadway Type 2 - 2-way traffic Control Section (TH Only) Reference Point 001+00.600 Detour Length 99.0 mi. Lanes ON 2 UNDER 0 ADT 15 YEAR 2004 HCA DT ADTT % Functional Class 09 - Rural - Local	Userkey 76 Structurally Deficient N Functionally Obsolete N Sufficiency Rating 93.9 Routine Inspection Date 09/17/2014 Routine Inspection Frequency 24 Inspector Name Stromberg, Dan Status A - Open																				
		+ NBI CONDITION RATINGS +																				
		Deck N Unsound Deck % Superstructure N Substructure N Channel 9 Culvert 7																				
	+ RDWY DIMENSIONS +	+ NBI APPRAISAL RATINGS +																				
	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 29.0 ft. Bridge Roadway Width 0.0 ft. Median Width On Bridge ft.	Structure Evaluation 7 Deck Geometry N Underclearances N Waterway Adequacy 8 Approach Alignment 8																				
+ 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 0 Culvert Type 154"X97" Barrel Length 40 Cantilever ID Number of Spans MAIN: 3 APPR: 0 TOTAL: Main Span Length 12.8 ft. Structure Length 50.0 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 1.80 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 0 - SUBSTANDARD Appr. Guardrail 0 - SUBSTANDARD 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;">06/04/2016</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			06/04/2016	Pinned Asbly.				Spec. Feat.			
	Y/N	Freq	Date																			
Frac. Critical																						
Underwater			06/04/2016																			
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.) 29.7 Waterway Opening (sf.) 245 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 12/1/1990 Overweight Permit Codes A N - N/A B N - N/A C N - N/A																				

MINNESOTA BRIDGE INSPECTION REPORT

08/31/2016

Inspector: CO Bridge

BRIDGE 91725 CR 52 OVER CALDWELL BROOK

County: Koochiching	Location: 0.3 MI S OF JCT CSAH 25	Length: 50.0 ft.
City:	Route: 07 - CNTY 52 Ref. Pt.: 001+00.600	Deck Width: 0.0 ft.
Township: 36004 - T - 151 R - 27	Control Section:	Rdwy. Area/ Pct. Unsnd: sq. ft. / %
Section: 2 Township: 151N Range: 27W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 1 - Concrete 19 - Culvert (includes frame culverts)	Local Agency Bridge Nbr.:	Culvert: 154"X97"
List:		Postings:
NBI Deck: N Super: N Sub: N Chan: 9 Culv: 7	Open, Posted, Closed: A - Open	
	MN Scour Code: E - CULVERT	

Appraisal Ratings - Approach: 8	Waterway: 8	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	93.9

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	08/09/2016	121 LF	0	121	0	0
		Migrated Values		121 LF	0	121	0	0
Notes: 2014 - Minor spall east end of north barrel. 2012 - Triple barrel. South pipe has hairline crack at 12 o'clock.								
800	Critical Deficiencies or Safety Hazards	Underwater	08/09/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: NO CRITICAL FINDINGS OBSERVED DURING THE LAST INSPECTION.								
870	Culvert End Treatment	Underwater	08/09/2016	6 EA	6	0	0	0
		Migrated Values		6 EA	6	0	0	0
871	Roadway Over Culvert	Underwater	08/09/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: Use this element to rate the condition of the roadway running above a culvert structure.								
885	Scour	Underwater	08/09/2016	1 EA	1	0	0	0
892	Slopes & Slope Protection	Underwater	08/09/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: Use this element to rate the condition of slopes and slope protection.								
894	Deck & Approach Drainage	Underwater	08/09/2016	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	08/09/2016	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: 2014 - Need riprap between aprons on ends. Water low 18" deep. Mold growing on pipe just above water line. Water fairly clear.
2012 - DG & WH. Need riprap between aprons. Water depth - 18". No sedimentation. Apprxom 5' difference to high water mark.
2010 - 18" from water to low pipe. 79" water depeth. 10" diameter spall in middle barrel near west end, rebar exposed. DG & WH.

Pictures



Photo 1 - Upstream Fascia, Looking Southeast



Photo 2 - Downstream Fascia, Looking Southwest

Pictures



Photo 3 - Culvert 1, Looking East



Photo 4 - Culvert 2, Looking West

Pictures



Photo 5 - Culvert 3, Looking East



Photo 6 - Culvert 2 Joint Spall, Looking South

Pictures



Photo 7 - Culvert 1 Typical Joints and Concrete Condition (South Wall Shown), Looking Southeast

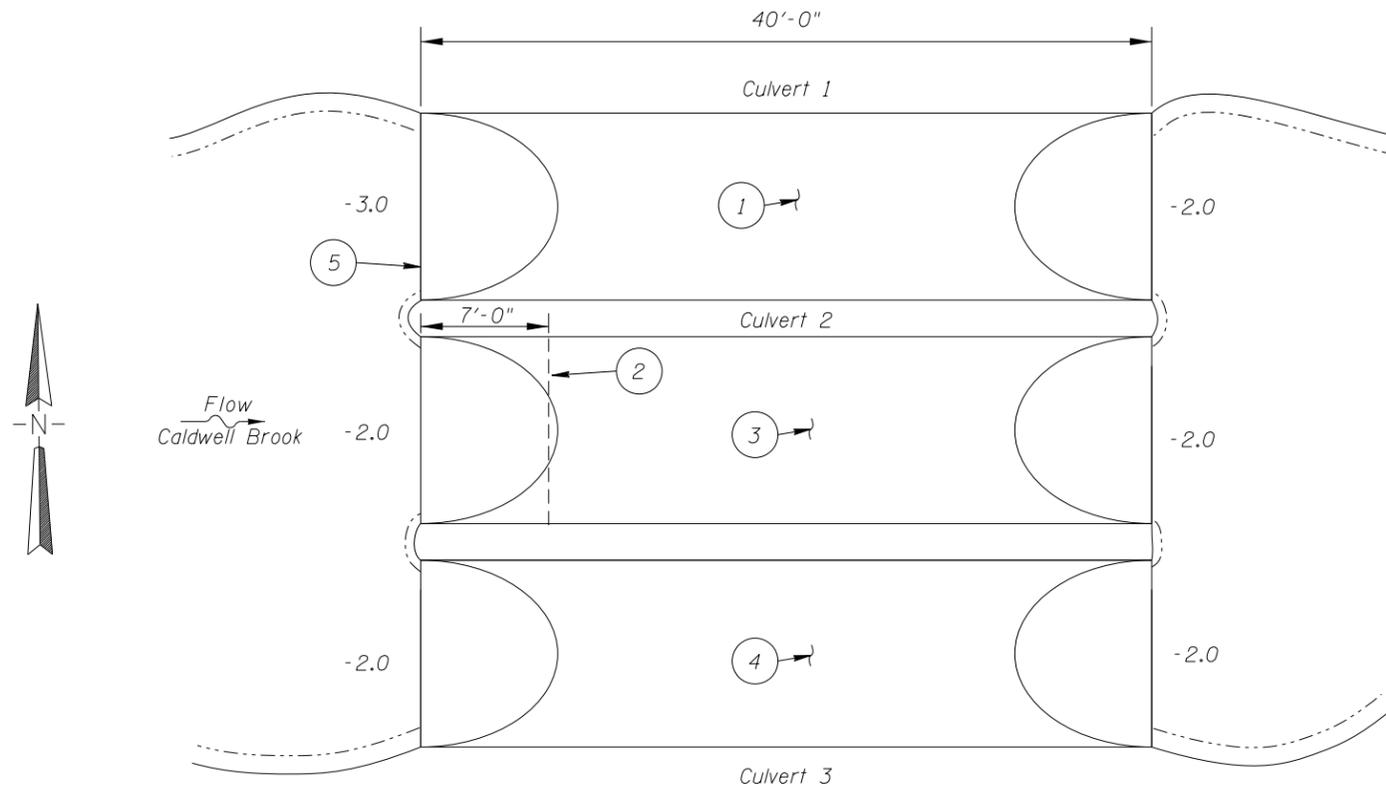


Photo 8 - Culvert 2 Typical Joint and Concrete Condition (South Wall Shown), Looking Southeast

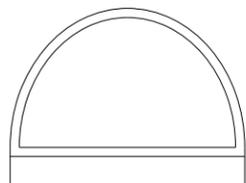
Pictures



Photo 9 - Culvert 3 Typical Joint and Concrete Condition (North Wall Shown), Looking Southeast



SOUNDING PLAN



TYPICAL END VIEW OF CULVERT

GENERAL NOTES:

1. Culverts 1 through 3 were inspected underwater.
2. At the time of inspection, on June 4, 2016, the waterline was located approximately 6.0 feet below the top of the South Culvert arch at the west end. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 94.0.
3. The concrete was typically in good condition with light scaling up to 1/2 inch maximum penetration on the culvert walls from 3 feet above the waterline to the channel bottom. All of the joints were in good condition with random minor areas of section loss, which is most likely due to the original placement. The joints were also all tight with up to 1 inch of offset and no evidence of backfill escaping.
4. Soundings indicate the water depth at the time of inspection and are measured in feet.
5. Soundings were taken at the mid points of the culverts.

INSPECTION NOTES:

- ① The channel bottom of Culvert 1 consisted of 6 inches of silt and scattered rocks which extended 15 feet in from the east end; the rest of the culvert was clean with the bare concrete floor exposed.
- ② An area of section loss 18 inches in diameter with an exposed corroded reinforcing bar and up to 1.5 inches of penetration was present at the joint approximately 7 feet from the west end of Culvert 2.
- ③ The concrete floor of Culvert 2 was exposed 15 feet in from the east end and extended to the west end of the culvert. The remaining channel bottom throughout Culvert 2 consisted of 3 to 6 inches of sit.
- ④ The channel bottom was level with the floor in Culvert 3 at the west end and 6 inches of silty sand and scattered rocks was present from the eastern opening to approximately 15 feet into the culvert.
- ⑤ At the west opening of Culvert 1 the south half of the culvert floor slab toe exhibited a maximum vertical exposure of 1 foot while the northern half of the culvert exhibited no vertical exposure.

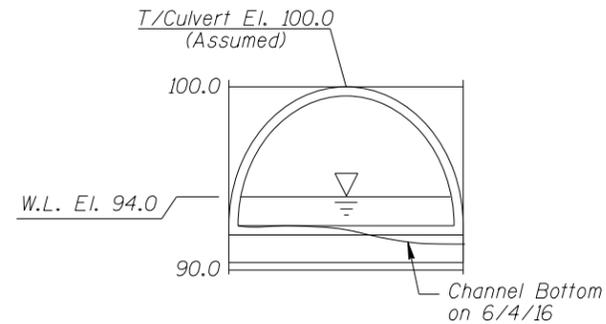
Legend

-2.0 Sounding Depth (6/4/16)

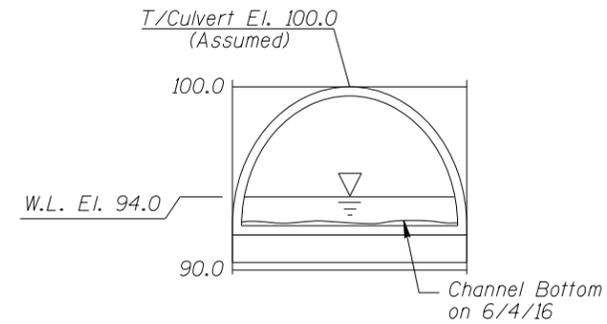
**MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 91725
OVER CALDWELL BROOK
DISTRICT I, KOOCHICHING COUNTY
INSPECTION AND SOUNDING PLAN

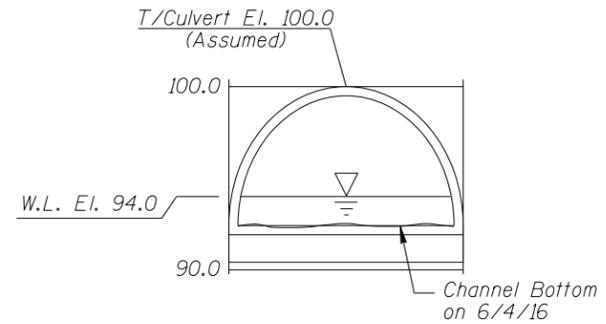
DRAWN BY: ELN	COLLINS ENGINEERS <small>133 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 4, 2016
CHECKED BY: DGS		SCALE: NTS
CODE: 968791725		FIGURE NO.: 1



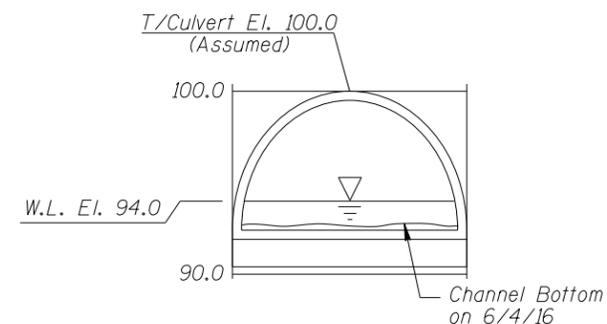
UPSTREAM FASCIA PROFILE
(CULVERT 1)



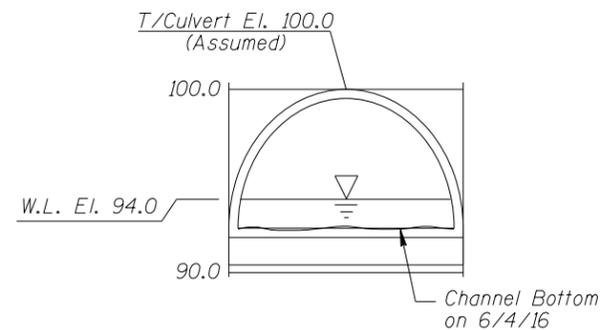
DOWNSTREAM FASCIA PROFILE
(CULVERT 1)



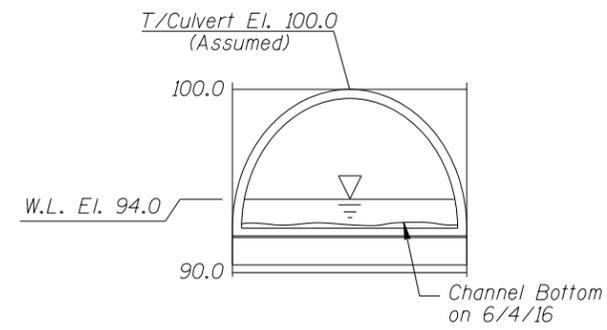
UPSTREAM FASCIA PROFILE
(CULVERT 2)



DOWNSTREAM FASCIA PROFILE
(CULVERT 2)



UPSTREAM FASCIA PROFILE
(CULVERT 3)



DOWNSTREAM FASCIA PROFILE
(CULVERT 3)

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 91725 OVER CALDWELL BROOK DISTRICT I, KOOCHICHING COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
DRAWN BY: ELN	COLLINS ENGINEERS	DATE: JUNE 4, 2016
CHECKED BY: DGS		SCALE: 1"=10'
CODE: 968791725		FIGURE NO.: 2