UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7695

CSAH 28

OVER THE

STONE RIVER

ST. LOUIS COUNTY

SEPTEMBER 27, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected below water at Structure No. 7695, Box 1 and Box 2 of the culvert, were found to be in satisfactory to fair condition with some defects of only minor structural significance. The concrete of the walls and floor exhibited light scaling with a maximum penetration of 1/8 inch. Diagonal cracks were observed in the center wall extensions with a maximum width of 1/8 inch. The apron toe was exposed at the upstream and downstream openings with a maximum vertical exposure of 0.6 feet.

INSPECTION FINDINGS:

(A) The culvert floor throughout the length of both boxes was typically clear of any debris or silt build-up.

(B) The channel bottom material upstream and downstream of the culvert apron consisted of silt and random stones approximately 4 inches in diameter allowing a maximum probe rod penetration of 1 foot.

(C) Light concrete scaling was observed extending from 2 feet above the waterline to the channel bottom on all walls and the floor of both boxes with a typical penetration of 1/8 inch.

(D) Diagonal cracks were observed on the upstream and downstream center wall extensions typically 1/8 inch wide with associated areas of concrete section loss. At the downstream extension, an area of section loss measured 6 inches wide by 6 inches long with a maximum penetration of 2 inches with one exposed reinforcing bar. At the upstream extension, an area of section loss measured 4 inches wide by 4 inches long with a maximum penetration of 1.5 inches.

(E) A spall 1 foot wide by 8 inches high was observed on the upstream headwall above the center wall with a maximum penetration of 1.5 inches.

(F) The concrete apron toe was exposed at the upstream end of Box 2 with a maximum vertical exposure of 0.3 feet and at the downstream end of Box 1 with a maximum vertical exposure of 0.6 feet. No undermining of the concrete apron was observed.

RECOMMENDATIONS:

(A) The area of concrete section loss at the downstream end of the center wall extension is not a structural concern at this time; however, it should be repaired to prevent further deterioration. The repair should include removal of concrete to a minimum of 1 inch behind the reinforcing steel, cleaning and replacing reinforcing steel as required, and placing concrete designed to provide high durability with low permeability.

(B) Monitor the diagonal cracking and scaling during future inspections.

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

RECOMMENDATIONS (CONT.):

(D) At the time of inspection of the submerged substructure units of Structure No. 7695, the waterline and water flow were noticeably lower than the mean values. As a result the inspection could be safely carried out by means of wading. During future inspections of the substructure units, a higher waterline elevation and/or increased flow may result in lower overhead clearance with a possibility of a confined space entrance requirements which may require a qualified dive team to safely carry out the inspection. If future inspections determine that the waterline consistently remains at a level which an inspection can be safely performed by the means of wading, consideration may be given to removing the structure from the underwater inspection list.

Respectfully submitted,

Inspection Team Leader:
Daniel G. Stromberg, P.E.

PROFESSIONAL ENGINEER
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Daniel G. Stromberg
Date 6/30/14 License # 21491

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7695

Feature Crossed: Stone River

Feature Carried: CSAH 28

Location: St. Louis County

Bridge Description: The culvert consists of two reinforced concrete culvert boxes designated as Box 1 and Box 2 from west to east.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E.

Dive Team: Marc B. Parker, Clayton Brookins

Date: September 27, 2012

Weather Conditions: Sunny, 60°F

Underwater Visibility: 1.0 foot

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Box 1 and Box 2

General Shape: The culvert consists of two reinforced concrete box barrels measuring 10 feet wide by 5 feet high and 32 feet long.

Maximum Water Depth at Substructure Inspected: Approximately 2.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the culvert headwall at the upstream end near the center wall extension.

Water Surface: The waterline was approximately 5.6 feet below reference.
Assumed Waterline Elevation = 94.4 feet.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 62: Culvert Condition: Code 5

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code A/09/12

Item 113: Scour Critical Bridges: Code E/12

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

____ Yes X No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
241	Concrete Culvert	66	LF	0	46	20	0	n/a
388	Culvert Headwall	2	EA	0	1	1	0	n/a
985	Slopes and Slope Protection	1	EA	1	0	0	n/a	n/a

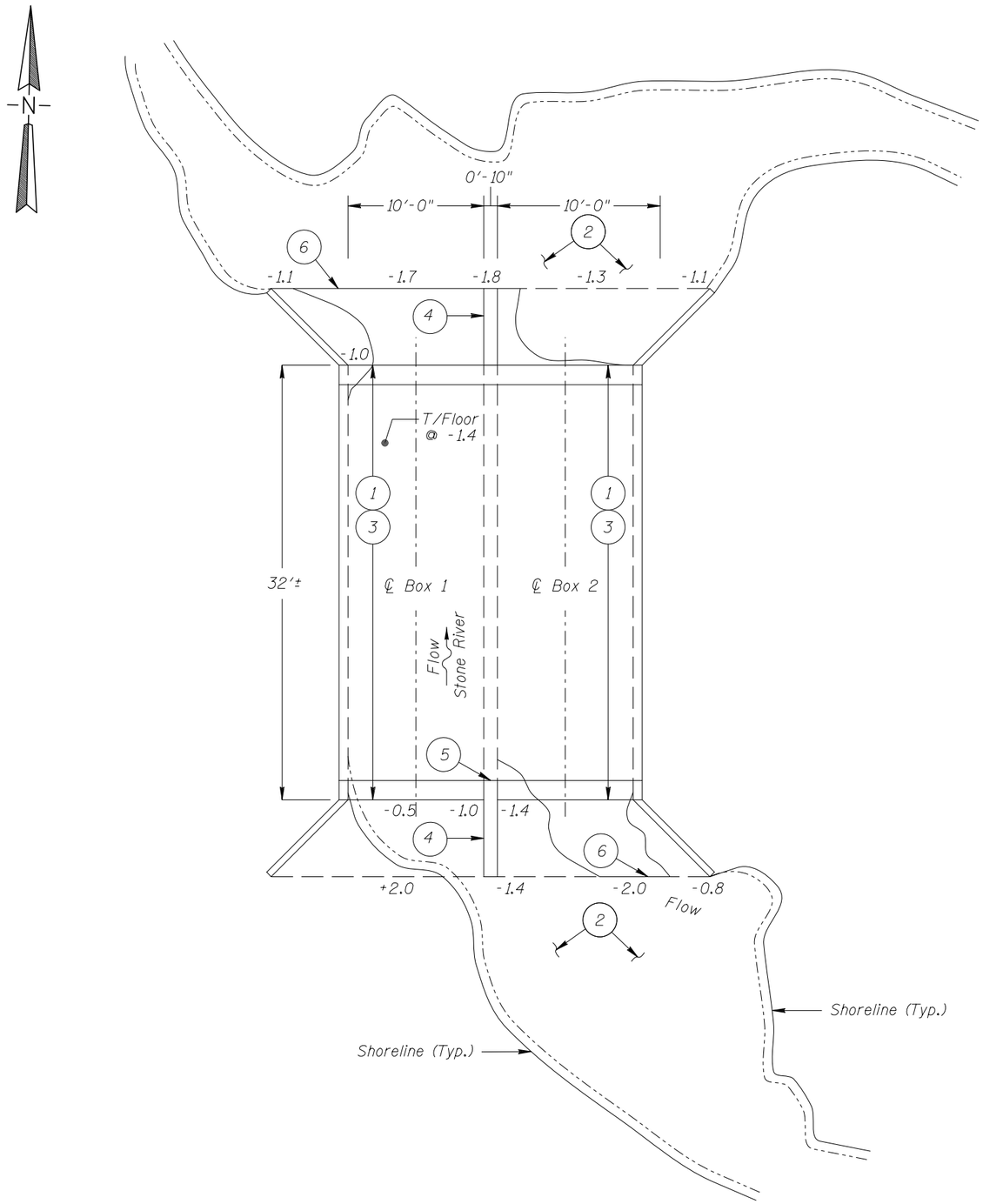
Photograph 1. Overall View of the Culvert, Looking Southeast.

Photograph 2. View of the West Wall of Box 1, Looking Southwest.

Photograph 3. View of the Center Wall, Looking Southwest.

Photograph 4. View of the East Wall of Box 2, Looking Southeast.

Photograph 5. View of the Diagonal Crack and Associated Area of Concrete Section Loss with Exposed Reinforcing Steel at the Downstream Extension of the Center Wall, Looking West.



SOUNDING PLAN

INSPECTION NOTES:

1. The culvert floor throughout the length of both boxes was typically clear of any debris or silt build-up.
2. The channel bottom material upstream and downstream of the culvert apron consisted of silt and random stones approximately 4 inches in diameter allowing a maximum probe rod penetration of 1 foot.
3. Light concrete scaling was observed extending from 2 feet above the waterline to the channel bottom on all walls and the floor of both boxes with a typical penetration of $\frac{1}{8}$ inch.
4. Diagonal cracks were observed on the upstream and downstream center wall extensions typically 1#8 inch wide with associated areas of concrete section loss. At the downstream extension, an area of section loss measured 6 inches wide by 6 inches long with a maximum penetration of 2 inches and one exposed reinforcing bar. At the upstream extension, an area of section loss measured 4 inches wide by 4 inches long with a maximum penetration of 1.5 inches.
5. A spall 1 foot wide by 8 inches high was observed on the upstream headwall above the center wall with a maximum penetration of 1.5 inches.
6. The concrete apron toe was exposed at the upstream end of Box 2 with a maximum vertical exposure of 0.3 feet and at the downstream end of Box 1 with a maximum vertical exposure of 0.6 feet. No undermining of the concrete apron was observed.

GENERAL NOTES:

1. Box 1 and Box 2 of culvert were inspected underwater.
2. At the time of inspection, on September 27, 2012, the waterline was located approximately 5.6 feet below the top of the culvert headwall at the upstream end at the center wall. Since insufficient elevation information was available, an elevation of 100.0 was assumed. This corresponds to a waterline elevation of 94.4.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.

Legend

-0.4	Sounding Depth (9/27/2012)
(5)	Inspection Note Number

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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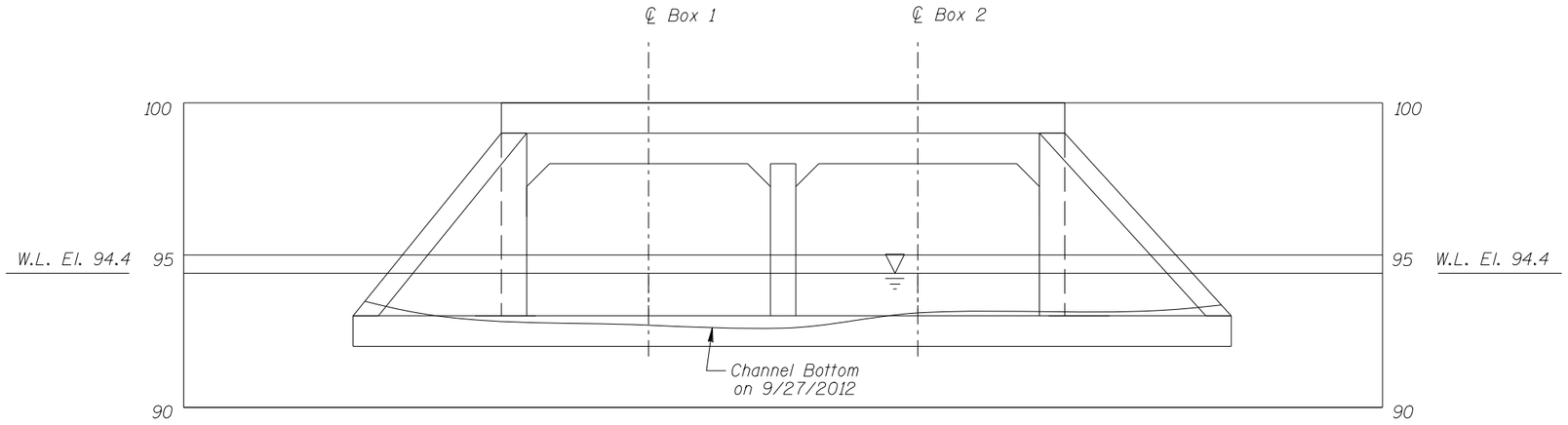
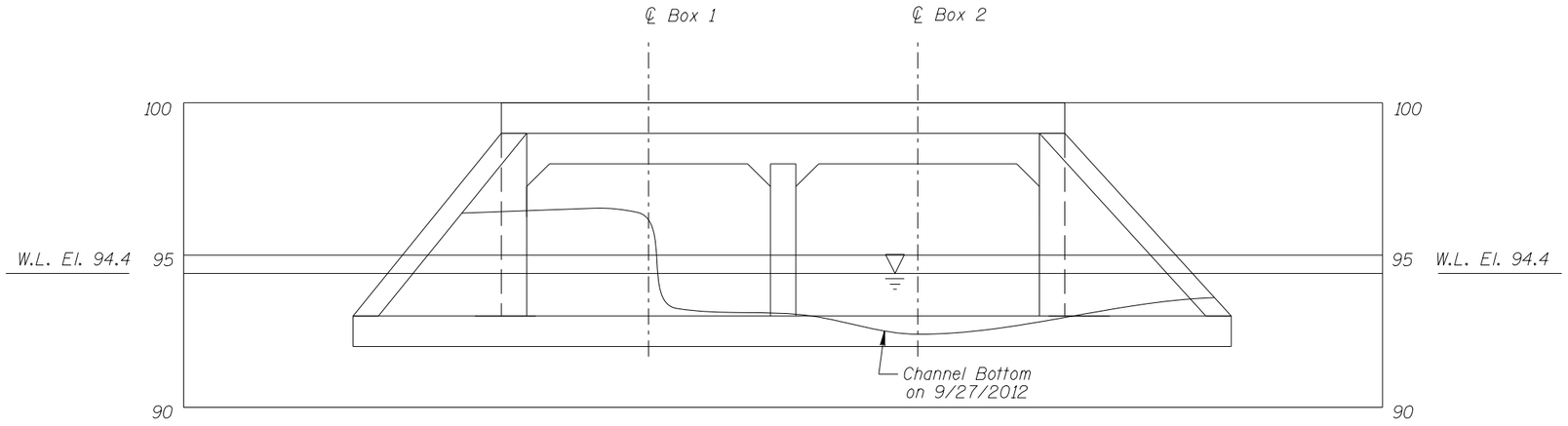
ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: MBP	COLLINS ENGINEERS 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: NOV. 2012
Checked By: LJ		Scale: 1"=10'
Code: 74237695		Figure No.: 1



DOWNSTREAM OPENING PROFILE



DOWNSTREAM OPENING PROFILE

Note:

Refer to Figure 1 for General Notes.

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UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: MBP	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: NOV. 2012
Checked By: LJ		Scale: 1"=5'
Code: 74237695		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: September 27, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 7695 WEATHER: Sunny, 60° F

WATERWAY CROSSED: Stone River

DIVING OPERATION: _____ SCUBA _____ SURFACE SUPPLIED AIR

X OTHER Inspection by Wading

PERSONNEL: Clayton Brookins, Marc B. Parker

EQUIPMENT: Dry Suit, Sounding Pole, Hand Tools, Camera, Underwater Light

TIME IN WATER: 2:50 P.M.

TIME OUT OF WATER: 3:15 P.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY 1 foot

DEPTH 2.0 feet maximum at the upstream opening

ELEMENTS INSPECTED: Box 1 and Box 2

REMARKS: Overall, the substructure units inspected were found to be in satisfactory to fair condition with some defects of only minor structural significance. The concrete of the walls and floor exhibited light scaling with a maximum penetration of 1/8 inch. Diagonal cracks were observed in the center wall extensions with a maximum width of 1/8 inch. The apron toe was exposed at the upstream and downstream openings with a maximum vertical exposure of 0.6 feet.

FURTHER ACTION NEEDED: X YES _____ NO

The area of concrete section loss at the downstream end of the center wall extension is not a structural concern at this time; however, it should be repaired to prevent further deterioration. The repair should include removal of concrete to a minimum of 1 inch behind the reinforcing steel, cleaning and replacing reinforcing steel as required, and placing concrete designed to provide high durability with low permeability.

Monitor the diagonal cracking and scaling during future inspections.

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

At the time of inspection of the submerged substructure units of Structure No. 7695, the waterline and water flow were noticeably lower than the mean values. As a result the inspection could be safely carried out by means of wading. During future inspections of the substructure units, a higher waterline elevation and/or increased flow may result in lower overhead clearance with a possibility of a confined space entrance requirements which may require a qualified dive team to safely carry out the inspection. If future inspections determine that the waterline consistently remains at a level which an inspection can be safely performed by the means of wading, consideration may be given to removing the structure from the underwater inspection list.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7695
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
WATERWAY CROSSED Stone River

INSPECTION DATE September 27, 2012

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	REINFORCED CONCRETE BOX CULVERT	FOOTINGS	DISPLACEMENT	OTHER (HEADWALL/WINGWALL)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (SILT & DEBRIS BUILDUP)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Concrete Culvert Box 1	1.8’	N	6	N	8	5	5	N	7	N	N	7	5	N	N	5	N	N
2	Concrete Culvert Box 2	2.0’	N	6	N	8	5	5	N	7	N	N	7	5	N	N	5	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure units inspected were found to be in satisfactory to fair condition with some defects of only minor structural significance. The concrete of the walls and floor exhibited light scaling with a maximum penetration of 1/8 inch. Diagonal cracks were observed in the center wall extensions with a maximum width of 1/8 inch. The apron toe was exposed at the upstream and downstream openings with a maximum vertical exposure of 0.6 feet.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.