UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. L6014

TWP 198

OVER

BEAVER RIVER

ST. LOUIS COUNTY

JUNE 18, 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 inspected at structure No. L6014, three corrugated metal pipe culverts, were found to be in fair condition with some defects of structural significance. All three culverts exhibited a band of heavy corrosion with widespread small areas of 100 percent section loss around the waterline. All three culverts exhibited some downward deflection/deformation, up to 6 inches, towards the downstream half of the culvert length. The concrete of the headwall and wingwalls was generally sound with only minor scaling around the waterline.

INSPECTION FINDINGS:

(A) The channel bottom material in the culverts and upstream and downstream of the culvert openings consisted of 1 foot diameter and smaller stone and gravel with some sand infill allowing no probe rod penetration.

(B) A 6 inch band of heavy corrosion was noted along the waterline with delaminations, typically 1/8 inch thick, and widespread areas of 100 percent section loss measuring 1 inch to 2 inches wide on the ribs of the corrugations. Within the affected area, the section loss typically ranged between 50 and 80 percent. The corrosion was heavier on the upstream and downstream quarters of the culverts. Moderate, less severe corrosion was observed above and below the noted 6 inch band with no associated complete loss of section.

(C) The concrete of the headwalls and wingwalls was generally sound with only light to moderate scaling with up to 1/2 inch penetration around the waterline. The concrete extended into the channel bottom.

(D) The top of the pipe has deflected/deformed downward 4 to 6 inches at approximately 5 feet to 10 feet from the downstream end of Pipes 1 and 2.

(E) The top of Pipe 3 has deflected/deformed downward 2 inches at approximately 15 feet from the downstream end of the culvert.

RECOMMENDATIONS:

(A) Monitor the roadway for any signs of settlement or depressions that may suggest CMP culvert deflection or distortion, which may warrant further action and a more frequent inspection.

(B) The inspection of the submerged substructure units of Structure No. L6014 can most likely be accomplished in the future without using a dive team. To conduct the underwater inspection, a properly equipped and qualified inspector will have to perform the inspection during a period of low water and low flow. As channel bottom contours and water depths can change abruptly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether a wading inspection is possible prior to beginning the inspection. If conditions are unsafe for inspection by wading, then an underwater inspection with the use of a dive team will be required.

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

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

Respectfully submitted,

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: L6014

Feature Crossed: Beaver River

Feature Carried: TWP 198

Location: St. Louis County

Bridge Description: The structure consists of three 4 foot diameter corrugated metal pipe culverts with a concrete headwall at the upstream opening.

2. INSPECTION DATA

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

Dive Team: Clayton Brookins, Breanne Stromberg

Date: June 18, 2012

Weather Conditions: Cloudy, 70^{o} F

Underwater Visibility: 1 feet

Waterway Velocity: 1.5 ft/s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Corrugated Metal Pipe Culverts (CMP) #1, #2, and #3.

General Shape: 4 foot diameter Corrugated Metal Pipe.

Maximum Water Depth at Substructure Inspected: Approximately 2.9 feet.

4. WATERLINE DATUM

Water Level Reference: Top of the concrete headwall at the upstream end of CMP #1

Water Surface: The waterline was approximately 2.3 feet below the reference. Assumed Waterline Elevation 97.7.

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

Item 62: Culvert: Code 5

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code A/06/12

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
240	Corrugated Metal Pipe Culvert	108	LF			108		

Photograph 1. View of Upstream Openings and Headwall, Looking North.

Photograph 2. View of Downstream Openings, Looking West.

Photograph 3. View along the Length of CMP #1, Looking Southwest.

Photograph 4. View along the Length of CMP #2, Looking Southwest.

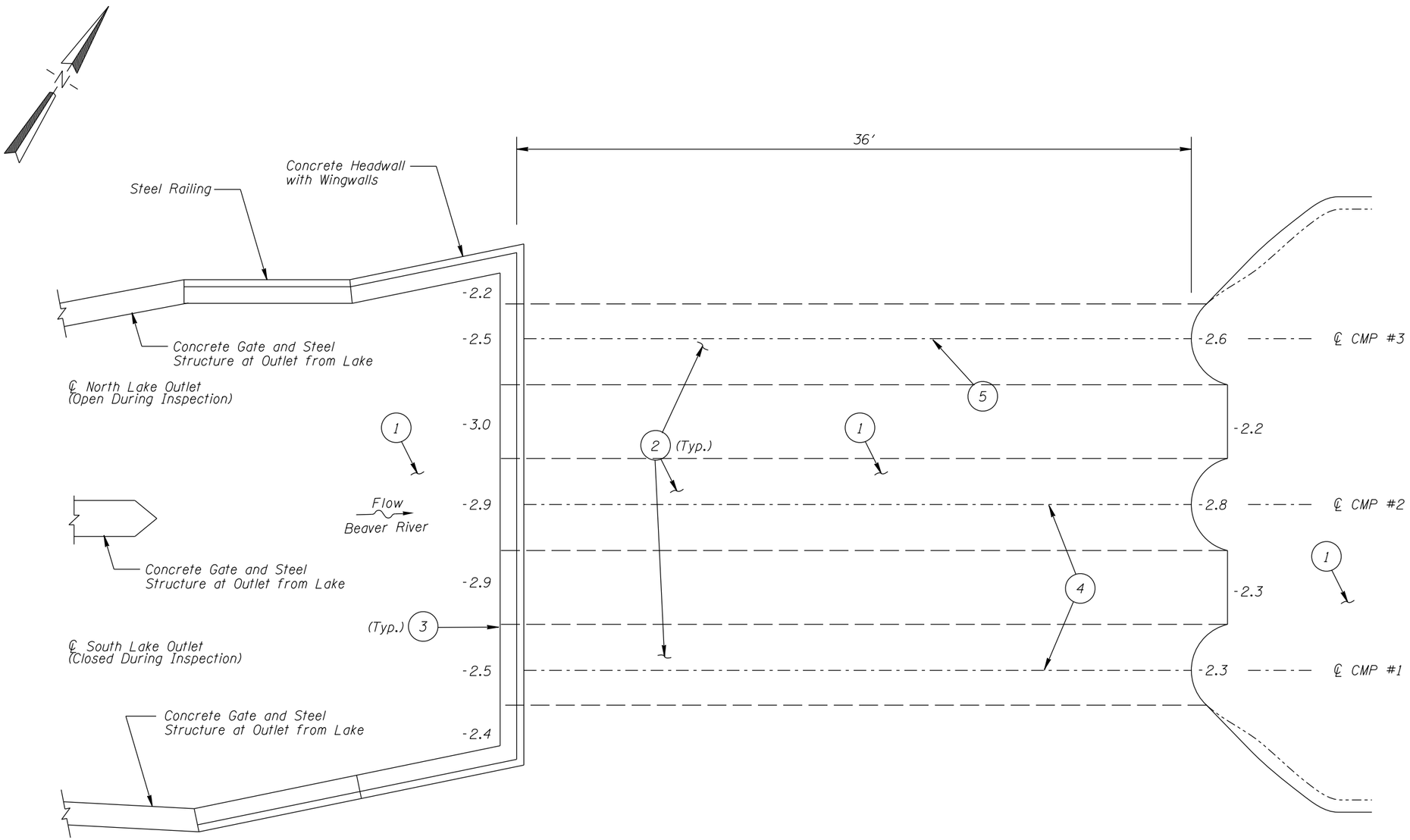
Photograph 5. View along the Length of CMP #3, Looking Southwest.

Photograph 6. View of the Typical Steel Condition at and above the Waterline Showing Heavy Corrosion and 100 percent Section Loss, Looking North.

Photograph 7. View of the Upstream Channel and Dam Gates to the Lake, Looking Southwest.

Photograph 8. View of the Downstream Channel, Looking Northeast.

Photograph 9. View of TWP 198 Roadway over the Three CMP Culverts, Looking Northwest.



SOUNDING PLAN

GENERAL NOTES:

1. CMP #1, #2, and #3 were inspected underwater.
2. At the time of inspection on June 18, 2012, the waterline was located approximately 2.3 feet below the top of headwall at the upstream end of CMP # 1. Due to lack of design plan information the reference elevation was assumed to be 100 feet. This corresponds to a waterline elevation of 97.7 feet.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the upstream and downstream openings of the culvert pipes.

INSPECTION NOTES:

(1) The channel bottom material in the culverts and upstream and downstream of the culvert openings consisted of 1 foot diameter and smaller stone and gravel with some sand infill allowing no probe rod penetration.

(2) A 6 inch band of heavy corrosion was noted along the waterline with delaminations, typically 1/8 inch thick, and widespread areas of 100 percent section loss measuring 1 inch to 2 inches wide on the ribs of the corrugations. Within the affected area the section loss typically ranged between 50 and 80 percent. The corrosion was heavier on the upstream and downstream quarters of the culverts. Moderate corrosion was observed above and below the deteriorated 6 inch band with no associated complete section loss.

(3) The concrete of the headwalls and wingwalls was generally sound with light to moderate scaling with up to 1/2 inch penetration around the waterline. The concrete extended completely into the channel bottom.

(4) The top of the pipe has deflected/deformed downward 4 to 6 inches at approximately 5 feet to 10 feet from the downstream end of CMP #1 and #2.

(5) The top of Pipe 3 has deflected/deformed downward ±2 inches at approximatly 15 feet from the downstream end of the culvert.

Legend

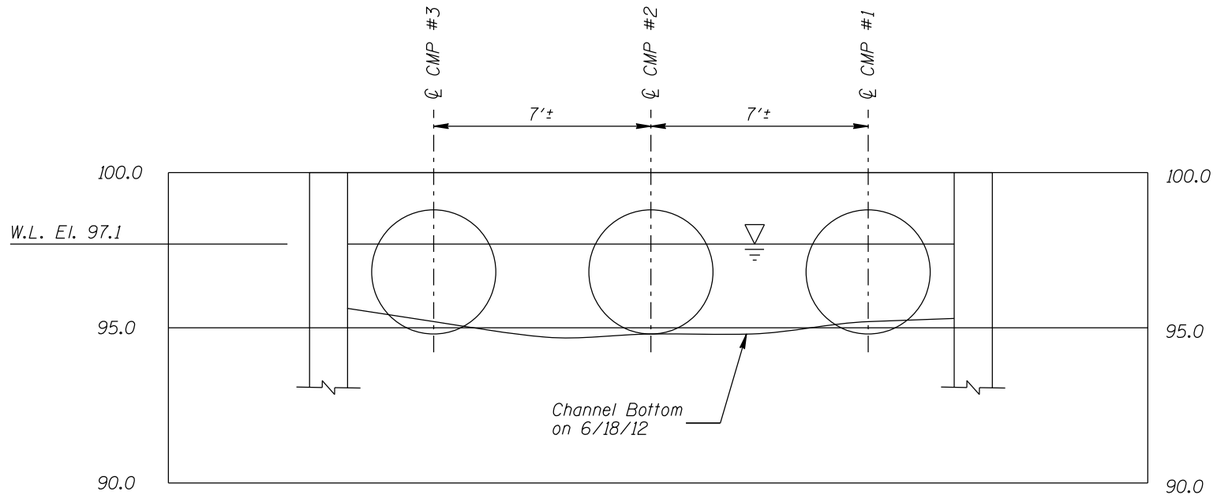
-1.0	Sounding Depth from Waterline (7/18/08)
(1)	Inspection Note Number

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

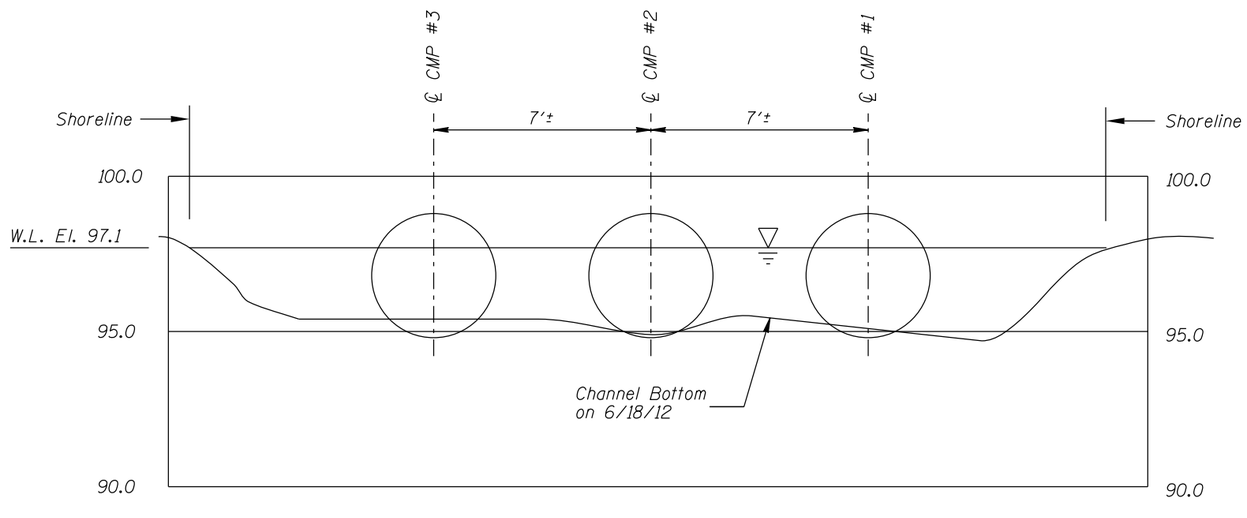
STRUCTURE NO. L6014
TWP 198 OVER THE BEAVER RIVER
ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: MBP	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: JUNE, 2012
Checked By: LJ		Scale: NTS
Code: 7423L6014		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

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INSPECTION AND SOUNDING PLAN

Drawn By: MBP	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: JUNE, 2012
Checked By: LJ		Scale: 1"=5'
Code: 7423L6014		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: June 18, 2012

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

BRIDGE NO: L6014 WEATHER: Cloudy, 70° F

WATERWAY CROSSED: Beaver River

DIVING OPERATION: _____ SCUBA _____ SURFACE SUPPLIED AIR

X OTHER Inspection by Wading

PERSONNEL: Marc B. Parker, Michael J. Banasiak

EQUIPMENT: Dry Suit, U/W Light, Scraper, Lead Line, Probe Rod, Camera

TIME IN WATER: 11:15 A.M.

TIME OUT OF WATER: 12:15 P.M.

WATERWAY DATA: VELOCITY 1.5 ft/s

VISIBILITY 1 feet

DEPTH 2.9 feet maximum

ELEMENTS INSPECTED: Corrugated Metal Pipe Culvert (CMP) #1, #2, and #3

REMARKS: Overall, the three corrugated metal pipe culverts were found to be in fair condition with some defects of structural significance. All three culverts exhibited a band of heavy corrosion with widespread small areas of 100 percent section loss around the waterline. All three culverts exhibited some downward deflection/deformation, up to 6 inches, near the downstream half of the culvert length. The concrete of the headwall and wingwalls was generally sound with only minor scaling around the waterline.

FURTHER ACTION NEEDED: _____ YES ___X___ NO

Monitor the roadway for any signs of settlement or depressions that may suggest CMP culvert deflection or distortion, which may warrant further action and a more frequent inspection.

The inspection of the submerged substructure units of Structure No. L6014 can most likely be accomplished in the future without using a dive team. To conduct the underwater inspection, a properly equipped and qualified inspector will have to perform the inspection during a period of low water and low flow. As channel bottom contours and water depths can change abruptly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether a wading inspection is possible prior to beginning the inspection. If conditions are unsafe for inspection by wading, then an underwater inspection with the use of a dive team will be required.

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

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. L6014
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G Stromberg, P.E.
WATERWAY CROSSED Beaver River

INSPECTION DATE June 18, 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.		MAXIMUM DEPTH OF WATER	PILING	CULVERT	FOOTINGS	DISPLACEMENT	OTHER (CMP PIPE)	OVERALL SUBSTRUCTURE CONDITION CODE	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	CPM #1	2.5’	N	N	N	5	5	5	N	7	7	N	7	N	5	N	5	N	N
	CPM #2	2.9’	N	N	N	5	5	5	N	7	7	N	7	N	5	N	5	N	N
	CPM #3	2.6’	N	N	N	6	5	5	N	7	7	N	7	N	5	N	5	N	N

REMARKS: Overall, the three corrugated metal pipe culverts were found to be in fair condition with some defects of structural significance. All three culverts exhibited a band of heavy corrosion with widespread small areas of 100 percent section loss around the waterline. All three culverts exhibited some downward deflection/deformation, up to 6 inches, towards the downstream half of the culvert length. The concrete of the headwall and wingwalls was generally sound with only minor scaling around the waterline.

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.