UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 88798

CR 600

OVER THE

FLINT CREEK

ST. LOUIS COUNTY

SEPTEMBER 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 unit inspected below water at Structure No. 7185, Bent 1, was found to be in satisfactory condition with only minor defects of structural significance. The timber of the piles and cross-bracing was generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. Bent 1 was leaning to the north approximately 6 inches on the downstream nose and 4 inches on the upstream nose; the pile cap is fully bearing on all the piles and square with all of the bridge girders. The cross-brace on the north face of Bent 1 was broken just east of Pile D and not connected to Pile E. A heavy accumulation of 4 inch diameter and smaller timber debris was observed between Bent 1 and the North Abutment. Random timber and other debris was scattered throughout the channel.

INSPECTION FINDINGS:

(A) The channel bottom material typically consisted of gravel and silt with a maximum probe rod penetration of 4 inches. Random debris was scattered throughout the channel.

(B) The timber piles were generally sound with random splitting or checking that was typically 1/4 inch wide and 1 inch deep.

(C) The north cross-brace at Bent 1 was broken just east of Pile D. The brace was not connected to Pile E.

(D) Bent 1 is leaning to the north up to 6 inches at Pile A (approximately 86.5 degrees) and 4 inches at Pile E (approximately 87.5 degrees). The pile cap is bearing fully on all piles and is square with the bridge girders. The leaning appears to be related to original construction rather than a result of any bent movement.

(E) A heavy accumulation of timber debris, consisting of logs and branches up to 4 inches in diameter, was observed between Bent 1 and the North Abutment extending from the channel bottom to 5 feet above the waterline.

(F) Random abandoned 12 inch diameter timber piles were observed in the channel.

RECOMMENDATIONS:

(A) The timber debris accumulation between Bent 1 and the North Abutment did not significantly affect the channel flow, and as a result, does not require removal at this time. If the debris accumulation increases in size or density, it may be necessary to remove the debris to reduce excessive lateral loads on the structure, limit further debris accumulation, and reduce the likelihood of channel bottom degradation resulting from obstructed channel flow.

(B) Monitor Bent 1 for any further leaning. If the bent shows signs of further leaning, loss of pile bearing, or pile cap rotation repairs may be warranted at that time.

(C) The inspection of the submerged substructure units of Structure No. 88798 can most likely be accomplished in the future without using a dive team. To perform the underwater inspection, a properly equipped qualified inspector will have to enter the water during a period of low flow. As channel bottom contours and depths of flow can change quickly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether wading 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.

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

Respectfully submitted,

Inspection Team Leader:

Nicholas R. Triandafilou

Nicholas R. Triandafilou, 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: 88798

Feature Crossed: Flint Creek

Feature Carried: CR 600

Location: St. Louis County

Bridge Description: The superstructure consists of a timber deck supported by steel beams. The superstructure is supported by two timber abutments and one timber pile bent.

2. INSPECTION DATA

Professional Engineer Diver: Nicholas R. Triandafilou, P.E.

Dive Team: Marc B. Parker, Clayton Brookins

Date: September 18, 2012

Weather Conditions: Sunny, 62°F

Underwater Visibility: < 0.5 feet

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Bent 1

General Shape: The superstructure consists of a timber deck supported by steel I-beams. The superstructure is supported by two timber abutments and one pile bent. Each abutment and Bent 1 consist of five 12 inch diameter timber piles labeled A through E from south to north with a 12 inch by 12 inch pile cap. Bent 1 has two diagonal 3 inch by 12 inch cross-bracing boards.

Maximum Water Depth at Substructure Inspected: Approximately 1.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pile cap above Pile C on the north side of Bent 1.

Water Surface: The waterline was approximately 8.1 feet below reference.
Assumed Waterline Elevation = 91.9 feet.

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

Item 60: Substructure Condition: Code 6

Item 61: Channel and Channel Protection: Code 5

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

Item 113: Scour Critical Bridges: Code I/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
228	Timber Piling	5	EA	0	5	0	0	n/a
360	Settlement	1	EA	0	1	0	n/a	n/a
985	Slopes and Slope Protection	1	EA	1	0	0	n/a	n/a

Photograph 1. Overall View of Structure, Looking Southeast.

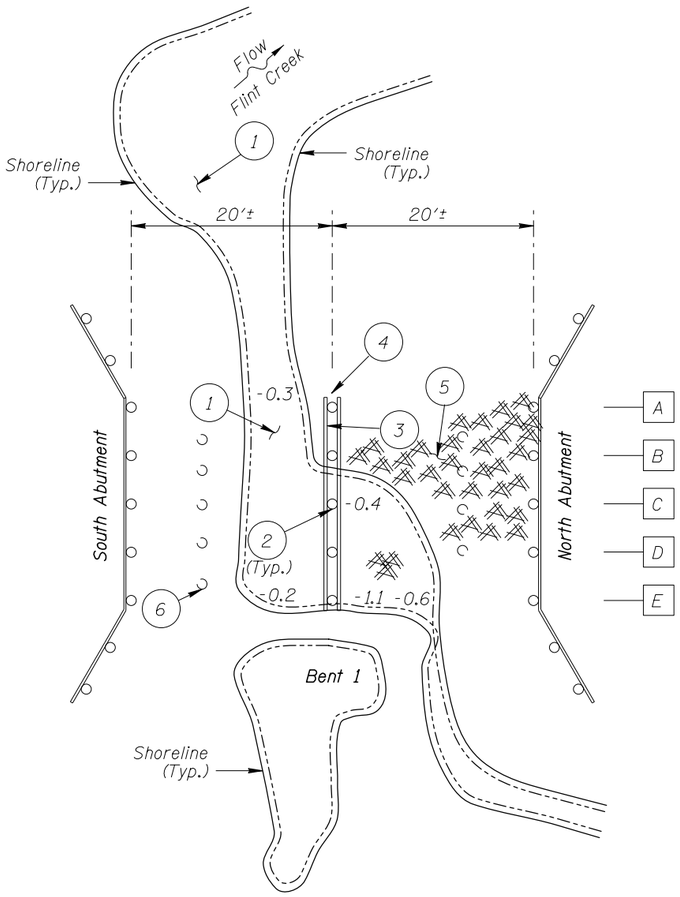
Photograph 2. View of the Bent 1 and Timber Debris Accumulation, Looking Southwest.

Photograph 3. View of Typical Timber Pile Condition, Looking Northwest.

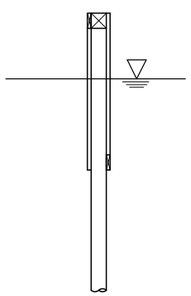
Photograph 4. View of Broken and Not Connected Cross-brace at the Pile E on the North Face of Bent 1, Looking Southwest.

Photograph 5. View of Bent 1 Leaning to the North at the upstream nose (yellow tape is vertical), Looking West.

Photograph 6. View of Bent 1 Leaning to the North at the downstream nose (yellow tape is vertical), Looking East.



SOUNDING PLAN



END VIEW OF BENT

INSPECTION NOTES:

1. The channel bottom material typically consisted of gravel and silt with a maximum probe rod penetration of 4 inches. Random debris was scattered throughout the channel.
2. The timber piles were generally sound with random splitting or checking that was typically $\frac{1}{4}$ inch wide and 1 inch deep.
3. The north cross-brace at Bent 1 was broken just east of Pile D. The brace was not connected to Pile E.
4. Bent 1 is leaning to the north up to 6 inches at Pile A and 4 inches at Pile E. The pile cap is bearing fully on all piles and is square with the bridge girders. The leaning appears to be related to original construction rather than a result of any bent movement.
5. A heavy accumulation of timber debris, consisting of logs and branches up to 3 inches in diameter, was observed between Bent 1 and the North Abutment extending from the channel bottom to 5 feet above the waterline.
6. Random abandoned 12 inch diameter timber piles were observed in the channel.

GENERAL NOTES:

1. Bent 1 was inspected underwater.
2. At the time of inspection on September 18, 2012, the waterline was located approximately 8.1 feet below the top of the pile cap above Pile C on the north side of Bent 1. Since elevation information was not available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 91.9.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.

Legend

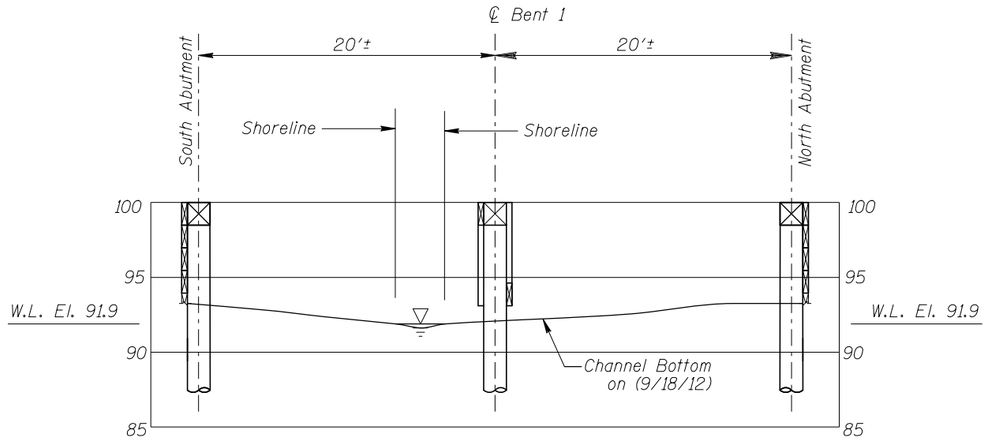
-17.0	Sounding Depth from Waterline (9/18/12)
A	Pile Identification Designation
○	12"ϕ Timber Pile
◠	12"ϕ Abandoned Timber Pile
(1)	Inspection Note Number
	Timber Debris

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

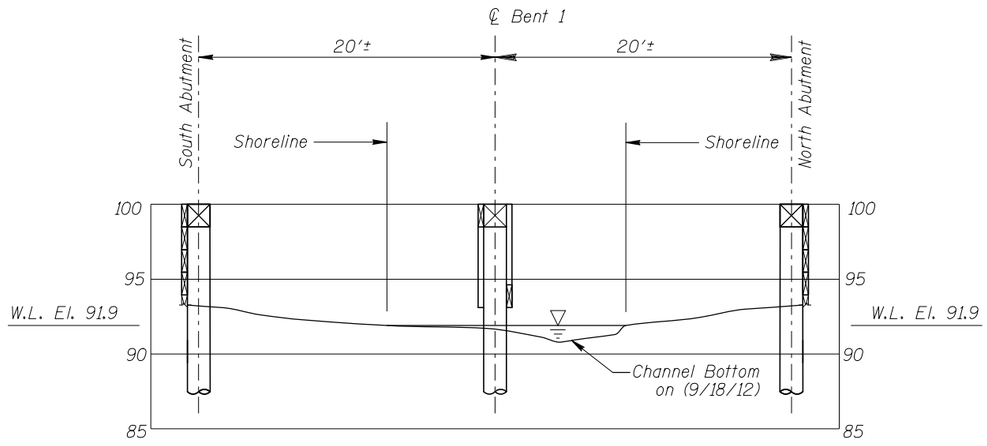
STRUCTURE NO. 88798
CR 600 OVER THE THE FLINT CREEK
ST. LOUIS COUNTY

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: OCTOBER, 2012
Checked By: LJ		Scale: 1"=15'
Code: 742388798		Figure No.: 1



DOWNSTREAM FASCIA PROFILE



UPSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 88798
CR 600 OVER THE THE FLINT CREEK
ST. LOUIS COUNTY

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: OCTOBER, 2012
Checked By: LJ		Scale: 1"=10'
Code: 742388798		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 88798
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Nicholas R. Triandafilou, P.E.
WATERWAY CROSSED Flint Creek

INSPECTION DATE September 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.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING (OLD PILING)	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (CROSS-BRACING)	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
1	Bent 1	1.1’	6	N	N	5	5	6	N	7	7	5	5	N	N	6	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure unit inspected underwater was found to be in satisfactory condition with only minor defects of structural significance. The timber of the piles and cross-bracing was generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. Bent 1 was leaning to the north approximately 6 inches on the downstream nose and 4 inches on the upstream nose; the pile cap is fully bearing on all the piles and square with all of the bridge girders. The cross-brace on the north face of Bent 1 was broken just east of Pile D and not connected to Pile E. A heavy accumulation of 4 inch diameter and smaller timber debris was observed between Bent 1 and the North Abutment. Random timber and other debris was scattered throughout the channel.

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.

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

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

ON-SITE TEAM LEADER: Nicholas R. Triandafilou, P.E.

BRIDGE NO: 88798 WEATHER: Sunny, 62° F

WATERWAY CROSSED: Flint Creek

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: 3:30 P.M.

TIME OUT OF WATER: 4:30 P.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY None/Negligible

DEPTH 1.1 feet maximum at Bent 1

ELEMENTS INSPECTED: Bent 1

REMARKS: Overall, the substructure unit inspected underwater was found to be in satisfactory condition with only minor defects of structural significance. The timber of the piles and cross-bracing was generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. Bent 1 was leaning to the north approximately 6 inches on the downstream nose and 4 inches on the upstream nose; the pile cap is fully bearing on all the piles and square with all of the bridge girders. The cross-brace on the north face of Bent 1 was broken just east of Pile D and not connected to Pile E. A heavy accumulation of 4 inch diameter and smaller timber debris was observed between Bent 1 and the North Abutment. Random timber and other debris was scattered throughout the channel.

FURTHER ACTION NEEDED: _____ YES ___X____ NO

The timber debris accumulation between Bent 1 and the North Abutment did not significantly affect the channel flow, and as a result, does not require removal at this time. If the debris accumulation increases in size or density, it may be necessary to remove the debris to reduce excessive lateral loads on the structure, limit further debris accumulation, and reduce the likelihood of channel bottom degradation resulting from obstructed channel flow.

Monitor Bent 1 for any further leaning. If the bent shows signs of further leaning, loss of pile bearing, or pile cap rotation repairs may be warranted at that time.

The inspection of the submerged substructure units of Structure No. 88798 can most likely be accomplished in the future without using a dive team. To perform the underwater inspection, a properly equipped qualified inspector will have to enter the water during a period of low flow. As channel bottom contours and depths of flow can change quickly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether wading 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.