UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. L8542

MUN ROUTE 10

OVER THE

LITTLE FORK RIVER

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 units inspected below water at Structure No. L8542, the North and South Abutments and Bent 1, were found to be in fair condition with only minor defects of structural significance. The timber of the piles and cross-bracing was at times decayed, but generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. 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 rocks, gravel and silt with a maximum probe rod penetration of 2 inches. Random debris was scattered throughout the channel.

(B) The timber piles typically exhibited external decay from the channel bottom to 1 foot above the waterline. The timber typically allowed an awl penetration of 1/4 inch and a maximum penetration of 1/2 inch. From 1 foot above the waterline to the top of the piles, the timber was sound with random splitting or checking up to 3/8 inch wide and 1 inch deep.

(C) Heavier timber deterioration and decay, allowing a maximum awl penetration of 1 inch, was observed on the west side of Piles A, B and E of Bent 1 and Piles A and B of the North Abutment. The area of deterioration and decay typically extended from the channel bottom to 1 foot above the waterline.

(D) Pile G of the South Abutment had cap bearing only on the southern 2 inches of the top of the pile.

(E) The timber cross-bracing was typically sound with random splitting at the connections up to 1/2 inch wide.

(F) A 1 inch gap was observed in the 2"x4" backwall boards at approximately 4 feet above the waterline extending from Pile H to Pile F of the South Abutment. No significant loss of backfill was observed.

(G) A slight rotation towards the channel was observed at the southeast wingwall. The wall showed no signs of structural inadequacy.

(H) A heavy accumulation of timber debris consisting of 1 foot diameter and smaller logs and branches was observed extending from Bent 1 to the South Abutment at the upstream half of the channel and along all of Bent 1. The debris extended from the channel bottom to 4 feet above the waterline. Random steel and old tire debris was scattered throughout the timber debris.

RECOMMENDATIONS:

(A) The timber debris accumulations between the South Abutment and Bent 1 and throughout the channel is obstructing majority of the channel and should be removed at this time. Removal of the timber debris will reduce excessive lateral loads on the bent, limit further debris accumulation, and reduce the likelihood of channel bottom degradation resulting from obstructed flow.

(B) Monitor the timber of the piles with noted heavier deterioration and decay and consider level III testing (core sampling) to verify interior soundness.

(C) Monitor inclination of Bent 1 and the southeast wingwall rotation.

(D) The inspection of the submerged substructure units of Structure No. L8542 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.

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

Respectfully submitted,

Inspection Team Leader:

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: L8542

Feature Crossed: Little Fork River

Feature Carried: Mun Route 10

Location: St. Louis County

Bridge Description: The super structure 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: < 1.0 feet

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The North and South Abutments and 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 timber pile bent. Each Abutment and Bent 1 consists of eight 12 inch diameter timber piles labeled A through H from west to east with a 12 inch by 12 inch pile cap. Bent 1 has six diagonal 3 inch by 12 inch cross-bracing boards.

Maximum Water Depth at Substructure Inspected: Approximately 1.4 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pile cap at the upstream end of Bent 1.

Water Surface: The waterline was approximately 7.2 feet below reference.
Assumed Waterline Elevation = 92.8 feet.

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

Item 60: Substructure Condition: Code 5

Item 61: Channel and Channel Protection: Code 4

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
206	Timber Columns	29	EA	0	24	5	0	n/a
216	Timber Abutment	92	LF	0	92	0	0	n/a
386	Timber Wingwall	4	EA	0	2	2	0	n/a
985	Slopes and Slope Protection	1	EA	0	1	0	n/a	n/a

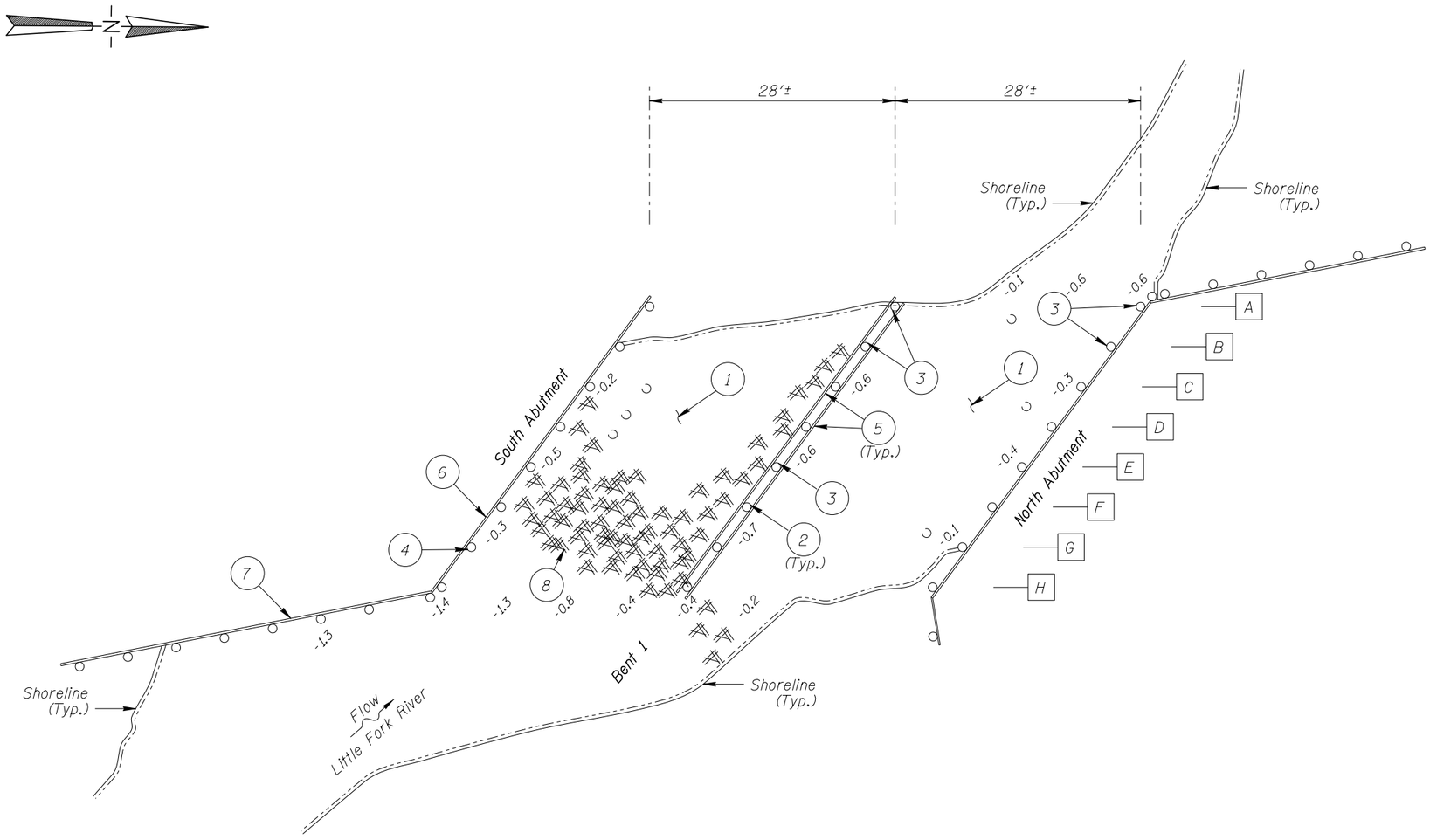
Photograph 1. Overall View, Looking Northwest.

Photograph 2. View of the South Abutment, Looking Southeast.

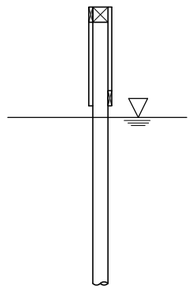
Photograph 3. View of Bent 1, Looking Southwest.

Photograph 4. View of the North Abutment, Looking Northwest.

Photograph 5. View of Heavy Timber Debris Accumulation between the South Abutment and Bent 1, Looking Southwest.



SOUNDING PLAN



END VIEW OF BENT

GENERAL NOTES:

1. The North and South Abutments and Bent 1 were inspected underwater.
2. At the time of inspection on September 18, 2012, the waterline was located approximately 7.2 feet below the top of the pile cap at the upstream end 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 92.8.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.

INSPECTION NOTES:

(1) The channel bottom material typically consisted of rocks, gravel and silt with a maximum probe rod penetration of 2 inches. Random debris was scattered throughout the channel.

(2) The timber piles typically exhibited external decay from the channel bottom to 1 foot above the waterline. The timber typically allowed an awl penetration of $\frac{1}{4}$ inch and a maximum penetration of $\frac{1}{2}$ inch. From 1 foot above the waterline to the top of the piles, the timber was sound with random splitting or checking up to $\frac{3}{8}$ inch wide and 1 inch deep.

(3) Heavier timber deterioration and decay, allowing a maximum awl penetration of 1 inch, was observed on the west side of Piles A, B and E of Bent 1 and Piles A and B of the North Abutment. The area of deterioration and decay typically extended from the channel bottom to 1 foot above the waterline.

(4) Pile G of the South Abutment had cap bearing only on the southern 2 inches of the pile.

(5) The timber cross-bracing was typically sound with random splitting at the connections up to $\frac{1}{2}$ inch wide.

(6) A 1 inch gap was observed in the 2"x4" backwall boards at approximately 4 feet above the waterline extending from Pile H to Pile F of the South Abutment. No significant loss of backfill was observed.

(7) A slight rotation towards the channel was observed at the southeast wingwall. The wall showed no signs of structural inadequacy.

(8) A heavy accumulation of timber debris consisting of 1 foot diameter and smaller logs and branches was observed extending from Bent 1 to the South Abutment as shown. The debris extended from the channel bottom to 4 feet above the waterline. Random steel and old tires debris was scattered throughout the timber debris.

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

Note:

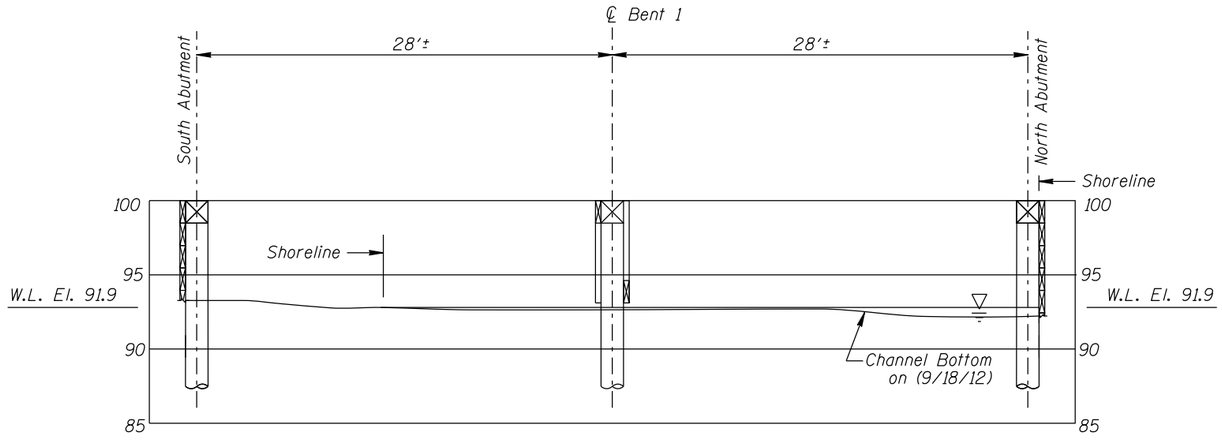
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

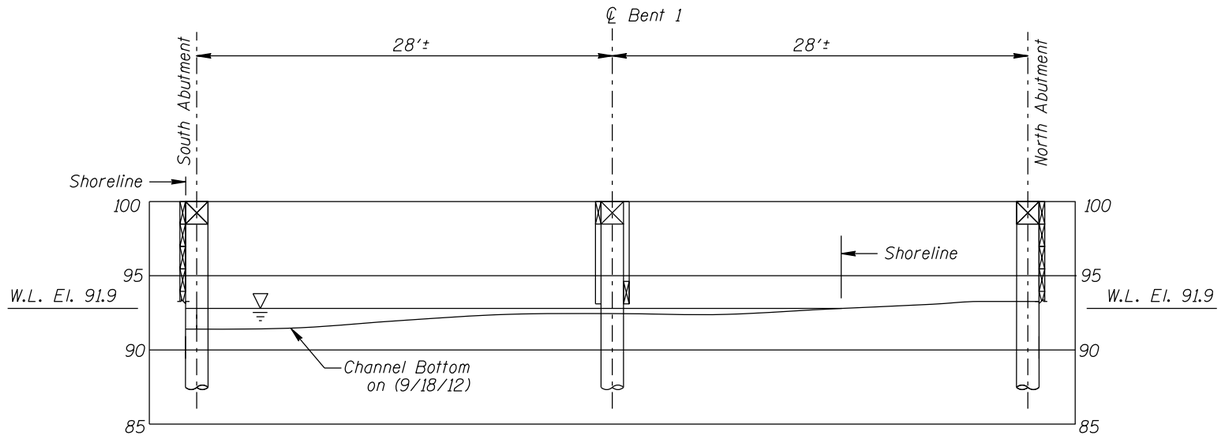
STRUCTURE NO. L8542
MUN 10 OVER THE THE LITTLE FORK RIVER
ST. LOUIS COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: MBP	COLLINS ENGINEERS 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: NOVEMBER, 2012
Checked By: LJ		Scale: N.T.S.
Code: 7423L8542		Figure No.: 1



DOWNSTREAM FASCIA PROFILE



UPSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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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: NOVEMBER, 2012
Checked By: LJ		Scale: 1"=10'
Code: 7423L8542		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. L8542
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Nicholas R. Triandafilou, P.E.
WATERWAY CROSSED Little Fork River

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	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
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	South Abutment	1.4’	5	N	N	5	N	5	N	6	6	4	4	N	N	5	N	N	N
	Bent 1	0.7’	5	N	N	6	6	5	N	N	N	4	4	N	N	5	N	N	N
	North Abutment	0.6’	5	N	N	6	N	5	N	6	7	5	5	N	N	5	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure unit inspected underwater were found to be in fair condition with only minor defects of structural significance. The timber of the piles and cross-bracing was at times decayed, but generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. 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: L8542 WEATHER: Sunny, 62° F

WATERWAY CROSSED: Little Fork 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: 5:00 P.M.

TIME OUT OF WATER: 6:30 P.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY < 1.0 feet

DEPTH 1.4 feet maximum at Southeast Wingwall

ELEMENTS INSPECTED: North and South Abutment and Bent 1

REMARKS: Overall, the substructure unit inspected underwater were found to be in fair condition with only minor defects of structural significance. The timber of the piles and cross-bracing was at times decayed, but generally sound exhibiting random splitting or checking up to 1/4 inch wide and 1 inch deep. 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: ___X____ YES _____ NO

The timber debris accumulations between the South Abutment and Bent 1 and throughout the channel is obstructing majority of the channel and should be removed at this time. Removal of the timber debris will reduce excessive lateral loads on the bent, limit further debris accumulation, and reduce the likelihood of channel bottom degradation resulting from obstructed flow.

Monitor the timber of the piles with noted heavier deterioration and decay and consider level III testing (core sampling) to verify interior soundness.

Monitor inclination of Bent 1 and the southeast wingwall rotation.

The inspection of the submerged substructure units of Structure No. L8542 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.