

UNDERWATER BRIDGE INSPECTION REPORT

---

STRUCTURE NO. 7877

COUNTY ROAD 367

OVER THE

PIKE RIVER

ST. LOUIS COUNTY

---



JUNE 21, 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 at Bridge 7877, Bents 1 through 5, were generally in good condition below water with no defects of structural significance observed. Timber piles and cross-bracing members were typically firm and sound, with no appreciable indications of decay, although two locations of bracing damage were observed that has compromised the brace-to-pile connection. A number of piles have upper portions that have been repaired with new splice-in-pile sections and all splices were secure and sound. The channel bottom around the substructure units appeared stable with no evidence of significant scour.

INSPECTION FINDINGS:

- (A) The channel bottom material consists of firm silty sand, gravel, and cobbles allowing probe rod penetration of 2 inches typical and up to 6 inches maximum penetration.
- (B) All timber piles were generally firm and sound with no indication of decay or soft areas. The timber typically allowed awl penetrations of 1/8 inch or less.
- (C) There was a split in the cross-brace at the brace-to-pile connection at Pile A of Bent 1. The Split measures 4 feet long by 1 inch wide and fully penetrates the cross-brace compromising the connection.
- (D) The cross-brace on the west face of Pile E of Bent 4 exhibited up to 50 percent loss of section. The cross-brace is no longer connected to the pile.

- (E) A splice-in-pile repair of the upper pile portion was observed on several piles. The piles which were repaired are Piles C and E of Bent 1, Piles B, C, and E of Bent 2, Piles B and E of Bent 3, Piles A, D, and E of Bent 4, and Piles A, C and D of Bent 5. All spliced sections were generally in good condition with minor checking or splitting with the exception of a ½ inch wide split observed on the east face of the spliced section at Pile C of Bent 2.

RECOMMENDATIONS:

- (A) Monitor cross-bracing member deterioration and/or brace-to-pile connections during future underwater inspections. If deficiencies are found to be progressing, then consideration may need to be given to repair the cross-braces or otherwise enhance the lateral stability of the structure.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:  
Daniel G. Stromberg

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: 7877

Feature Crossed: Pike River

Feature Carried: CR 367

Location: St. Louis County

Bridge Description: The superstructure consists of timber decking supported by timber beams. The superstructure was supported by two timber abutments and five timber bents with 12 inch by 12 inch pile caps. The abutments and bents each consisted of five 12 inch diameter timber piles. The substructure units are designated as the East Abutment, Bents 1 through 5, and the West Abutment. Piles are designated A through E from north to south.

2. INSPECTION DATA

Professional Engineer/ Team Leader: Daniel G. Stromberg, P.E.

Dive Team: Breanne M. Stromberg, Clay G. Brookins

Date: June 21, 2012

Weather Conditions: Sunny, 65 °F

Underwater Visibility: 2 ft.

Waterway Velocity: 1 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Bents 1 through 5

General Shape: Bents 1 through 5 consist of five 12 inch diameter timber piles with two 3 inch by 12 inch diagonal cross-bracing members. The piles of each pier support a 12 inch by 12 inch timber cap.

Maximum Water Depth at Substructure Inspected: Approximately 9.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream end of Bent 3.

Water Surface: The waterline was approximately 4.1 feet below reference.  
Assumed waterline elevation: 95.9 feet

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

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 7

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

Item 113: Scour Critical Bridges: Code I

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 MEMBER CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
228	Timber Piling	25	EA	13	12			
235	Timber Pier Cap/Bearing Cap	115	LF	115				



Photograph 1. Overall View of Upstream Fascia, Looking North.



Photograph 2. Overall View of Downstream Fascia, Looking Southeast.



Photograph 3. View of Bent 1, Looking Southwest.



Photograph 4. View of Bent 2, Looking Northeast.



Photograph 5. View of Bent 3, Looking Northwest.



Photograph 6. View of Bent 4, Looking Northwest.



Photograph 7. View of Bent 5, Looking Southwest.



Photograph 8. View of East Abutment (Not Inspected Underwater), Looking Southeast.



Photograph 9. View of Typical Splice-In-Pile Repair at Pile E of Bent 1, Looking Northeast.



Photograph 10. View of Timber Cross-Brace Loss of Section at Pile E of Bent 4, Looking West.



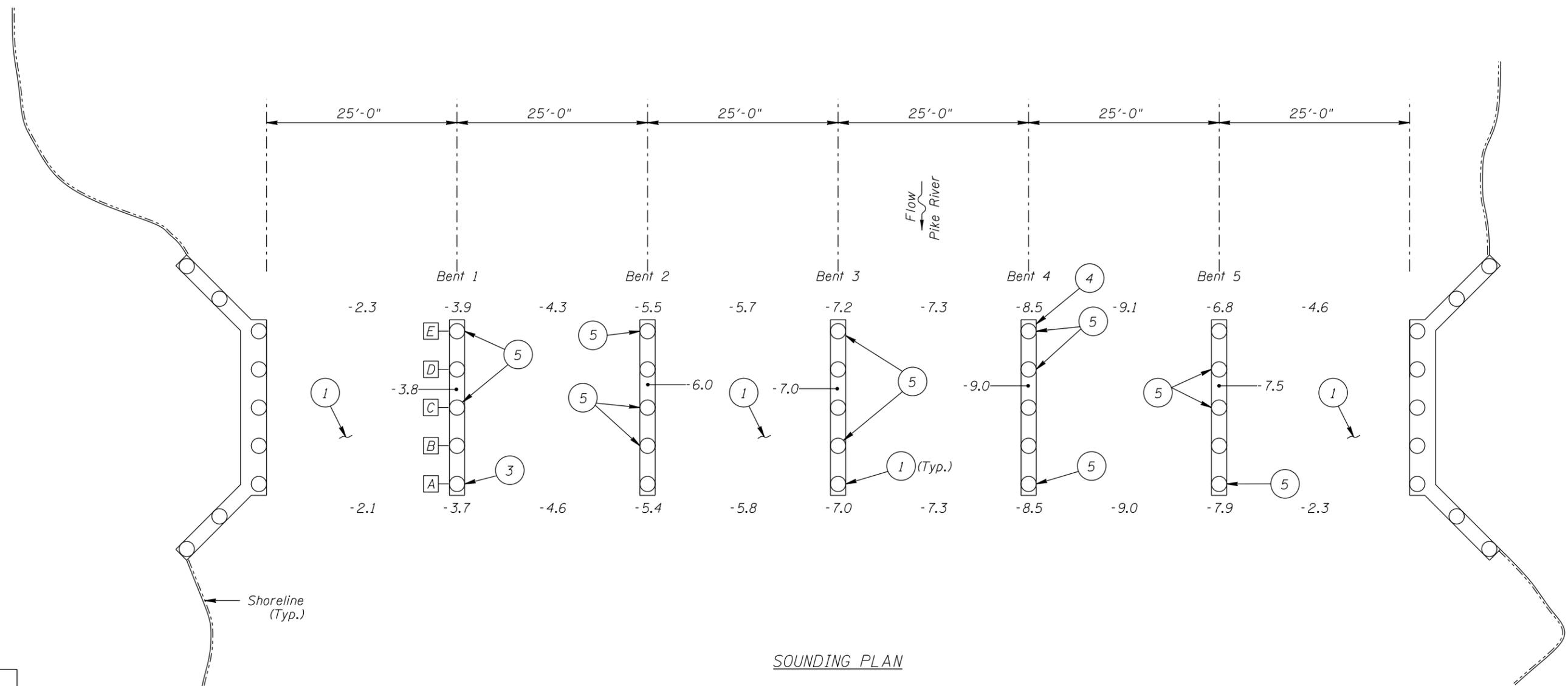
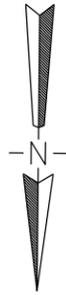
Photograph 11. View of Upstream Channel, Looking South.



Photograph 12. View of Downstream Channel, Looking North.



Photograph 13. View of CR 367 Over the Pike River, Looking East.



TYPICAL END VIEW OF BENTS

GENERAL NOTES:

1. Bent 1 thru Bent 5 were inspected underwater.
2. At the time of inspection on June 21, 2012, the waterline was located approximately 4.1 feet below the top of the pier cap located at the upstream end of Bent 3. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 95.9.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/2 point intervals between the substructure units.

NOTE:

See Figure 2 for inspection notes.

Legend

- 18.0 Sounding Depth from Waterline (6/21/12)
- (1) Inspection Note Number
- [A] Pile Designation

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7877 CR 367 OVER THE PIKE RIVER ST LOUIS COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: BMS	<b>COLLINS ENGINEERS</b>	Date: JULY 2012
Checked By: LJ	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 742307877		Figure No.: 1

INSPECTION NOTES:

- 1 The channel bottom material consists of firm silty sand, gravel, and cobbles allowing probe rod penetration of 2 inches typical and up to 6 inches maximum penetration.
- 2 All timber piles were generally firm and sound with no indication of decay or soft areas. The timber typically allowed awl penetrations of 1/8 inch or less.
- 3 There was a split in the cross-brace at the brace-to-pile connection at Pile A of Bent 1. The Split measures 4 feet long by 1 inch wide and fully penetrates the cross-brace compromising the connection.
- 4 The cross-brace on the west face of Pile E of Bent 4 exhibited up to 50 percent loss of section. The cross-brace is no longer connected to the pile.
- 5 A splice-in-pile repair of the upper pile portion was observed on several piles. The piles which were repaired are Piles C and E of Bent 1, Piles B, C, and E of Bent 2, Piles B and E of Bent 3, Piles A, D, and E of Bent 4, and Piles A, C and D of Bent 5. All spliced sections were generally in good condition with minor checking or splitting with the exception of a \*inch wide split observed on the east face of the spliced section at Pile C of Bent 2.

NOTE:

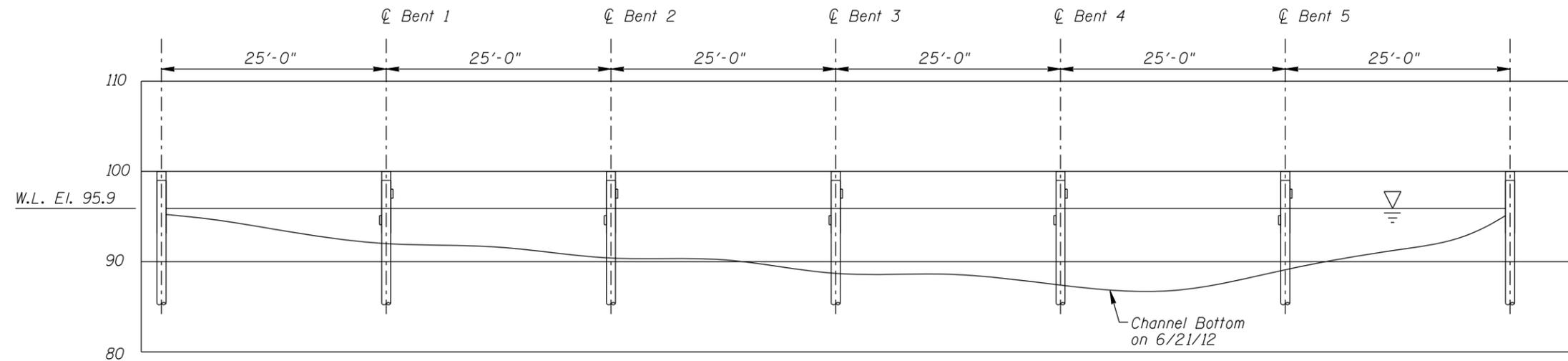
See Figure 1 for plan view and inspection note locations.

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

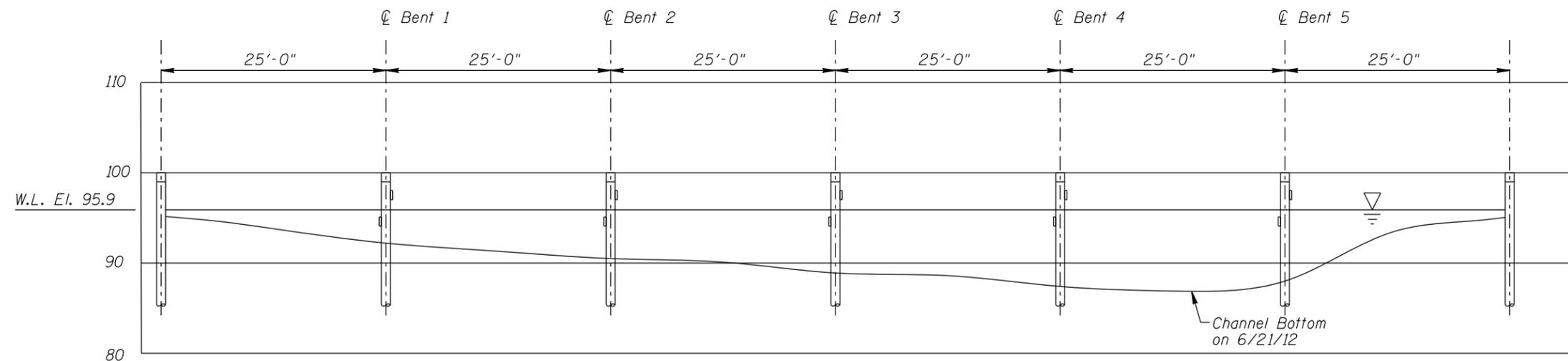
STRUCTURE NO. 7877  
CR 367 OVER PIKE RIVER  
ST LOUIS COUNTY

INSPECTION NOTES

Drawn By: BMS	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: JULY 2012
Checked By: LJ		Scale: NTS
Code: 742307877		Figure No.: 2



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7877 CR 367 OVER THE PIKE RIVER ST LOUIS COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: BMS	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: JULY 2012
Checked By: LJ		Scale: NTS
Code: 742307877		Figure No.: 3

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

INSPECTORS: Collins Engineers, Inc. DATE: June 21, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg

BRIDGE NO: 7877 WEATHER: Sunny, 65°F

WATERWAY CROSSED: Pike River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Clay G. Brookins, Breanne M. Stromberg

EQUIPMENT: Commercial Scuba, U/W Light, Hand Tools, Lead Line, Probe Rod, Camera

TIME IN WATER: 12:00 P.M.

TIME OUT OF WATER: 1:30 P.M.

WATERWAY DATA: VELOCITY 1 ft.sec

VISIBILITY 2 ft

DEPTH 9.0 feet maximum at Bent 5

ELEMENTS INSPECTED: Bents 1 through 5

REMARKS: Overall, Bents 1 through 5 were generally in good condition below water with no defects of structural significance observed. Timber piles and cross-bracing were typically firm and sound, with no appreciable indications of decay, although two locations of bracing damage were observed that has compromised the brace-to-pile connection. A number of piles have upper portions that have been repaired with new splice-in-pile sections and all splices were secure and sound. The channel bottom around the substructure units appeared stable with no evidence of significant scour.

FURTHER ACTION NEEDED:  YES  NO

Monitor cross-bracing member deterioration and/or brace-to-pile connections during future underwater inspections. If deficiencies are found to be progressing, then consideration may need to be given to repair the cross-braces or otherwise enhance the lateral stability of the structure.

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

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7877  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.  
 WATERWAY CROSSED Pike River

INSPECTION DATE June 21, 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

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE					CHANNEL					GENERAL						
			PILING (TIMBER)	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
	Bent 1	3.9'	7	N	N	8	6	7	N	N	N	N	7	N	N	7	8	7	N
	Bent 2	6.0'	7	N	N	8	7	7	N	N	N	7	7	N	N	7	8	7	N
	Bent 3	7.2'	7	N	N	8	7	7	N	N	N	7	7	N	N	7	8	7	N
	Bent 4	9.0'	7	N	N	8	6	7	N	N	N	7	7	N	N	7	8	7	N
	Bent 5	7.9'	7	N	N	8	7	7	N	N	N	N	7	N	N	7	8	7	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, Bents 1 through 5 were generally in good condition below water with no defects of structural significance observed. Timber piles and cross-bracing were typically firm and sound, with no appreciable indications of decay, although two locations of bracing damage were observed that has compromised the brace-to-pile connection. A number of piles have upper portions that have been repaired with new splice-in-pile sections and all splices were secure and sound. The channel bottom around the substructure units appeared stable with no evidence of significant scour.

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.