

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 18506

CSAH NO. 31

OVER THE

RABBIT LAKE

DISTRICT 3 – CROW WING COUNTY

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SEPTEMBER 9, 2012

PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY  
COLLINS ENGINEERS, INC.

AND  
WSB & ASSOCIATES, INC.

JOB NO. 2107

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 18506, the North and South Abutments, were found to be in satisfactory condition with no defects of structural significance. The timber bents exhibited very minor checking and there was some light to moderate corrosion on the steel sheeting backwalls and wingwalls below the waterline. The channel bottom around the substructure units consisted of silty sand, which appeared well established and stable with no evidence of significant scour observed.

INSPECTION FINDINGS:

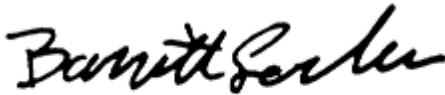
- (A) Minor checking generally with widths of less than 1/4 inch was observed on all of the timber piles.
  
- (B) The steel sheeting exhibited coating failure, surface corrosion, and minor delaminations (rust scale) from 1 foot above the waterline to 1.5 feet below the waterline (generally 50-100 percent coverage with 1/32 inch deep estimated section loss). Below 1.5 feet below the waterline, the sheeting exhibited rust nodules with up to 1/16 inch deep pitting (generally on less than 5 percent of the surface area).

RECOMMENDATIONS:

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

Inspection Team Leader:

WSB and Associates



Barritt Lovelace  
Registered Professional Engineer  
Bridge Safety Inspection Team Leader

Respectfully submitted,

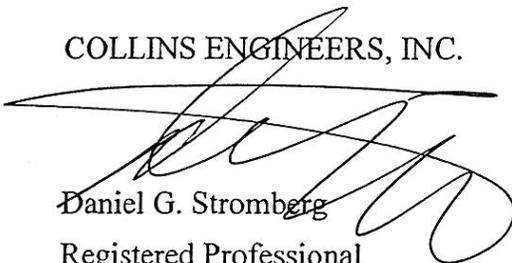
PROFESSIONAL ENGINEER

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: 18506

Feature Crossed: Rabbit Lake

Feature Carried: CSAH No. 31

Location: District 3 – Crow Wing County

Bridge Description: The bridge superstructure consists of one span of multiple steel beams supporting a reinforced concrete deck. The superstructure is supported by two timber pile abutments. The abutments consist of timber piles with a timber pile cap and cross bracing. The backwall and wingwalls of each abutment consist of steel sheeting.

2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt Lovelace, P.E.

Dive Team: Brad Robinson (WSB), Lukas Janulis (Collins)

Date: September 9, 2012

Weather Conditions: Sunny, 65° F

Underwater Visibility: 4.0 feet

Waterway Velocity: Negligible / None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: North and South Abutments.

General Shape: Each abutment consists of five timber piles interconnected with timber cross bracing and a timber pile cap. The timber piles are in front of steel sheet piles which form the backwall and two skewed wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 14.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of pier cap on the west end of the North Abutment.

Water Surface: The waterline was approximately 6.4 feet below reference.

Assumed Waterline Elevation = 93.6

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

Item 60: Substructure: Code   6  

Item 61: Channel and Channel Protection: Code   8  

Item 92B: Underwater Inspection: Code   B/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:

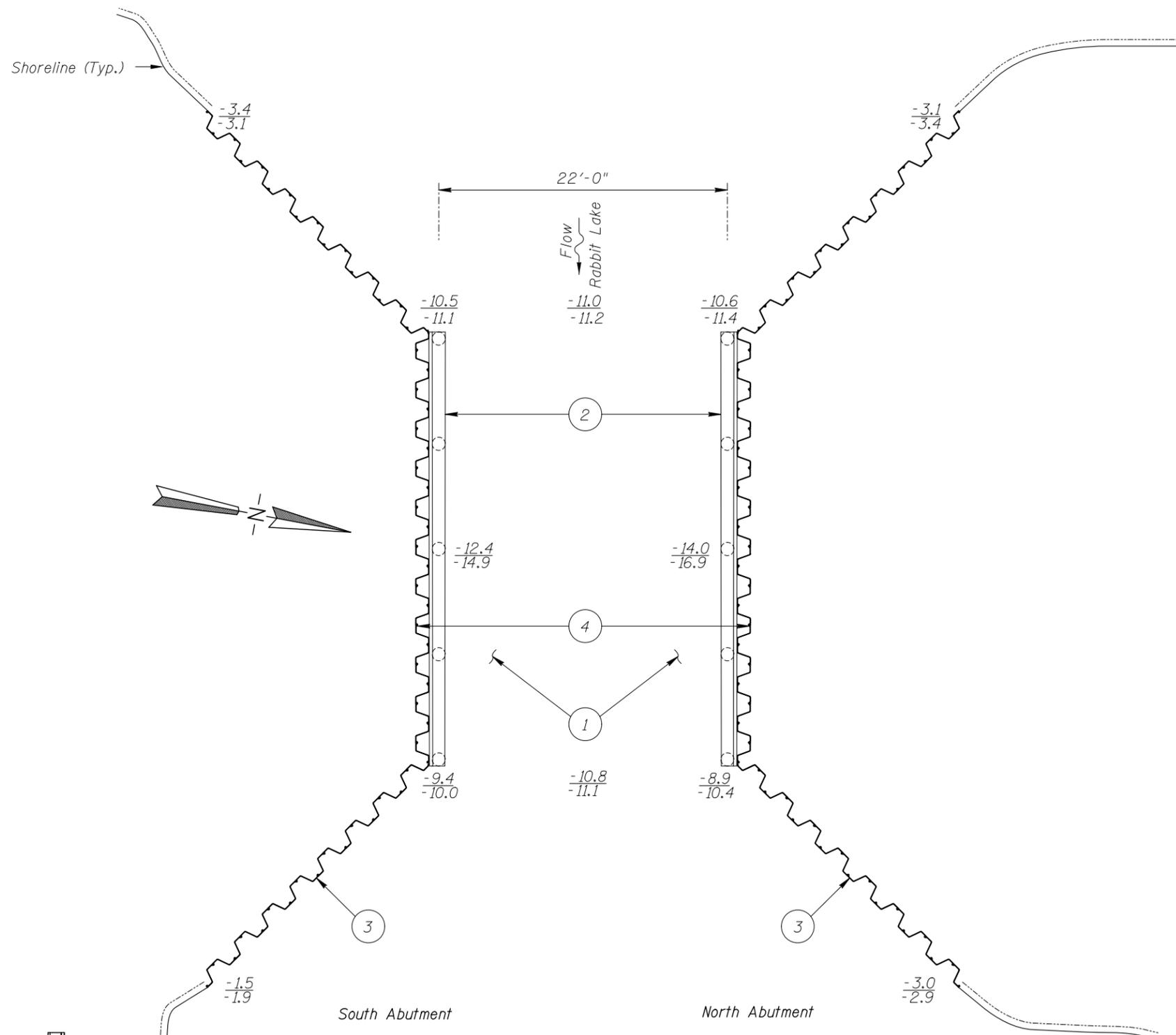
Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
206	Timber Column	10	EA	9	1			
985	Slopes	1	EA	1				



Photograph 1. View of South Abutment, Looking South.



Photograph 2. View of North Abutment, Looking North.



**GENERAL NOTES:**

1. The North and South Abutments were inspected underwater.
2. At the time of inspection on September 9, 2012, the waterline was located approximately 6.4 feet below the top of the pile cap at the upstream end of the North Abutment. Since insufficient bridge elevation information was available, a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 93.6.
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 the mid point intervals between the substructure units.

**INSPECTION NOTES:**

- 1 The channel bottom consisted of silty sand with 2 to 4 inches of probe rod penetration.
- 2 The timber members exhibited minor checking up to 1/4 inch wide.
- 3 Light aquatic growth was observed on the steel sheeting below the waterline.
- 4 The steel sheeting exhibited coating failure and surface corrosion on 50 to 100 percent of the surface area from 1 foot above to 1.5 feet below the waterline with minor delaminations and section loss of up to 1/32 inch in depth. From 1.5 feet below the waterline to the channel bottom, the steel sheeting exhibited rust nodules with up to 1/16-inch-deep pitting on less than 5 percent of the surface area.

Note:  
All soundings based on 2012 waterline location.

TYPICAL END VIEW OF  
SOUTH ABUTMENT  
(N. Abutment Opp. Hand)

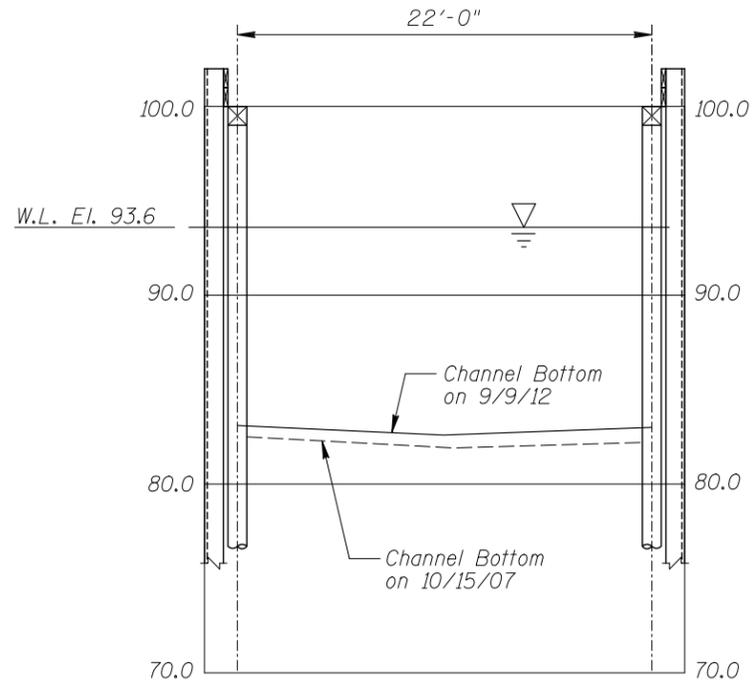
SOUNDING PLAN

**Legend**

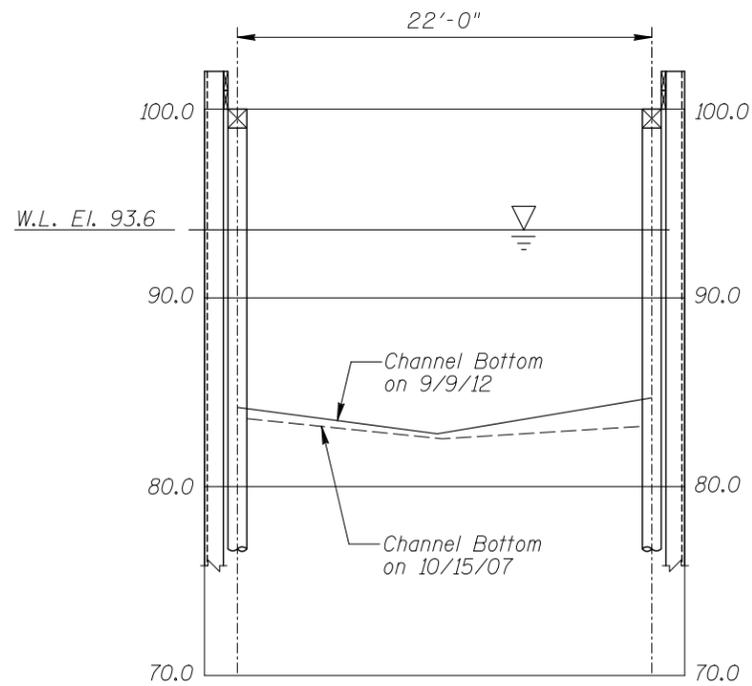
- 5.2 Sounding Depth (9/9/12)
- 5.2 Sounding Depth (10/15/07)
- Timber Pile

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INFRASTRUCTURE • ENGINEERING • PLANNING • CONSTRUCTION

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 18506 OVER RABBIT LAKE DISTRICT 3, CROW WING COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: BJR	<b>COLLINS ENGINEERS</b>	Date: SEP. 2012
Checked By: BRL		Scale: NTS
Code: 522118506		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

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<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 18506 OVER RABBIT LAKE DISTRICT 3, CROW WING COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: BJR	<b>COLLINS ENGINEERS</b> 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: SEP. 2012
Checked By: BRL		Scale: 1"=10'
Code: 522118506		Figure No.: 2

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

INSPECTORS: WSB & Associates and Collins Engineers      DATE: September 9, 2012

ON-SITE TEAM LEADER: Barritt Lovelace, P.E.

BRIDGE NO: 18506      WEATHER: Sunny, 65° F

WATERWAY CROSSED: Rabbit Lake

DIVING OPERATION:  SCUBA       SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Brad Robinson (WSB), Lukas Janulis (Collins)

EQUIPMENT: Commercial Scuba, U/W Light, Probe Rod, Lead Line, Sounding Pole,  
Scraper, Camera

TIME IN WATER: 12:55 p.m.

TIME OUT OF WATER: 1:15 p.m.

WATERWAY DATA: VELOCITY Negligible / None

VISIBILITY 4.0 feet

DEPTH 14.0 feet maximum at North Abutment

ELEMENTS INSPECTED: North and South Abutments

REMARKS: Overall, the timber piling and bracing of the North and South Abutments was in good condition with no significant deterioration. In addition, the steel sheeting backwall was also in overall satisfactory condition with mostly minor deterioration. All timber members exhibited very minor checking and there was light to moderate corrosion on the steel sheeting below the waterline. The steel sheeting exhibited coating failure, surface corrosion, and minor delaminations from 1 foot above the waterline to 1.5 feet below the waterline. Below 1.5 feet below the waterline the sheeting exhibited rust nodules with up to 1/16 inch deep pitting. There was no notable scour or other channel bottom deficiencies.

FURTHER ACTION NEEDED:       YES       NO

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. 18506  
 INSPECTORS WSB & Associates and Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Barritt Lovelace, P.E.  
 WATERWAY CROSSED Rabbit Lake

INSPECTION DATE September 9, 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	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (STEEL SHEETING)	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
	North Abutment	14.0'	7	N	N	8	6	6	8	N	N	N	8	N	6	7	7	N	N
	South Abutment	12.4'	7	N	N	8	6	6	8	N	N	N	8	N	6	7	7	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the timber piling and bracing of the North and South Abutments was in good condition with no significant deterioration. In addition, the steel sheeting backwall was also in overall satisfactory condition with mostly minor deterioration. All timber members exhibited very minor checking and there was light to moderate corrosion on the steel sheeting below the waterline. The steel sheeting exhibited coating failure, surface corrosion, and minor delaminations from 1 foot above the waterline to 1.5 feet below the waterline. Below 1.5 feet below the waterline the sheeting exhibited rust nodules with up to 1/16 inch deep pitting. There was no notable scour or other channel bottom deficiencies.

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.