

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7003

CSAH NO. 38

OVER THE

BIG FORK RIVER

DISTRICT 1 - ITASCA COUNTY



AUGUST 14, 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 No. 7003, Piers 1 through 5, were found to be in satisfactory condition with no significant deterioration. The timber piles were typically exhibited random minor splitting and checking, with more extensive checking and splitting present at three piles. There were a light to moderate accumulations of timber debris observed throughout the bridge and around most of the piers, particularly across the upstream fascia. Overall, the channel bottom appeared stable with no scour and no significant changes since the previous underwater inspection.

INSPECTION FINDINGS:

- (A) Overall, the timber piles were in satisfactory condition with minor delaminations at the waterline, random 1/4 inch typical to 1/2 inch maximum checking with up to 3 inches of penetration, and random 1/16 inch typical to 1/8 inch wide maximum splits.
- (B) Pile C on Piers 4 and 5 exhibited a 1/4-inch-wide, 3-inch-deep split extending from the top of the pile to the mudline. 1.5 inch thick outer shell was cracked and soft and delaminated from 2 feet above waterline to channel bottom.
- (C) Light accumulations of 6 to 18 inch diameter pieces of timber debris were scattered on the channel bottom throughout Pier 5 from channel bottom up 3 feet.
- (D) A moderate accumulation of timber debris consisting of 1 foot diameter and smaller pieces was observed along the upstream fascia extending from the channel bottom to the waterline at Piers 4 and 5.
- (E) The channel bottom consisted of silt with probe rod penetrations ranging from 1 to 2 feet along Piers 1 and 2.
- (F) The channel bottom at Pier 3 consisted of silty sand with a probe rod penetration of 6 inches.

- (G) The channel bottom at Pier 4 consisted of sandy gravel with 3 inches of probe rod penetration.
- (H) The channel bottom at Pier 5 consisted of sand and gravel with 1-foot-diameter cobbles with no probe rod penetration.
- (I) Horizontal brace at Pile F of Pier 4 had several splits and decay around the connection to pile.
- (J) A light accumulation of timber debris consisting of branches and up to 12 inch diameter logs was observed at the upstream end and along the east faces of Piers 1 and 2.
- (K) Pile B on Pier 1 was 50% broken and missing at horizontal connection.
- (L) The braces exhibited section loss at the ends and minor splitting. Except where noted, the connections were generally in good condition.
- (M) Pile E on Pier 5 exhibited a 1/4 inch to 1/2 inch wide split from 2 feet above to 1 foot below the waterline on the north face.
- (N) Moderate accumulation of timber debris, consisted of 6 inch to 18 inch diameter branches and extending from the channel bottom to the waterline, was observed at the upstream end of Pier 3.

RECOMMENDATIONS:

- (A) At this point, timber drift accumulations at the bridge are not excessive; however, they should be monitored, and if found to be progressing to an extent where excessive lateral loads may be exerted on the bridge or scour may be influenced, the drift may need to be removed at that time.

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

Inspection Team Leader



Roy A. Forsyth, PE
Date 6/30/2014 License# 49270

Respectfully submitted,

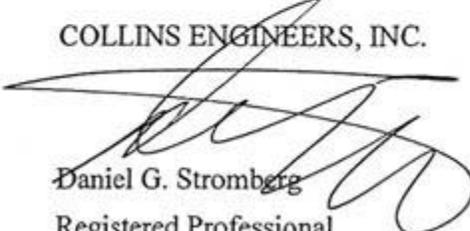
PROFESSIONAL ENGINEER

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: 7003

Feature Crossed: The Big Fork River

Feature Carried: CSAH NO. 38

Location: District 1 - Itasca County

Bridge Description: The bridge superstructure consists of six spans of timber deck on multiple timber stringers. The superstructure is supported by five timber pile bent piers and two timber pile abutments. The piers are numbered 1 through 5 starting from the west end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Roy A. Forsyth, P.E.

Dive Team: Jordan Furlan, P.E., Charles Euwema

Date: August 14, 2012

Weather Conditions: Partly Cloudy, 80 °F

Underwater Visibility: 4 foot

Waterway Velocity: 0 ft/s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 5.

General Shape: The piers consist of six timber piles interconnected with timber cross bracing.

Maximum Water Depth at Substructures Inspected: Approximately 7.5 foot.

4. WATERLINE DATUM

Water Level Reference: The top of pile cap at north end of Pier 5.

Water Surface: The waterline was approximately 6.1 feet below reference.
Assumed Waterline Elevation = 93.9 feet.

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 6

Item 92B: Underwater Inspection: Code B/08/12

Item 113: Scour Critical Bridges: Code U/02

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	30	EA		30			
361	Scour Smart Flag	1	EA	1				
985	Slopes & Slope Protection	1	EA		1			



Photograph 1. Overall View of the Structure, Looking Southwest.



Photograph 2. View of Pier 1, Looking Northwest.



Photograph 3. View of Pier 2, Looking Northwest.



Photograph 4. View of Pier 3, Looking Northwest.



Photograph 5. View of Pier 4, Looking Northwest.



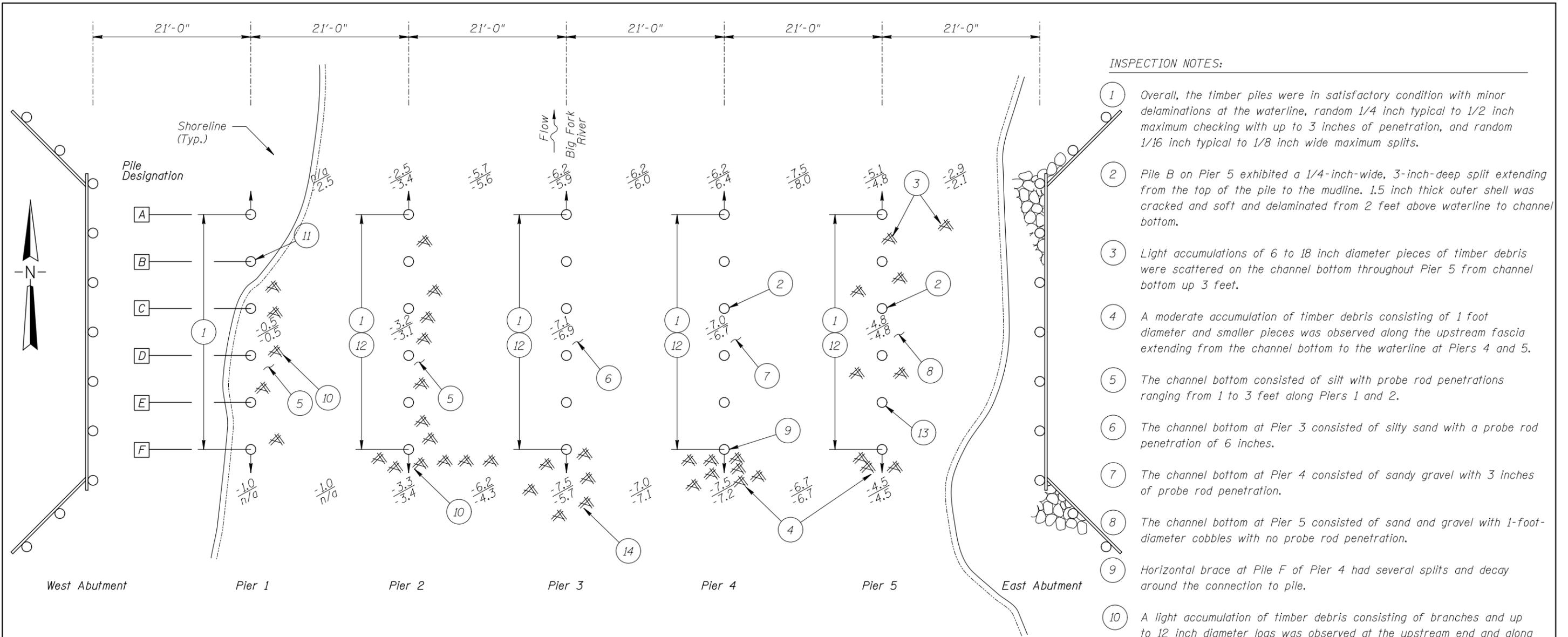
Photograph 6. View of Pier 5, Looking Northwest.



Photograph 7. View of West Abutment, Looking Northwest.



Photograph 8. View of East Abutment, Looking Northeast.



INSPECTION NOTES:

- 1 Overall, the timber piles were in satisfactory condition with minor delaminations at the waterline, random 1/4 inch typical to 1/2 inch maximum checking with up to 3 inches of penetration, and random 1/16 inch typical to 1/8 inch wide maximum splits.
- 2 Pile B on Pier 5 exhibited a 1/4-inch-wide, 3-inch-deep split extending from the top of the pile to the mudline. 1.5 inch thick outer shell was cracked and soft and delaminated from 2 feet above waterline to channel bottom.
- 3 Light accumulations of 6 to 18 inch diameter pieces of timber debris were scattered on the channel bottom throughout Pier 5 from channel bottom up 3 feet.
- 4 A moderate accumulation of timber debris consisting of 1 foot diameter and smaller pieces was observed along the upstream fascia extending from the channel bottom to the waterline at Piers 4 and 5.
- 5 The channel bottom consisted of silt with probe rod penetrations ranging from 1 to 3 feet along Piers 1 and 2.
- 6 The channel bottom at Pier 3 consisted of silty sand with a probe rod penetration of 6 inches.
- 7 The channel bottom at Pier 4 consisted of sandy gravel with 3 inches of probe rod penetration.
- 8 The channel bottom at Pier 5 consisted of sand and gravel with 1-foot-diameter cobbles with no probe rod penetration.
- 9 Horizontal brace at Pile F of Pier 4 had several splits and decay around the connection to pile.
- 10 A light accumulation of timber debris consisting of branches and up to 12 inch diameter logs was observed at the upstream end and along the east faces of Piers 1 and 2.
- 11 Pile B on Pier 1 was 50% broken and missing (loss of section) at horizontal connection.
- 12 The braces exhibited section loss at the ends and minor splitting. Except where noted, the connections were in good condition.

SOUNDING PLAN

INSPECTION NOTES:

- 13 Pile E on Pier 5 exhibited a 1/4 inch to 1/2 inch wide split from 2 feet above to 1 foot below the waterline on the north face.
- 14 Moderate accumulation of timber debris consisting of 6 inch to 18 inch diameter branches, extending from the channel bottom to the waterline, was observed around the upstream end of Pier 3.

GENERAL NOTES:

- 1. Piers 1 through 5 were inspected underwater.
- 2. At the time of inspection on August 14, 2012, the waterline was located approximately 6.1 feet below the top of the cap at the north end of Pier 5. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 93.9.
- 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 mid point intervals between the substructure units.

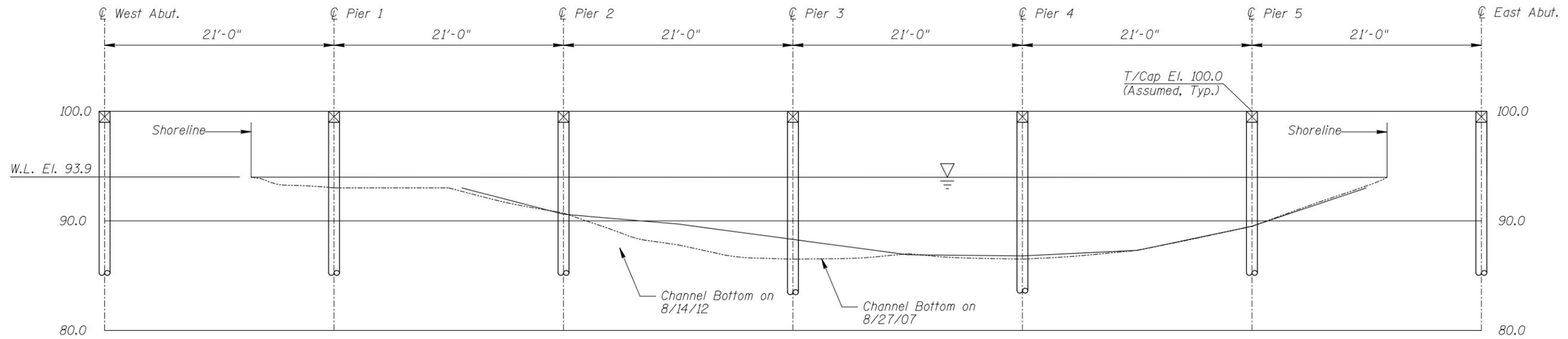
Note:
All soundings based on 2012 waterline location.

Legend

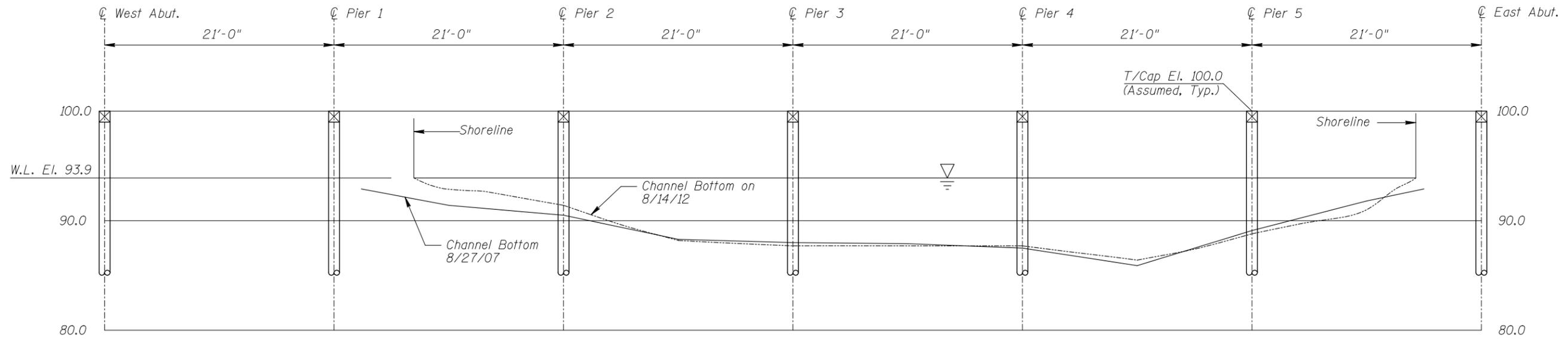
- 5.2 Sounding Depth (8/14/2012)
- 5.2 Sounding Depth (8/27/2007)
- Timber Pile
- Battered Timber Pile
- ⌘ Timber Debris
- ⊠ Riprap

TYPICAL END VIEW OF PIERS

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7003 OVER THE BIG FORK RIVER DISTRICT 1, ITASCA COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: JTF	COLLINS ENGINEERS	Date: AUGUST 2012
Checked By: DGS		Scale: NTS
Code: 52217003		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7003 OVER THE MISSISSIPPI RIVER DISTRICT 1, ITASCA COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: JTF	COLLINS ENGINEERS	Date: AUGUST 2012
Checked By: DGS		Scale: 1"=10'
Code: 52217003		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 14, 2012

ON-SITE TEAM LEADER: Roy A. Forsyth, P.E.

BRIDGE NO: 7003 WEATHER: Partly Cloudy, 80 °F

WATERWAY CROSSED: The Big Fork River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Jordan Furlan, P.E., Charles Euwema

EQUIPMENT: Commercial Scuba, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera

TIME IN WATER: 2:30 P.M.

TIME OUT OF WATER: 3:00 P.M.

WATERWAY DATA: VELOCITY 0 ft/s

VISIBILITY 4.0 feet

DEPTH 7.5 feet maximum at Piers 3 and 4

ELEMENTS INSPECTED: Piers 1 through 5

REMARKS: The substructure units inspected at Bridge No. 7003, Piers 1 through 5, were found to be in satisfactory condition with no significant deterioration. The timber piles were typically in satisfactory condition with random minor splitting and checking, with more extensive checking and splitting present at three piles. There was a light to moderate accumulation of timber debris observed throughout the bridge and around most of the piers, especially across the upstream fascia. Overall, the channel bottom appeared stable with no scour.

FURTHER ACTION NEEDED: YES NO

At this point, timber drift accumulation at the bridge is not excessive; however, it should be monitored, and if found to be progressing to an extent where excessive lateral loads may be exerted on the bridge or scour may be influenced, the drift may need to be removed at that time.

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

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7003
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Roy A. Forsyth, P.E.
 WATERWAY CROSSED The Big Fork River

INSPECTION DATE August 14, 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 (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
	Pier 1	1.0'	6	N	N	8	7	6	8	7	7	7	7	N	N	6	N	N	N
	Pier 2	3.3'	6	N	N	8	7	6	8	N	N	7	7	N	N	6	N	N	N
	Pier 3	7.5'	6	N	N	8	7	6	8	N	N	6	6	N	N	6	N	N	N
	Pier 4	7.5'	6	N	N	8	7	6	8	N	N	6	6	N	N	6	N	N	N
	Pier 5	5.1	6	N	N	8	7	6	8	8	8	6	6	N	N	6	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: The substructure units inspected at Bridge No. 7003, Piers 1 through 5, were found to be in satisfactory condition with no significant deterioration. The timber piles were typically in satisfactory condition with random minor splitting and checking, with more extensive checking and splitting present at three piles. There was a light to moderate accumulation of timber debris observed throughout the bridge and around most of the piers, especially across the upstream fascia. Overall, the channel bottom appeared stable with no 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.