

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # L8228 TWP 31 over S BR BUFFALO RIVER

DISTRICT: District 4

COUNTY: Clay

CITY/TOWNSHIP: GLYNDON

STATE: Minnesota

Date of Inspection: 10/17/2016

Equipment Used:

Owner: Town or Township Highway Agency

Inspected By: Schroeder, Brian

Report Written By: Brian Schroeder

Report Reviewed By:

Final Report Date:



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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge No. L8228, the West Abutment, East Abutment, and Piers 1 and 2, were in satisfactory to fair condition with minor defects of structural significance observed. The fourth upstream pile of Pier 1 exhibited defects including moderate to heavy weathering and excessive splitting. The remainder of the timber piles were in good condition with no instances of excessive decay. Random splitting at the connections was observed in numerous diagonal bracing members. A heavy accumulation of timber debris was observed around Piers 1 and 2 and throughout the channel in the vicinity of the bridge.

INSPECTION FINDINGS

- (A) The diagonal timber braces were split through their connections at several locations at both piers. The splitting in the connections measured up to 2 inches wide by 12 feet in length.
- (B) The diagonal on the east face of Pier 2 has broken off at the fourth upstream pile and is not engaging the fifth upstream pile.
- (C) A heavy timber debris accumulation was observed around both piers and throughout the channel. The debris consisted primarily of branches and trees.
- (D) All of the timber elements had minor to moderate weathering with checks up to 1/2 inch wide and penetrations 1/4 to 3/4 inch deep. The fourth upstream pile at Pier 1 had the most extensive cracking and splitting. The galvanized connection hardware had minor surface corrosion.
- (E) The West Abutment timber backwall and piles had minor lateral movement up to 1 inch indicating possible excessive lateral earth pressure on the abutment.

RECOMMENDATIONS

- (A) Remove the heavy accumulation of timber debris from around the structure to eliminate the potential for continued accumulation, scour influence, and excessive lateral loads on bridge.
- (B) Repair/replace the split timber braces to restore lateral stability to the piers.
- (C) Repair/replace the fourth upstream pile of Pier 1 having extensive cracking and splitting before load carrying capacity is jeopardized at that location.
- (D) Monitor lateral movement/deflection of the West Abutment backwall and piles.
- (E) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Contractor: Ayres Associates & Collins Engineers, Inc

Contractor Job Number: 9687

UNDERWATER INSPECTION

1. BRIDGE DATA

Bridge #: L8228
Feature Intersected: S BR BUFFALO RIVER
Facility Carried: TWP 31
District: District 4
County: 014 - Clay

Bridge Description:

The superstructure consists of three timber beam spans. The substructure consists of two timber pile abutments and two timber pile piers. The piers are numbered 1 and 2 starting from the west end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Brian K Schroeder, P.E.
Inspection Diver: Brian K. Schroeder, P.E.
Date of Underwater Inspection: 10/17/2016
Weather Conditions: Sunny, 75°F
Underwater Visibility (feet): 0.5
Waterway Velocity (ft/sec): Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: The West Abutment, East Abutment, and Piers 1 and 2

General Shape:

The piers consist of five vertical timber piles supporting a timber pile cap. The abutments consist of five vertical timber piles supporting a timber pile cap and timber wall planking with adjacent timber pile and planking wingwalls.

Maximum Water Depth at Substructure(s) Inspected (feet): 3.5

4. WATERLINE DATUM

Water Level Reference: The top of the timber curb at the south end of Pier 1
Waterline Elevation (feet): 91.6
Description: The waterline was approximately 8.4 feet below reference.

5. NBIS CODING INFORMATION

(Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code: 5
Item 61: Channel and Channel Protection: Code: 5
Item 62: Culvert: Code:
Item 92B: Underwater Inspection: Code: Y 48 10/2016

Item 113: Scour Critical Bridge:

Code: I

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

Yes

No

(Mark your selection with an X)

6. STRUCTURAL ELEMENT CONDITION RATING

ELEM #	Element Description	Quantity	Unit	Conditions			
				CS1	CS2	CS3	CS4
228	Timber Pile	20	EA		19	1	
216	Timber Abutment	83	LF		83		
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge L8228 (TWP No. 31 over the South Branch of the Buffalo River) was completed on October, 17, 2016. The underwater inspection was conducted from shore. The inspection was conducted by a team consisting of a PE-Diver with a valid MnDOT Team leader certification, a backup diver and a dive tender. The inspection utilized commercial dive equipment and techniques (SSA and/or SCUBA) in accordance with OSHA regulations. Profiles were taken along the upstream and downstream faces of the bridge and around the periphery of substructure units to determine the presence, location and area of scour.

The bridge elements inspected consisted of a timber abutment and two timber piers. According to the bridge inventory or design drawings, the piers consist of five vertical timber piles supporting a timber pile cap and the abutment consisted of five vertical timber piles supporting a timber pile cap, timber wall planking with adjacent timber pile and planking wingwalls. Inspection procedures followed FHWA guidance and the MnDOT Bridge and Structure Inspection Program Manual with channel bottom probing to search for foundations. The routine underwater inspection frequency is recommended to remain at 60 months based on those findings and risk factors. Also, inspection procedures should continue to follow the above approach and standard guidance with 100% Level I and 10% Level II intensity efforts.

MINNESOTA BRIDGE INSPECTION REPORT

02/03/2017

BRIDGE L8228 TWP 31 OVER S BR BUFFALO RIVER

County: Clay Location: 1.4 MI E OF JCT CSAH 11 Length: 94.6 ft.
 City: Route: 08 - TWNS 31 Ref. Pt.: 001+00.410 Deck Width: 22.1 ft.
 Township: 14010 - GLYNDON Control Section: Rdwy. Area/ Pct. Unsd: 2024 sq. ft. / %
 Section: 16 Township: 139N Range: 47W Maint. Area: Paint Area/ Pct. Unsd: sq. ft. / %
 Span Type: 7 - Wood or Timber 2 - Local Agency Bridge Nbr.: GL16N Culvert: N/A
 List: Stringer/Multi-beam or Girder Postings: 24 40 40
 NBI Deck: 5 Super: 6 Sub: 5 Chan: 6 Culv: N
 Open, Posted, Closed: P - Posted for Load
 MN Scour Code: I - LOW RISK

Appraisal Ratings - Approach: 3 Waterway: 5 Unofficial Structurally Deficient N
 Required Bridge Signs - Load Posting: 2 - Vehicle & Semi (Type Traffic: 0 - Not Required Unofficial Functionally Obsolete Y
 R12-5)
 Horizontal: 1 - Object Markers Vertical: N - Not Applicable Unofficial Sufficiency Rating 57.7

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
31	Timber Deck	Underwater	10/17/2016	2091 SF	2049	0	42	0
		Migrated Values		2091 SF	2049	0	42	0
Notes: CLEAN DECK AND REPAIR BITUMINOUS WEARING WEARING SURFACE. (92)(93)(94)(95)(96)(97)(98)(99)(00)GRAVEL COVERED (01)(02)(04)(06)(08)(10)Very end plank on East end is broke and leaking gravel through onto abutment cap. (12)THE EAST END OF THE DECK HAS A PLANK PULLED LOOSE AND HAS CREATED A 2-3" GAP ON END OF THE BRIDGE. (95)(96) PLANK LOOKS THE SAME THIS YEAR. STILL HAS A GAP ON THE END AND LEAKS GRAVEL THROUGH DECK. (97)(98)(99)(00)(01)(02)(04)(06)(08) Still the same. No change in condition. (10)(12)2 end plank on East end split and damaged from plow. See pic. (14)Planking has developed a small hole on East end that was earlier damage. Small area has hole in planking. Also the South planking on East end is pulled apart slightly also. See pic. (15)								
111	Timber Open Girder/Beam	Underwater	10/17/2016	945 LF	898	47	0	0
		Migrated Values		945 LF	898	47	0	0
Notes: Girders have checks and splits with minor deterioration. (12)No changes. (14)No change (15)								
216	Timber Abutment	Underwater	10/17/2016	83 LF	20	63	0	0
		Migrated Values		83 LF	20	63	0	0
Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:20 CS2:20 CS3:0 CS4:0). BACKING ON BOTH ABUTMENTS GETTING ROTTEN. (92)(93) NOT A PROBLEM YET. (94)(95)(96)(97)(98)(99)(00)(01)(02)(04)(06)(08)(10)Some splits and cracks but not leaking or busted out yet. (12)No change (14)								
Wingwall notes: THE SOUTHWEST WING PILING BROKE UP, AND NORTHEAST WING CAP BROKE. (92)(93)(94)(95)(96)(97)(98)(99)(00)(01)(02)(04)(06)(08)(10)(12)No change (14)The Southeast wind is has planking broke and is leaning out some. (15)								
228	Timber Pile	Underwater	10/17/2016	20 EA	0	19	1	0
		Migrated Values		20 EA	0	20	0	0
Notes: Piling have checks and splits. Some East abutment pile are rotten on the tops. Also the pier piling look split and discolored and deteriorating. The 2nd pile in from South on West pier looks pretty rotten. Was also obsesrved during the underwater inspection and noted on the report. (12)Went on the ice this year and sounded piling. All 5 piling in East pier have large splits and sound partially hollow in areas above the ice line. Remaining pile on the West pier with the exception of the second pile are sound but have some checks/splits. Bracing on the piers is broke with areas missing. (14)No change. Couldn't get out to the pier due to water. (15) [2016] Moderate weathering with checks up to 1/2 inch wide and awl penetrations 1/4 to 3/4 inch deep at all timber piles. Defects were particularly heavy at the fourth upstream pile of Pier 1.								
235	Timber Pier Cap	Underwater	10/17/2016	89 LF	0	89	0	0
		Migrated Values		89 LF	0	89	0	0
Notes: Pier caps have checks and splits. (12)Sway bracing on piers is broke. (12)No change (14)No change (15)								

BRIDGE L8228 TWP 31 OVER S BR BUFFALO RIVER

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
330	Metal Bridge Railing	Underwater	10/17/2016	190 LF	142	48	0	0
		Migrated Values		190 LF	142	48	0	0
	Notes: [2016] Migrator assumed metal rail/timber post combination type rail. A NEW GUARDRAIL TYPE RAILING, NEW POSTS AND A REFLECTIVE MATERIAL ARE BEING INSTALLED AT THIS TIME. LOOKS GOOD. (94)(95)REFLECTIVE MATERIAL GONE. (96)5 POSTS ON SOUTH RAILING ARE BROKE AND SPLINTERED. RAILING STILL OK BUT POSTS ARE SPLIT FROM BEING HIT.(97)(98)(99)(00)(01)(02)SAME (04)(06)(08)(10)(12)No changes. (14)Some of the posts have been repaired. Tops are deteriorated slightly. (15)							
515	Steel Protective Coating	Underwater	10/17/2016	999 SF	999	0	0	0
		Migrated Values		999 SF	999	0	0	0
	Notes: [2016] Migrator assumed CS1 and a quantity of 999 SF.							
332	Timber Bridge Railing	Underwater	10/17/2016	31 LF	23	8	0	0
		Migrated Values		31 LF	23	8	0	0
	Notes: [2016] Migrator assumed metal rail/timber post combination type rail. Post spacing assumed to be 5LF, each post 1LF. A NEW GUARDRAIL TYPE RAILING, NEW POSTS AND A REFLECTIVE MATERIAL ARE BEING INSTALLED AT THIS TIME. LOOKS GOOD. (94)(95)REFLECTIVE MATERIAL GONE. (96)5 POSTS ON SOUTH RAILING ARE BROKE AND SPLINTERED. RAILING STILL OK BUT POSTS ARE SPLIT FROM BEING HIT.(97)(98)(99)(00)(01)(02)SAME (04)(06)(08)(10)(12)No changes. (14)Some of the posts have been repaired. Tops are deteriorated slightly. (15)							
800	Critical Deficiencies or Safety Hazards	Underwater	10/17/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: NO CRITICAL FINDINGS OBSERVED DURING THE LAST INSPECTION.							
885	Scour	Underwater	10/17/2016	1 EA	1	0	0	0
890	Load Posting or Vertical Clearance Signing	Underwater	10/17/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: [2016] Structure requires a vertical clearance sign or load posting sign.							
891	Other Bridge Signing	Underwater	10/17/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: NORTHEAST BRIDGE END MARKER DOWN. LAYING BY WING IN CHANNEL.(96) SIGNS LOOK GOOD THIS YEAR. (97)(98) NEEDS SW BR. END MARKER (99) 3 OF 4 MARKERS DOWN. (00)SIGNING OK NOW. (01) BOTH BRIDGE END MARKERS DOWN.(02) NW BR END MARKER DOWN, OTHER WEST ONE TWISTED.(08)(10)Signs are up this yr. and look ok. (12)Signs are all up and look good. New weight limit signs in place. (14)No change (15)							
892	Slopes & Slope Protection	Underwater	10/17/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
	Notes: Slopes on wings ok. No slopes under the bridge. Water sits up against abutments. (12)(14)No change (15)							
894	Deck & Approach Drainage	Underwater	10/17/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
	Notes: Water sits on the deck. No drains. Gravel is water saturated. (12)No changes. (14)approach drainage is ok. No change (15)							
895	Sidewalk, Curb, & Median	Underwater	10/17/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
	Notes: Curb has checks and splits. 20' piece on the south side midspan is missing. (12)No change (14)No change (15)							
900	Protected Species	Underwater	10/17/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: Use this element to track the presence of protected species living on this structure.							

General Notes: PONTIS inspection comments - BUILT IN 1948
 LOT OF LOGS IN CHANNEL UP AGAINST BRIDGE AND UPSTREAM. SHOULD BE CLEANED OUT. (00)(01) BAD

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
	(02)(04)(06) STILL A LOT OF LOGS UP AGAINST THE BRIDGE PIER.(08)River has been cleaned out of logs recently looks good. (10)Channel pretty clean this yr. (12)							
	58. Deck NBI:	Deck underside looks discolored and has minor deterioration. (12) No changes visible. (14)East end has a small hole. (15)						
	36A. Brdg Railings NBI:							
	36B. Transitions NBI:							
	36C. Appr Guardrail NBI:							
	36D. Appr Guardrail Terminal NBI:							
	59. Superstructure NBI:							
	60. Substructure NBI:	[2016] All timber elements had minor to moderate weathering with checks up to 1/2 inch wide and awl penetrations 1/4 to 3/4 inch deep. The diagonal bracing at the piers were split/broken in multiple areas.						
	61. Channel NBI:	[2016] The channel bottom consisted of silt with up to 1 foot of probe rode penetration. Only minor amounts of debris remain whereas previous inspection had major debris. Banks at abutments show minor damage.						
	62. Culvert NBI:							
	71. Waterway Adeq NBI:							
	72. Appr Roadway Alignment NBI:							

Inspector's Signature

Reviewer's Signature

Pictures



Photo 1 - North Profile



Photo 2 - South Profile

Pictures



Photo 3 - West Abutment



Photo 4 - East Abutment

Pictures



Photo 5 - Pier 1 West Side



Photo 6 - Pier 1 East Side

Pictures



Photo 7 - Pier 2 West Side



Photo 8 - Pier 2 East Side

Pictures

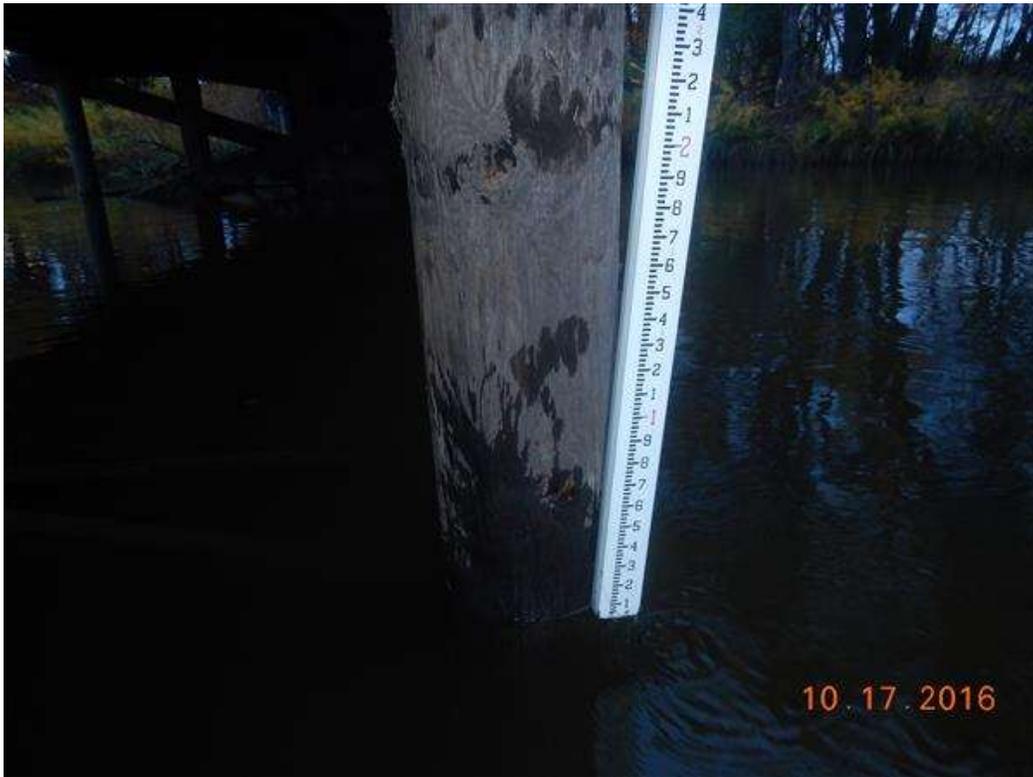


Photo 9 - Condition at Waterline

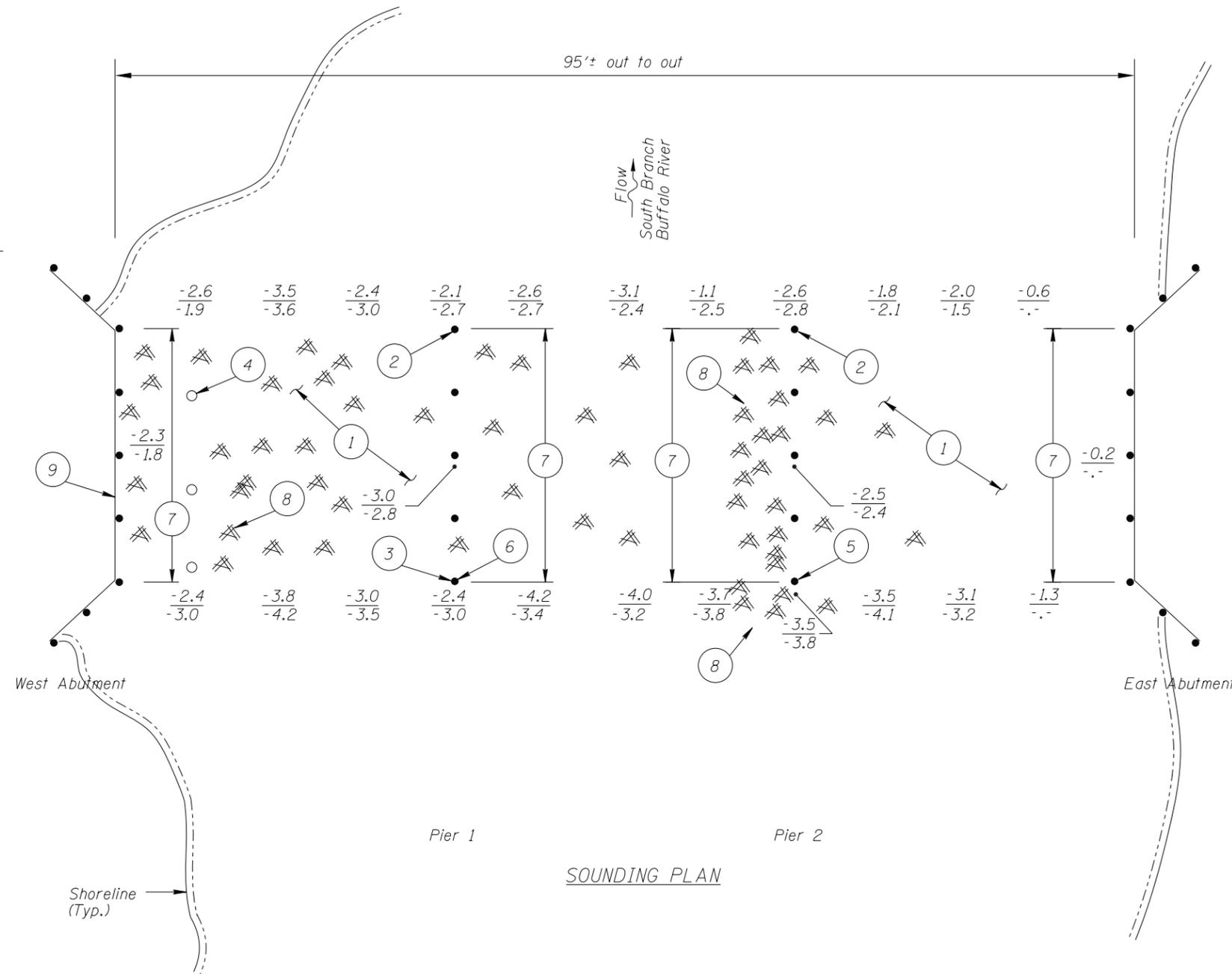
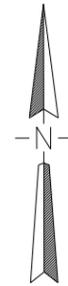


Photo 10 - Upstream Channel

Pictures



Photo 11 - Downstream Channel



INSPECTION NOTES:

- 1 The channel bottom consisted of silt with up to 1 foot of probe rod penetration.
- 2 The diagonal bracing was split at the connection below the waterline, measuring 2 inches wide at the northernmost 8 feet of the diagonal bracing attached to the west face of Piers 1 and 2.
- 3 The diagonal bracing was split at the pile cap connection, measuring 1 inch wide at the southernmost 4 feet of the diagonal bracing attached to the west face of Pier 1.
- 4 Old cut off piles were observed protruding from the channel bottom up to 1.5 feet above the waterline (typical).
- 5 The diagonal bracing was split/broken for the southernmost 12 feet of the diagonal bracing attached to the east face of Pier 2.
- 6 The diagonal bracing was split for the southernmost 8 feet of the diagonal bracing attached to the east face of Pier 1.
- 7 All timber elements (piles, cross bracing, caps, and abutment sheeting) had minor to moderate weathering with checks up to 1/2 inch wide and awl penetrations 1/4 to 3/4 inch deep. These defects were particularly heavy at the fourth upstream pile of Pier 1. The galvanized connection hardware had only minor surface corrosion.
- 8 A heavy accumulation of timber debris consisting of logs and branches was observed along both sides of Pier 1 and Pier 2 and throughout the entire channel under the structure.
- 9 Lateral deflection/movement of up to 1 inch (eastward) was present along the West Abutment.

GENERAL NOTES:

1. The West Abutment, and Piers 1 and 2 were inspected underwater.
2. At the time of inspection on October 17, 2016, the waterline was located approximately 8.4 feet below the top of the timber curb at the upstream end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 91.6.
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 1/4 point intervals between the substructure units.

SOUNDING PLAN

Legend

- 2.0 Sounding Depth (10/17/16)
- 5.2 Sounding Depth (7/12/12)
- .- Sounding Depth Not Previously Taken
- Timber Pile
- Cut Off Timber Pile
- ⌘ Timber Debris

Note:

All soundings based on 2016 waterline location.

TYPICAL END VIEW OF PIERS

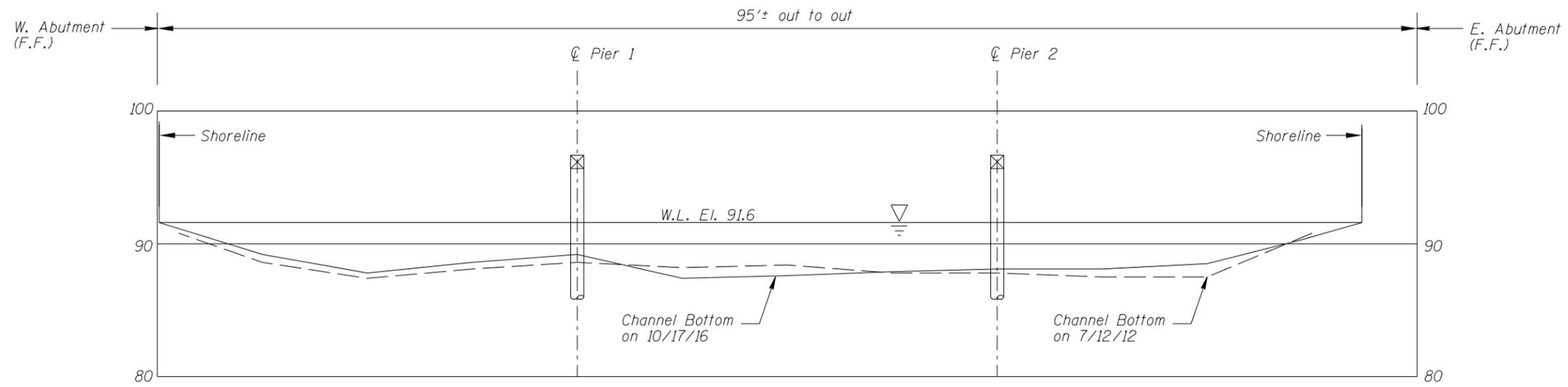


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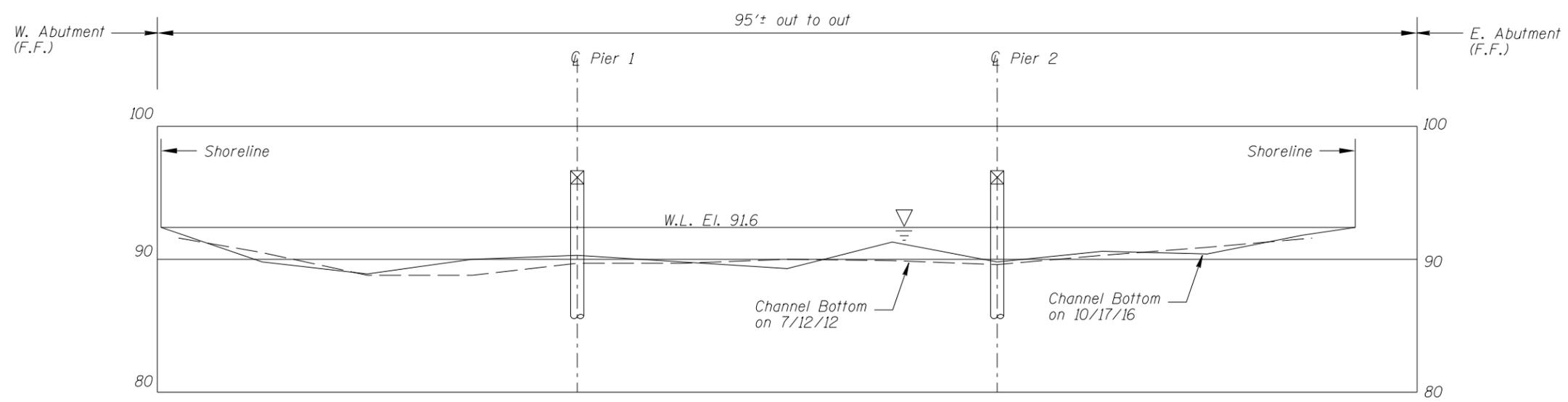
Drawn By: JJM
Checked By: BKS
Project: 63-9687

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MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION	
STRUCTURE NO. L8228 OVER THE SOUTH BRANCH OF THE BUFFALO RIVER DISTRICT 4, CLAY COUNTY, GLYNDON TOWNSHIP	
INSPECTION AND SOUNDING PLAN	
Date: OCT 2016	Scale: NTS
Figure No.: 1	



UPSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"



DOWNSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION	
STRUCTURE NO. L8228 OVER THE SOUTH BRANCH OF THE BUFFALO RIVER DISTRICT 4, CLAY COUNTY, GLYNDON TOWNSHIP	
UPSTREAM AND DOWNSTREAM FASCIA PROFILES	
Drawn By: JJM	Date: OCT 2016
Checked By: BKS	Scale: NTS (U.O.N.)
Project: 63-9687	Figure No.: 2

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