

2016 UNDERWATER BRIDGE INSPECTION REPORT



BRIDGE # 69536 TWP 415 over CHAN LAKE VERMILLION

DISTRICT: District 1 **COUNTY:** St. Louis **CITY/TOWNSHIP:** GREENWOOD
STATE: Minnesota

Date of Inspection: 06/21/2016

Equipment Used:

Owner: Town or Township Highway Agency

Inspected By: Janulis, Lukas

Report Written By: Lukas Janulis

Report Reviewed By:

Final Report Date:

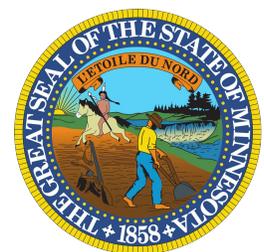


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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge No. 69536, Piers 1 and 2, were found to be in good condition with no defects of structural significance observed below water. The coating loss and surface corrosion on the pipe piles was comparable to the findings in the previous 2012 underwater inspection report. The corrosion consisted of rust nodules and pitting below the waterline. Areas of minor coating loss and surface corrosion were also observed above the waterline. The channel bottom appeared to be stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS

(A) The channel bottom material typically consisted of firm sand with scattered rocks up to 18 inches in diameter allowing a maximum probe rod penetration of 3 inches.

(B) Both Shorelines were well protected with 12 inch to 3 foot diameter riprap material along the banks.

(C) The steel pipe piles exhibited 50 to 75 percent coating loss from 1 foot below the waterline to the channel bottom with widespread nodular corrosion (50 percent coverage), ranging in size from 1 to 1.5 inches in diameter. Rust nodules exhibited typical pitting of 1/32 inch in deep and a maximum of 1/16 inch maximum.

(C) From 1 foot below the waterline to the top of steel pipe piles there were small areas of coating failure with surface corrosion on the exposed steel. These areas had no measurable loss of section.

RECOMMENDATIONS

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

Contractor: Collins Engineers, Inc.

Contractor Job Number: 9687

UNDERWATER INSPECTION

1. BRIDGE DATA

Bridge #: 69536
Feature Intersected: CHAN LAKE VERMILLION
Facility Carried: TWP 415
District: District 1
County: 069 - St. Louis

Bridge Description:

The superstructure is a three span, multiple prestressed concrete girder bridge supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two steel shell pile bent piers. The piers are numbered 1 and 2 starting from the west end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Lukas Janulis
Inspection Diver: Lukas Janulis
Date of Underwater Inspection: 06/21/2016
Weather Conditions: Sunny, 75°F
Underwater Visibility (feet): 4.0 feet
Waterway Velocity (ft/sec): Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure(s) Inspected: Piers 1 and 2.

General Shape:

Rectangular reinforced concrete pile cap with rounded ends supported by four concrete-filled steel shell piles.

Maximum Water Depth at Substructure(s) Inspected (feet): 5.5 feet

4. WATERLINE DATUM

Water Level Reference: The top of the cap at the south end of Bent 1.
Waterline Elevation (feet): 92.8 feet
Description: The waterline was located approximately 7.2 feet below the reference.

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: 8
Item 62: Culvert: Code:
Item 92B: Underwater Inspection: Code: Y 48 06/2016

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
225	Steel or CIP Piling	8	EA		8		
885	Scour	1	EA	1			

UNDERWATER INSPECTION

INSPECTION PROCEDURES

The routine underwater inspection of Bridge 69536 (TWP 415 over Channel Lake Vermillion) was completed on June 21, 2016. The underwater inspection was conducted from shore. The inspection was conducted by a team consisting of a Professional Engineer Diver with a valid MnDOT Team Leader certification, a backup diver and dive tender. The inspection utilized commercial dive equipment and techniques in accordance with OSHA regulations. Channel bottom 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 two piers. According to the bridge inventory, Piers 1 and 2 are founded on concrete-filled steel shell piles supporting a reinforced concrete cap. Inspection procedures followed FHWA guidance and the MnDOT Bridge and Structure Inspection Program Manual with channel bottom probing to search for foundations. The maximum 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

11/09/2016

Inspector: CO Bridge

BRIDGE 69536 TWP 415 OVER CHAN LAKE VERMILLION

County: St. Louis	Location: TO ISLE OF PINES ISLAND	Length: 229.0 ft.
City:	Route: 08 - TWNS 415 Ref. Pt.: 000+00.000	Deck Width: 33.0 ft.
Township: 69035 - GREENWOOD	Control Section:	Rdwy. Area/ Pct. Unsnd: 5500 sq. ft. / %
Section: 3 Township: 062N Range: 16W Maint. Area:		Paint Area/ Pct. Unsnd: sq. ft. / %
Span Type: 5 - Prestressed Concrete 2 - List: Stringer/Multi-beam or Girder	Local Agency Bridge Nbr.: 312	Culvert: N/A
NBI Deck: 7 Super: 8 Sub: 7 Chan: 8 Culv: N		Postings:
	Open, Posted, Closed: A - Open	
	MN Scour Code: 1 - LOW RISK	

Appraisal Ratings - Approach: 4	Waterway: 9	Unofficial Structurally Deficient	N
Required Bridge Signs - Load Posting: 0 - Not Required	Traffic: 0 - Not Required	Unofficial Functionally Obsolete	N
Horizontal: 1 - Object Markers	Vertical: N - Not Applicable	Unofficial Sufficiency Rating	89.1

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
12	Reinforced Concrete Deck	Underwater	11/01/2016	7557 SF	7557	0	0	0
		Migrated Values		7557 SF	7557	0	0	0
Notes: [2015] Efflorescence along underside of poured deck joints over piers from leakage. [2013] Minor trans cracks and leaching at sawed joints/poured joints on fascias of deck at all pier ends. N. EDGES OF SLAB SPALLED.								
510	- Wearing Surfaces	Underwater	11/01/2016	5500 SF	5500	0	0	0
		Migrated Values		5500 SF	5500	0	0	0
Notes: Top of Concrete Deck with Uncoated Rebar Notes: [2015] 0.01" cracks at pier 2. Some light scale and wear on deck surface. [2013] No other deterioration noted. Minor cracking on deck at pier 2.								
109	Prestressed Concrete Open Girder/Beam	Underwater	11/01/2016	915 LF	915	0	0	0
		Migrated Values		915 LF	915	0	0	0
Notes: [2015-2013] No deterioration noted.								
215	Reinforced Concrete Abutment	Underwater	11/01/2016	106 LF	66	40	0	0
		Migrated Values		106 LF	66	40	0	0
Notes: [2016] Migrator added 40 LF to abutment quantity to account for wingwalls (CS1:20 CS2:20 CS3:0 CS4:0). [2015] All cracks have a width of 0.01" or less. 1 vertical crack under beam 2 East abutment and beam 3 west abutment. Horizontal cracking along bottom of east parapet wall with leaching. [2013] Abutments have vertical cracking throughout at barrel and parapet walls. Leaching is present. MINOR CRACKS THROUGH BOTH SEATS. Wingwall notes: [2015-2013] Spall at wing and minor cracks. Spall on NE and NW corner at deck joints.								
225	Steel Pile	Underwater	11/01/2016	8 EA	0	8	0	0
		Migrated Values		8 EA	0	8	0	0
Notes: [2015-2013] Paint failure and surface rust at water and below.								
515	- Steel Protective Coating	Underwater	11/01/2016	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.								
234	Reinforced Concrete Pier Cap	Underwater	11/01/2016	66 LF	66	0	0	0
		Migrated Values		66 LF	66	0	0	0
Notes: [2015-2013] No deterioration noted.								

BRIDGE 69536 TWP 415 OVER CHAN LAKE VERMILLION

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
301	Pourable Joint Seal	Underwater	11/01/2016	66 LF	66	0	0	0
		Migrated Values		66 LF	66	0	0	0
Notes: [2015] Efflorescence on the underside of deck along joints over piers indicates that joints are leaking. [2013] Joints are in-tact with no spalling on adjacent deck. Poured deck joints above piers. Deck ends have steel protection angles.								
310	Elastomeric Bearing	Underwater	11/01/2016	8 EA	4	4	0	0
		Migrated Values		8 EA	4	4	0	0
Notes: [2015-2013] Some bearings have slight contraction (appropriate for current temp) and bearings show slight bulging. Expansion bearings located at abutments.								
313	Fixed Bearing	Underwater	11/01/2016	16 EA	16	0	0	0
		Migrated Values		16 EA	16	0	0	0
Notes: [2015-2013] No deterioration. Located at both Piers.								
330	Metal Bridge Railing	Underwater	11/01/2016	459 LF	459	0	0	0
		Migrated Values		459 LF	459	0	0	0
Notes: [2016] Migrator assumed concrete/metal combination type rail. [2015] 1 to 3 vertical cracks per rail segment on north rail. Cracks are 0.01" in width. Cork missing in NW rail joint between approach sidewalk rail and bridge rail. [2013] Minor cracking throughout concrete bottom rail. CS2 is not appropriate.								
515 - Steel Protective Coating		Underwater	11/01/2016	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.								
331	Reinforced Concrete Bridge Railing	Underwater	11/01/2016	459 LF	459	0	0	0
		Migrated Values		459 LF	459	0	0	0
Notes: [2016] Migrator assumed concrete/metal combination type rail. [2015] 1 to 3 vertical cracks per rail segment on north rail. Cracks are 0.01" in width. Cork missing in NW rail joint between approach sidewalk rail and bridge rail. [2013] Minor cracking throughout concrete bottom rail. CS2 is not appropriate.								
800	Critical Deficiencies or Safety Hazards	Underwater	11/01/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [2015-2013] No critical findings during this inspection.								
810	Concrete Decks - Cracking & Sealing	Underwater	11/01/2016	0 LF	0	0	0	0
		Migrated Values		0 LF	0	0	0	0
Notes: [2015] Cracks are 0.01" in width. [2013] Minor cracking present at deck joint above Pier 2								
822	Bituminous Approach Roadway	Underwater	11/01/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
Notes: [2015] Bituminous approach roadway was reclaimed and repaved in July of 2014. No notable deterioration or settlement. [2013] Many cracks with patches and possible settlement. West approach								
823	Gravel Approach Roadway	Underwater	11/01/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
Notes: [2015] Minor potholes along edge of deck. No increase in traffic impact on bridge. [2013] Well maintained. East approach								

BRIDGE 69536 TWP 415 OVER CHAN LAKE VERMILLION

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
855	Secondary Members (Superstructure)	Underwater	11/01/2016	27 EA	27	0	0	0
		Migrated Values		27 EA	27	0	0	0
	Notes: [2015-2013] No deterioration. 21 Paint steel diaphragms 6 Concrete end diaphragms							
883	Concrete Shear Cracking	Underwater	11/01/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: [2015] No shear cracking present.							
885	Scour	Underwater	11/01/2016	1 EA	1	0	0	0
891	Other Bridge Signing	Underwater	11/01/2016	1 EA	0	0	1	0
		Migrated Values		1 EA	0	0	1	0
	Notes: [2015] Dead end road sign installed over NW delineator. [2013] Delineators.							
892	Slopes & Slope Protection	Underwater	11/01/2016	2 EA	2	0	0	0
		Migrated Values		2 EA	2	0	0	0
	Notes: [2015-2013] Minor washing away from slopes at abutments. Riprap and vegetation.							
893	Guardrail	Underwater	11/01/2016	1 EA	0	1	0	0
		Migrated Values		1 EA	0	1	0	0
	Notes: [2015-2013] Some damage to NW rail. Flex beam and turned down ends.							
894	Deck & Approach Drainage	Underwater	11/01/2016	2 EA	2	0	0	0
		Migrated Values		2 EA	2	0	0	0
	Notes: [2015-2013] Minor erosion at SE approach.							
895	Sidewalk, Curb, & Median	Underwater	11/01/2016	1 EA	1	0	0	0
		Migrated Values		1 EA	1	0	0	0
	Notes: [2015] Spall in east end of curb from plow impact. [2013] Minor scrapes and scaling of surfaces.							
900	Protected Species	Underwater	11/01/2016	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: SLC District 4
Inspected by: [2015] CG, TM : [2013] JRS, JDO.

58. Deck NBI: [2015] 0.01" cracks at pier 2. Leaking on underside of deck along deck joint above piers. Some light scale on deck surface.
[2013] Minor cracking with leaching at under deck fascias above piers. Minor cracking on deck at pier 2. No other deterioration.

36A. Brdg Railings NBI: Concrete railing type J with one-line steel pipe on south and Concrete railing with two-line steel pipe with sidewalk along railing. No posted speed limit and north rail is substandard for all speeds.

36B. Transitions NBI: Guardrail end posts do not meet requirements. Posts are not 3' in length.

36C. Appr Guardrail NBI: Flexbeam with timber posts.

36D. Appr Guardrail Terminal NBI: Turn down ends.

59. Superstructure NBI: [2015-2013] No deterioration noted.

BRIDGE 69536 TWP 415 OVER CHAN LAKE VERMILLION

ELEM NBR	ELEMENT NAME	REPORT TYPE	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
60.	Substructure NBI:	[2015-2013]	Abutments have vertical cracking throughout at barrel and parapet walls. Leaching is present.					
61.	Channel NBI:	[2015]	Riprap protecting banks with very little deterioration. Ledge rock along SE wing.					
62.	Culvert NBI:							
71.	Waterway Adeq NBI:	[2015]	Bridge is over a channel between edge of lake and an island. Remote chance of overtopping due to mostly constant water level.					
72.	Appr Roadway Alignment NBI:	[2015]	3.5% grade on west end changing to a -6.5% on the east end. Profile of the bridge is causing a significant sight distance issue causing a need for reduction in speed.					
	Inventory Notes:							

Inspector's Signature

Reviewer's Signature

Pictures



Photo 1 - North Fascia, Looking Southeast

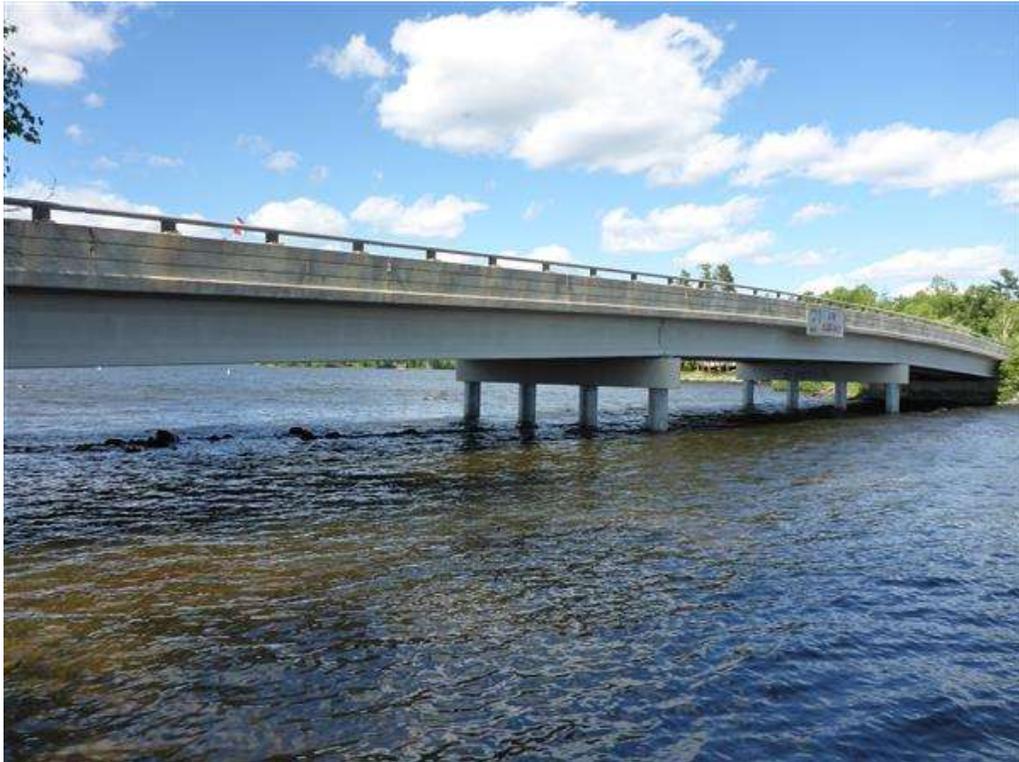


Photo 2 - South Fascia, Looking Northeast

Pictures



Photo 3 - Bent 1, Looking Southwest

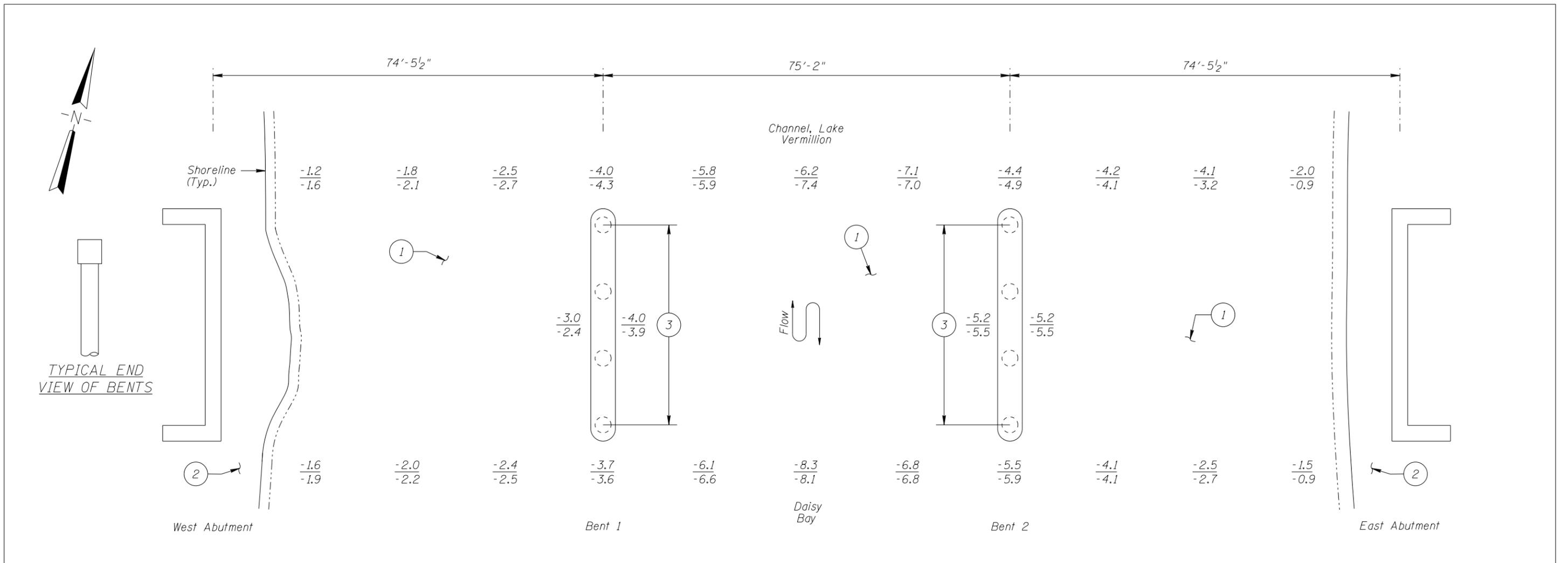


Photo 4 - Bent 2, Looking Southwest

Pictures



Photo 5 - Typical Steel Condition at Waterline (Bent 2 Shown), Looking West



GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on June 21, 2016, the waterline was located approximately 7.2 feet below the top of the cap at the south end of Bent 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 92.8.
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.

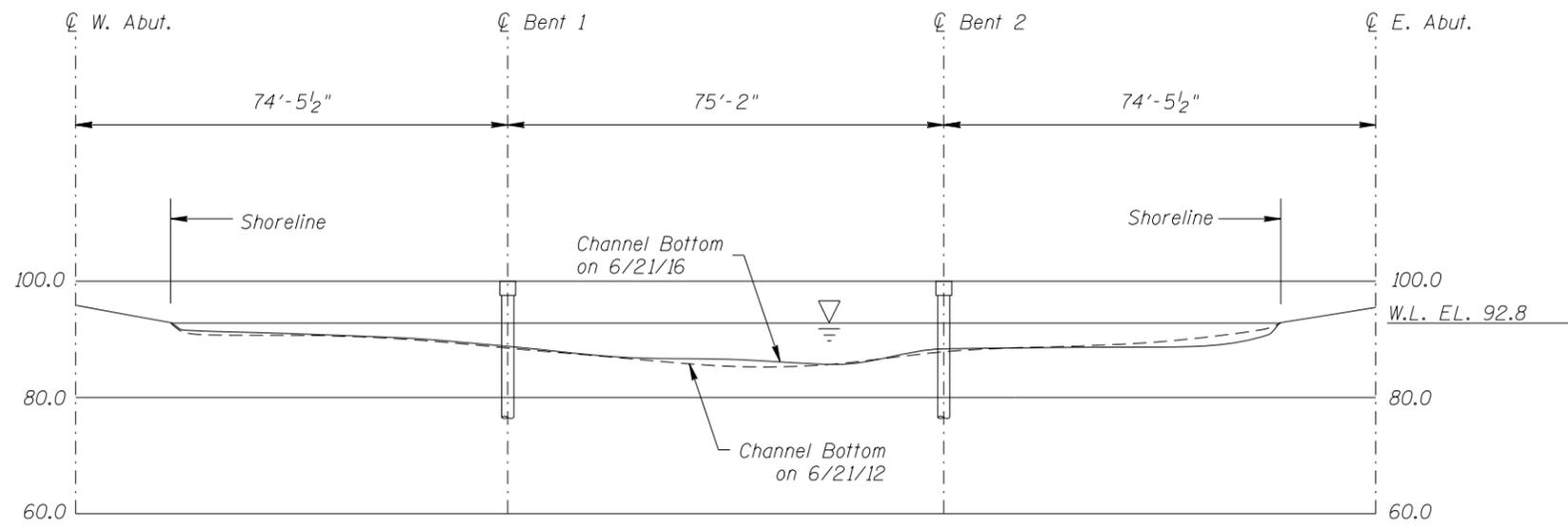
INSPECTION NOTES:

1. The channel bottom material typically consisted of firm sand with scattered rocks up to 18 inches in diameter allowing a maximum probe rod penetration of 3 inches.
2. Both shorelines were well protected with 12 inch to 3 foot diameter riprap material along the banks.
3. The steel pipe piles exhibited 50 to 75 percent coating loss from 1 foot below the waterline to the channel bottom with widespread nodular corrosion (50 percent coverage), ranging in size from 1 to 1.5 inches in diameter. Rust nodules exhibited typical pitting of 1/32 inch deep and a maximum of 1/16 inch deep.
4. From 1 foot below the waterline to the top of steel pipe piles there were random small areas of coating failure with surface corrosion on the exposed steel. These areas had no measurable loss of section.

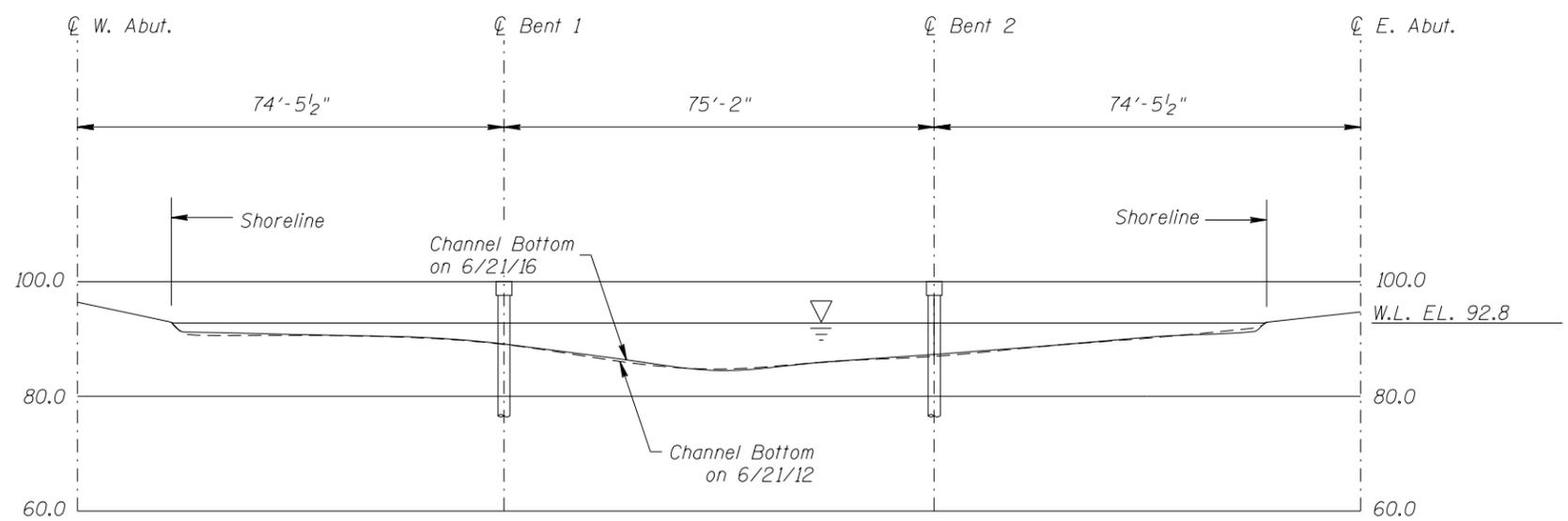
Legend

- 4.0 Sounding Depth (6/21/16)
 - 3.5 Sounding Depth (6/21/12)
 - Concrete Filled Steel Pipe Pile
- Note:*
All soundings are based on 2016 waterline location.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 69536 TWP 415 OVER CHANNEL, LAKE VERMILLION DISTRICT 1, ST. LOUIS COUNTY		
INSPECTION AND SOUNDING PLAN		
DRAWN BY: MBP	COLLINS ENGINEERS	DATE: JUNE 21, 2016
CHECKED BY: LJ	<small>133 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	SCALE: NTS
CODE: 968769536		FIGURE NO.: 1



NORTH FASCIA PROFILE



SOUTH FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 69536 TWP 415 OVER CHANNEL, LAKE VERMILLION DISTRICT 1, ST. LOUIS COUNTY NORTH AND SOUTH FASCIA PROFILES		
DRAWN BY: MBP	COLLINS ENGINEERS <small>133 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	DATE: JUNE 21, 2016
CHECKED BY: LJ		SCALE: 1"=30'-0"
CODE: 968769536		FIGURE NO.: 2