UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 4260

CITY ROUTE 154

OVER THE

NORTH CHANNEL OF THE MISSISSIPPI

DISTRICT 6 - WINONA COUNTY, CITY OF WINONA

AUGUST 16, 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. 4260, Piers 1 through 13, were found to be in satisfactory condition. The submerged concrete was typically in satisfactory to fair condition with moderate scaling from 1 foot above to 1 foot below the waterline and random widespread hairline cracking throughout most pier shafts. The structure had extensive riprap with sand infilling present around all of the piers to address any past footing undermining. The riprap typically extended to top of footing or to no lower than 3 feet below top of footing. The concrete footings typically exhibited rough surfaces with up to 3 inch maximum penetration.

INSPECTION FINDINGS:

(A) The channel bottom at Piers 1 through 12 consisted of riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 3 feet below top of footing. The concrete footings (when exposed) typically exhibited rough surfaces with up to 3 inch maximum penetration.

(B) The channel bottom of Pier 13 consisted of silt with small stones and no riprap. Stones and rubble were observed at the upstream and downstream ends.

(C) The footing at Pier 1 was exposed along the southwest face from nose to nose of the pier with a maximum vertical face exposure of 2 feet.

(D) The submerged concrete was typically in satisfactory to fair condition with moderate scaling from 1 foot above to 1 foot below the waterline with typical penetrations of 1 inch and maximum penetrations of up to 6 inches. Random vertical and horizontal hairline cracks were also observed on the concrete shaft surfaces widespread throughout all piers. Cracking often had efflorescence associated with it.

(E) The footing at Pier 2 was exposed at the upstream nose and tapered off to midpoint where it was covered by riprap. The footing was exposed a maximum of 3 feet vertically.

(F) Pier 9 exhibited an area of section loss on the downstream south corner from 2 feet above to 6 inches below the waterline with up to 3 inches of penetration.

(G) The upstream nose and west face of Pier 3 had moderate timber debris accumulation from channel bottom up to 2 feet above waterline, consisting of 2 foot diameter and smaller logs.

RECOMMENDATIONS:

(A) Prior placement of riprap at the piers has substantially improved structural integrity of the bridge. Therefore, monitor footing exposure during future inspections and reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Respectfully submitted,

Inspection Team Leader

Roy Forsyth

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

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: 4260

Feature Crossed: North Channel of the Mississippi River

Feature Carried: City Route 154

Location: District 6 - Winona County, City of Winona

Bridge Description: The superstructure consists of twenty-four spans of reinforced concrete arches or beams. The main spans across the channel are open spandrel reinforced concrete arches. The bridge is supported by reinforced concrete piers which are founded on timber piles. The channel piers are numbered 1 through 13 starting with Pier 1 on the east shore.

2. INSPECTION DATA

Professional Engineer/Team Leader: Roy A. Forsyth, P.E.

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

Date: August 16, 2012

Weather Conditions: Sunny, 65°F

Underwater Visibility: 1.0 feet

Waterway Velocity: 1.0 ft/s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 13.

General Shape: Oblong rectangular shafts with rounded corners which sit on rectangular footings that are founded on timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 10.7 feet.

4. WATERLINE DATUM

Water Level Reference: Springline at the downstream end of Pier 1.

Water Surface: The waterline was approximately 6.9 feet below the springline at the downstream end of Pier 1.
Assumed Waterline Elevation = 93.1.

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 7

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

Item 113: Scour Critical Bridges: Code P/07

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
210	Reinforced Concrete Pier Wall	325	LF		275	50		
361	Scour Smart Flag	1	EA		1			
985	Slopes and Slope Protection	2	EA	1	1			

Photograph 1. View of Pier 1, Looking north.

Photograph 2. View of Pier 2, Looking West.

Photograph 3. View of Pier 3, Looking West.

Photograph 4. View of Pier 4, Looking West.

Photograph 5. View of Pier 5, Looking West.

Photograph 6. View of Pier 6, Looking West.

Photograph 7. View of Pier 7, Looking West.

Photograph 8. View of Pier 8, Looking West.

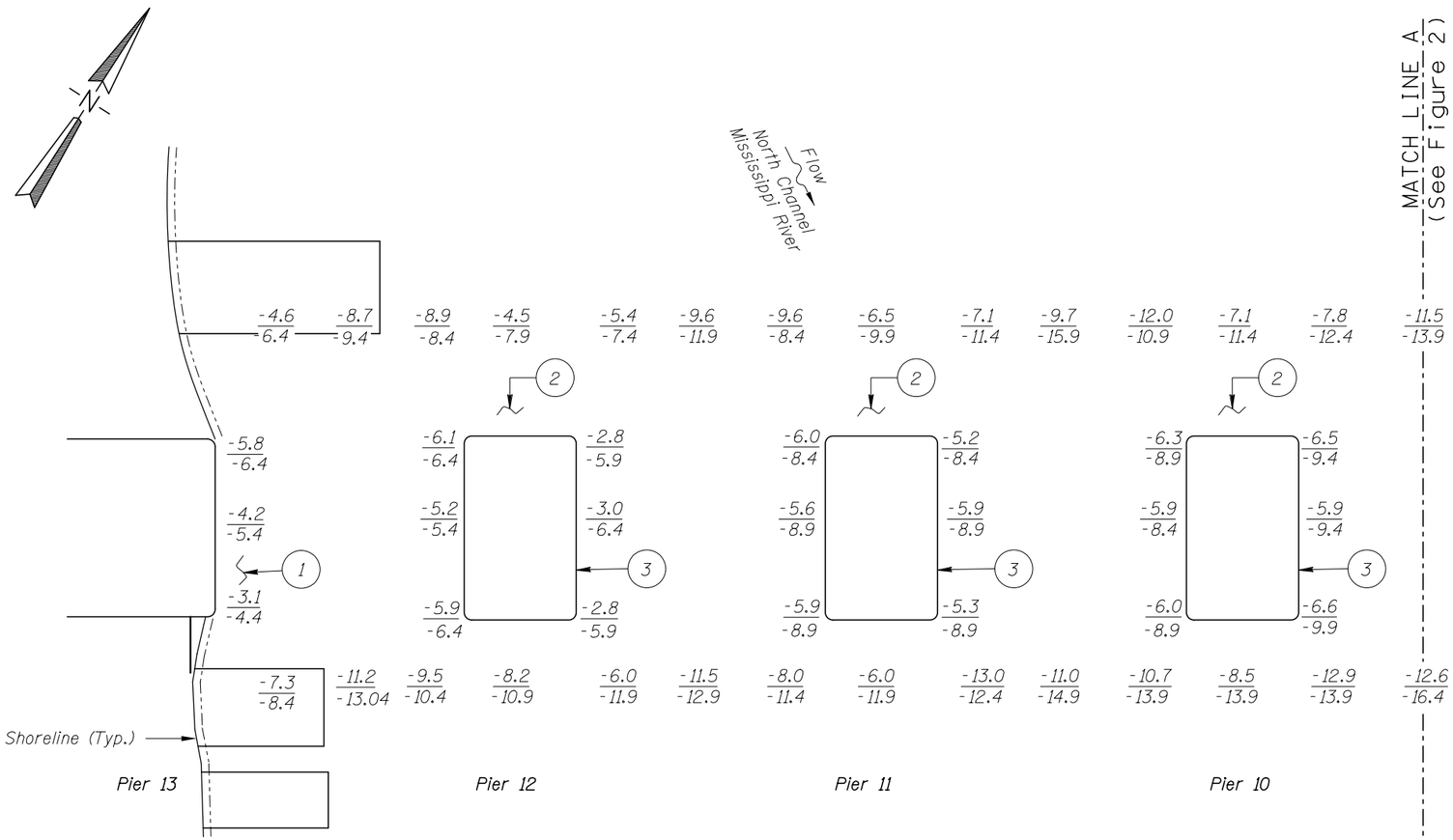
Photograph 9. View of Pier 9, Looking West.


Photograph 10. View of Pier 10, Looking West.

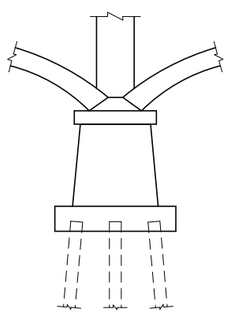
Photograph 11. View of Pier 11, Looking West.

Photograph 12. View of Pier 12, Looking West.

Photograph 13. View of Pier 13, Looking West.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. *Piers 1 through 13 were inspected underwater.*
2. *At the time of inspection on August 16, 2012, the waterline was located approximately 6.9 feet below the springline at the downstream end of Pier 1. Since design drawings were not available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 93.1.*
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 at Pier 13 consisted of silt with small stones and no riprap. Stone and rubble was observed at the upstream and downstream ends.*

(2) *The channel bottom at Piers 1 through 12 consisted of riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 3 feet below top of footing.*

(3) *The submerged concrete was typically in satisfactory condition with moderate scaling from 1 foot above the waterline to 1 feet below the waterline with typical penetrations of 1 inch and maximum penetrations of up to 6 inch. Random vertical and horizontal hairline cracks were also observed on the concrete shaft surfaces widespread throughout all piers. Cracking often had efflorescence associated with it. The concrete footing (where exposed) typically exhibited rough surfaces with up to 3 inch maximum penetration.*

Legend

-2.0	Sounding Depth from Waterline (08/16/12)
-5.2	Sounding Depth from Waterline (10/25/07)
	Timber Debris

Note:

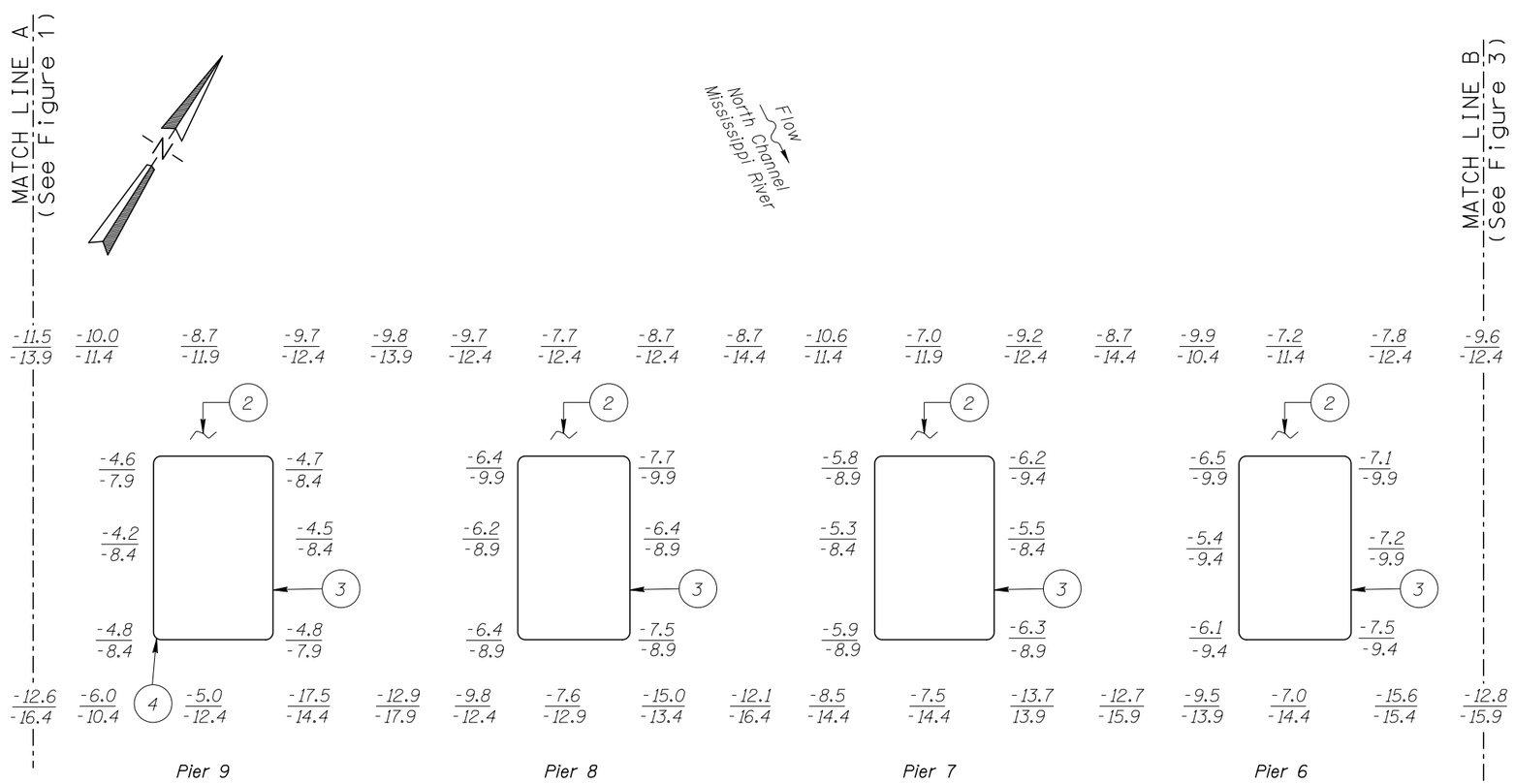
All soundings based on 2012 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
DISTRICT 6, WINONA COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: CRE	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: AUG. 2012
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 1



SOUNDING PLAN

Note:

Refer to Figure 1 for General Notes.

INSPECTION NOTES:

(2) The channel bottom at Piers 1 through 12 consisted of riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 3 feet below top of footing.

(3) The submerged concrete was typically in satisfactory condition with moderate scaling from 1 foot above the waterline to 1 feet below the waterline with typical penetrations of 1 inch and maximum penetrations of up to 6 inch. Random vertical and horizontal hairline cracks were also observed on the concrete shaft surfaces widespread throughout all piers. Cracking often had efflorescence associated with it. The concrete footing (where exposed) typically exhibited rough surfaces with up to 3 inch maximum penetration.

(4) Pier 9 exhibited an area of section loss on the downstream south corner from 2 feet above to 6 inches below the waterline with up to 3 inches of penetration.

Legend

-2.0 / -5.2 Sounding Depth from Waterline (08/16/12) / (10/25/07)

Timber Debris

Note:

All soundings based on 2012 waterline location.

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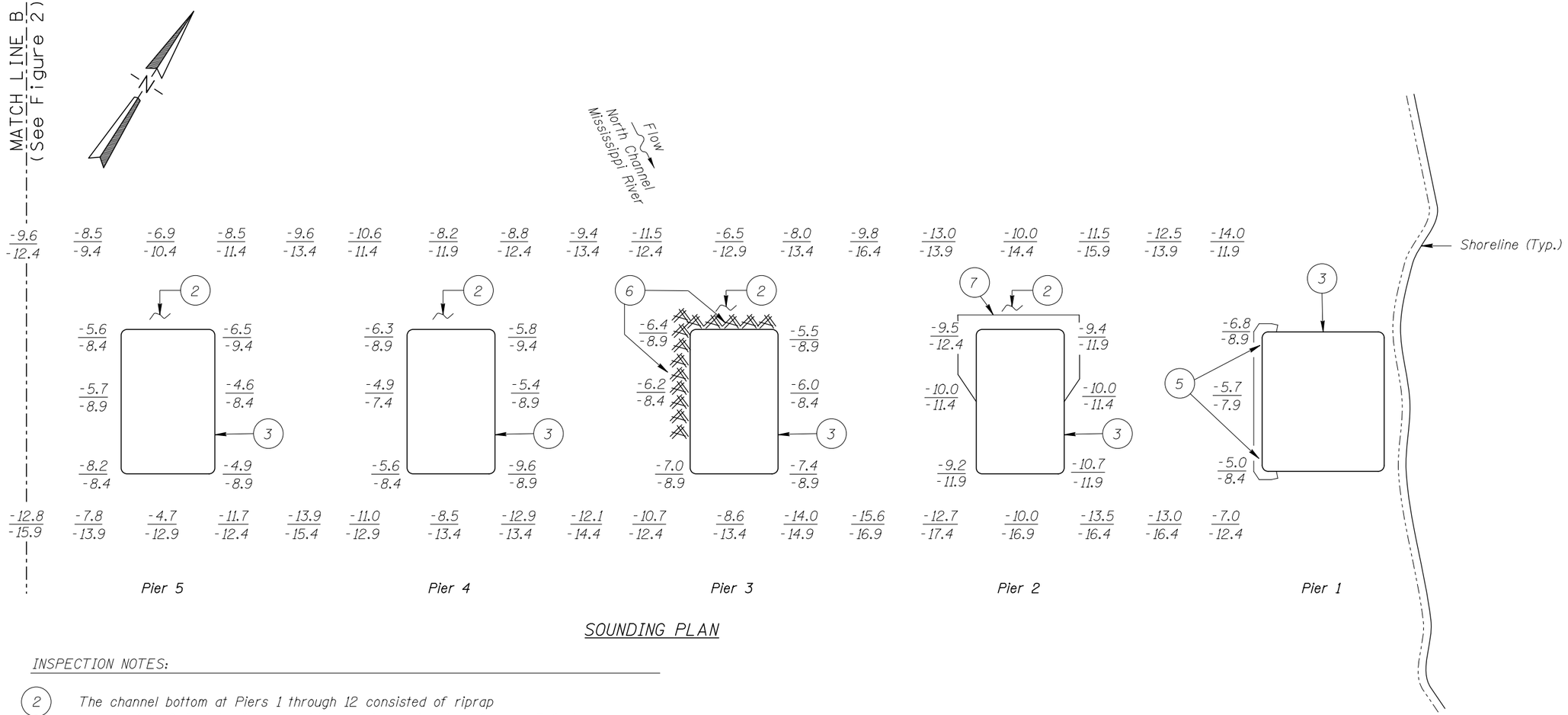
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 2



SOUNDING PLAN

INSPECTION NOTES:

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(5) *The footing at Pier 1 was exposed along the southwest face from nose to nose of the pier with a maximum vertical face exposure of 2 feet.*

(6) *The upstream nose and west face of Pier 3 had moderate timber debris consisting of 2 foot diameter and smaller logs, extending from channel bottom up to 2 feet above waterline,*

(7) *The footing at Pier 2 was exposed around the upstream half of the pier. The footing was exposed a maximum of 3 feet vertically.*

Legend

-2.0	*Sounding Depth from Waterline (08/16/12)*
-5.2	*Sounding Depth from Waterline (10/25/07)*
	Timber Debris

Note:

All soundings based on 2012 waterline location.

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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INSPECTION AND SOUNDING PLAN

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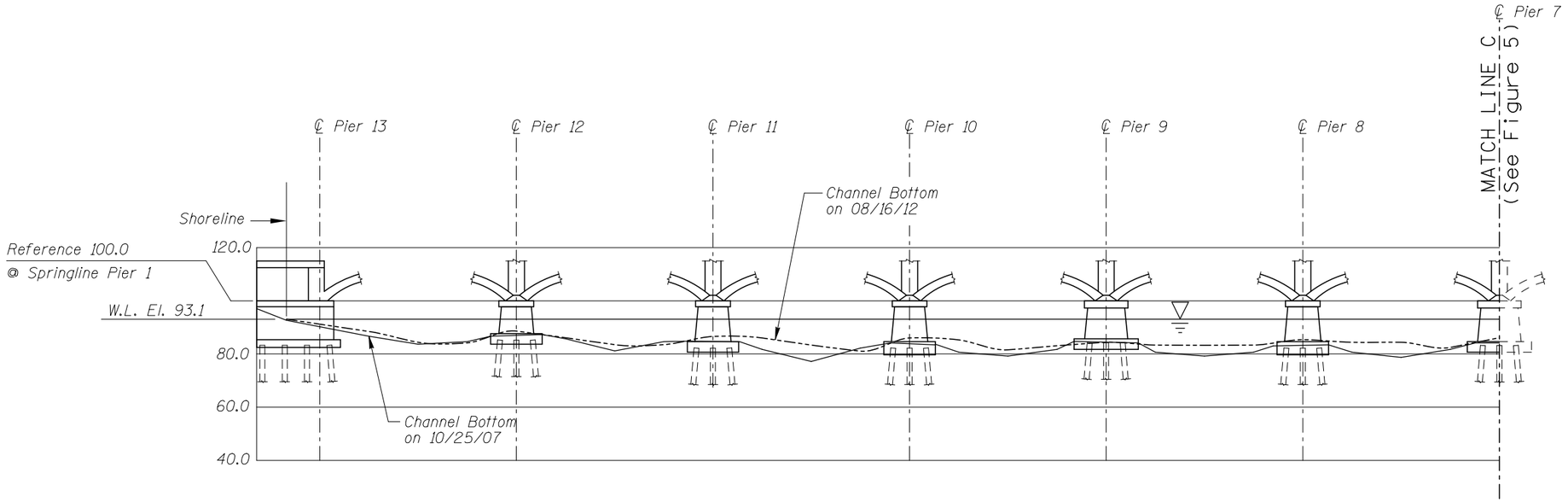
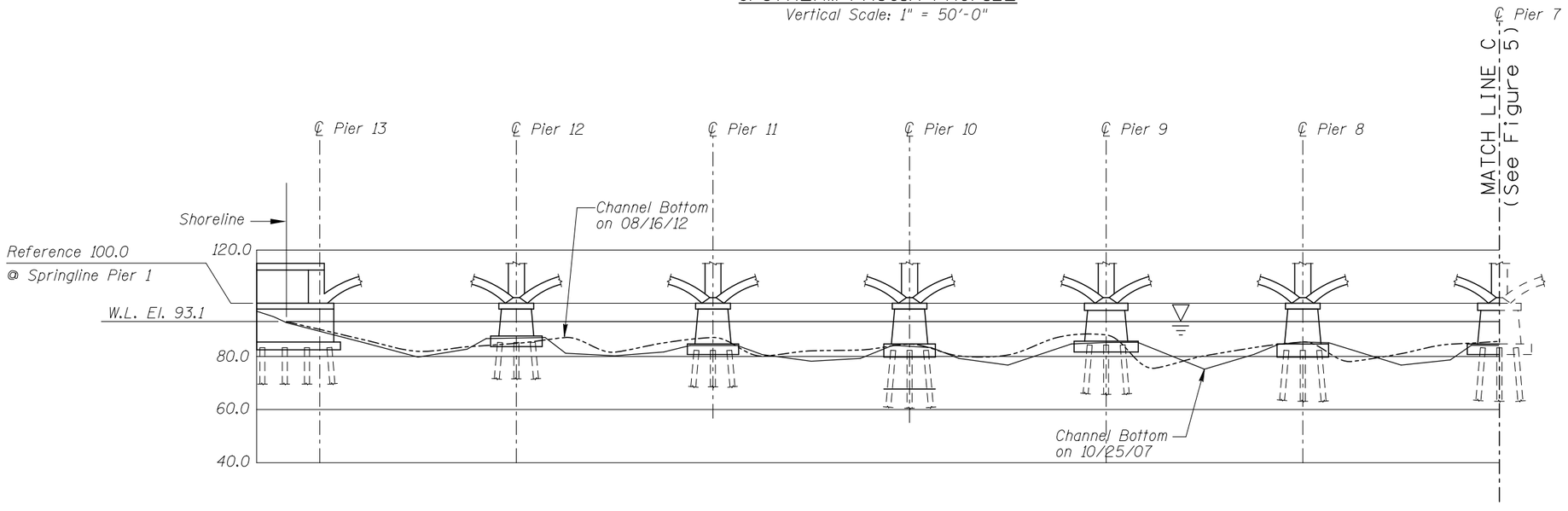
Code: 52210150		Figure No.: 3



UPSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"



DOWNSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
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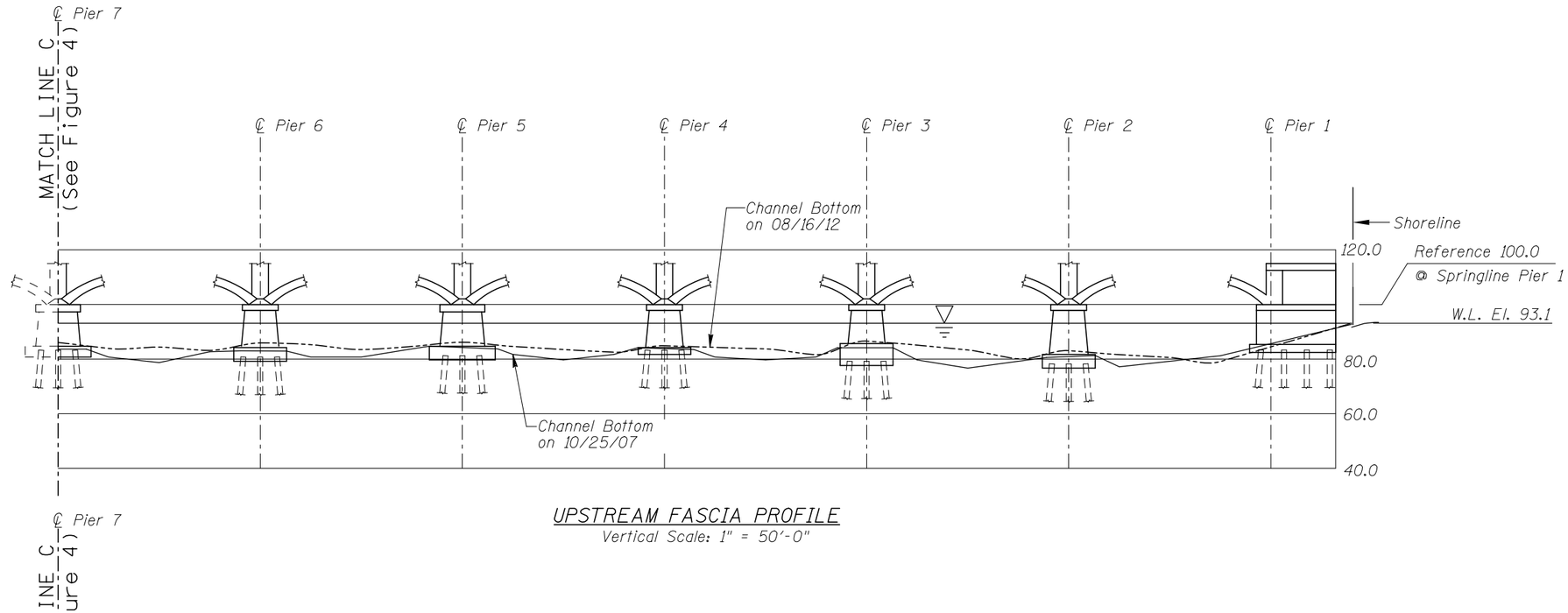
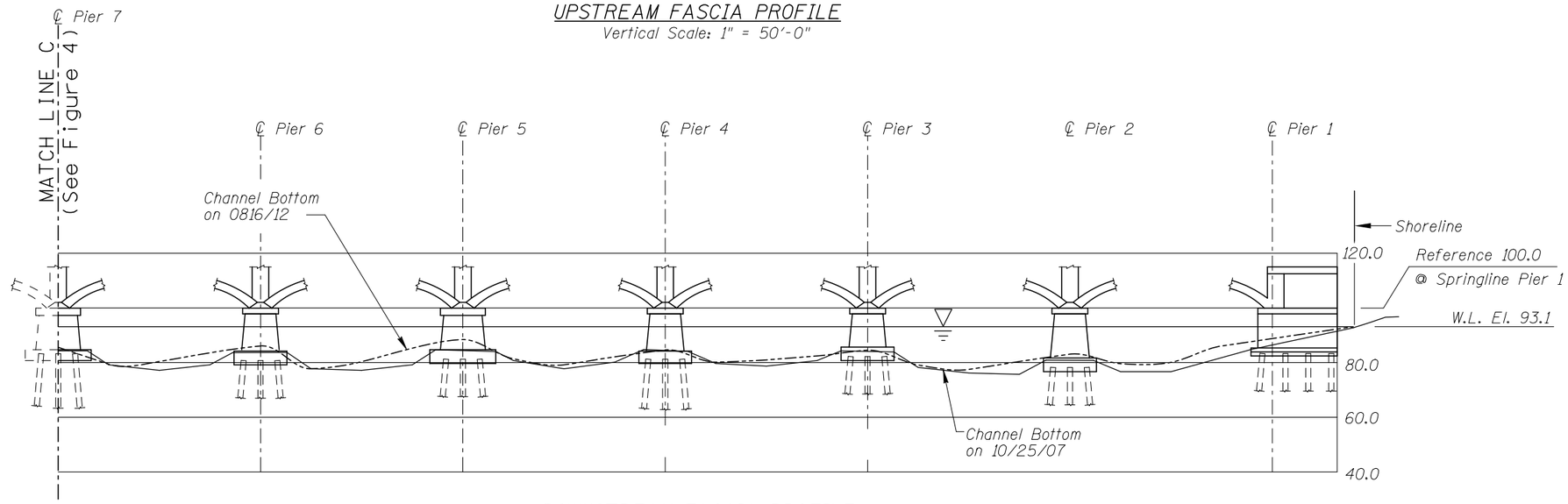
UPSTREAM AND DOWNSTREAM
FASCIA PROFILES

Drawn By: CRE	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: AUG. 2012
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 4



UPSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"



DOWNSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
DISTRICT 6, WINONA COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

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Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 5

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

INSPECTORS: Collins Engineers, Inc. DATE: August 16, 2012

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

BRIDGE NO: 4260 WEATHER: Sunny, 65°F

WATERWAY CROSSED: North Channel of the Mississippi River

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER _____

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

EQUIPMENT: Commercial Scuba, Scraper, Sounding Pole, Probe Rod, Camera, Boat, Fathometer

TIME IN WATER: 9:05 a.m.

TIME OUT OF WATER: 10:10 a.m.

WATERWAY DATA: VELOCITY 1.0 ft/s

VISIBILITY 1.0 foot

DEPTH 10.7 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 through 13

REMARKS: Overall, Piers 1 through 13 were found to be in satisfactory condition. The submerged concrete was typically in fair condition with moderate scaling from 1 foot above to 1 foot below the waterline and random widespread hairline cracking throughout most pier shafts. The structure had extensive riprap with sand infilling present around all of the piers to address any past footing undermining. The riprap typically extended to top of footing or to no lower than 3 feet below top of footing. The concrete footings typically exhibited rough surfaces with up to 3 inches maximum probe rod penetration.

FURTHER ACTION NEEDED: _____ YES X NO

Prior placement of riprap at the piers has substantially improved structural integrity of the bridge. Therefore, monitor footing exposure during future inspections and 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. 4260
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Roy A Forsyth, P.E.
WATERWAY CROSSED North Channel of the Mississippi River

INSPECTION DATE August 16, 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

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	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	6.8’	6	6	7	7	N	6	6	N	N	N	6	6	N	N	7	N	N
	Pier 2	10.7’	N	6	7	7	N	6	6	N	N	N	6	6	N	N	7	N	N
	Pier 3	8.6’	N	6	N	7	N	6	7	N	N	7	7	6	N	N	7	N	N
	Pier 4	9.6’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 5	8.2’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 6	7.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1 through 13 were found to be in satisfactory condition. The submerged concrete was typically in satisfactory to fair condition with moderate scaling from 1 foot above to 1 foot below the waterline and random widespread hairline cracking throughout most pier shafts. The structure had extensive riprap with sand infilling present around all of the piers to address any past footing undermining. The riprap typically extended to top of footing or to no lower than 3 feet below top of footing. The concrete footings typically exhibited rough surfaces with up to 3 inches maximum probe rod penetration.

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.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 4260
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Roy A. Forsyth, P.E.
WATERWAY CROSSED North Channel of the Mississippi River

INSPECTION DATE August 16, 2012

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UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	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 7	7.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 8	7.7’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 9	8.7’	N	5	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 10	8.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 11	6.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 12	8.2’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N
	Pier 13	5.8’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	7	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1 through 13 were found to be in satisfactory condition. The submerged concrete was typically in satisfactory to fair condition with moderate scaling from 1 foot above to 1 foot below the waterline and random widespread hairline cracking throughout most pier shafts. The structure had extensive riprap with sand infilling present around all of the piers to address any past footing undermining. The riprap typically extended to top of footing or to no lower than 3 feet below top of footing. The concrete footings typically exhibited rough surfaces with up to 3 inches maximum probe rod penetration.

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