

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 2441  
CSAH NO. 5 (FRANKLIN AVENUE)  
OVER THE  
MISSISSIPPI RIVER  
HENNEPIN COUNTY

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OCTOBER 29, 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. 2441, Piers 2 and 3, were found to be in satisfactory to fair condition. Both piers exhibited substantial scaling and section loss with exposed and corroded reinforcing steel; however, due to the massive size of the piers, the deterioration has not yet significantly compromised the overall structural capacity of the piers. The channel bottom around the substructure units appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

- (A) The concrete along the west face of Pier 2 was in fair to poor condition with extensive scaling and areas of section loss observed from approximately 4 feet above the waterline to the channel bottom. Typically, the areas of section loss exhibited up to 14 inches of penetration with exposed heavily corroded reinforcing steel.
- (B) Accumulation of concrete rubble and steel debris was observed around Pier 2 and extended approximately 1 foot above the waterline along the west face of the pier.
- (C) Two areas of section loss with exposed reinforcing steel were observed near the underside quarter point of the east face of Pier 2 extending from 4 feet above the waterline to approximately 5 feet below the waterline with up to 12 inches of penetration.
- (D) Typically, Piers 2 and 3 exhibited heavy scaling from 2 feet above the waterline to 3 feet below waterline with areas of exposed reinforcing steel and up to 8 inches of penetration.
- (E) Heavy section loss was observed from 6 feet above the waterline to 3 feet below

the waterline along the middle portion of Pier 3 along both faces with exposed reinforcing steel and up to 1 foot of penetration.

- (F) Large diameter riprap was stacked up in front of the upstream nose of Pier 3.
- (G) Rocks and boulders were observed on the channel bottom along the east side of Pier 3.

RECOMMENDATIONS:

- (A) The deterioration with exposed reinforcing steel should be addressed before it progresses and becomes more detrimental. At the minimum, the exposed reinforcing steel should be cleaned and covered with an epoxy grout. Due to the significant loss of concrete section, however, a more desirable repair would be to remove all loose and unsound concrete, clean the exposed reinforcing steel, and reform the shaft to the original dimensions and lines with a concrete mix designed for underwater applications.
- (B) 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,

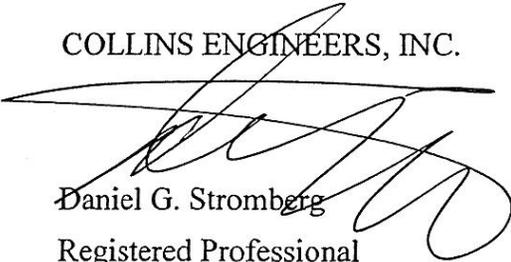
PROFESSIONAL ENGINEER

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: 2441

Feature Crossed: Mississippi River

Feature Carried: CSAH No. 5 (Franklin Avenue)

Location: Hennepin County

Bridge Description: Bridge No. 2441 has a five span, open-spandrel concrete arch superstructure. The superstructure is supported by two reinforced concrete abutments and four reinforced concrete piers. The available design drawings did not indicate the type of footing or foundation construction of the piers. The piers are numbered 1 through 4 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt R Lovelace, P.E. (WSB)

Dive Team: Marc B. Parker, Lukas Janulis, P.E.

Date: October 29, 2012

Weather Conditions: Cloudy, 40° F

Underwater Visibility: 0.5 feet

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 2 and 3.

General Shape: The piers consist of large oblong rectangular shafts with rounded noses and various corners / recesses in the construction. The drawings furnished did not provide any foundation information.

Maximum Water Depth at Substructure Inspected: Approximately 10.7 Feet.

4. WATERLINE DATUM

Water Level Reference: The benchmark reference at Elevation 731.0 located on Pier 2.

Water Surface: The waterline was approximately 5.6 feet below reference.  
Waterline Elevation = 725.4.

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 7

Item 92B: Underwater Inspection: Code B/10/12

Item 113: Scour Critical Bridges: Code R/02

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

X Yes \_\_\_\_\_ No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
205	Reinforced Concrete Column	4	EA			4		
985	Slope and Slope Protection	1	EA	1				
361	Scour Smart Flag	1	EA	1				



Photograph 1. View of Pier 2, Looking Northwest.



Photograph 2. View of Upstream End of Pier 2, Looking Southwest.



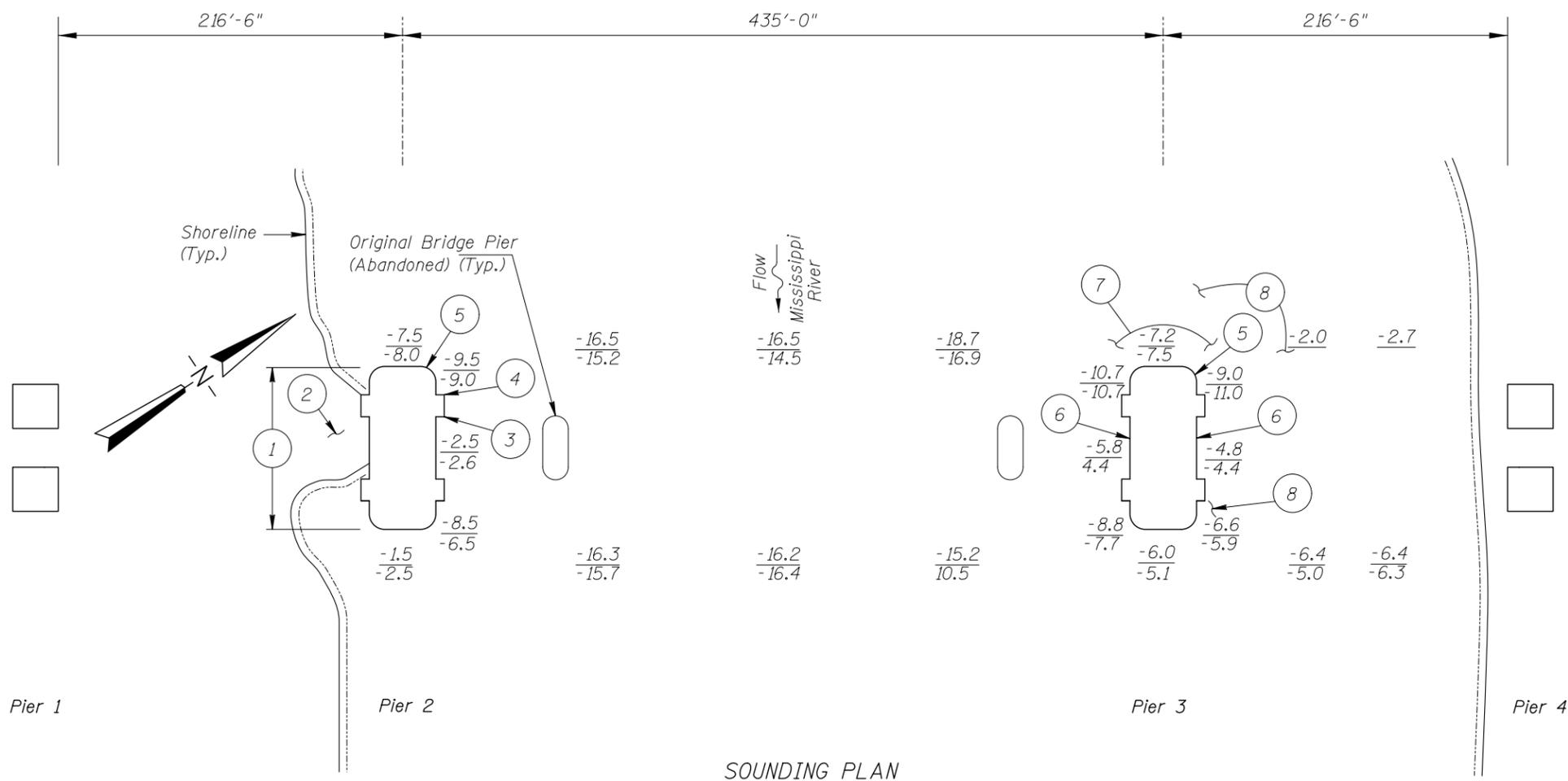
Photograph 3. View of Pier 3, Looking Northeast.



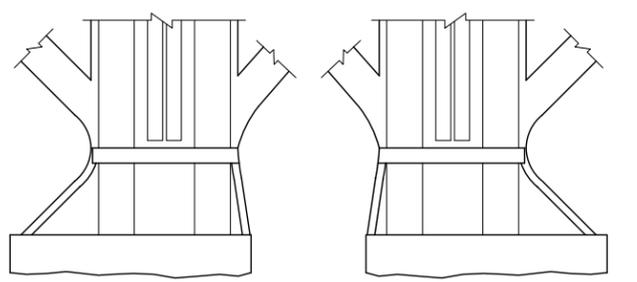
Photograph 4. View of Heavy Deterioration and Section Loss along the East Side of Pier 3, Looking West.



Photograph 5. View of Deterioration and Section Loss along the West Side of Pier 3, Looking East.



SOUNDING PLAN



UPSTREAM PIER 2      UPSTREAM PIER 3  
TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 2 and 3 were inspected underwater.
2. At the time of inspection on October 29, 2012, the waterline was located approximately 5.6 feet below the benchmark reference at Elevation 731.0 on Pier 2. Based on the reference this corresponds with a waterline elevation of 725.4.
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 concrete along the west face of Pier 2 was in fair to poor condition with extensive scaling and areas of section loss observed from approximately 4 feet above the waterline to the channel bottom. Typically, the areas of section loss exhibited up to 14 inches of penetration with exposed heavily corroded reinforcing steel.
- ② Accumulation of concrete rubble and steel debris was observed around Pier 2 and extended approximately 1 foot above the waterline along the west face of the pier.
- ③ An area of section loss with exposed reinforcing steel was observed from 4 feet above the waterline to approximately 4 feet below the waterline with up to 10 inches of penetration.
- ④ An area of section loss with exposed reinforcing steel was observed from 4 feet above the waterline to approximately 5 feet below the waterline with up to 12 inches of penetration.
- ⑤ Typically, Piers 2 and 3 exhibited heavy scaling from 2 feet above the waterline to 3 feet below waterline with areas of exposed reinforcing steel and up to 8 inches of penetration.
- ⑥ Heavy section loss was observed from 6 feet above the waterline to 3 feet below the waterline along the middle portion of the pier along both faces with exposed reinforcing steel and up to 1 foot of penetration.
- ⑦ Large diameter riprap was stacked up in front of the upstream nose of Pier 3.
- ⑧ Rocks and boulders were observed on the channel bottom along the east side of Pier 3.

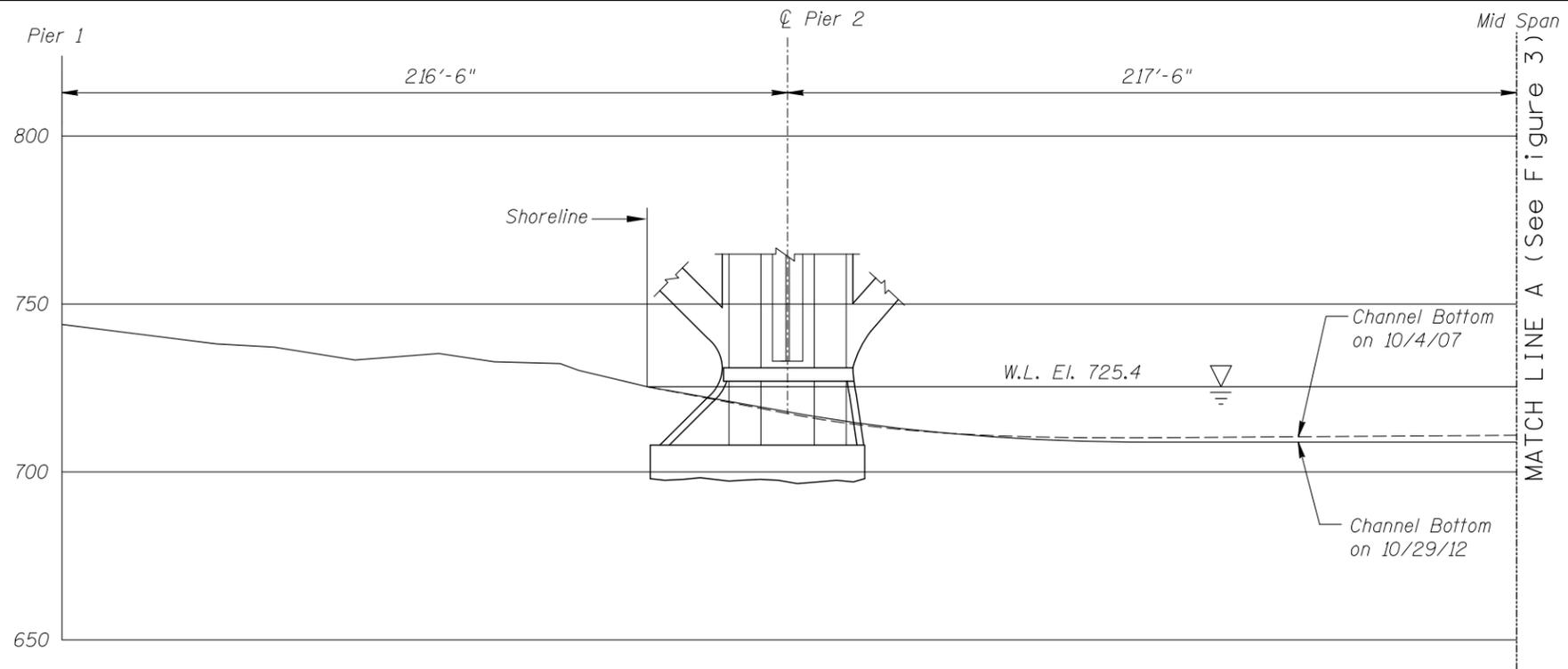
Legend

- 4.1 Sounding Depth (10/29/12)
- 3.7 Sounding Depth (10/4/07)

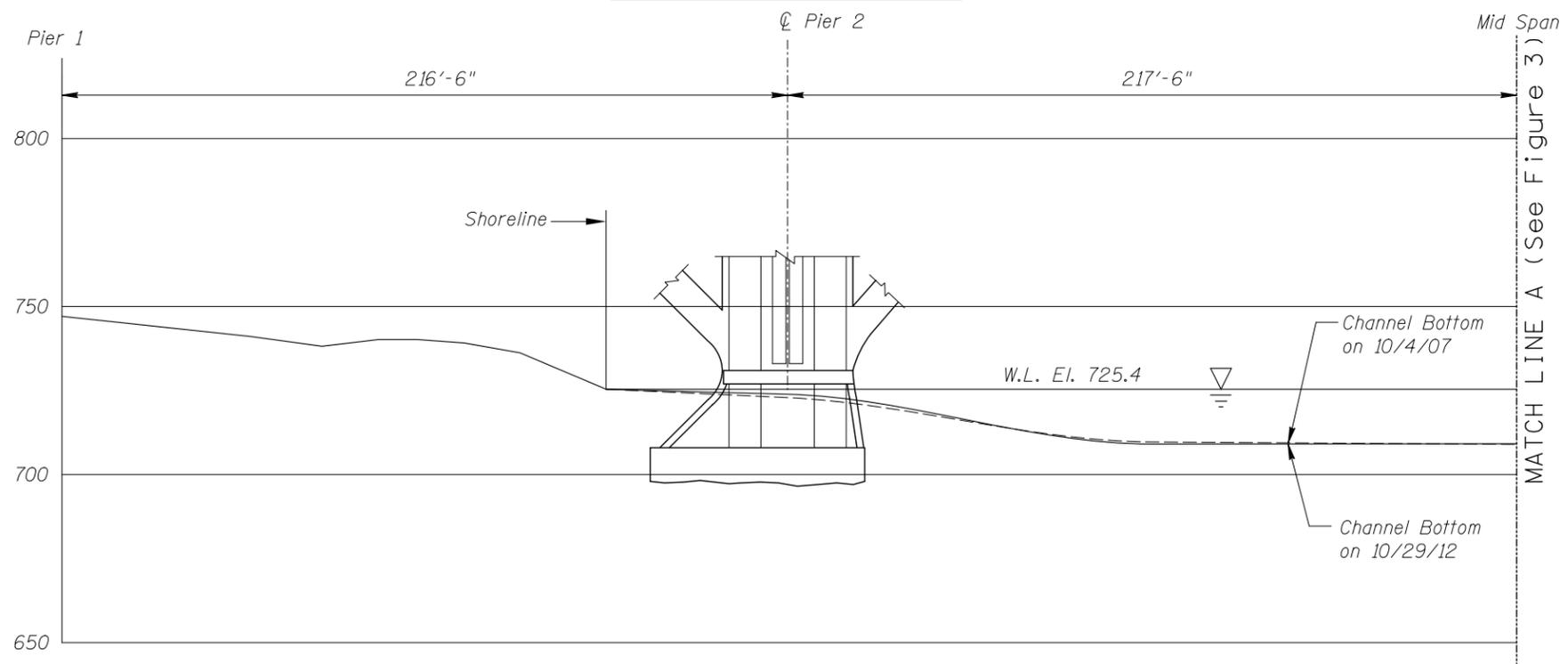
Note:

All soundings based on 2012 waterline location.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 2441 OVER THE MISSISSIPPI RIVER HENNEPIN COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: CRE	<b>COLLINS ENGINEERS</b>	Date: OCT., 2012
Checked By: LJ		Scale: NTS
Code: 74232441		Figure No.: I
123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com		



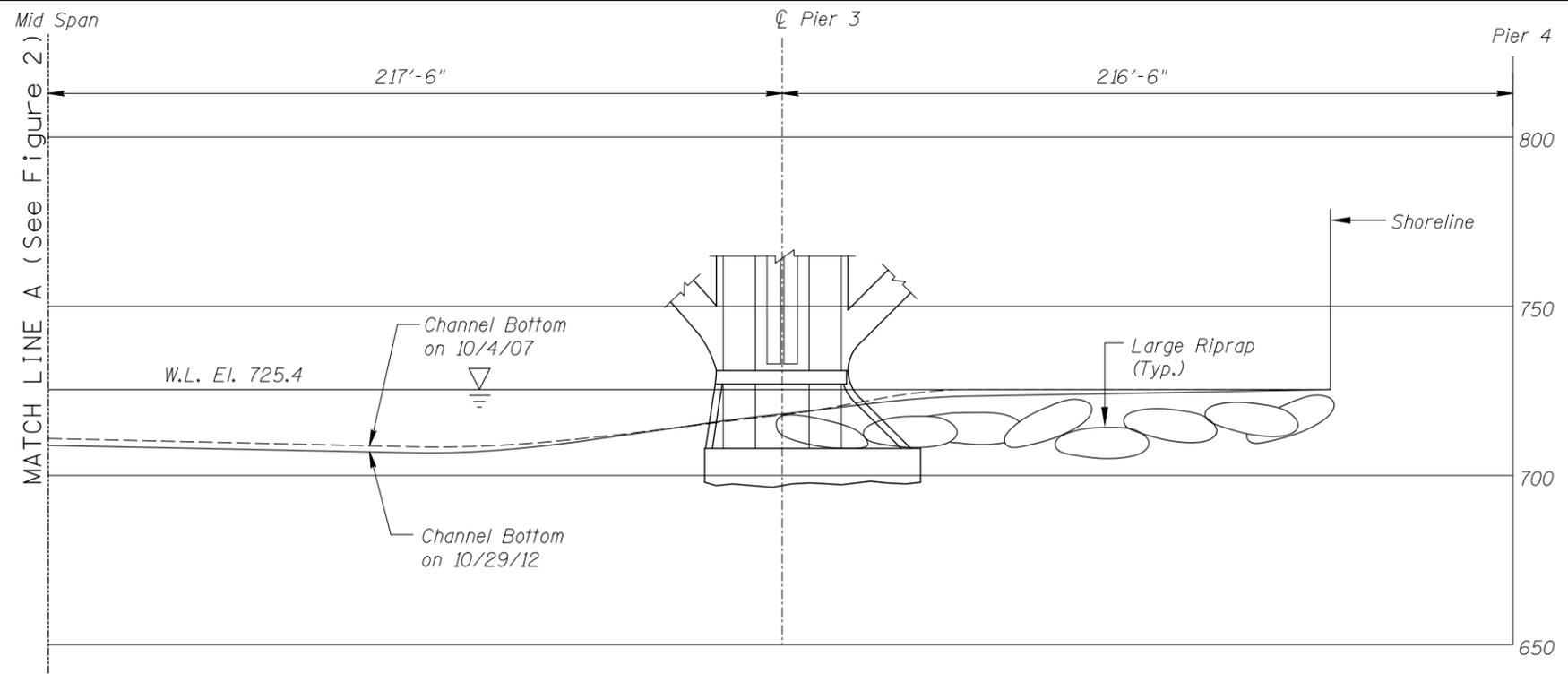
UPSTREAM FASCIA PROFILE



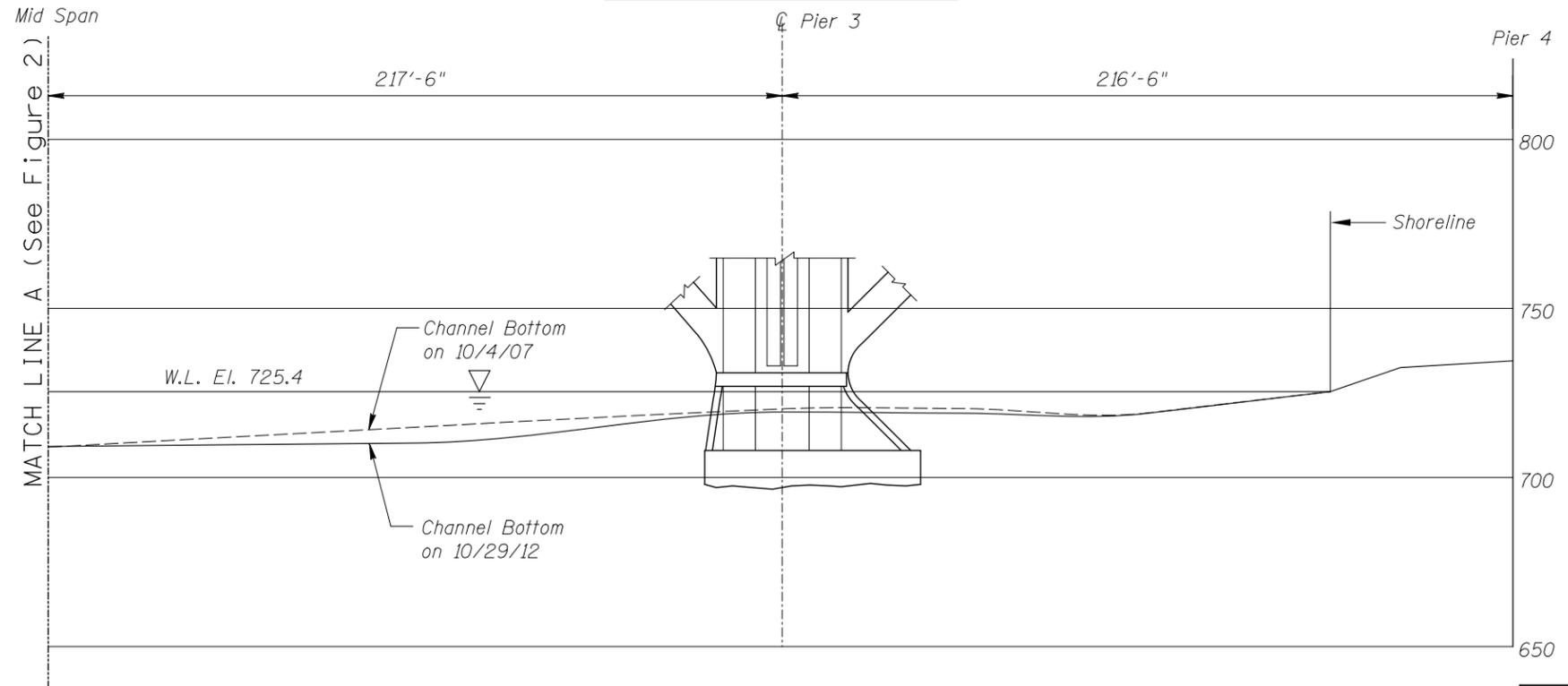
DOWNSTREAM FASCIA PROFILE

*Note:*  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 2441 OVER THE MISSISSIPPI RIVER HENNEPIN COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES - I</b>		
Drawn By: CRE	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: OCT., 2012
Checked By: LJ		Scale: 1"=50'
Code: 7423244I		Figure No.: 2



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 2441 OVER THE MISSISSIPPI RIVER HENNEPIN COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES - II</b>		
Drawn By: CRE	<b>COLLINS ENGINEERS</b>	Date: OCT., 2012
Checked By: LJ		Scale: 1"=50'
Code: 7423244I		Figure No.: 3

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

INSPECTORS: Collins Engineers, Inc. DATE: October 29, 2012

ON-SITE TEAM LEADER: Barritt R Lovelace, P.E. (WSB)

BRIDGE NO: 2441 WEATHER: Cloudy, 40° F

WATERWAY CROSSED: Mississippi River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Marc B. Parker, Lukas Janulis, P.E.

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

TIME IN WATER: 3:30 P.M.

TIME OUT OF WATER: 4:20 P.M.

WATERWAY DATA: VELOCITY 0.5 ft/sec

VISIBILITY 0.5 feet

DEPTH 10.7 feet maximum at Pier 3

ELEMENTS INSPECTED: Piers 2 and 3

REMARKS: Overall, Piers 2 and 3, were found to be in satisfactory to fair condition. Both piers exhibited substantial scaling and section loss with exposed and corroded reinforcing steel; however, due to the massive size of the piers, the deterioration has not yet significantly compromised the overall structural capacity of the piers. The channel bottom around the substructure units appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

FURTHER ACTION NEEDED:  YES  NO

At a minimum, the exposed reinforcing steel should be cleaned and covered with an epoxy grout. Due to the substantial loss of section, however, a more desirable repair would be to remove all loose and unsound concrete, clean the exposed reinforcing steel, and reform the concrete to the original dimensions and lines.

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. 2441  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Barritt Lovelace, P.E.  
WATERWAY CROSSED Mississippi River

INSPECTION DATE October 29, 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	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL (REINFORCING)	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 2	9.5'	N	5	N	8	N	5	8	8	6	7	7	5	5	N	4	N	N
	Pier 3	10.7'	N	5	N	8	N	5	8	8	6	N	7	5	5	N	4	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 2 and 3, were found to be in satisfactory to fair condition. Both piers exhibited substantial scaling and section loss with exposed and corroded reinforcing steel; however, due to the massive size of the piers, the deterioration has not yet significantly compromised the overall structural capacity of the piers. The channel bottom around the substructure units appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

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.