

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 3381

CR 422

OVER

UNNAMED STREAM

ST. LOUIS COUNTY

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JUNE 22, 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 3381, the West and East Abutments, were generally in fair to poor condition with significant deterioration at two of the six piles at the East Abutment and five of the six piles at the West Abutment. The pile deterioration consisted of outer shell splintering, splitting, and decay with piles exhibiting loss of section and/or deficient material affecting between 20 percent and 90 percent of the pile sections. The abutment backwall planks and wingwalls were also of older timbers and were heavily weathered, but with no notable deterioration or section losses.

INSPECTION FINDINGS:

- (A) Channel bottom consisted of soft silty gravel typically allowing 2 feet of probe rod penetration. Near the middle of the abutments the silty gravel was more firm allowing 1 foot of probe rod penetration.
- (B) A 6 inch wide by 2 inch deep area of soft/rotted (decayed) timber was observed on the north face of Pile C of the East Abutment at approximately 8 inches below the pile cap.
- (C) Pile A of the East Abutment exhibited approximately 60 percent loss of section extending from the pile cap down 3.5 feet.
- (D) An 8 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the south face of Pile A of the West Abutment. The defected area extended from the pile cap down 1.5 feet.
- (E) A 15 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the south and east faces of Pile B of the West Abutment and extended from the pile cap down 1.5 feet.

- (F) An 15 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the east face of Pile C of the West Abutment and extended from the pile cap down 1.5 feet.
  
- (G) An area of splintered and soft timber extending 1.5 inches into the outer shell was observed on the east half of Pile F of the West Abutment and extended from the pile cap down 1.5 feet.
  
- (H) Pile D of the West Abutment was severely split/splintered. Approximately 90 percent of the total cross-sectional area of the pile was observed to be unsound with areas of heavy decay.

RECOMMENDATIONS:

- (A) Consideration should be given to evaluating the abutment load carrying capacities in light of the significant number of deficient, heavily deteriorated piling. Based on that evaluation, additional piling or other corrective measures will likely be warranted.
  
- (B) Until the above evaluation and actions are implemented, the underwater inspection interval should be reduced to twenty four (24) months.

Inspection Team Leader:  
Daniel G. Stromberg, P.E.

Respectfully submitted,

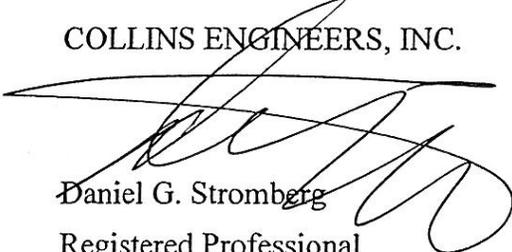
PROFESSIONAL ENGINEER

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: 3381

Feature Crossed: Unnamed Stream

Feature Carried: CR 422

Location: St. Louis County

Bridge Description: The superstructure consists of timber decking supported by steel beams. The superstructure is supported by two abutments. Both abutments consist of six timber piles supporting a timber pile cap. The substructure units are designated as the West Abutment and the East Abutment. Piles are designated A through F from south to north.

2. INSPECTION DATA

Professional Engineer/ Team Leader: Daniel G. Stromberg, P.E.

Dive Team: Clayton Brookins, Breanne Stromberg

Date: June 22, 2012

Weather Conditions: Sunny, 75 °F

Underwater Visibility: 2 ft.

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The West and East Abutments

General Shape: The West and East Abutments each consisted of a timber pile cap supported by six timber piles. The backwalls and wingwalls were comprised of timber piles and timber lagging.

Maximum Water Depth at Substructure Inspected: Approximately 4.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pile cap at the upstream end of the East Abutment.

Water Surface: The waterline was approximately 2.4 feet below reference.

Assumed Waterline Elevation: 97.6

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 4

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/06/12

Item 113: Scour Critical Bridges: Code J

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	12	EA		5	5	2	
216	Timber Abutment	48	LF		48			



Photograph 1. View of the Upstream Fascia, Looking Northeast.



Photograph 2. View of the Downstream Fascia, Looking Southwest.



Photograph 3. View of the West Abutment, Looking Northwest.



Photograph 4. View of the East Abutment, Looking Northeast.



Photograph 5. View of Soft/Rotted Timber at Pile C of the East Abutment, Looking Southeast.



Photograph 6. View of Split/Splintered Timber on Pile A of the East Abutment, Looking North.



Photograph 7. View of Typical Outer Shell Splintering, Splitting, and Deterioration at Pile B of the West Abutment, Looking West.



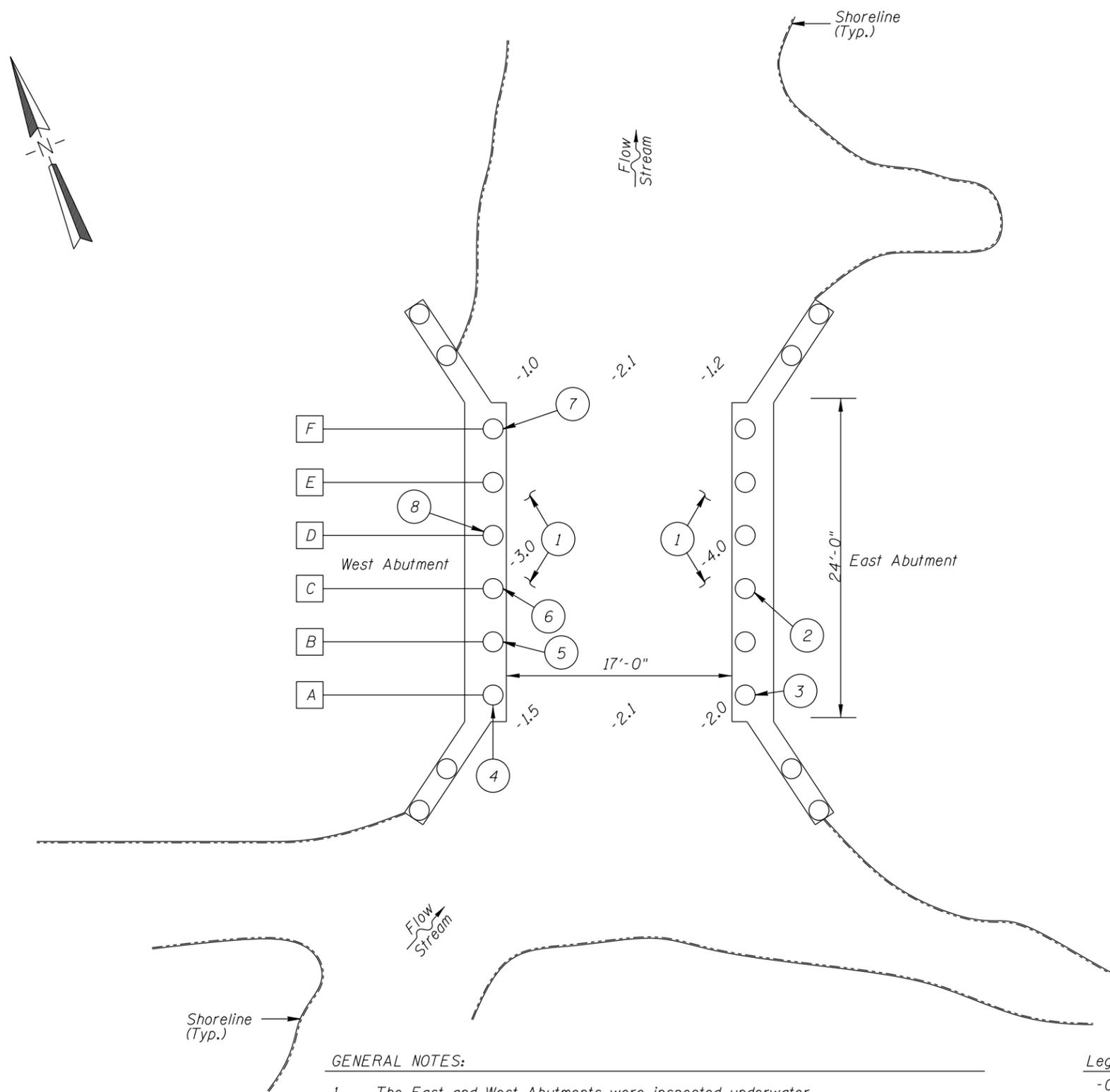
Photograph 8. View of Severe Splintering, Splitting, and Deterioration at Pile D of the West Abutment, Looking Northwest.



Photograph 9. View of Typical Backwall Condition at the West Abutment between Piles D and E, Looking Southwest.



Photograph 10. View of Typical Wingwall Condition at the Upstream end of the East Abutment, Looking Northeast.



**INSPECTION NOTES:**

- 1 Channel bottom consisted of soft silty gravel typically allowing 2 feet of probe rod penetration. Near the middle of the abutments the silty gravel was more firm allowing 1 foot of probe rod penetration.
- 2 A 6 inch wide by 2 inch deep area of soft/rotted (decayed) timber was observed on the north face of Pile C of the East Abutment at approximately 8 inches below the pile cap.
- 3 Pile A of the East Abutment exhibited approximately 60 percent loss of section extending from the pile cap down 3.5 feet.
- 4 An 8 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the south face of Pile A of the West Abutment. The defected area extended from the pile cap down 1.5 feet.
- 5 A 15 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the south and east faces of Pile B of the West Abutment and extended from the pile cap down 1.5 feet.
- 6 An 15 inch wide area of splintered and soft timber extending 2 inches into the outer shell was observed on the east face of Pile C of the West Abutment and extended from the pile cap down 1.5 feet.
- 7 Pile D of the West Abutment was severely split/splintered. Approximately 90 percent of the total cross-sectional area of the pile was observed to be unsound with areas of heavy decay.
- 8 An area of splintered and soft timber extending 1.5 inches into the outer shell was observed on the east half of Pile F of the West Abutment and extended from the pile cap down 1.5 feet.

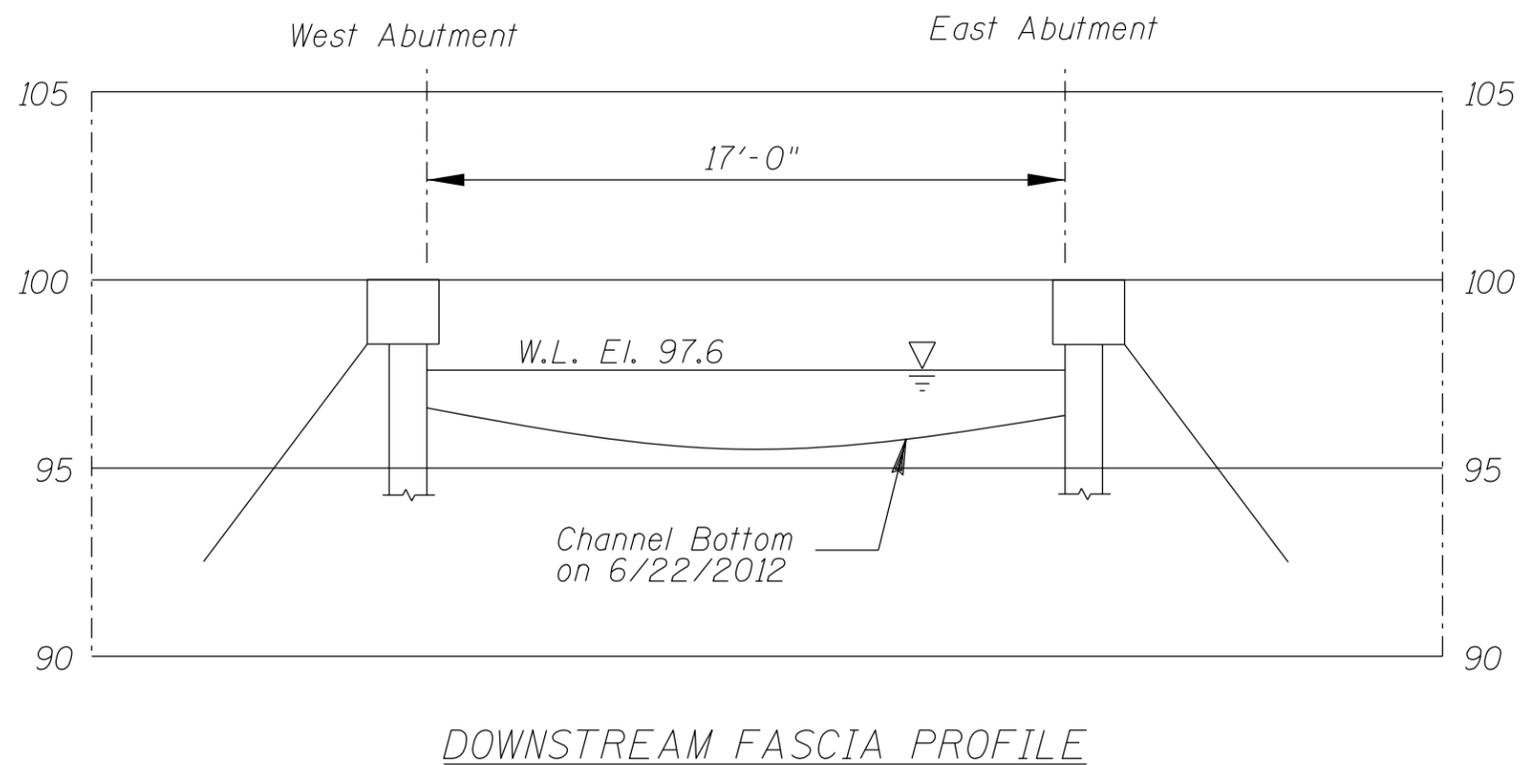
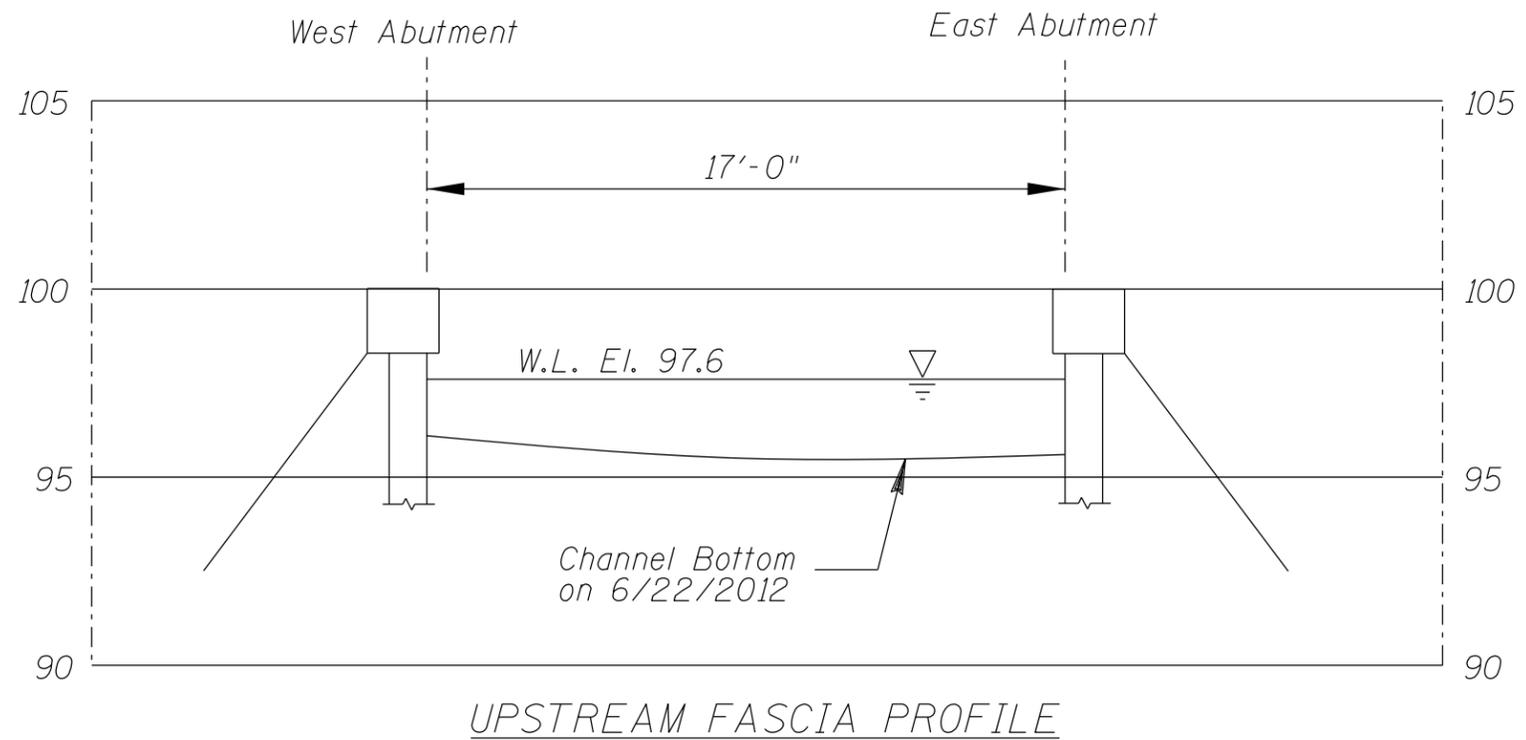
**GENERAL NOTES:**

1. The East and West Abutments were inspected underwater.
2. At the time of inspection, on June 22, 2012, the waterline was located approximately 2.4 feet below the top of the cap at the upstream end of the East Abutment. Due to lack of design plan information, the reference elevation was assumed to be 100.0 feet. This corresponds to waterline elevation of 97.6 feet.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to north and south fascias at 1/2 point intervals.

**Legend**

- 0.4 Sounding Depth (6/22/12)
- A Pile Designation

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 3381 CR 422 OVER A STREAM ST LOUIS COUNTY, TOWNSHIP OF PORTAGE		
INSPECTION AND SOUNDING PLAN		
Drawn By: BMS	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: JULY 2012
Checked By: LJ		Scale: NTS
Code: 74233381		Figure No.: 1



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

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 3381 CR 422 OVER A STREAM ST LOUIS COUNTY, TOWNSHIP OF PORTAGE UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: BMS	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: JULY 2012
Checked By: LJ		Scale: NTS
Code: 74233381		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: June 22, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 3381 WEATHER: Sunny, 75°F

WATERWAY CROSSED: Unnamed Stream

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Clayton Brookins, Breanne Stromberg

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

TIME IN WATER: 1:30 P.M.

TIME OUT OF WATER: 2:15 P.M.

WATERWAY DATA: VELOCITY 0.5 ft/sec

VISIBILITY 2 ft

DEPTH 4.0 feet maximum at the East Abutment

ELEMENTS INSPECTED: The West and East Abutment

REMARKS: Overall, the West and East Abutments were generally in fair to poor condition with significant deterioration at two of the six piles at the East Abutment and five of the six6 piles at the West Abutment. The pile deterioration consisted of outer shell splintering , splitting, and decay with piles exhibiting loss of section and/or deficient material affecting between 20 percent and 90 percent of the pile sections. The abutment backwall planks and wingwalls were also of older timbers and were heavily weathered, but with no notable deterioration or section losses.

FURTHER ACTION NEEDED:  YES  NO

Consideration should be given to evaluating the abutment load carrying capacities in light of the significant number of deficient, heavily deteriorated piling. Based on that evaluation, additional piling or other corrective measures will likely be warranted.

Until the above evaluation and actions are implemented, the underwater inspection interval should be reduced to twenty four (24) months.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 3381  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.  
 WATERWAY CROSSED Unnamed Stream

INSPECTION DATE June 22, 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 (BACKWALLS)	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
	East Abutment	4'	4	N	N	5	6	4	N	7	N	N	7	N	N	4	5	N	N
	West Abutment	3'	4	N	N	5	6	4	N	7	N	N	7	N	N	4	4	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the West and East Abutments were generally in fair to poor condition with significant deterioration at two of the six piles at the East Abutment and five of the six6 piles at the West Abutment. The pile deterioration consisted of outer shell splintering , splitting, and decay with piles exhibiting loss of section and/or deficient material affecting between 20 percent and 90 percent of the pile sections. The abutment backwall planks and wingwalls were also of older timbers and were heavily weathered, but with no notable deterioration or section losses.

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.