

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 58506  
CSAH NO. 7  
OVER THE  
SNAKE RIVER  
DISTRICT 1 - PINE COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
BY  
COLLINS ENGINEERS, INC.  
JOB NO. 3512 (CEI 73)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 58506, Piers 1 through 8, were found to be in satisfactory to fair condition. No defects of major structural significance were observed, except for a considerable amount of bracing defects and failures, which have compromised the lateral stability of the bridge. Light accumulations of timber drift were observed at Piers 1, 3, and 7. The channel bottom around the substructure units and the shorelines appeared to be in stable condition with no significant scour or appreciable changes since the previous inspection. An adjacent retaining wall at the southeast shoreline was leaning into the channel and has failed.

INSPECTION FINDINGS:

- (A) It was observed that the retaining wall located to the east of Pier 8 was leaning into the channel and has failed.
- (B) In general, the cross-bracing between the piles of each pier was in fair to poor condition with splitting typically at one or more brace connections on each pier. Many of the pier braces also displayed moderate to heavy section loss and related connection failures.
- (C) The majority of the timber piles were in fair condition with weathering and random vertical checking present with widths of up to 1/4 inch. The only significant pile distress found was as follows:
  - \* The pile at the center of Pier 2 was cracked, splintered and soft to a depth of 1/2 inch. This condition existed from 1 foot above the waterline to the channel bottom. Below this 1/2 inch softer outer layer, the wood material was sound and firm.

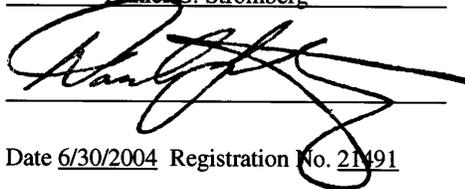
- \* The westernmost pile on the south side of Pier 7 was splintered over a 12 inch high by 6 inch wide by 3/4 inch deep area. This area was located 2 feet below the waterline. The material beneath the splintered material was soft to an estimated depth of 1/4 inch. The total loss of cross-section at this location was estimated to be between 10 and 20 percent.
  
- (D) Light accumulations of timber debris were observed throughout the piles of Piers 1, 3, and 7.

RECOMMENDATIONS:

- (A) The cracked, split, and deteriorated pier cross-bracing should be replaced to restore the lateral stability of the piers.
  
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

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.

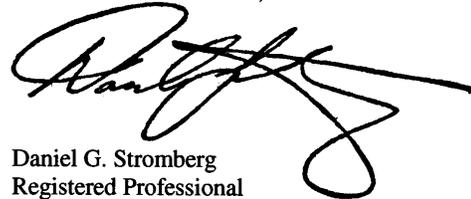
Daniel G. Stromberg



Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 58506

Feature Crossed: The Snake River

Feature Carried: CSAH No. 7

Location: District 1 - Pine County

Bridge Description: The superstructure consists of ten spans of timber deck on multiple timber stringers supported by nine timber pile piers and two timber pile abutments. The piers are numbered 1 through 9 starting from the north end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Shirley M. Walker

Dive Team: Clayton G. Brookins, Michelle D. Koerbel

Date: September 25, 2002

Weather Conditions: Rain, " 50° F

Underwater Visibility: " 1.0 Foot

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 8.

General Shape: Each pier consists of a timber cap supported by timber piles. Timber cross-bracing is present between the piles. The number of piles at each pier varies from two rows of five piles (Piers 3 and 7) to one row of seven piles (all other piers). In addition, Piers 3 and 7 have a nosing pile at the upstream end.

Maximum Water Depth at Substructure Inspected: Approximately 8.2 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at east end of Pier 8.

Water Surface: The waterline was approximately 8.7 feet below reference.  
Water Elevation = 933.8.

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

Item 60: Substructure: Code 6

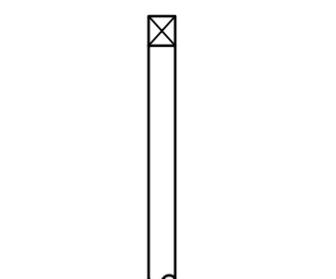
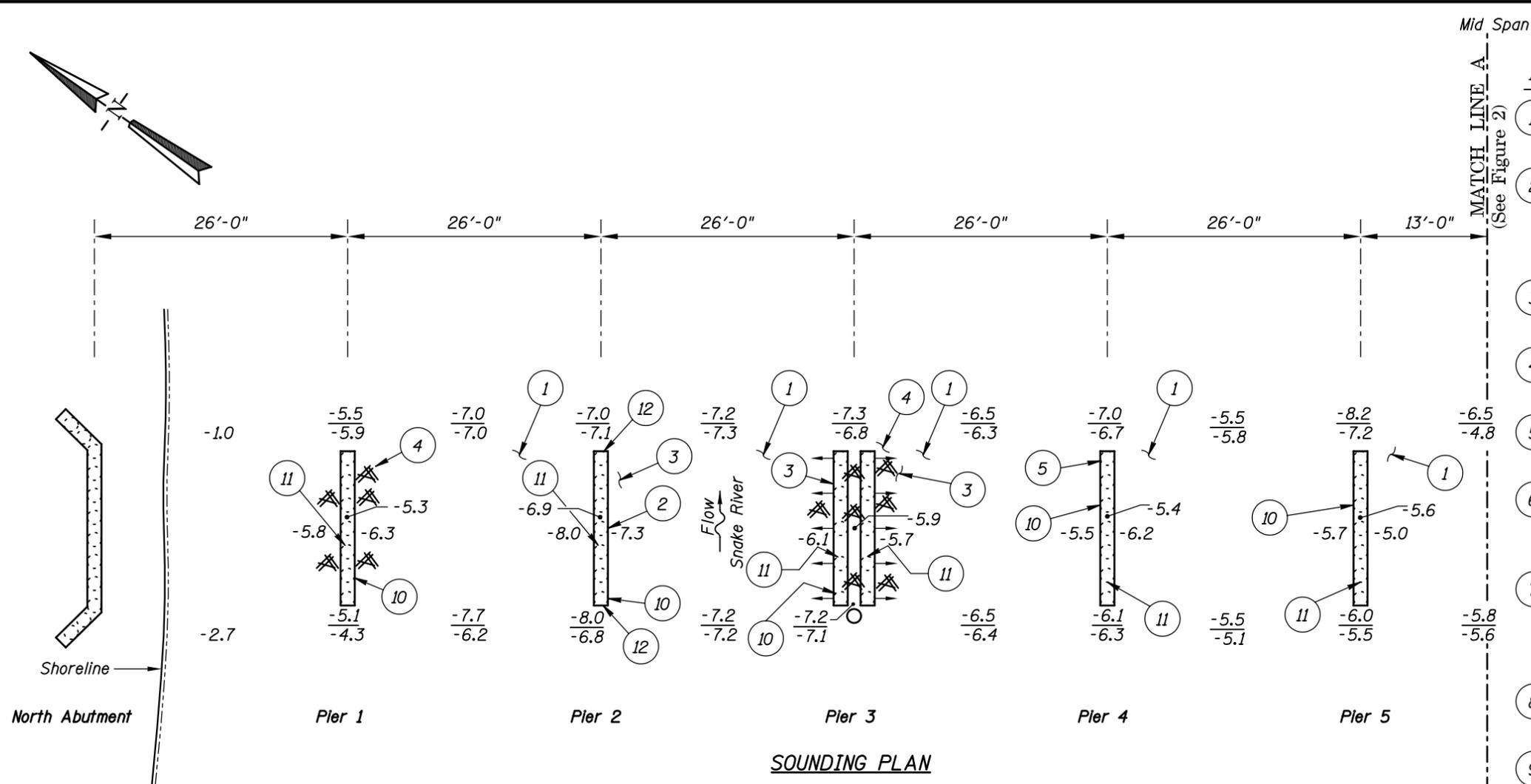
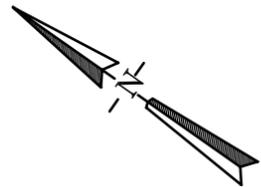
Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/09/02

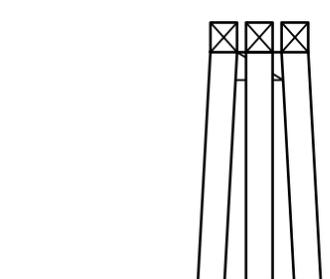
Item 113: Scour Critical Bridges: Code J/97

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

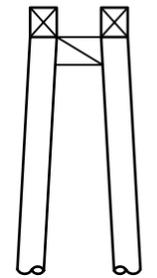
\_\_\_\_\_ Yes  X  No



TYPICAL END VIEW OF PIERS 1, 2, 4, 6, 8 & 9



TYPICAL END VIEW OF PIERS 3 & 7 UPSTREAM



TYPICAL END VIEW OF PIERS 3 & 7 DOWNSTREAM

GENERAL NOTES:

1. Piers 1 through 9 were inspected underwater.
2. At the time of inspection on August 25, 2002, the waterline was located 8.7 feet below the top of cap on the downstream end of Pier 8. This corresponds to a waterline elevation of 933.8 feet based on the previous report.
3. Soundings indicate the water depth at the time of the inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at the mid points between the substructure units.

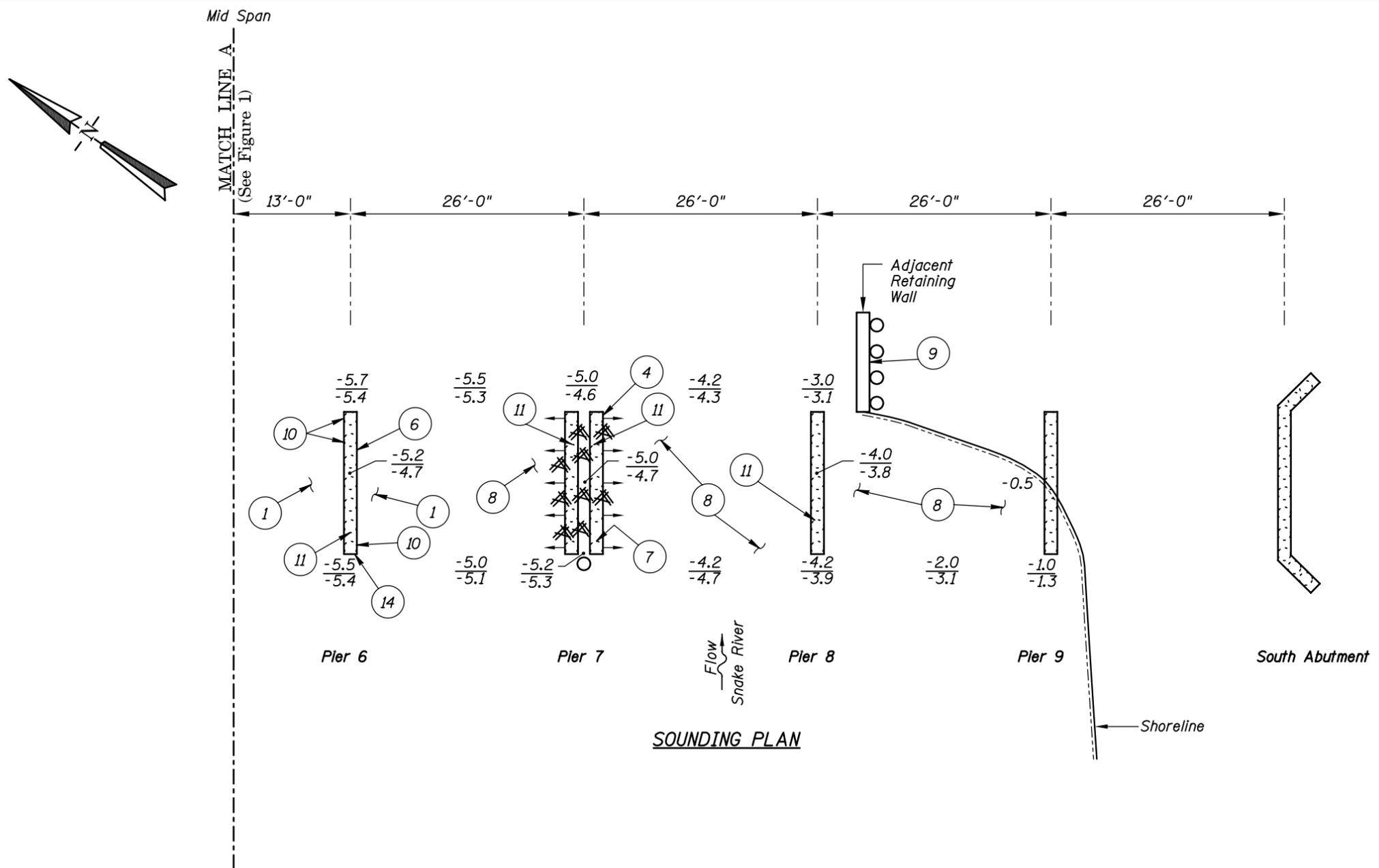
Legend

- 7.0 Sounding Depth from Waterline (9/25/02)
- 7.1 Sounding Depth from Waterline (8/28/97)
- Timber Pile
- ⊙ Timber Pile
- ⊙→ Battered Timber Pile
- ⚡ Timber Debris

INSPECTION NOTES:

- 1 The channel bottom consisted of silty sand with random scattered riprap and up to 6 inches of probe rode penetration.
- 2 The outer 1/2 inch shell of the fourth pile from the west end of pier was cracked, splintered, soft, and delaminated. This condition was present from the channel bottom to 1 foot above the waterline. Probing revealed the wood beneath this outer shell to be sound.
- 3 The channel bottom at Piers 2 and 3 consisted of sand and riprap up to 6 inches in diameter with no appreciable probe rod penetration.
- 4 A minor accumulation of timber debris was observed around the piles of Piers 1, 3, and 7.
- 5 A 1/2 inch wide by 5 feet long crack was present in the diagonal bracing at the east connection on the north side.
- 6 The diagonal brace was cracked and splintered at the bottom connections. The fourth pile from the west end displayed soft wood to a depth of 1/2 inch at a 3 inch diameter knot hole 1 foot below the waterline.
- 7 A 12 inch high by 6 inch wide by 3/4 inch deep portion of the outer shell of this pile has splintered outward. The wood beneath this area was soft to a depth of 1/4 inch. The estimated loss in cross sectional area was 10 to 20 percent. This condition occurred at 2 feet below the waterline.
- 8 The channel bottom at Piers 7 through 9 consisted of a mixture of gravel and riprap with no appreciable probe rod penetration.
- 9 The east-west retaining wall at this location was leaning and has failed.
- 10 Brace at connection heavily cracked and deteriorated.
- 11 All of the piles exhibited random checking up to 1/4 inch wide, and a softer out pile shell up to 1/4 inch thick with 1/8 inch wide splits.
- 12 The edge braces were broken at the waterline at the upstream pile and the downstream pile of Pier 2.
- 13 A 1/2 inch wide by 8 feet long split in the brace that was broken through the pile connection was observed on the north face of Pier 3.
- 14 A 1/2 inch wide by 5 feet long split in the brace connection was observed on the downstream end of Pier 6.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 58506 OVER THE SNAKE RIVER DISTRICT 1, PINE COUNTY		
<b>INSPECTION AND SOUNDING PLAN I</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b>	Date: SEPT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35120073		Figure No.: 1

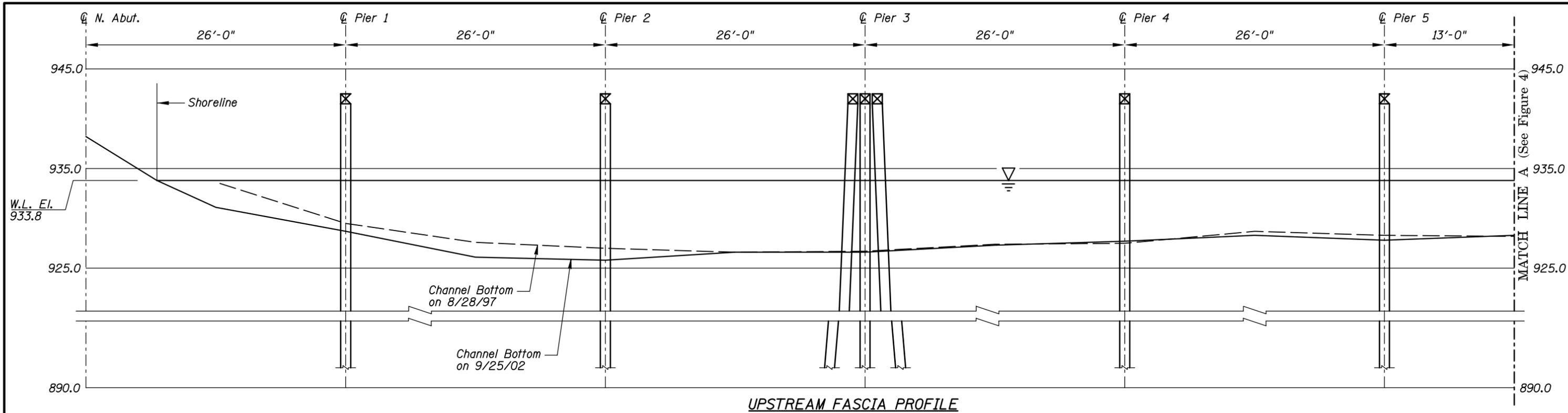


Notes:  
 Refer to Figure 1 for General Notes.  
 Refer to Figure 1 for Inspection notes.

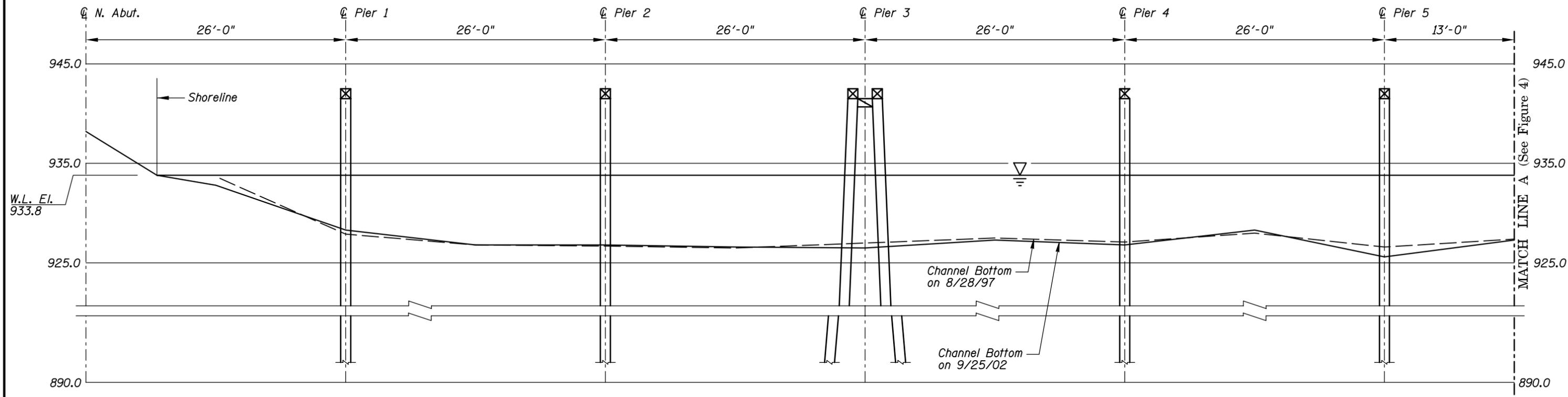
Legend

-7.0	Sounding Depth from Waterline (9/25/02)
-7.1	Sounding Depth from Waterline (8/28/97)
○	Timber Pile
⊙	Timber Pile
⊙→	Battered Timber Pile
⊗	Timber Debris

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 58506 OVER THE SNAKE RIVER DISTRICT I, PINE COUNTY		
<b>INSPECTION AND SOUNDING PLAN II</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b>	Date: SEPT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35I20073		Figure No.: 2



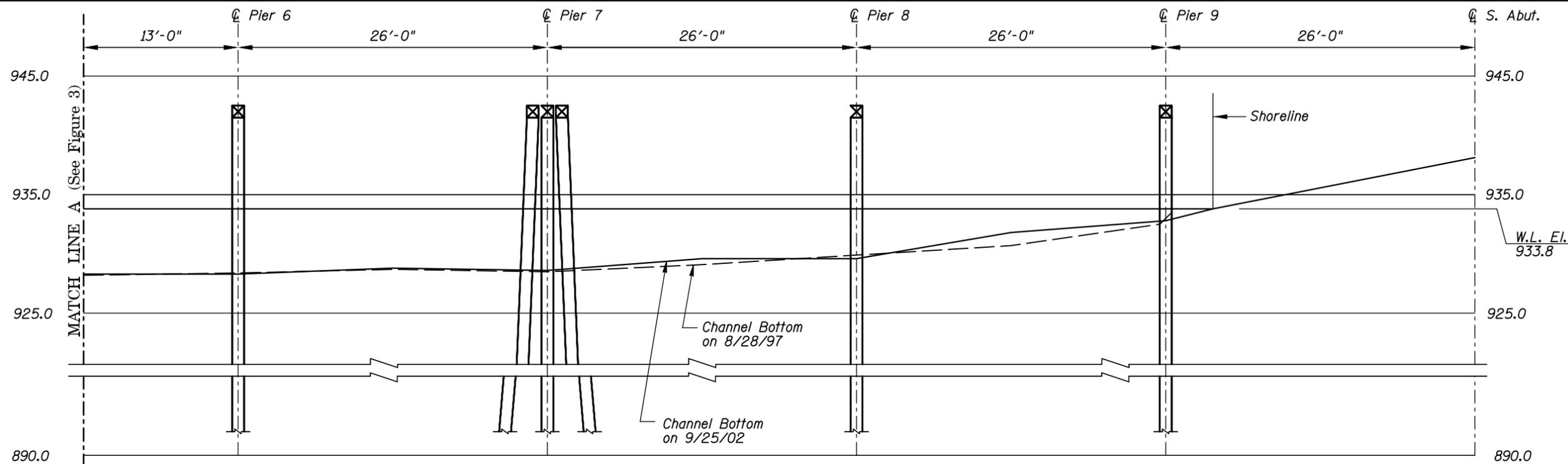
**UPSTREAM FASCIA PROFILE**



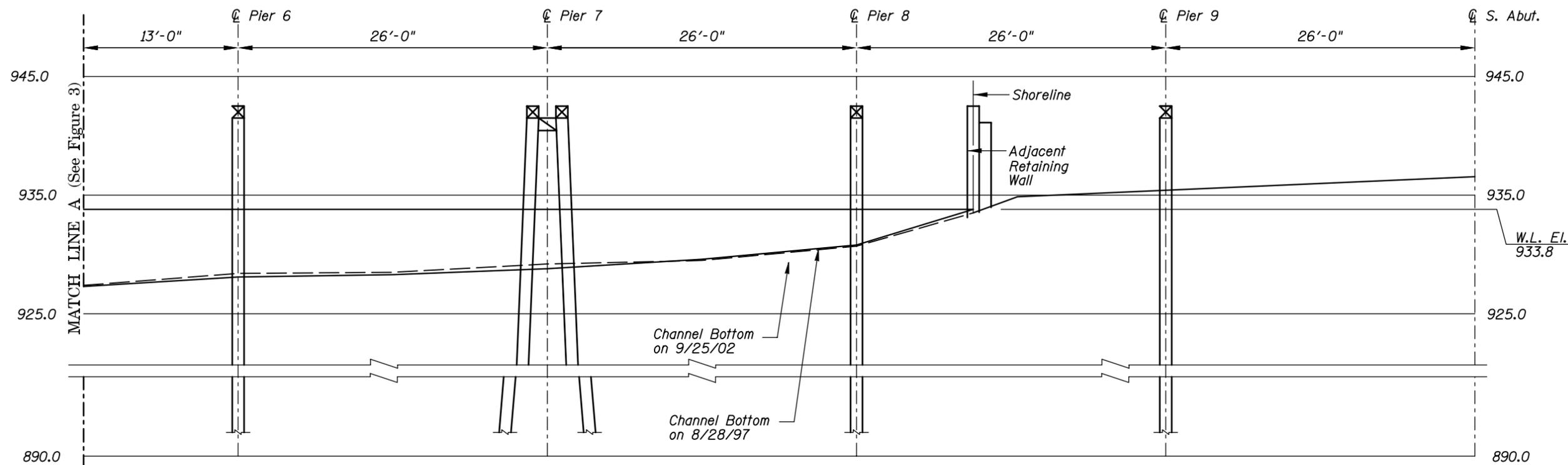
**DOWNSTREAM FASCIA PROFILE**

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 58506 OVER THE SNAKE RIVER DISTRICT I, PINE COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES I</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b> 300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: SEPT. 2002
Checked By: MDK		Scale: 1"=10'
Code: 35120073		Figure No.: 3



**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. 58506 OVER THE SNAKE RIVER DISTRICT I, PINE COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES II</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b> 300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: SEPT. 2002
Checked By: MDK		Scale: 1"=10'
Code: 35I20073		Figure No.: 4



Photograph 1. Overall View of the Structure, Looking Southwest.



Photograph 2. View of North Abutment, Looking West.



Photograph 3. View of Pier 1, Looking Southwest.



Photograph 4. View of Pier 2, Looking Southwest.



Photograph 5. View of Pier 3, Looking Southwest.



Photograph 6. View of Pier 4, Looking Southwest.



Photograph 7. View of Piers 5 and 6, Looking Northwest.



Photograph 8. View of Pier 7, Looking North.



Photograph 9. View of the Retaining Wall Along the Southeast Embankment at the Bridge, Looking Southeast.



Photograph 10. View of the Upstream Nose of Piers 3 through 6, Looking Southeast.



Photograph 11. View of the Upstream Nose of Piers 3 through 8, Looking Southeast.

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

INSPECTORS: Collins Engineers, Inc.

DATE: September 25, 2002

ON-SITE TEAM LEADER: Shirley M. Walker, P.E.

BRIDGE NO: 58506

WEATHER: Rain, " 50° F

WATERWAY CROSSED: The Snake River

DIVING OPERATION:   X           SCUBA           SURFACE SUPPLIED AIR  
  OTHER

PERSONNEL: Clayton G. Brookins, Michelle D. Koerbel

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

TIME IN WATER: 2:30 P.M.

TIME OUT OF WATER: 4:00 P.M.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY " 1 feet

DEPTH 8.2 feet maximum at Pier 5

ELEMENTS INSPECTED: Piers 1 through 8

REMARKS: Overall, the piles were in satisfactory to fair condition with random 1/4 inch checking and 1/8 inch splitting. The timber bracing at all piers was in fair to poor condition with splitting, section loss , and damage at the connections. The retaining wall adjacent to Pier 8 was leaning and has failed. Light accumulations of timber drift were observed around Piers 1, 3, and 7. The channel bottom consisted of 6 to 12 inch diameter riprap with deposits consisting of silty sand and organic material. The channel bottom appeared to be stable with no evidence of significant scour.

FURTHER ACTION NEEDED:      X   YES              NO

Replace the cracked, split, and deteriorated pier cross-bracing to restore lateral stability of the piers.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 58506  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Shirley M. Walker, P.E.  
WATERWAY CROSSED The Snake River

INSPECTION DATE September 25, 2002

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 (BRACING)	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	6.3'	6	N	N	8	5	6	8	N	N	7	7	N	N	6	6	N	N
	Pier 2	8.0'	6	N	N	8	5	6	8	N	N	8	8	N	N	6	6	N	N
	Pier 3	7.3'	6	N	N	8	5	6	8	N	N	7	7	N	N	5	5	N	N
	Pier 4	7.0'	6	N	N	8	5	6	8	N	N	8	8	N	N	5	5	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the piles were in satisfactory to fair condition with random 1/4 inch checking and 1/8 inch splitting. The timber bracing at all piers was in fair to poor condition with splitting, section loss, and damage at the connections. The retaining wall adjacent to Pier 8 was leaning and has failed. Light accumulations of timber drift were observed around Piers 1, 3, and 7. The channel bottom consisted of 6 to 12 inch diameter riprap with deposits consisting of silty sand and organic material. The channel bottom appeared to be stable with no evidence of significant scour.

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. 58506  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Shirley M. Walker, P.E.  
WATERWAY CROSSED The Snake River

INSPECTION DATE September 25, 2002  
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 (BRACING)	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 5	8.2'	6	N	N	8	5	6	8	N	N	8	8	N	N	5	5	N	N
	Pier 6	5.7'	6	N	N	8	5	6	8	N	N	8	8	N	N	5	5	N	N
	Pier 7	5.2'	6	N	N	8	6	6	8	N	N	7	7	N	N	5	5	N	N
	Pier 8	4.2'	6	N	N	8	6	6	8	N	N	8	8	N	N	6	6	N	N
	Pier 9	1.0'	6	N	N	8	6	6	8	N	N	8	8	N	N	6	6	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the piles were in satisfactory to fair condition with random 1/4 inch checking and 1/8 inch splitting. The timber bracing at all piers was in fair to poor condition with splitting, section loss, and damage at the connections. The retaining wall adjacent to Pier 8 was leaning and has failed. Light accumulations of timber drift were observed around Piers 1, 3, and 7. The channel bottom consisted of 6 to 12 inch diameter riprap with deposits consisting of silty sand and organic material. The channel bottom appeared to be stable with no evidence of significant scour.

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.