

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 88845

CR 61

OVER

HAY CREEK

DISTRICT 1 - KOOCHICHING COUNTY



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION
BY
COLLINS ENGINEERS, INC.
JOB NO. 3512 (CEI 1A)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 88845, the East and West Abutments, were found to be in good to satisfactory condition, with sound and firm timber components and with no significant deficiencies below water, except for several undermining cavities at the bottom planks of the East Abutment. Above water some defects were observed. These deficiencies included gaps between the pile cap and pile tops of the West Abutment, checking and splitting on the piles, and gaps between the planking of both abutment backwalls. All the wingwalls showed displacement towards the channel at their ends. The channel bottom appeared stable with some minor scour along the abutment walls.

INSPECTION FINDINGS:

- (A) The bottom of the timber backwall planking construction was found to be exposed in various places along the East Abutment. Minor scour has caused undermining below the bottommost plank with cavities measuring up to a maximum length of 4 feet and a maximum height of 6 inches. The maximum penetration found was 1 foot.
- (B) There was some movement of the pile cap of the West Abutment and both abutment wingwalls. The inward displacement measured up to 1 foot at the northeast and northwest wingwalls, and up to 6 inches at the southeast and southwest wingwalls. At the West Abutment cap, 2 to 4 inch gaps at certain pile tops were present.
- (C) Two 1/2 to 3/4 inch wide splits were found in the two upstream piles of the West Abutment.

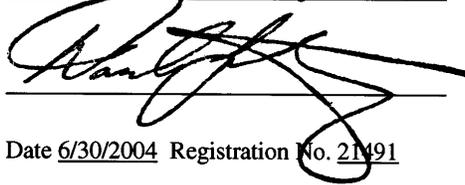
RECOMMENDATIONS:

- (A) At the minimum, full bearing at the pile cap should be restored for all of the piles at the West Abutment. Other repairs to stabilize and/or fortify the (2nd pile from upstream at the West Abutment) and especially all of the wingwalls can also be considered

- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years, with particular attention paid to the undermining of East Abutment backwall.

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: 88845

Feature Crossed: Hay Creek

Feature Carried: CR 61

Location: District 1 - Koochiching County

Bridge Description: The bridge superstructure consists of a timber deck and stringers.
The superstructure is supported by timber pile abutments with
skewed timber pile wingwalls.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 24, 2002

Weather Conditions: Sunny, $\pm 75^{\circ}$ F

Underwater Visibility: ± 1.0 Foot

Waterway Velocity: Negligible / None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: East and West Abutments

General Shape: Timber pile bents with timber cap and timber plank backwalls, and skewed timber pile and plank wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 5.3 Feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 3.0 feet below reference.
Assumed Waterline Elevation = 97.0 feet

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

Item 60: Substructure: Code 5

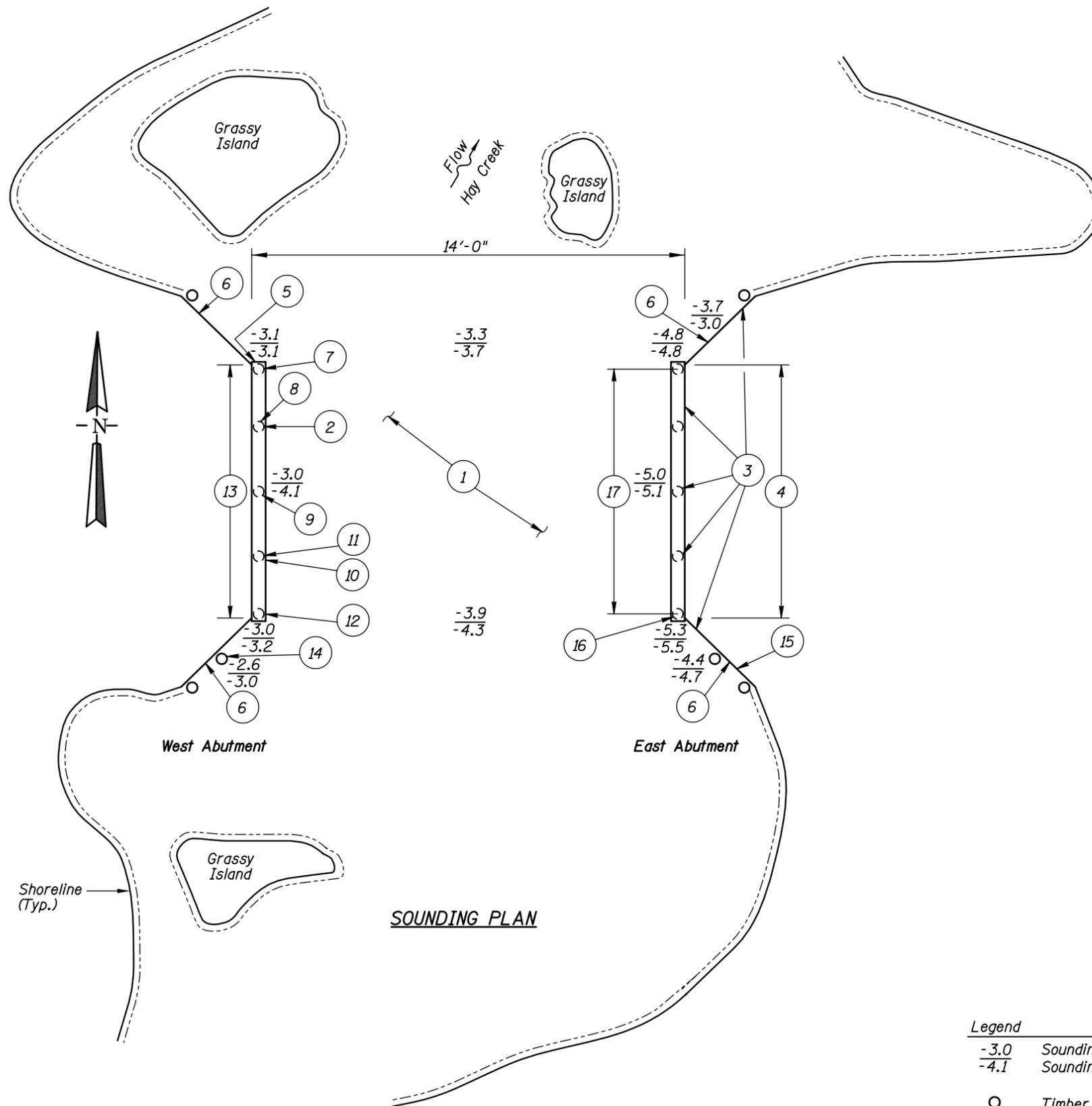
Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/08/02

Item 113: Scour Critical Bridges: Code I/95

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

Yes No



SOUNDING PLAN

TYPICAL SECTION THROUGH EAST ABUTMENT
(West Abutment Opp. Hand)

GENERAL NOTES:

1. The East and West Abutments were inspected at this bridge.
2. At the time of inspection on August 24, 2002, the waterline was located approximately 3.0 feet below the top of East Abutment pile cap at the downstream end. Design plans were not available, therefore a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 97.0
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 mid point intervals between the substructure units.

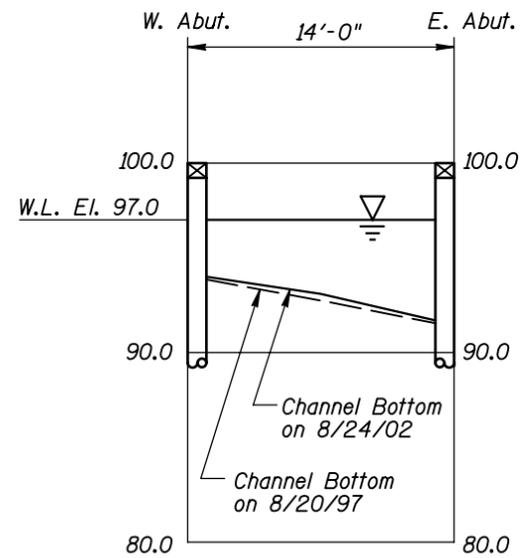
INSPECTION NOTES

- 1 Channel bottom consisted of primarily a very soft organic/silty material with up to 1 foot of probe rod penetration.
- 2 Checking on east face from 1 foot above to 2 feet below the waterline with a maximum width of 1/4 inch.
- 3 Undermining at abutment wall behind all 5 piles and the northeast wingwall, up to 3 inches in maximum height and 4 foot in maximum width with 6 inches to 1 foot maximum penetration. Undermining is the result of minor scour around each pile.
- 4 A 1/2 inch gap between the backwall planks was observed along the full length of the East Abutment and had up to 2 to 6 inches of penetration with no fill escaping.
- 5 Pile cap warped to north end resulting in loss of bearing at pile top with a maximum gap dimension of 2 inches. (except for note 7)
- 6 Movement at the ends of the wingwalls up to 1 foot at the Northeast and Northwest ends and 6 inches at the southeast and southwest.
- 7 A 4 inch gap between the pile and pile cap.
- 8 The timber pile was displaced to the east approximately 2 inches from center with a 1-1/2 to 2 inch gap between the pile and pile cap. The drift pin connecting the pile and pile cap was inclined to the west.
- 9 A 1 inch gap between the pile and pile cap was observed with no cap bearing on the pile.
- 10 A 1 inch gap between the pile and pile cap was observed with 25 percent of the cap bearing on the pile.
- 11 A 1/2 inch wide split from the top of the pile to 1 foot below the waterline was observed, and exhibited heavy decay with insect infestation (sawdust) present.
- 12 Approximately 33 percent of the pile cap was bearing pile.
- 13 1/2 inch wide gaps between the backwall planks were observed along the West Abutment. The gaps were most probably caused by differential movement resulting from a loss of lateral pile support.
- 14 The pile exhibited a 1/2 inch wide split to the center of the pile that extended from the pile cap to the waterline.
- 15 The top cord timber was missing at the south wingwall of the East Abutment.
- 16 A 1/4 inch wide vertical split was observed in the south end of the East Abutment pile cap.
- 17 The East Abutment timber piles were in good condition with occasional 1/8 inch wide checking.

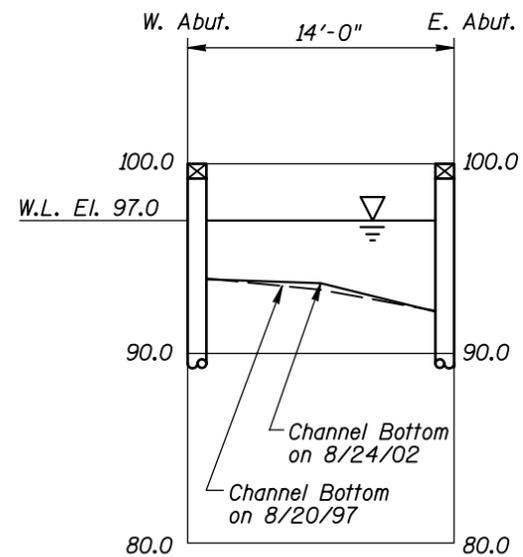
Legend

- 3.0 Sounding Depth from Waterline (8/24/02)
- 4.1 Sounding Depth from Waterline (8/20/97)
- Timber Pile
- ◌ Timber Pile

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 88845 OVER HAY CREEK DISTRICT I, KOOCHICHING COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 351200IA		Figure No.: 1



UPSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"



DOWNSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 88845 OVER HAY CREEK DISTRICT I, KOOCHICHING COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS (U.O.N.)
Code: 35I200IA		Figure No.: 2



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



Photograph 2. West Abutment, Looking North.



Photograph 3. View of the North Wingwall of the West Abutment, Looking West.



Photograph 4. View of the South Wingwall of the West Abutment, Looking North.



Photograph 5. View of the North Wingwall of the East Abutment, Looking East.



Photograph 6. View of the South Wingwall of the East Abutment, Looking East.



Photograph 7. View of the Downstream End of the West Abutment, Looking West.



Photograph 8. View of the 3rd Pile in From the Downstream End of the West Abutment, Looking Southwest.



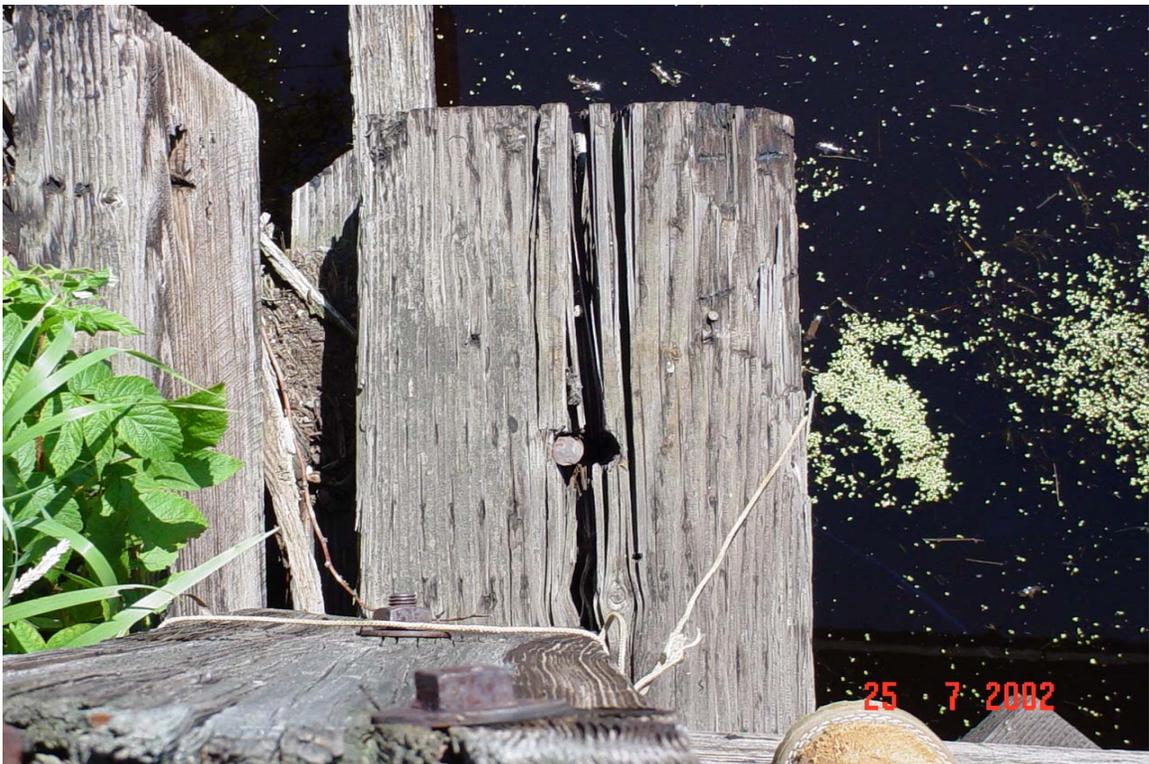
Photograph 9. View of the 4th Pile in From the Downstream End of the West Abutment, Looking Southwest.



Photograph 10. View of Split in the Upstream Pile of the West Abutment, Looking West.



Photograph 11. View of Split in the 2nd Pile in From the Upstream Pile of the West Abutment, Looking Northwest.



Photograph 12. View of Vertical Split in the Pile Cap of the East Abutment, Looking South.

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

INSPECTORS: Collins Engineers, Inc. DATE: August 24, 2002
ON-SITE TEAM LEADER: Daniel Stromberg, P.E.
BRIDGE NO: 88845 WEATHER: Sunny, " 75° F
WATERWAY CROSSED: Hay Creek
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
OTHER

PERSONNEL: Michelle D. Koerbel, Matthew J. Lengyel
EQUIPMENT: SCUBA, U/W Light, Scraper, Lead Line, Probe Rod, Camera
TIME IN WATER: 1:25 P. M.
TIME OUT OF WATER: 2:00 P. M.
WATERWAY DATA: VELOCITY Negligible/None
VISIBILITY " 1.0 foot
DEPTH 5.3 feet maximum at East Abutment.

ELEMENTS INSPECTED: East and West Abutments

REMARKS: Overall, the East Abutment timber piling and breastwall planking were sound and in good to satisfactory condition with no significant deficiencies, aside from numerous 6 inch to 1 foot deep undermining cavities at the base of the breast wall planking. The West Abutment exhibited considerable deficiencies, most notably the lack of bearing (3 of 5 piles) or minimal bearing (< 33% bearing at other 2 piles) for the piles at the pile cap. In addition, the second pile from upstream exhibited significant checking and decay/insect infestation below the pile cap. Related to the lack of pile bearing, there was also indications of outward movement (toward the channel) for the piles and breastwall planking. All four of the wingwalls displayed significant outward displacement toward the waterway at their ends.

FURTHER ACTION NEEDED: X YES _____ NO

At the minimum, full bearing at the pile cap should be restored for all of the piles at the West Abutment. At the minimum, full bearing at the pile cap should be restored for all of the piles at the West Abutment. Other repairs to stabilize and/or fortify the (2nd pile from upstream at the West Abutment) and especially all of the wingwalls can also be considered.

FURTHER ACTION NEEDED (CONTINUED)

Monitor the undermining cavities at the East Abutment walls and the displacement of the wingwalls, and for any adverse affects on the approach embankments due to these deficiencies.

Reinspect the submerged substructure units at the normal maximum recommended interval of five (5) years, with particular attention paid to undermining at East Abutment backwall.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 88845
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491
WATERWAY CROSSED The Hay Creek

INSPECTION DATE August 24, 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 (WINGWALLS)	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 (PILE BEARING)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	East Abutment	+5.3'	7	7	N	8	5	6	6	8	N	8	6	N	N	7	8	N	7
	West Abutment	+3.1'	5	6	N	6	5	5	8	8	N	8	8	N	N	6	6	N	4

*UNDERWATER PORTION ONLY

REMARKS: Overall, the East Abutment timber piling and breastwall planking were sound and in good to satisfactory condition with no significant deficiencies, aside from numerous 6 inch to 1 foot deep undermining cavities at the base of the breast wall planking. The West Abutment exhibited considerable deficiencies, most notably the lack of bearing (3 of 5 piles) or minimal bearing (< 33% bearing at other 2 piles) for the piles at the pile cap. In addition, the second pile from upstream exhibited significant checking and decay/insect infestation below the pile cap. Related to the lack of pile bearing, there was also indications of outward movement (toward the channel) for the piles and breastwall planking. All four of the wingwalls displayed significant outward displacement toward the waterway at their ends.

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.