

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 7799

CR NO. 547

OVER

WOLF CREEK

DISTRICT 1 - ST. LOUIS COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY  
COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 5)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 7799, the East and West Abutments and the Center Pier, were found to be generally in good condition. Since the previous inspection the scaling around the waterline has increased and new cracks in the Center Pier and East Abutment have developed; however, there were still no defects of structural significance present at the bridge. The top two timber flash boards between the Center Pier and East Abutment (middle section) were bowed considerably and appeared to be failing, and the third flash board from top between the Center Pier and West Abutment (middle section) has failed. The channel bottom inspected upstream and downstream of the substructure units is presently stable with no evidence of significant scour and no significant changes since the last inspection.

INSPECTION FINDINGS:

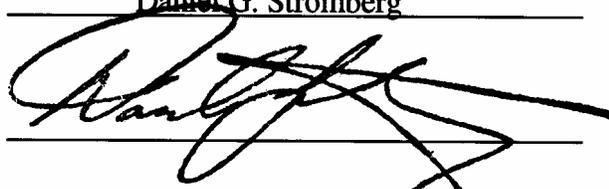
- (A) A vertical hairline crack was observed at both abutments, extending from the top corner of the south wingwall down the full wall height, with associated minor spalling up to 1/2 inch wide.
- (B) Moderate to heavy scaling was observed on all substructure units from 1.5 feet above the waterline to 1 foot below the waterline with up to 1 inch of penetration.
- (C) Four hairline to 1/16 inch wide vertical cracks were observed extending from the bridge deck to the waterline on the Center Pier and East Abutment (two cracks at each unit).
- (D) The top two flash boards of the east dam wall(center section) were deflecting towards the downstream fascia approximately 5 inches and exhibited imminent failure; and the third flash board from top of the west dam wall (center section) has failed.

- (E) The concrete sill at the base of the upstream face of the dam was observed 4.5 feet below the waterline and had a maximum of 1 foot of vertical exposure with a light accumulation of 6-inch-diameter and smaller timber debris resting against it.
- (F) A light accumulation of debris consisting of 6 inch diameter and smaller branches was located along the north face of the dam. Also a 1 foot diameter log and an 8 inch diameter log were observed lying across the dam.

RECOMMENDATIONS:

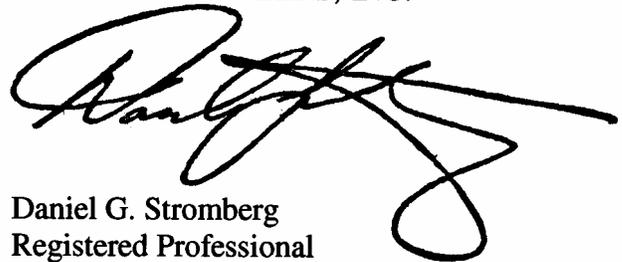
- (A) Notify proper authorities of the impending failure of top two flash boards at the middle span between the Center Pier and the East Abutment and third from top flash board at the middle span between the Center Pier and the West Abutment, whose failure could disrupt water levels and hydraulics upstream and downstream of the bridge.
- (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 6/30/2008 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: 7799

Feature Crossed: Wolf Creek

Feature Carried: CR No. 547

Location: District 1 - St. Louis County

Bridge Description: The structure consists of a two span concrete beam superstructure supported by two concrete abutments and a concrete center pier with a dam incorporated at the upstream end of the substructure.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 24, 2007

Weather Conditions: Sunny, 55° F

Underwater Visibility: 1.5 feet

Waterway Velocity: 2.0 f.p.s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The East and West Abutments and the Center Pier.

General Shape: The East and West Abutments and the Center Pier shaft are rectangular walls, and the abutments have perpendicular wingwalls upstream and downstream of the structure. The substructure sits on a monolithic base slab and incorporates a dam across the upstream side of the structure.

Maximum Water Depth at Substructure Inspected: Approximately 5.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the bridge seat on the upstream and downstream sides of the Center Pier.

Water Surface: The upstream waterline was approximately 3.2 feet below reference.

Assumed Water Elevation = 96.8

The downstream waterline was approximately 9.5 feet below reference.

Assumed Water Elevation = 90.5.

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

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code I/92

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

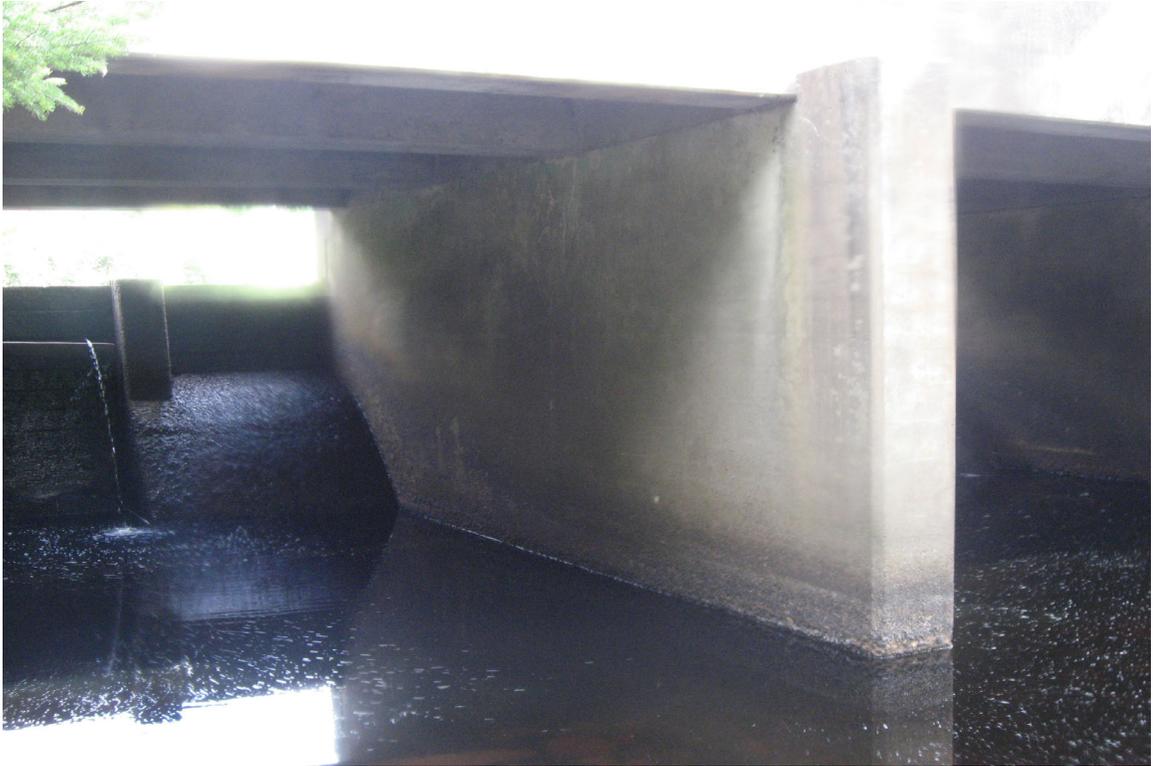
       Yes   X   No



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



Photograph 2. View of the East Abutment, Looking Northeast.



Photograph 3. View of the Center Pier, Looking Northeast.



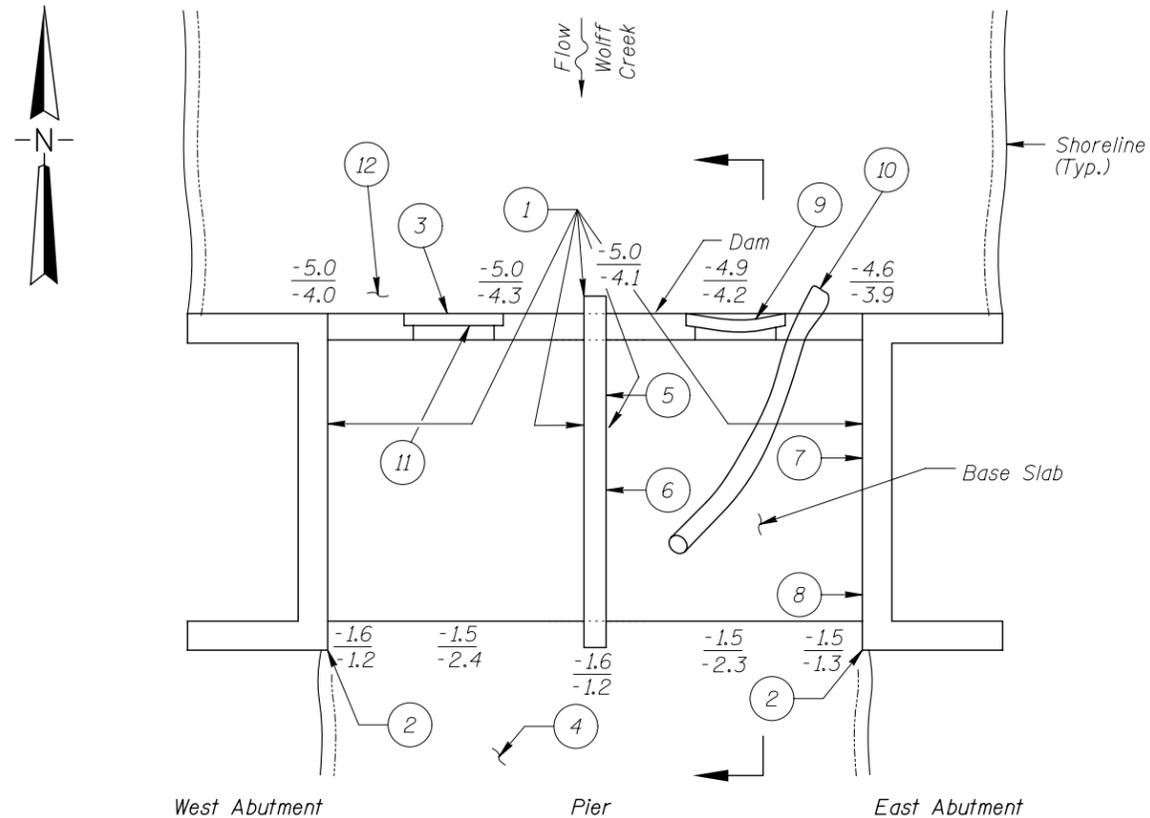
Photograph 4. View of the West Abutment, Looking Northwest.



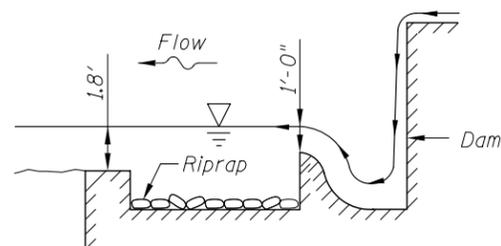
Photograph 5. View of the Third from top (failed) Timber Flash Board at West Wall of Dam, Looking Northwest.



Photograph 6. View of the Timber Flash Boards and Debris at East Wall of Dam, Looking Northwest. Note top two center boards bowed and failing.



SOUNDING PLAN



SECTION

GENERAL NOTES:

1. The Center Pier and the West and East Abutments were inspected underwater.
2. At the time of inspection on August 24, 2007, the waterline was located approximately 9.5 feet below the bridge seat at the downstream end of the Center Pier and approximately 3.2 feet below the bridge seat at the upstream end of the Center Pier. Since no elevation data was available, a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation at the upstream fascia was 96.8 and the waterline elevation at the downstream fascia was 90.5.
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 the mid points between the substructure units.

INSPECTION NOTES:

- 1 Moderate to heavy scaling was observed on all substructure units from 1.5 foot above the waterline to 1 foot below the waterline with up to 1 inch of penetration.
- 2 Hairline vertical crack, extending from the top corner of the wingwall down full height of wall, with associated minor spalling up to 1/2 inch wide.
- 3 The concrete sill at the base of the upstream dam was observed 4.5 feet below the waterline that had a maximum of 1 foot of vertical exposure with a light accumulation of 6-inch-diameter timber debris against the face of the base slab.
- 4 Channel bottom consisted of sandy gravel and 0.5- to 1-foot-diameter riprap with less than 1 inch of probe rod penetration.
- 5 A hairline vertical crack with efflorescence extended from the bottom of the bridge deck to the lip of the spillway.
- 6 A hairline vertical crack extended from the bottom of the bridge deck to the base slab.
- 7 A vertical crack up to 1/16 inch wide extended from the bottom of the bridge deck to the base slab.
- 8 A vertical crack up to 1/32 inch wide with efflorescence extended from the bottom of the bridge deck to 3 feet above the waterline.
- 9 The top two flash boards of the east dam wall exhibited up to 5 inches of deflection towards the downstream fascia, and appeared to be approaching failure.
- 10 A 1-foot-diameter log and an 8-inch-diameter log were observed laying across the dam.
- 11 The third flash board from top of the west dam wall has failed.
- 12 A light accumulation of debris consisting of 6-inch-diameter and smaller branches was located along the North face of the dam.

Legend

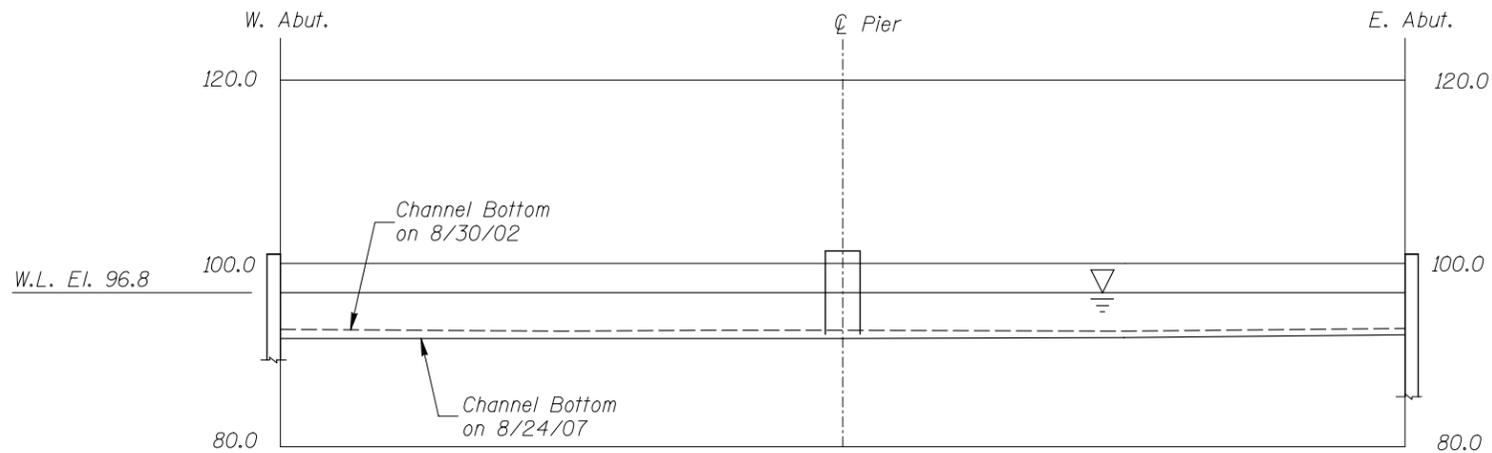
- 5.0 Sounding Depth (8/24/07)
- 5.5 Sounding Depth (8/30/02)

MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

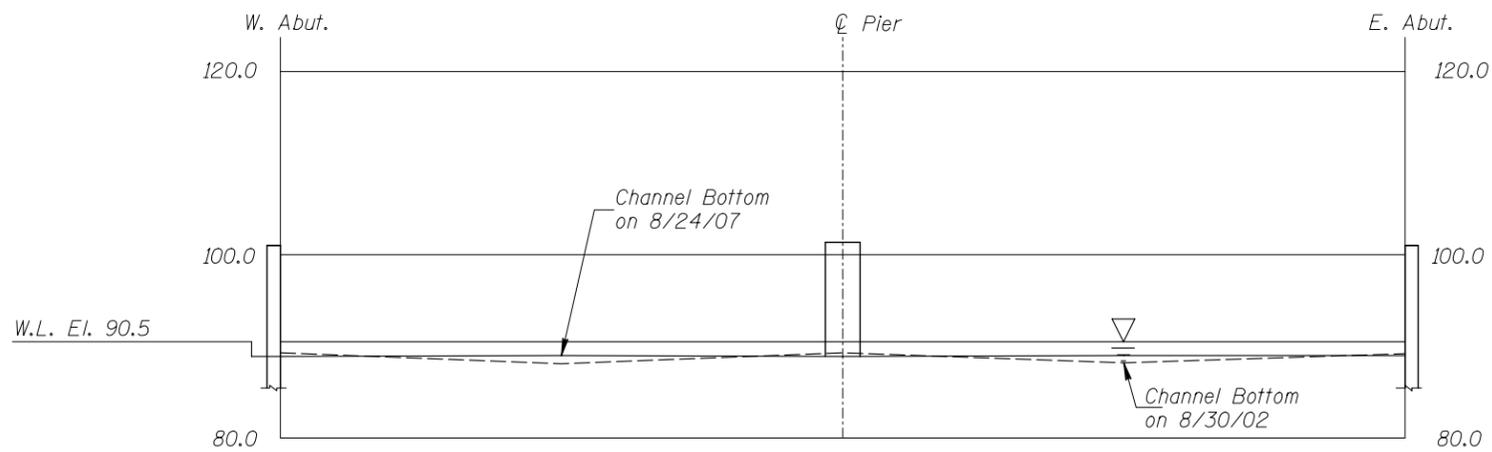
STRUCTURE NO. 7799  
OVER THE WOLF CREEK  
DISTRICT 1, ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUG. 2007
Checked By: MDK		Scale: NTS
Code: 52210005		Figure No.: 1



UPSTREAM FASCIA PROFILE  
Vertical Scale: 1"=20'-0"



DOWNSTREAM FASCIA PROFILE  
Vertical Scale: 1"=20'-0"

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7799 OVER THE WOLF CREEK DISTRICT 1, ST. LOUIS COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUG. 2007
Checked By: MDK		Scale: NTS (U.O.N.)
Code: 52210005		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 24, 2007

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

BRIDGE NO: 7799 WEATHER: Sunny, 55° F

WATERWAY CROSSED: Wolf Creek

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: John J. Loftus, Valerie Roustan

EQUIPMENT: SCUBA, U/W Light, Scraper, Lead Line, Probe Rod, Camera

TIME IN WATER: 11:25 a.m.

TIME OUT OF WATER: 11:50 a.m.

WATERWAY DATA: VELOCITY 2.0 f.p.s

VISIBILITY 1.5 feet

DEPTH 5.0 feet upstream of dam.

ELEMENTS INSPECTED: East and West Abutments, and the Center Pier

REMARKS: Overall, the concrete of the abutments and the pier was generally sound and in good condition with moderate to heavy scaling around the waterline and minor hairline to 1/16 inch wide cracks, some with efflorescence. The top two flash boards at the center span between the East Abutment and the pier exhibited up to 5 inches of deflection towards the downstream fascia and appeared to be approaching failure. The third flash board from the top at the center span between the West Abutment and the pier has failed. A light accumulation of timber debris was observed along the upstream side of the dam apron and two logs were resting on the dam.

FURTHER ACTION NEEDED:  YES  NO

Notify proper authorities of the impending failure of top two flash boards at the middle span between the Center Pier and the East Abutment and third from top flash board at the middle span between the Center Pier and the West Abutment, whose failure could disrupt water levels and hydraulics upstream and downstream of the bridge.

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. 7799  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.  
 WATERWAY CROSSED Wolf Creek

INSPECTION DATE August 24, 2007  
 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 (DAM FLASH BOARDS)	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
	West Abutment	5.0'	N	7	N	9	4	7	8	8	8	7	7	7	N	N	N	N	N
	Center Pier	5.0'	N	7	N	9	N	7	8	8	8	7	7	7	N	N	N	N	N
	East Abutment	4.6'	N	7	N	9	4	7	8	8	8	7	7	7	N	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete of the abutments and the pier was generally sound and in good condition with moderate to heavy scaling around the waterline and minor hairline to 1/16 inch wide cracks, some with efflorescence. The top two flash boards at the center span between the East Abutment and the pier exhibited up to 5 inches of deflection towards the downstream fascia and appeared to be approaching failure. The third flash board from the top at the center span between the West Abutment and the pier has failed. A light accumulation of timber debris was observed along the upstream side of the dam apron and two logs were resting on the dam.

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.