UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7865

CR 315

OVER THE

EAST TWO RIVERS

ST. LOUIS COUNTY

SEPTEMBER 27, 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. 7865, the North and South Abutments, were found to be in good to satisfactory condition, with no defects of structural significance. The timber piles and backwalls were typically sound with no notable decay, deterioration, splitting or checking. Piles A' and B of the North Abutment were not load bearing due to a gap between the top of the pile and the bottom of the pile cap. Numerous vertical planking boards were observed extending out of the channel along both abutments. Concrete rubble with protruding reinforcing steel was observed scattered along both abutments.

INSPECTION FINDINGS:

(A) The channel bottom material in the upstream channel and along both abutments typically consisted of sandy silt allowing up to 4 inches of probe rod penetration.

(B) The channel bottom material in the downstream half of the channel consisted of firm gravel and rocks allowing no appreciable probe rod penetration.

(C) The timber piles were typically sound allowing a typical timber awl penetration of 1/8 inch. No significant decay, deterioration, splitting or checking was observed.

(D) The timber backwall at the both abutments was typically sound and in good condition. No significant gaps or loss of backfill was observed.

(E) A gap, up to 1/4 inch wide, was observed between the top of the pile and the bottom of the pile cap at Piles A' and B of the North Abutment resulting in complete loss of bearing at both piles.

(F) Vertical planking boards were observed along the length of both abutments extending from the channel bottom to roughly 2 feet above the waterline at approximately 2.5 feet off the backwall and running parallel to both abutments.

(G) Pile F of the North Abutment extends out from the face of the pile cap by roughly half a pile diameter resulting is approximately 50 percent bearing. A vertical 2 inch by 8 inch timber was placed between Pile F of the North Abutment and the backwall. The pile cap is partially bearing on the 2 inch by 8 inch timber.

(H) Scattered concrete rubble with reinforcing steel protruding was observed along both abutment faces.

RECOMMENDATIONS:

(A) Place shims between the top of Piles A' and B of the North Abutment and the pile cap to restore full bearing of both piles.

(B) Reinspect the submerged substructure at the normal maximum recommended (NBIS) interval of sixty (60) months.

(C) The inspection of the submerged substructure units of Structure No. 7865 can most likely be accomplished in the future without the use of a dive team. To perform the underwater inspection, a properly equipped qualified inspector will have to enter the water during a period of low flow. As channel bottom contours and depths of flow can change quickly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether wading is possible prior to beginning the inspection. If conditions are unsafe for inspection by wading, then an underwater inspection with the use of a dive team will be required.

Respectfully submitted,

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

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: 7865

Feature Crossed: East Two Rivers

Feature Carried: CR 315

Location: St. Louis County

Bridge Description: The superstructure consists of a timber deck supported by steel I-beams. The superstructure is supported by two abutments consisting of six roughly 18 inch diameter timber piles, a 12 inch by 12 inch timber pile cap, and a timber backwall. The North Abutment has one supplemental 12 inch diameter pile (A') next to Pile A.

2. INSPECTION DATA

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

Dive Team: Marc B. Parker, Clay G. Brookins

Date: September 27, 2012

Weather Conditions: Sunny, 60^{o} F

Underwater Visibility: 2 feet

Waterway Velocity: None / Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The North and South Abutments

General Shape: The North and South Abutments each consist of six roughly 18 inch diameter timber piles, a 12 inch by 12 inch timber pile cap, and a timber backwall. The North Abutment has one supplemental 12 inch diameter pile (A') next to Pile A.

Maximum Water Depth at Substructure Inspected: Approximately 3.2 feet.

4. WATERLINE DATUM

Water Level Reference: Top of the pile cap at the upstream end of the South Abutment

Water Surface: The waterline was approximately 3.4 feet below the reference.
Waterline Elevation 96.6.

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 6

Item 92B: Underwater Inspection: Code A/09/12

Item 113: Scour Critical Bridges: Code I/12

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	13	EA	11	0	2	0	n/a
216	Timber Abutment	49	LF	49	0	0	0	n/a
386	Timber Wingwalls	4	EA	4	0	0	0	n/a
360	Settlement	1	EA	0	1	0	n/a	n/a
985	Slopes and Slope Protection	1	EA	1	0	0	n/a	n/a

Photograph 1. Overall View of Structure, Looking Northwest

Photograph 2. View of the North Abutment, Looking Northwest.

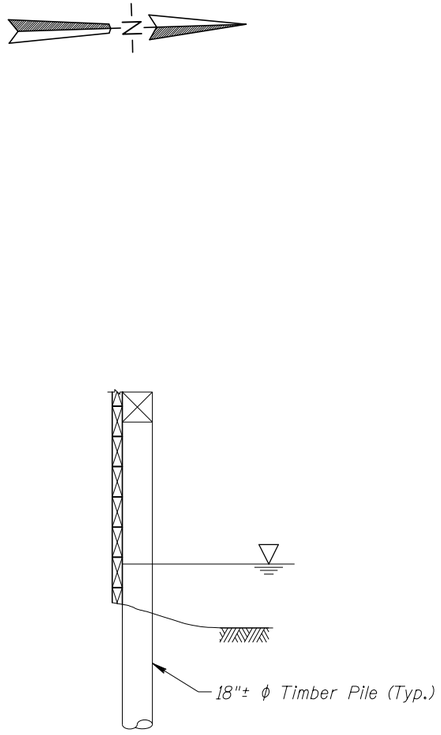
Photograph 3. View of the South Abutment, Looking Southeast.

Photograph 4. View of Piles A, A’ and B of the North Abutment, Looking North.

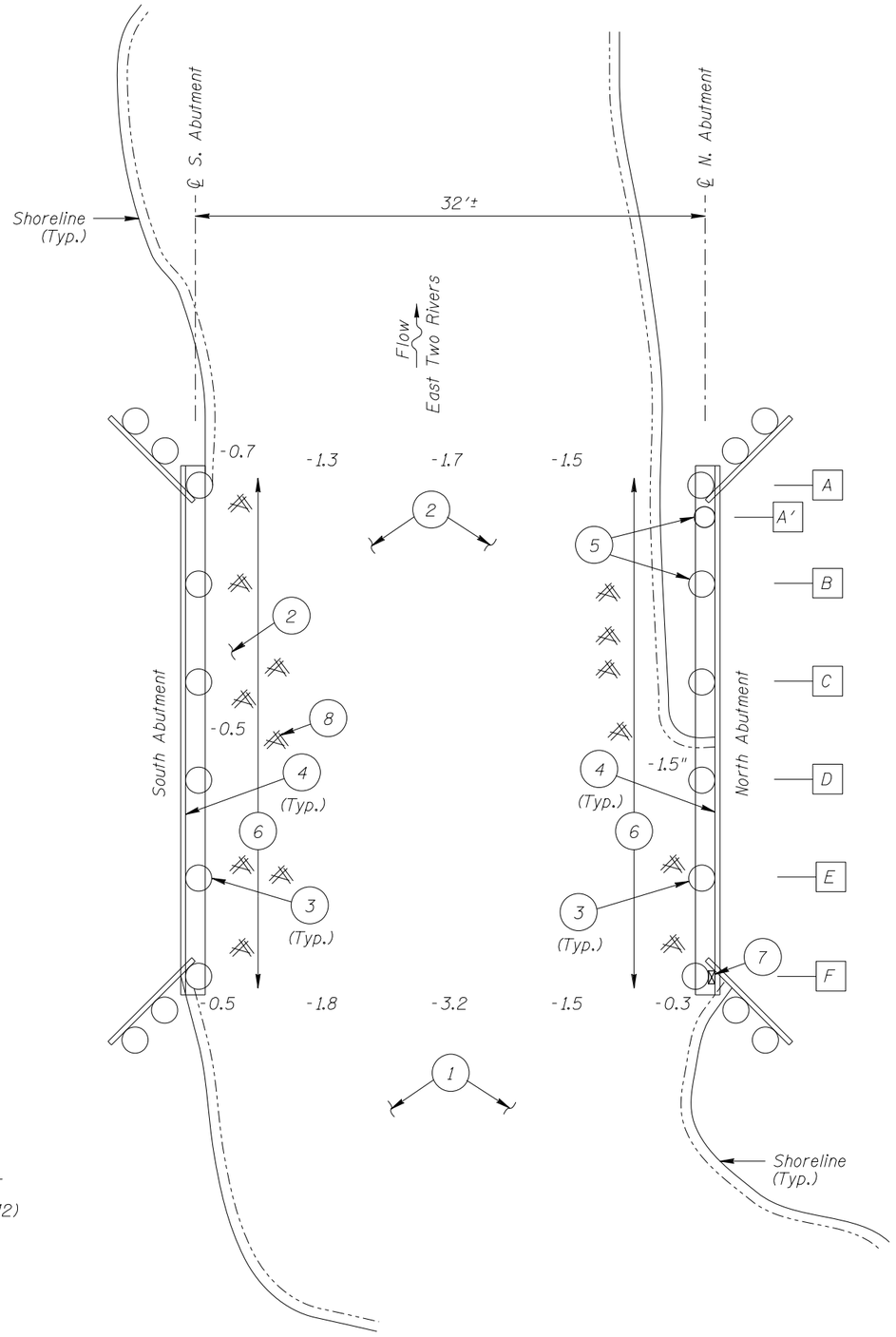
Photograph 5. View of the Gap between the Top of Pile A' and the bottom of the Pile Cap, Looking North.

Photograph 6. View of the Gap between the Top of Pile B and the bottom of the Pile Cap, Looking North.

Photograph 7. View of Pile F of the North Abutment and the 2 inch by 8 inch Vertical Backing Board, Looking West.



TYPICAL END VIEW OF ABUTMENTS



SOUNDING PLAN

INSPECTION NOTES:

1. The channel bottom material in the upstream channel and along both abutments typically consisted of sandy silt allowing up to 4 inches of probe rod penetration.
2. The channel bottom material in the downstream half of the channel consisted of firm gravel and rocks allowing no appreciable probe rod penetration.
3. The timber piles were typically sound allowing a typical timber awl penetration of 1/8 inch. No significant decay, splitting or checking was observed.
4. The timber backwall at the both abutments was typically sound and in good condition. No significant gaps or loss of backfill was observed.
5. A gap, up to 1/4 inch wide, was observed between the top of the pile and the bottom of the pile cap at Piles A' and B at the North Abutment resulting in complete loss of bearing at both piles.
6. Vertical planking was observed along the length of both abutments extending from the channel bottom to roughly 2 feet above the waterline at approximately 2.5 feet off the backwall and running parallel to both abutments.
7. Pile F of the North Abutment extends out from the face of the pile cap by roughly half a pile diameter resulting is approximately 50 percent bearing. A vertical 2"x8" timber was placed between Pile F of the North Abutment and the backwall. The pile cap is partially bearing on the 2"x8" timber.
8. Scattered concrete rubble with reinforcing steel protruding was observed along both abutment faces.

GENERAL NOTES:

1. The North and South Abutments were inspected during the underwater inspection.
2. At the time of inspection on September 27, 2012, the waterline was located approximately 3.4 feet below the top of the pile cap at the upstream end of the South Abutment. Since elevation information was not available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 96.6.
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.

Legend

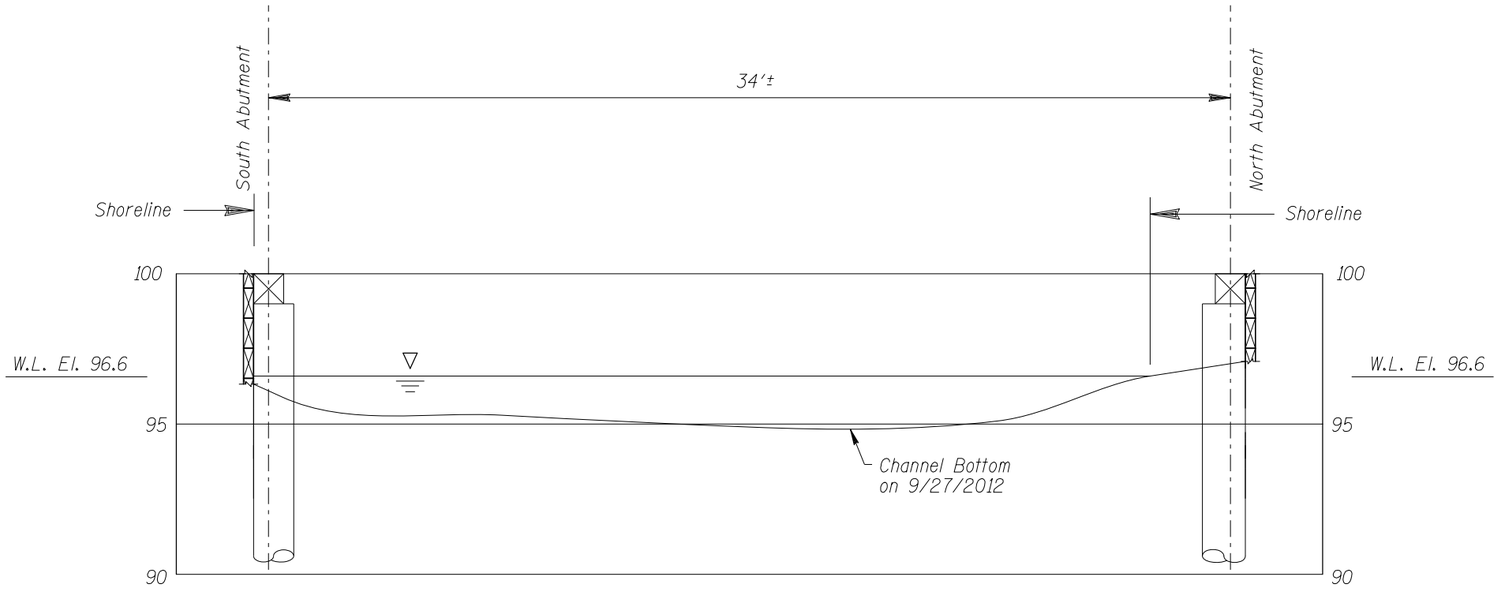
-1.0	Sounding Depth from Waterline (9/27/2012)
A	Pile Identification Designation
○	18± inch Diameter Timber Pile
1	Inspection Note Number
	Concrete Rubble

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

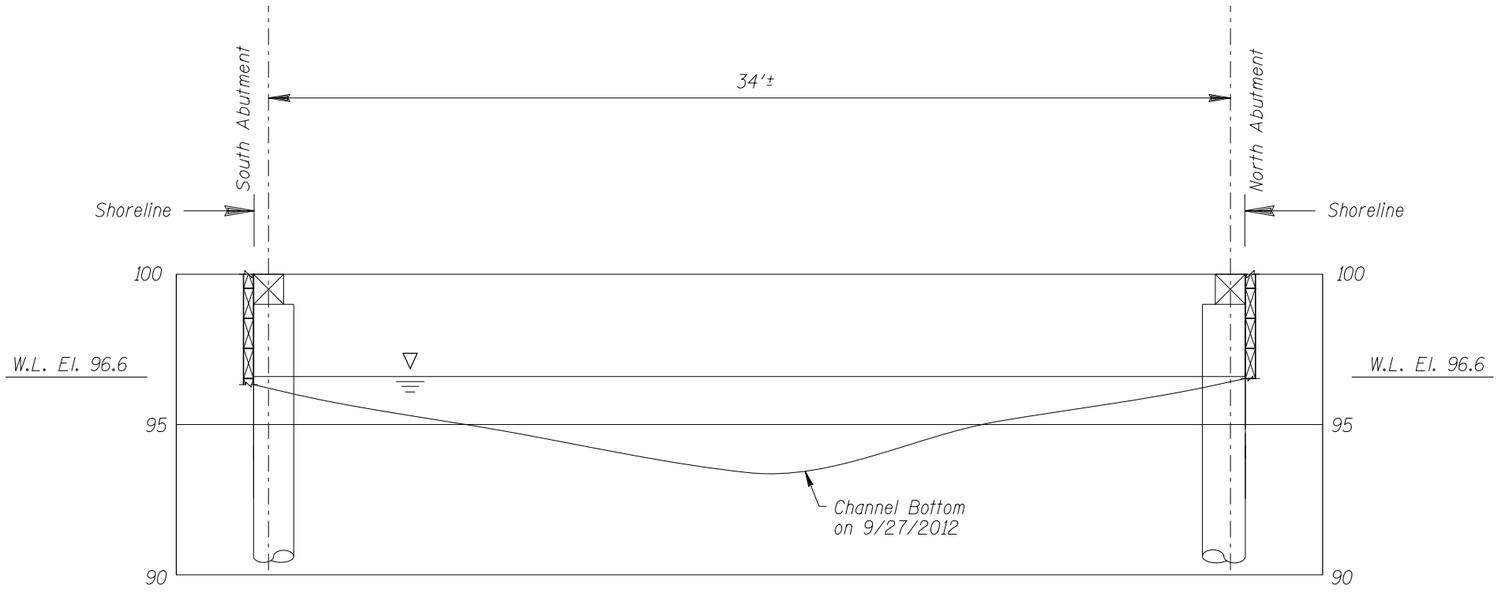
STRUCTURE NO. 7865
CR 315 OVER THE EAST TWO RIVERS
ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: MBP	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: DEC. 2012
Checked By: LJ		Scale: NTS
Code: 74237865		Figure No.: 1



DOWNSTREAM FASCIA PROFILE



UPSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
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UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: MBP	COLLINS ENGINEERS, INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: DEC. 2012
Checked By: LJ		Scale: 1"=5'
Code: 74237865		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: September 27, 2012

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

BRIDGE NO: 7865 WEATHER: Sunny, 60° F

WATERWAY CROSSED: East Two Rivers

DIVING OPERATION: _____ SCUBA _____ SURFACE SUPPLIED AIR

X OTHER Inspection by Wading

PERSONNEL: Marc B. Parker, Clayton G. Brookins

EQUIPMENT: Dry Suit, Probe Rod, Camera, Hand Tools

TIME IN WATER: 5:00 P.M.

TIME OUT OF WATER: 5:45 P.M.

WATERWAY DATA: VELOCITY None / Negligible

VISIBILITY 2 feet

DEPTH 0.7 feet maximum at the South Abutment

ELEMENTS INSPECTED: The North and South Abutments

REMARKS: Overall, the North and South Abutments, were found to be in good to satisfactory condition, with no defects of structural significance. The timber piles and backwalls were typically sound with no notable decay, deterioration, splitting or checking. Piles A' and B of the North Abutment were not load bearing due to a gap between the top of the pile and the bottom of the pile cap. Numerous vertical planking boards were observed extending out of the channel along both abutments. Concrete rubble with protruding reinforcing steel was observed scattered along both abutments.

FURTHER ACTION NEEDED: ___X___ YES _____ NO

Place shims between the top of Piles A' and B of the North Abutment and the pile cap to restore full bearing of both piles.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

The inspection of the submerged substructure units of Structure No. 7865 can most likely be accomplished in the future without the use of a dive team. To perform the underwater inspection, a properly equipped qualified inspector will have to enter the water during a period of low flow. As channel bottom contours and depths of flow can change quickly, it is recommended that lead line soundings of water depth be taken along the upstream and downstream fascias to determine whether wading is possible prior to beginning the inspection. If conditions are unsafe for inspection by wading, then an underwater inspection with the use of a dive team will be required.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7865
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
WATERWAY CROSSED East Two Rivers

INSPECTION DATE September 27, 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

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	TIMBER PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BACKWALL AND WINGWALL)	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
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	North Abutment	0.3’	7	N	N	6	7	7	N	7	N	6	6	N	N	7	N	N	N
	South Abutment	0.7’	7	N	N	8	7	7	N	7	N	6	6	N	N	7	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the North and South Abutments, were found to be in good to satisfactory condition, with no defects of structural significance. The timber piles and backwalls were typically sound with no notable decay, deterioration, splitting or checking. Piles A’ and B of the North Abutment were not load bearing due to a gap between the top of the pile and the bottom of the pile cap. Numerous vertical planking boards were observed extending out of the channel along both abutments. Concrete rubble with protruding reinforcing steel was observed scattered along both abutments.

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.