



Underwater Bridge Inspection Report

Structure No.: 037B00066N

Crossing: Kentucky River

Route: Old Broadway Pedestrian Bridge

County: Franklin

District: 5

State: Kentucky

Stantec Consulting Services Inc.
Design with Community in Mind

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Prepared for:
Kentucky Transportation Cabinet
Frankfort, Kentucky

Inspection Date: October 5, 2020

Executive Summary

BRIDGE DATA

NUMBER:	037B00066N	SUBSTRUCTURE OBSERVED:	Piers 4, 5, and 6
ROUTE:	Old Broadway Pedestrian Bridge	SUBSTRUCTURE TYPES:	Reinforced Concrete and Masonry Block
CROSSING:	Kentucky River	WATERLINE ELEVATION:	471.2 feet
LOCATION:	Franklin County, Kentucky	MEASURED FROM:	3.6 feet Clinton Street Bridge, Pier 1, Top of Cap (EL. 474.8 feet)

INSPECTION DATA

INSPECTION DATE:	October 5, 2020	TEAM LEADER:	Adam Crace, PE
INSPECTION TYPE:	Underwater	WATERWAY CURRENT:	<1 knot
INSPECTION MODE:	Surface Supplied Air	MAX. WATER DEPTH:	13.0 feet
U/W VISIBILITY:	<1 foot	WEATHER:	Sunny, 73°
LATITUDE:	38.202087	LONGITUDE:	-84.882002
BRIDGE ACCESS:	Boat Access	DISTANCE TO RAMP:	2000 feet

RATINGS AND PRIORITY REPAIR RECOMMENDATIONS

SI&A Rating:

60 – Substructure

Rating: 3 – Poor Condition

Inspector Observed
Recommended Scour

Rating: 5 - Stable

Damage or deterioration which may have significantly affected the integrity, stability or load bearing capacity of the observed substructure elements was not detected at or below the water surface for pier 4. Pier 5 shows significant section loss on the masonry blocks within the splash zone. There are also missing masonry blocks as noted in Section 2.2. If this bridge is reopened to pedestrian traffic it is recommended that Pier 5 would need substantial rehabilitation to repair missing and broken blocks. In additions, missing and cracked mortar would need to be cleaned and pointed. Pier 6 shows minor areas of masonry section loss and the pier should be repointed.

**Underwater Bridge Inspection of
Structure Number: 037B00066N
over Kentucky River**

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1. Introduction

This report contains the results of an underwater inspection performed on Structure No. 037B00066N over Kentucky River located in Franklin County, Kentucky. The inspection was performed on October 5, 2020. The purpose of this inspection was to obtain information pertaining to the present conditions existing beneath the water surface at each of the substructure elements located within the limits of the waterway and to provide recommendations for further engineering investigations or repairs.

1.1. Description of Structure

The structure is a six-span steel truss with plate girder approaches. The bridge is currently closed to vehicle and pedestrian traffic. Substructures are numbered in accordance with the Kentucky Bridge Inspections Procedures Manual. At the time of the inspection portions of Piers 4, 5, and 6 were located beneath the water surface. It should be noted that Pier 4 is a shared pier and is used to support 037B00066N and the adjacent railroad. There were no plans available for the bridge at the time of the inspection. The last underwater inspection was complete on this bridge on October 29, 2009 as a part of the KYTC Statewide Underwater Inspection contract. Sketches of the substructure elements are provided within Appendix A. Overview photographs of the structure and each of the elements inspected are included within Appendix B.

1.2. Inspection Procedure

The underwater inspection was conducted by a three-person team meeting National Bridge Inspection Standards (NBIS) requirements for inspection of in-service bridges. The inspection was performed by a licensed Engineer Diver using Stantec equipment in general accordance with relevant Occupational Safety and Health Administration (OSHA) CFR 1910 Subpart T and Association of Diving Contractors International (ADCI) standards for commercial diving.

The underwater inspection was performed by Adam Crace, PE, Tim Kivi, and Ian Kidney in accordance with NBIS criteria for a routine inspection. As performed on this structure the routine inspection consisted of a Level I visual and tactile inspection of 100 percent of the exterior surface of each underwater element and a Level II inspection (cleaning) on at least 10 percent of the underwater portion of the structure at selected areas. The inspection was performed to observe and record obvious major damage or deterioration and the existing conditions at each element. Specifically, the elements were inspected for signs of distress, deterioration, movement, settlement, impact damage and loss of foundation support (undermining). Conditions such as channel bed material, localized scour and debris were also noted.

Using a pneumofathometer, the diver performed depth measurements around the perimeter of each substructure element and at any exposed foundation elements. Above water photographs of the bridge and each inspected element were taken and the water surface elevation at the time of the inspection was measured from a datum point on the structure.

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Above water photographs of the bridge and each inspected element were taken and the water surface elevation at the time of inspection was measured from a datum point on the structure.

2. Inspection Results

The following provides a description of the conditions noted during the underwater inspection. The results of the channel bottom survey and the general underwater configurations of the substructure as noted during the inspection are illustrated on the provided drawings in Appendix A.

2.1. Underwater Inspection Conditions

The water surface elevation at the time of the inspection measured 3.6 feet below the second Top of Cap on Pier 1 Clinton Street Bridge (EL 474.8 feet). The underwater visibility during the inspection was less than 1 foot. The water current in the river during the inspection was estimated to be less than 1 knot.

2.2. Observed Structure Conditions

General

- The bottom material consists of sand, gravel, cobbles, pieces of broken masonry block and silt.
- Light scaling and biological growth is present on the surface of the pier below the water surface.

Pier 4

- This pier is shared for the support of 037B00066N and the adjacent railroad.
- Tree debris is present around the entire south face extending from the river bottom to 2' above the bottom.
- There is a vertical crack located in the center of the west face measuring 1/8" wide with up to 3/4" penetration extending from 10' above the water surface to the river bottom.
- There is a vertical crack located just north of the center of the face measuring 1/4" wide with up to 1" penetration extending from the 2' above the water surface to 6' below the water surface.
- There is an area of honeycombing on the NW corner measuring 1' wide by 6" tall with up to 1" penetration located 6' below the water surface.
- There is a vertical crack on the east face located 8' and 18' north of the south face measuring 1/4" wide with up to 1" penetration extending from 6' above the water surface to 3' below the water surface.
- There is a vertical crack located in the center of the east face measuring 1/4" wide with up to 1/2" depth extending from the water surface to the river bottom.

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- Steel sheet is exposed from the mid-point on the eastern side and extends around the upstream nose and becomes buried by the mudline on the downstream nose. The top of the sheet pile is 6' below the water surface and is located 6' outboard of the pier. There is concrete fill between the sheet pile wall and the pier. The top of the concrete is located 6' below the water surface.
- There is an area of honeycombing on the east face located 5' north of the center of the pier measuring 2' wide by 6" tall up to 1.5" deep.

Pier 5

- There is a vertical crack on the west face:
 - 8' north of the SW corner measuring 3" wide up to 3' penetration extending from the top of the masonry to the river bottom
 - 2' north of the SW corner measuring 5" wide up to 3' penetration extending from 4' above the surface to 6' below the water surface,
 - 1' north of the south face measuring 3" wide up to 2' penetration extending from 4' above the water surface to 6.5' below the water surface
 - 10' south of the north point measuring 2" wide up to 2' penetration extending from 4' above the water surface to the river bottom.
- Section loss of a masonry block:
 - 6' bws south face 3' wide by 2' tall up to 1' penetration
 - center of west face at the water surface 3' wide by 2' tall up to 1' penetration
 - 6' south of north point on the west face 2' tall by 1' wide up to 2' penetration
 - 8' north of the SW corner at the water surface 2' tall by 1' wide up to 1' penetration
- The joints between the blocks vary from 3/4" to 3" wide and are occasionally noted to have loose rock in the voids.
- There is blocks missing from the south point on the east face 10' below the water surface and NE corner 8' below the water surface
- There is a vertical crack in the center of the east face
 - 2" wide up to 2' penetration extending from the water surface to the river bottom
 - 3.5' north of the SE corner measuring 3" wide up to 2' penetration extending from 15' above the ledge to the river bottom.
- There is a 2 missing masonry block on the south face 12' and 15' below the water surface measuring 3' wide by 2' tall by 2' penetration.
- There is a missing masonry block on the southwest face approximately 8' below the water surface measuring 4' wide by 3' tall by 1.5' penetration.

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Pier 6

- There is a concrete/mortar overlay covering the masonry block on the east face from 3 feet above the water surface to 1' below the water surface.
- Section loss of the masonry block 25' south of the north face measuring 2' wide by 1' tall by 8" penetration located 6' below the water surface.
- There is a highly fractured block on the east face 10' north of the south face located 10' below the water surface.
- Several blocks on the east face are exhibiting areas of delamination and pointing.

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3. Conclusions and Recommendations

It is recommended that development of the FHWA Structure Inventory and Appraisal (SI&A) ratings for this structure consider the underwater portions of the substructure consistent with the ratings as follows. The recommended ratings consider inspected elements located within the waterway, conditions existing below the water surface and the level of information known regarding the foundation system only. Additional consideration and evaluation is necessary for the actual assignment of condition ratings for the structure.

SI&A Rating:

60 – Substructure

Rating: 3 – Poor Condition

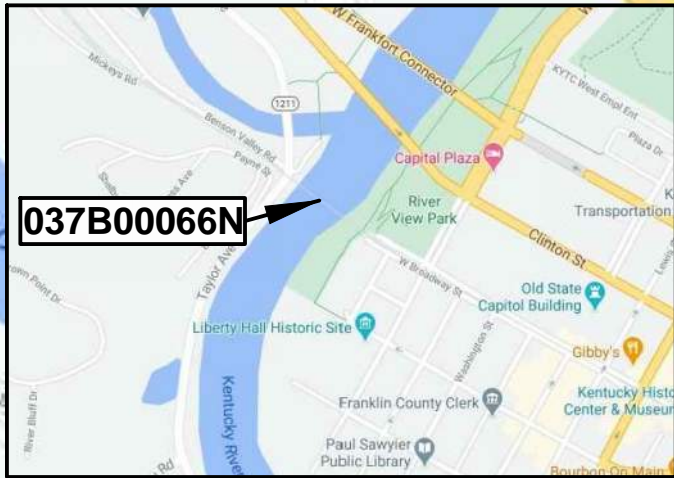
Inspector Observed
Recommended Scour

Rating: 5 - Stable

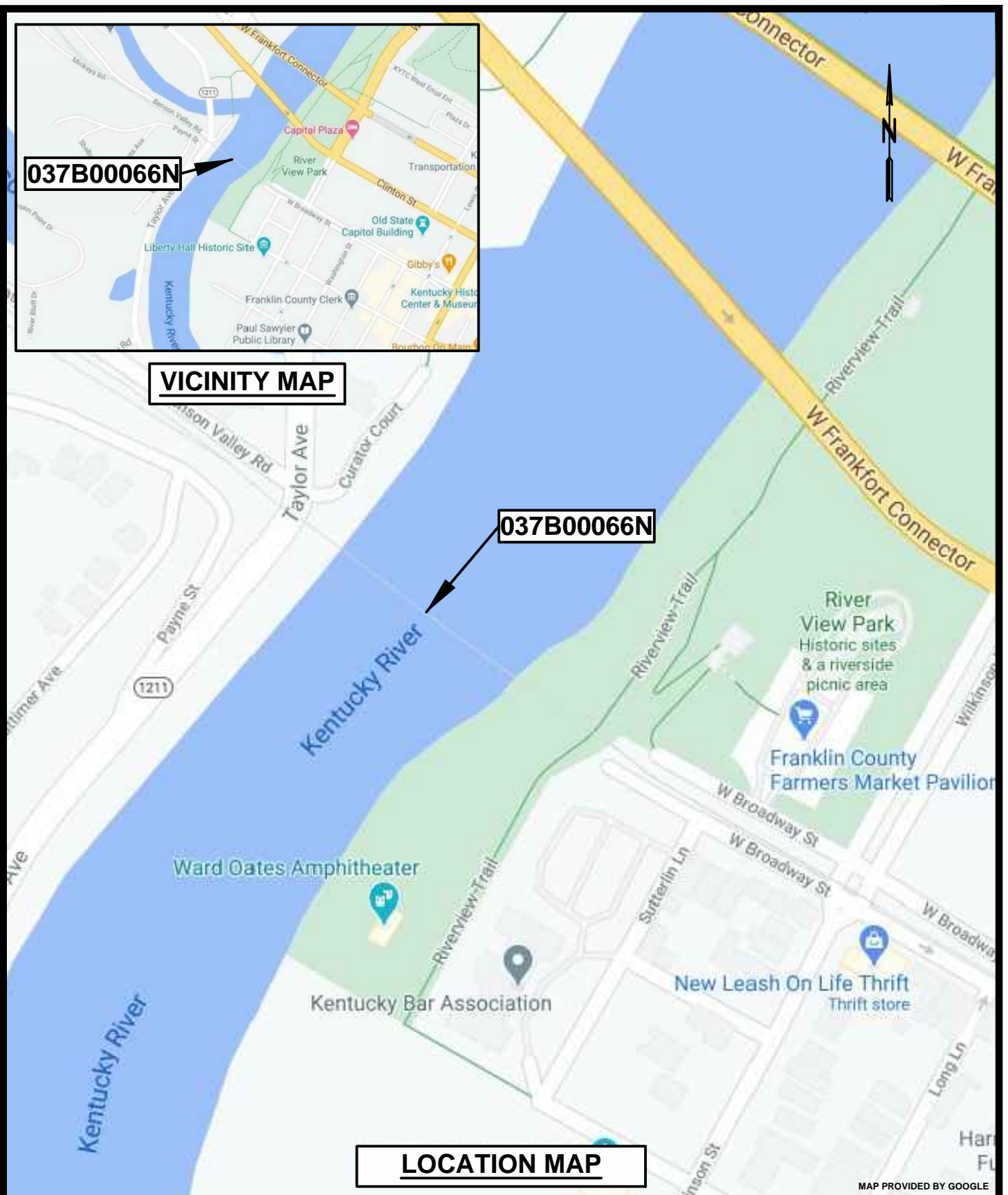
Damage or deterioration which may have significantly affected the integrity, stability or load bearing capacity of the observed substructure elements was not detected at or below the water surface for pier 4. Pier 5 shows significant section loss on the masonry blocks within the splash zone. There are also missing masonry blocks as noted in Section 2.2. If this bridge is reopened to pedestrian traffic it is recommended that Pier 5 would need substantial rehabilitation to repair missing and broken blocks. In additions, missing and cracked mortar would need to be cleaned and pointed. Pier 6 shows minor areas of masonry section loss and the pier should be repointed.

Appendix A

Figures



VICINITY MAP



LOCATION MAP

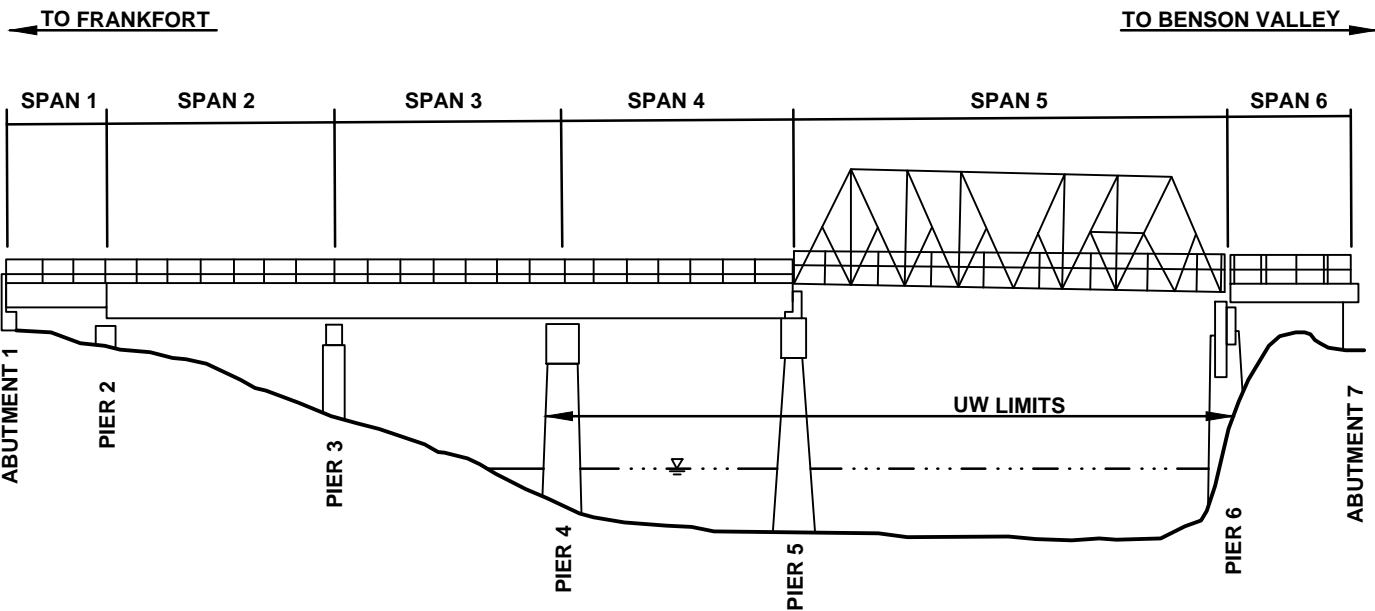
MAP PROVIDED BY GOOGLE



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GRAPHIC SCALE:	
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INSPECTION DATE:	OCTOBER 15, 2020
DRAWN BY: RWE	CKD. BY: ACC
STANTEC JOB NO.:	175568427
FILE NAME:	37B-66_LOC_MAP.DWG

KENTUCKY TRANSPORTATION CABINET 2020 UNDERWATER BRIDGE INSPECTIONS	
BRIDGE:	037B00066N
PAGE NO.	A-1
SHEET:	OLD BROADWAY PEDESTRIAN BRIDGE FRANKLIN COUNTY, KENTUCKY LOCATION MAP
FIG. NO.	1

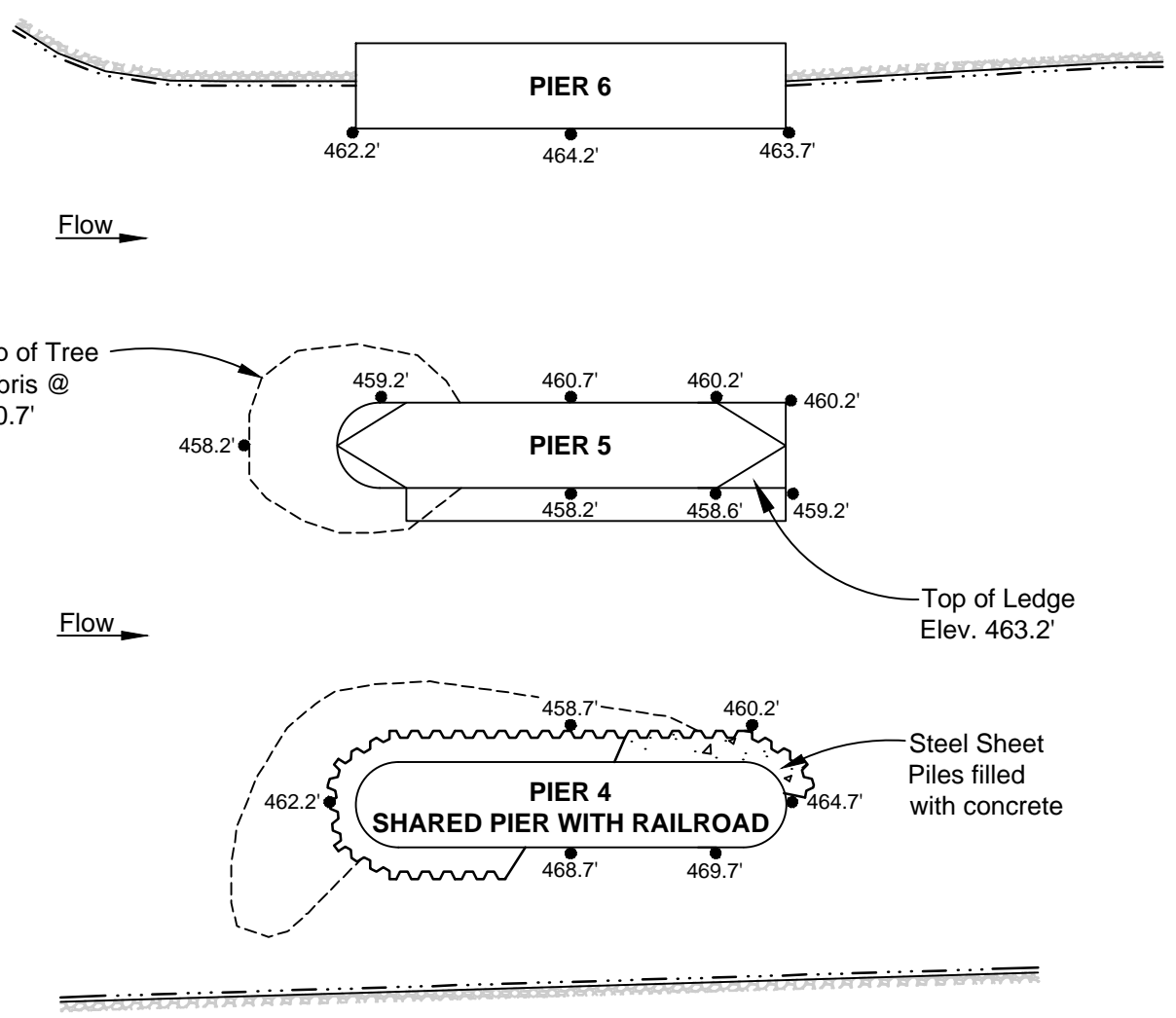
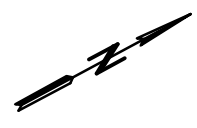


PIER 4 SHARED WITH RR BRIDGE

LEGEND

- 471.2' • Sounding Location and Mudline Elevation
- Shoreline
- Direction of Flow
- Limits of Debris
- Concrete
- Sheet Piles

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	INSPECTION DATE: OCTOBER 15, 2020		BRIDGE: 037B00066N	PAGE NO. A-2
	DRAWN BY: RWE	CKD. BY: ACC	SHEET: OLD BROADWAY PEDESTRIAN BRIDGE FRANKLIN COUNTY, KENTUCKY PROFILE VIEW	
	STANTEC JOB NO.: 175568427			
	FILE NAME: 37B-66_PROF.DWG			
		FIG. NO. 2		



LEGEND

- 471.2' ● Sounding Location and Mudline Elevation
- Shoreline
- Flow → Direction of Flow
- Limits of Debris
- Concrete
- Sheet Piles

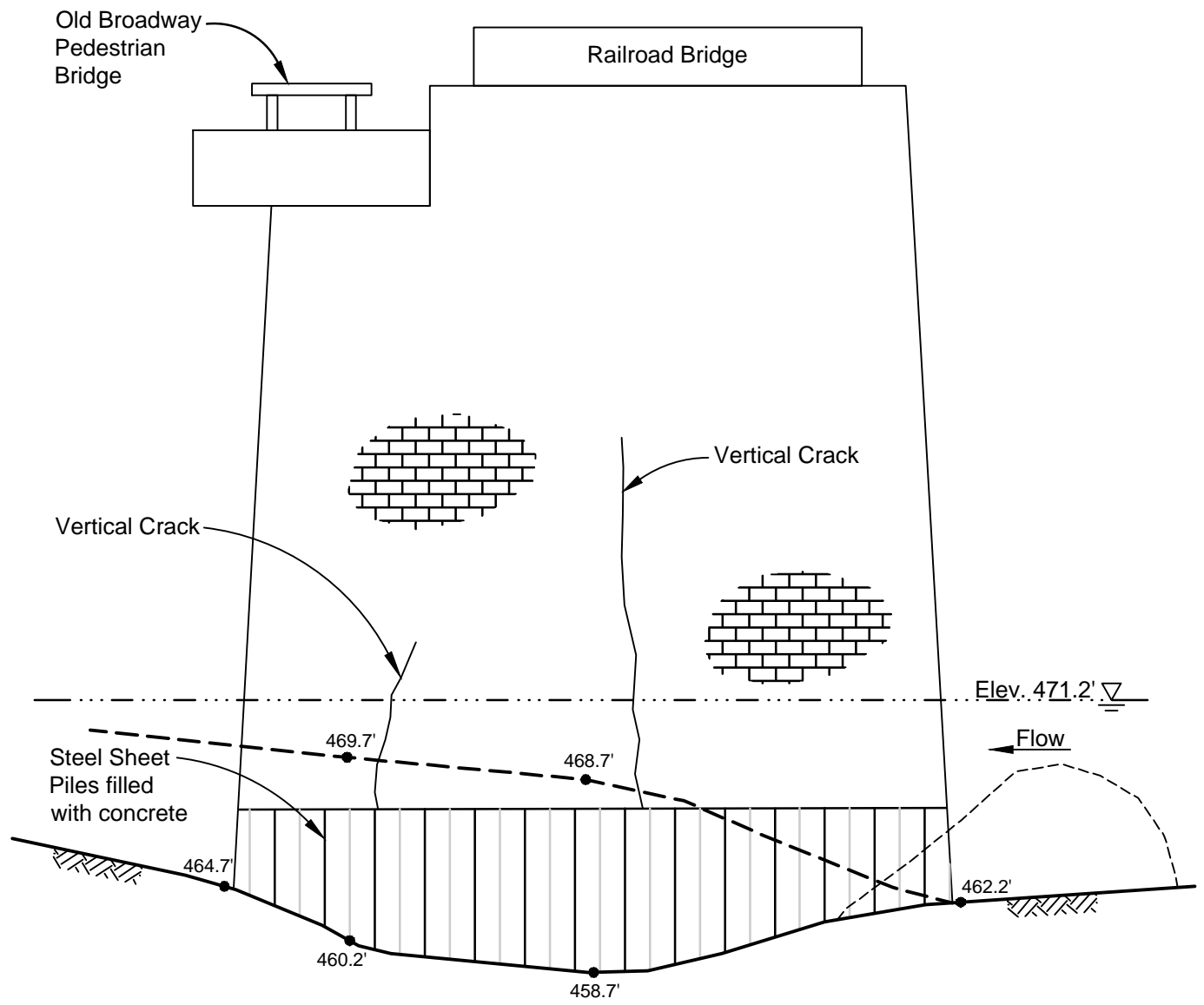
PLAN

NOTE:

1. Water Surface Elevation = 471.2'.

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DRAWN BY: RWE	CKD. BY: ACC	SHEET: OLD BROADWAY PEDESTRIAN BRIDGE FRANKLIN COUNTY, KENTUCKY SUBSTRUCTURE PLAN VIEW	
STANTEC JOB NO.: 175568427	FILE NAME: 37B-66_PLAN.DWG	FIG. NO. 3	



**PIER 4
SHARED PIER
LOOKING EAST**

LEGEND

- Front Side Mudline
- - - - Back Side Mudline
- 471.2' ● Sounding Location and Mudline Elevation
- ∇ — Water Surface
- Flow → Direction of Flow
- ▭ Concrete
- ▨ Soil Channel Bottom
- ▧ Masonry Blocks



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UNDERWATER BRIDGE INSPECTIONS

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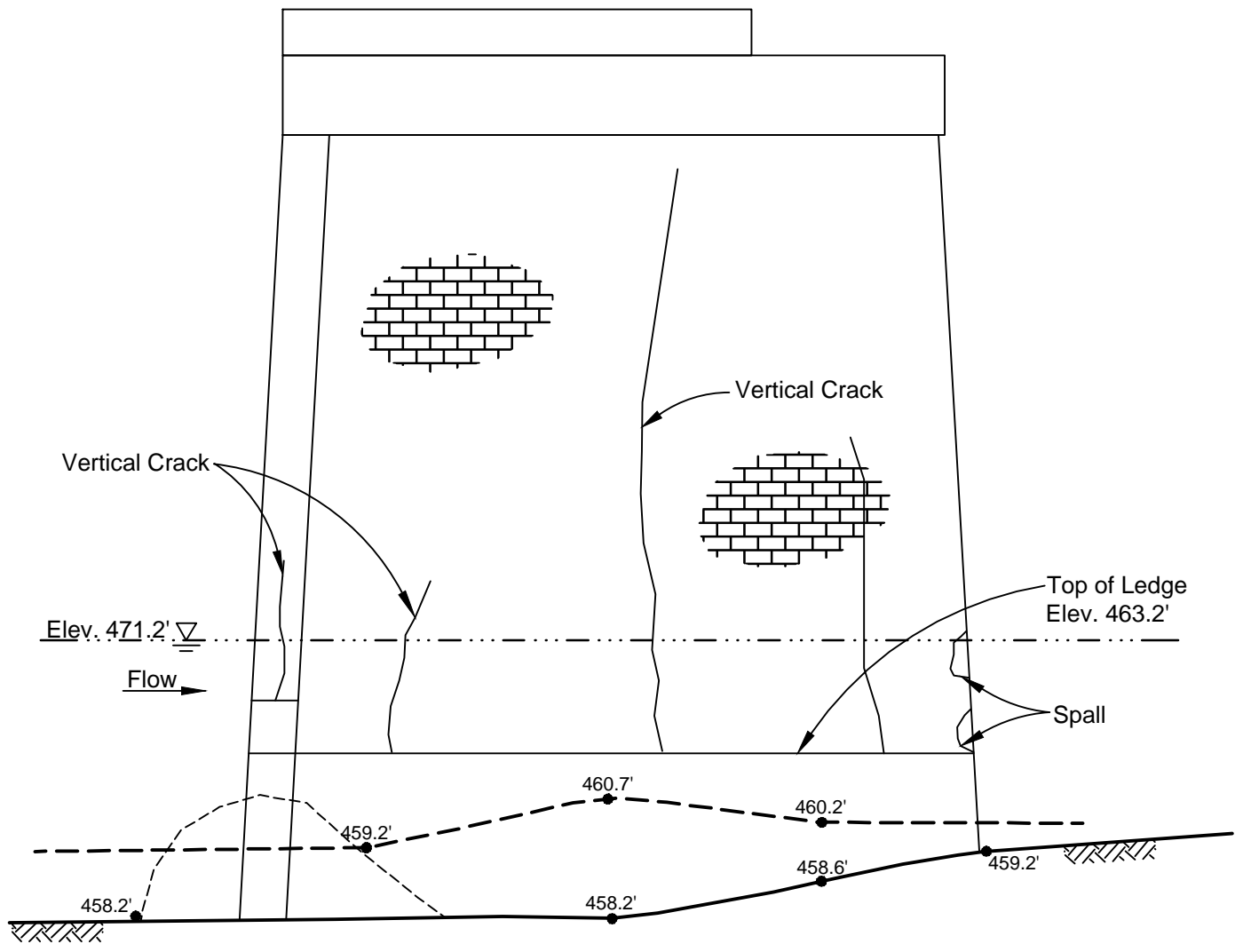
SHEET:
**OLD BROADWAY PEDESTRIAN BRIDGE
FRANKLIN COUNTY, KENTUCKY
PIER 4 ELEVATION**

PAGE NO.

A-4

FIG. NO.

4



**PIER 5
LOOKING WEST**

LEGEND

- Front Side Mudline
- - - Back Side Mudline
- 471.2' ● Sounding Location and Mudline Elevation
- ∇ — Water Surface
- Flow → Direction of Flow
- ▣ Concrete
- ▨ Soil Channel Bottom
- ▤ Masonry Blocks



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FILE NAME: **37B-66_PIER_5.DWG**

KENTUCKY TRANSPORTATION CABINET 2020
UNDERWATER BRIDGE INSPECTIONS

BRIDGE: **037B00066N**

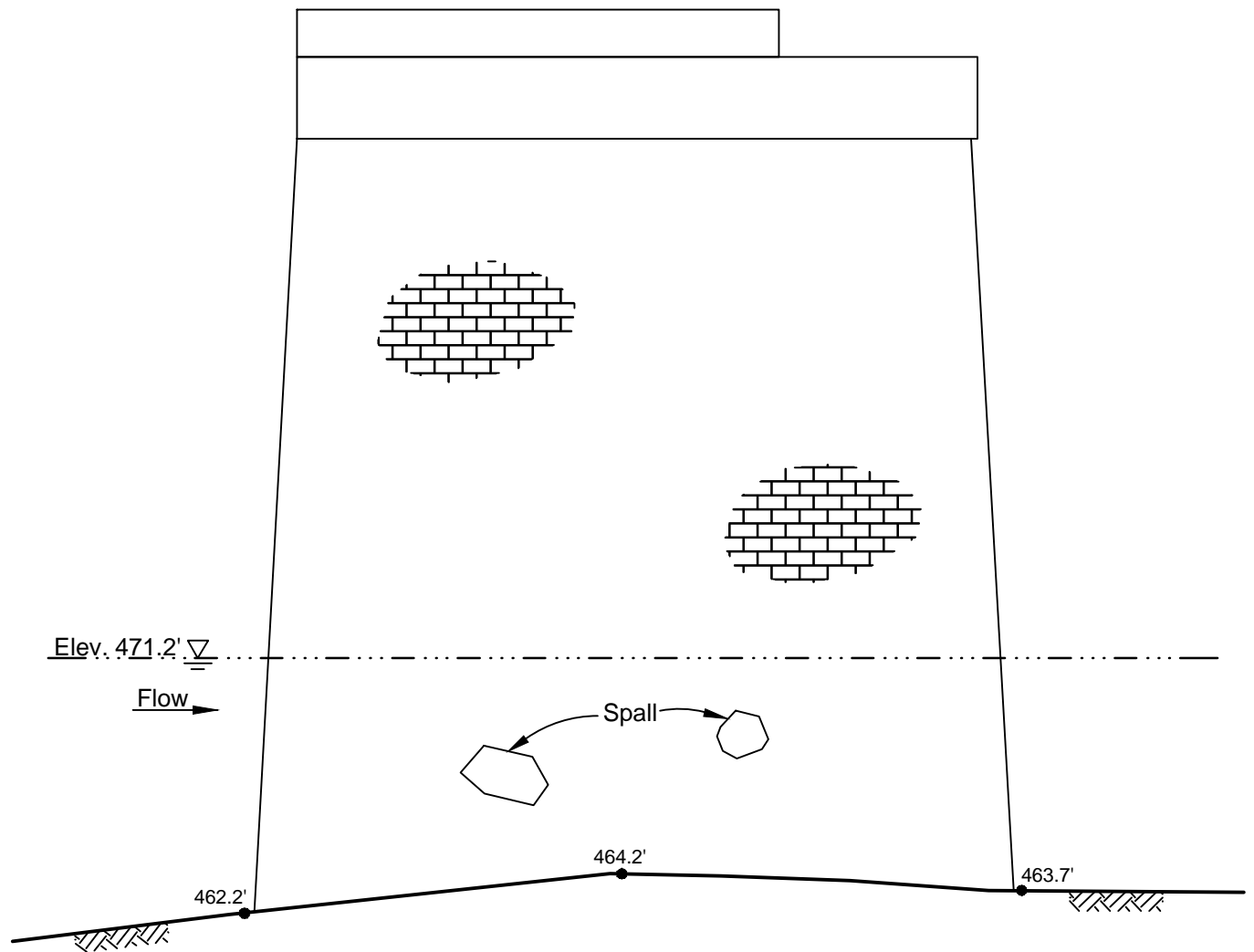
SHEET:
**OLD BROADWAY PEDESTRIAN BRIDGE
FRANKLIN COUNTY, KENTUCKY
PIER 5 ELEVATION**

PAGE NO.

A-5

FIG. NO.

5



**PIER 6
LOOKING WEST**

LEGEND

- Front Side Mudline
- - - - Back Side Mudline
- 471.2' ● Sounding Location and Mudline Elevation
- ··· ··· ▽ Water Surface
- Flow → Direction of Flow
- ▭ Concrete
- ▨ Soil Channel Bottom
- ▧ Masonry Blocks



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INSPECTION DATE: OCTOBER 15, 2020	BRIDGE: 037B00066N	PAGE NO. A-6	
DRAWN BY: RWE CKD. BY: ACC	SHEET: OLD BROADWAY PEDESTRIAN BRIDGE FRANKLIN COUNTY, KENTUCKY PIER 6 ELEVATION	FIG. NO. 6	
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Appendix B
Photographs

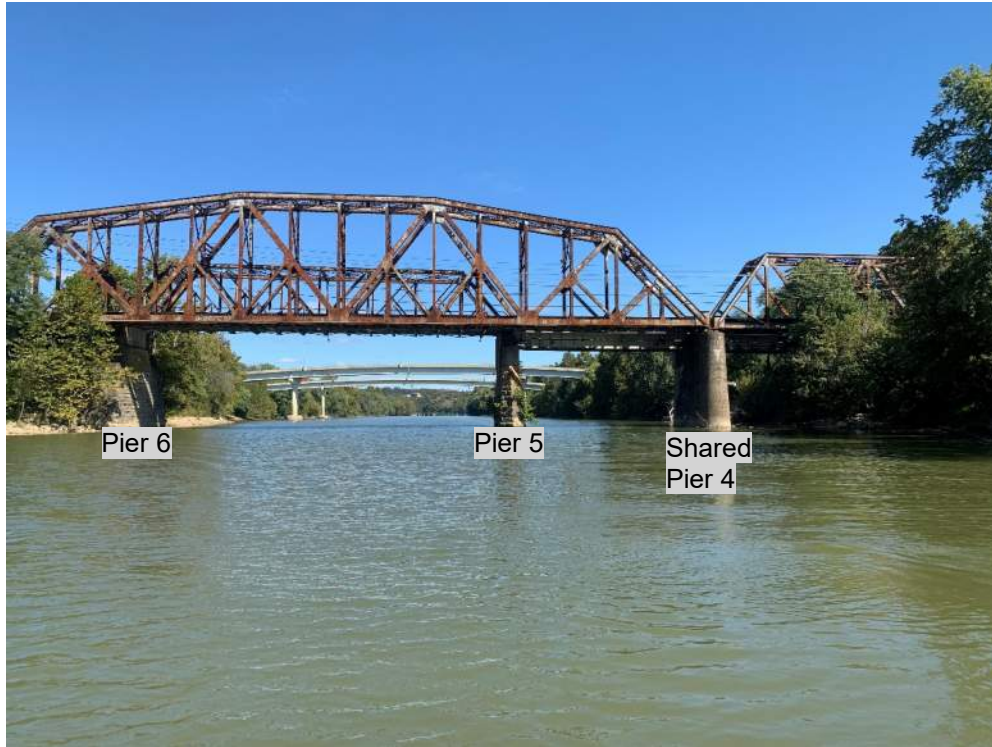


Photo 1 Overview of Bridge Looking Downstream



Photo 2 Overview of Bridge Looking Upstream

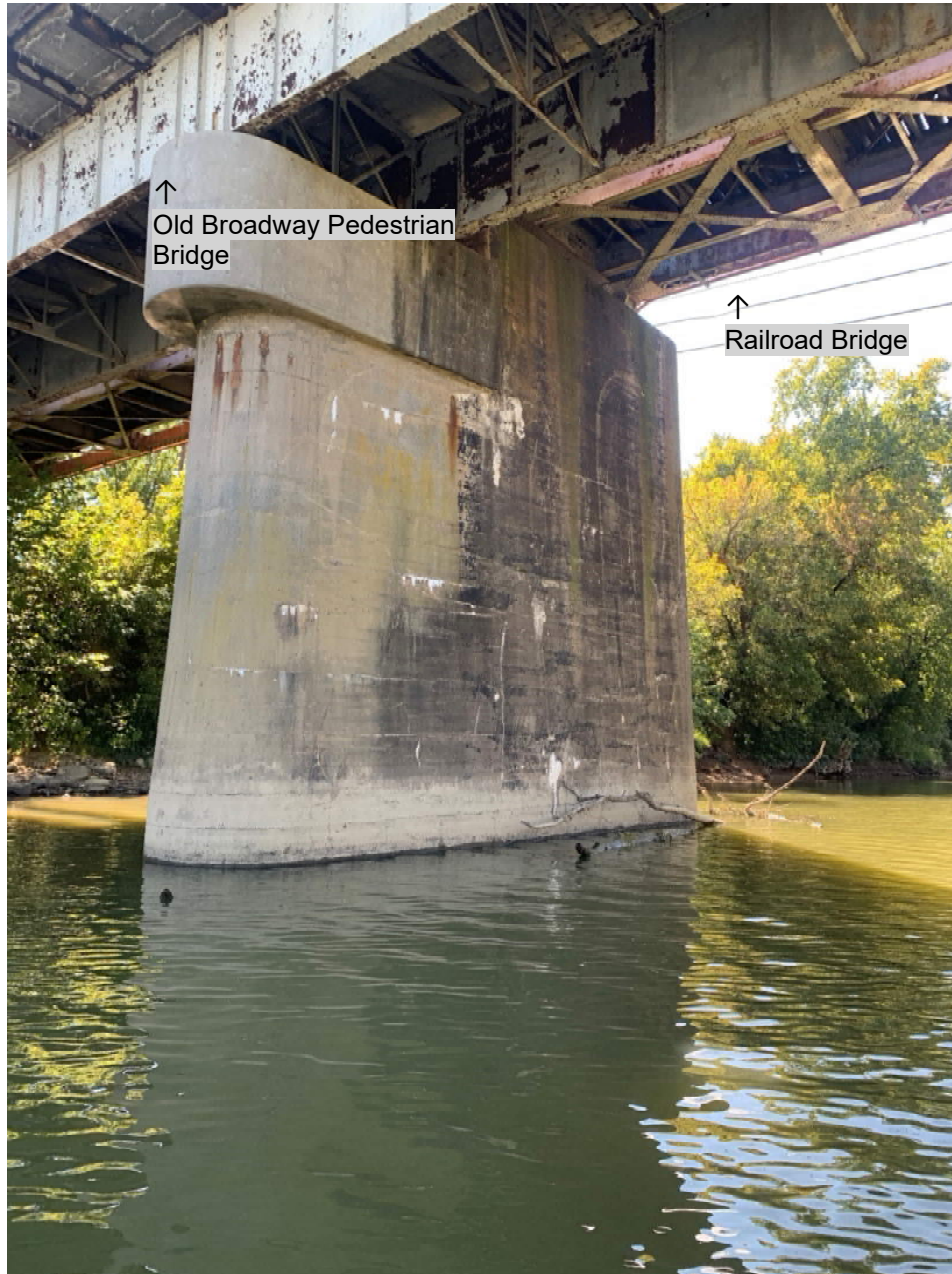


Photo 3 Pier 4 Looking East (Shared Pier with Railroad)



Photo 4 Pier 5 Looking West



Photo 5 Pier 6 Looking West