

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. JEF-07-3380
SR 7 OVER YELLOW CREEK
JEFFERSON COUNTY, OH
DISTRICT 11

August 2017

Prepared for:

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

STATE OF OHIO
JOSHUA M. JOHNSON
E-76141
1/11/18
REGISTERED PROFESSIONAL ENGINEER

Prepared by:

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EXECUTIVE SUMMARY

Project: ODOT District 11 Underwater Bridge Inspections - 2017

Purpose of Project: To perform a detailed visual and tactile underwater investigation of scour critical bridges for District 11 of the Ohio Department of Transportation.

Inspection Team: Team Leader – Kurt Lingo, E.I.T. – Collins Engineers, Inc.
Team Member – Matthew Rogers, E.I.T. – Collins Engineers, Inc.
Team Member – John Strub, E.I.T. – Collins Engineers, Inc.

Inspection Date(s): August 4, 2017

Water Visibility:	<1 ft	***Water Velocity:***	<1 ft/s
Water Temperature:	73 °F	***Weather:***	Cloudy – 80 °F
Waterline Elevation:	49.1 ft	***Type of Boat:***	23 ft Carolina Skiff
Coordinates:	36.9426°N, 86.0287°W		
Access Location:	Rayland Marina Public Boat Ramp		
Dive Mode:	Surface Supplied Air		
Waterline Reference:	57.9 ft below the top of deck at the downstream nose of Pier 4.		
Maximum Depth at SSU:	10.8 ft – Upstream Nose of Pier 5.		
Shoreline Conditions:	The north and south shorelines consisted of moderately to heavily vegetated mild slopes with minor erosion and multiple trees leaning toward the channel.		

Summary of Findings:

- **Piers 1 and 2:**
  - Were not located within Yellow Creek and therefore, did not require an underwater inspection.
- **Pier 3:**
  - No noteworthy deficiencies.
- **Pier 4:**
  - Moderate timber debris, up to 3 in diameter by up to 2 ft vertical, at the upstream nose of the southbound pier column.
  - Light timber debris, up to 6 in vertical, mostly small branches at the upstream nose of the northbound pier column.
- **Pier 5:**
  - Moderate timber debris, up to 2 ft diameter, buried in silt, at the upstream nose of the southbound pier column.
  - Moderate scale, up to 1/4 in deep, extending from the channel bottom to 1 ft below the waterline.
  - Failed spall repair, full width of the downstream nose by 6 in vertical by up to 1 in deep.

- **Pier 6:**
  - Moderate timber debris, up to 3 in diameter by up to 2 ft vertical, at the upstream nose of the southbound pier column.
  - Light timber debris, up to 6 in vertical, mostly small branches at the upstream nose of the northbound pier column.
- **Piers 7 - 9:**
  - Were not located within Yellow Creek and therefore, did not require an underwater inspection.

Summary of Recommendations:

- Monitor timber debris accumulation at Piers 4 - 6.
- Clean, repair, and patch spall at the downstream nose of Pier 5.
- Monitor scaling on Piers 3 through 6.

Underwater Inspection Coding:

NBI Ratings:

Item	Description	Coding	Condition
60	Substructure	7– Good Condition	Light Concrete Scaling
61	Channel	6 – Satisfactory Condition	Timber Debris Accumulation
62	Culvert	N/A	
92B	UW Insp. Frequency	60 Months	
93B	Insp. Date	08 04 17	
113	Scour Critical Bridges	8 – Above Foundation Limits	Stable (Inspector Recommended)

AASHTO National Bridge Element (NBE) Ratings:

Element #	Description	Units	Total	Condition State			
				1	2	3	4
210	Reinforced Concrete Pier Wall	LF	120	119	1	0	0

Note: Ratings were developed using the FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. The recommended ratings consider inspected elements located within the waterway and conditions existing below the water surface only. Additional consideration is necessary for the assignment of overall condition ratings for this bridge.

1.0 INTRODUCTION

1.1 Purpose and Scope

This report consists of the results of a detailed underwater investigation performed at the SR 7 Bridge over Yellow Creek in Jefferson County, OH. Collins Engineers, Inc. (Collins) conducted the underwater investigation for the Ohio Department of Transportation (ODOT) on August 4, 2017. The primary purpose of the investigation was as follows:

- Determine the condition of the substructure components located in the water at the time of the inspection from the waterline to the channel bottom.
- Obtain channel bottom depth measurements along the bridge fascias, upstream and downstream of the bridge, and around the submerged substructure units.
- Determine the condition of the shorelines in the vicinity of the structure.
- Obtain photographs of the bridge and any significant defects.

In addition, a brief inspection was made of areas that could be submerged during periods of high water. The following report includes a description of the structure, the method of investigation, a description of existing conditions, an evaluation and recommendations based on the conditions, inspection figures, and photographs.

1.2 General Description of the Structure

Structure No. JEF-07-3380 spans 633.5 ft, carrying SR 07 over Yellow Creek and is approximately 26.5 ft wide. The bridge superstructure is constructed of eight steel girder spans. The roadway orientation of the longitudinal axis of the bridge is south to north. The substructure units are labeled as Rear and Forward Abutments and Piers 1 through 9. Existing design drawings were available at the time of the inspection and were used to determine water surface elevation and foundation elevations. Refer to Figure 1 in Exhibit 1 for a Location Map of the bridge. Refer to Photographs 1 and 2 in Exhibit 2 for overall views of the bridge.

1.3 Method of Investigation

A detailed field inspection was conducted to determine the physical condition of the submerged bridge substructure units from the waterline to the channel bottom. A brief visual examination of the substructure units above the waterline was also made.

A three-person team consisting of an engineer-diver and team leader (Kurt Lingo, E.I.T.) and two engineer divers (Matthew Rogers, E.I.T. and John Strub, E.I.T.) conducted the underwater inspection. The inspection was conducted using surface supplied air diving equipment. During the inspection, the inspectors worked from a boat and a note taker in the boat recorded the inspection notes.

The underwater inspection consisted of a visual and tactile examination of the accessible surfaces of the substructure units from the waterline to the channel bottom with particular attention given to any observed areas of deterioration or apparent distress. Approximately 10 percent of the total area on the underwater surfaces of the substructure units was cleaned so that the condition could be more closely examined. Photographs were taken to document the general conditions and observed deficiencies. Underwater Photographs could not be obtained due to poor water conditions. The type of channel bottom material, the presence or extent of scour, the presence or extent of riprap, the presence or extent of drift and debris, and the location of any foundation exposure or undermining were noted.

Channel bottom soundings were performed utilizing a telescoping survey rod and digital fathometer. Soundings were collected at quarter points along the bridge centerline as well as 10 feet and 50 feet upstream and downstream of the bridge, parallel with its fascias. Additional soundings were collected adjacent to Piers 3 - 6 and at 10 feet intervals in-line with the piers, upstream and downstream, and the waterline was referenced to a known elevation on the bridge. A sounding plan was developed using the soundings and approximate location of the shorelines. Refer to Figures 2 and 3 in Exhibit 1 for the sounding plan and channel cross sections that show the channel limits and water depths around the structure.

2.0 EXISTING CONDITIONS

2.1 General Conditions

At the time of the inspection, the waterline of JEF-07-3380 was located approximately 60.9 ft below the top of deck at the downstream nose of Pier 5, which corresponds to a waterline elevation of 644.95 ft. During the inspection, the waterway was flowing at approximately 1 ft per second. The bridge pier skew was consistent with the channel alignment and does not require attention at this time. The north and south shorelines consisted of moderately to heavily vegetated mild slopes with minor erosion and multiple trees leaning toward the channel. Refer to Photographs 3 through 8 in Exhibit 2 for views of the shorelines near the structure.

2.2 Substructure Conditions

2.2.1 Pier 3

The channel bottom material around Pier 3 consisted of soft silt with approximately 24 in. probe rod penetration. The submerged portions of the pier exhibited light scaling up to 1/8 in deep. Refer to Figures 6 in Exhibit 1 for detailed inspection notes of Pier 3. Refer to Photographs 9 and 10 in Exhibit 2 for views of Pier 3.

2.2.2 Pier 4

The channel bottom material around Pier 4 consisted of soft silt with approximately 24 in. probe rod penetration. The submerged portions of the pier exhibited light scaling up to 1/8 in deep. Refer to Figures 7in Exhibit 1 for detailed inspection notes of Pier 4. Refer to Photographs 11 and 12 in Exhibit 2 for views of Pier 4.

2.2.3 Pier 5

The channel bottom material around Pier 5 consisted of soft silt with approximately 12 in. probe rod penetration. The submerged portions of the pier exhibited light scaling up to 1/4 in deep. Refer to Figures 8 in Exhibit 1 for detailed inspection notes of Pier 5. Refer to Photographs 13, 14, 17, and 18 in Exhibit 2 for views of Pier 5 and typical concrete condition at the waterline.

2.2.4 Pier 6

The channel bottom material around Pier 6 consisted of soft silt with approximately 24 in. probe rod penetration. The submerged portions of the pier exhibited light scaling up to 1/8 in deep. Refer to Figures 9 in Exhibit 1 for detailed inspection notes of Pier 6. Refer to Photographs 15 and 16 in Exhibit 2 for views of Pier 6.

3.0 EVALUATION AND RECOMMENDATIONS

Overall, the inspected substructure units of Structure No. JEF-07-3380 were in good condition. A comparison of the soundings recorded during the previous inspection on August 19, 2012 and the soundings taken during this inspection revealed no significant change in the channel bottom profile in the vicinity of the structure. Although no channel deficiencies were observed, the channel bottom should continue to be monitored during future underwater inspections to verify that localized scour or overall channel degradation is not occurring and that the pier footings remain adequately embedded in the channel bottom.

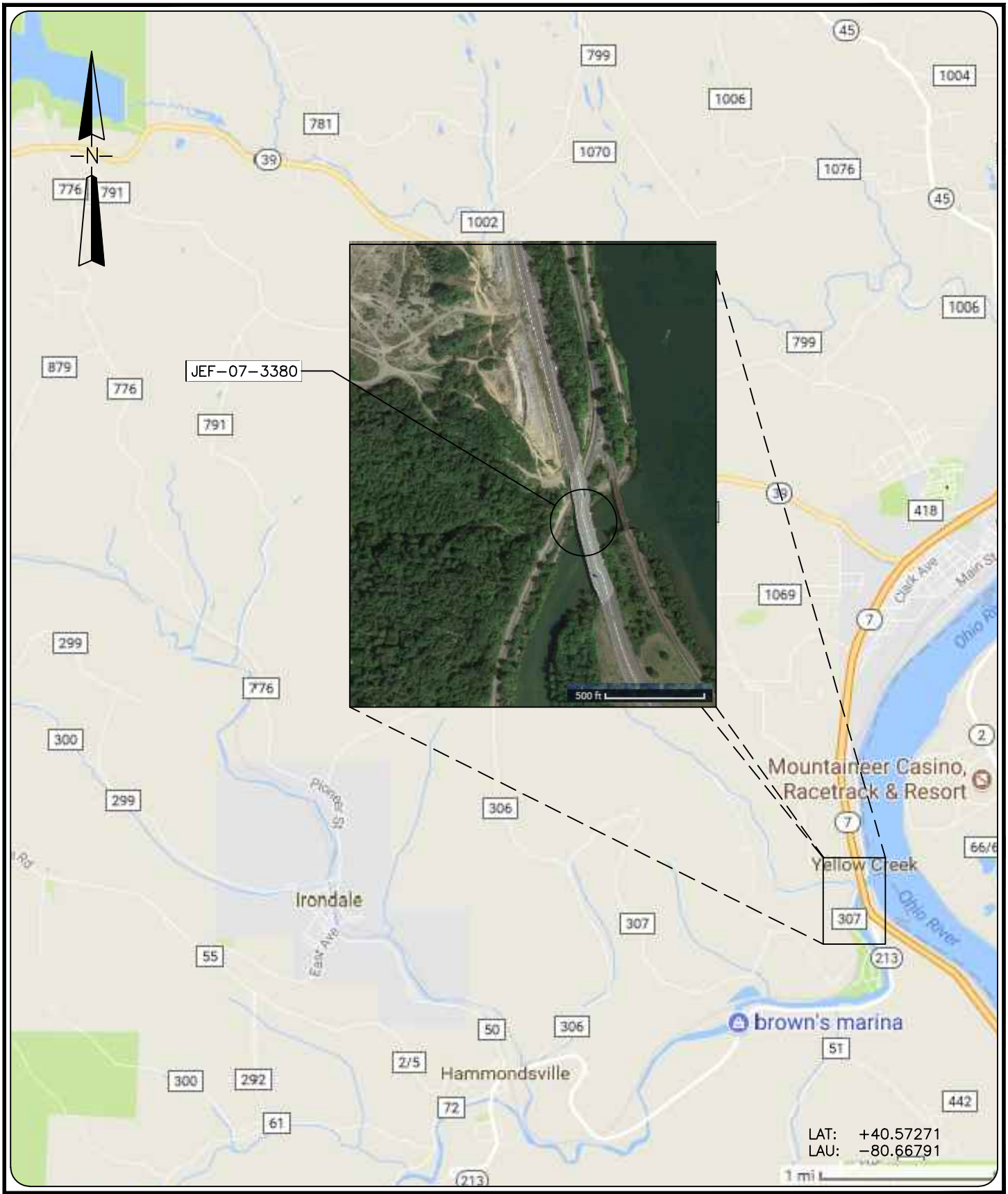
It is recommended that the submerged substructure units of Structure No. JEF-07-3380 be next inspected underwater at an interval not to exceed 60 months, no later than August 4, 2022.

Respectfully Submitted,
COLLINS ENGINEERS, INC.

Joshua Johnson, P.E.
Project Manager/Team Leader

Originated by:
Matthew Rogers, E.I.T.

EXHIBIT 1 – FIGURES



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SR 7 OVER YELLOW CREEK
STRUCTURE NO. JEF-07-3380

LOCATION MAP

JEFFERSON COUNTY, OHIO

INSPECTED BY: MOR	CEI PROJECT: 55-10356.00
DRAWN BY: KMM	DATE: AUG 2017
CHECKED BY: JMJ	SHEET NO: 1

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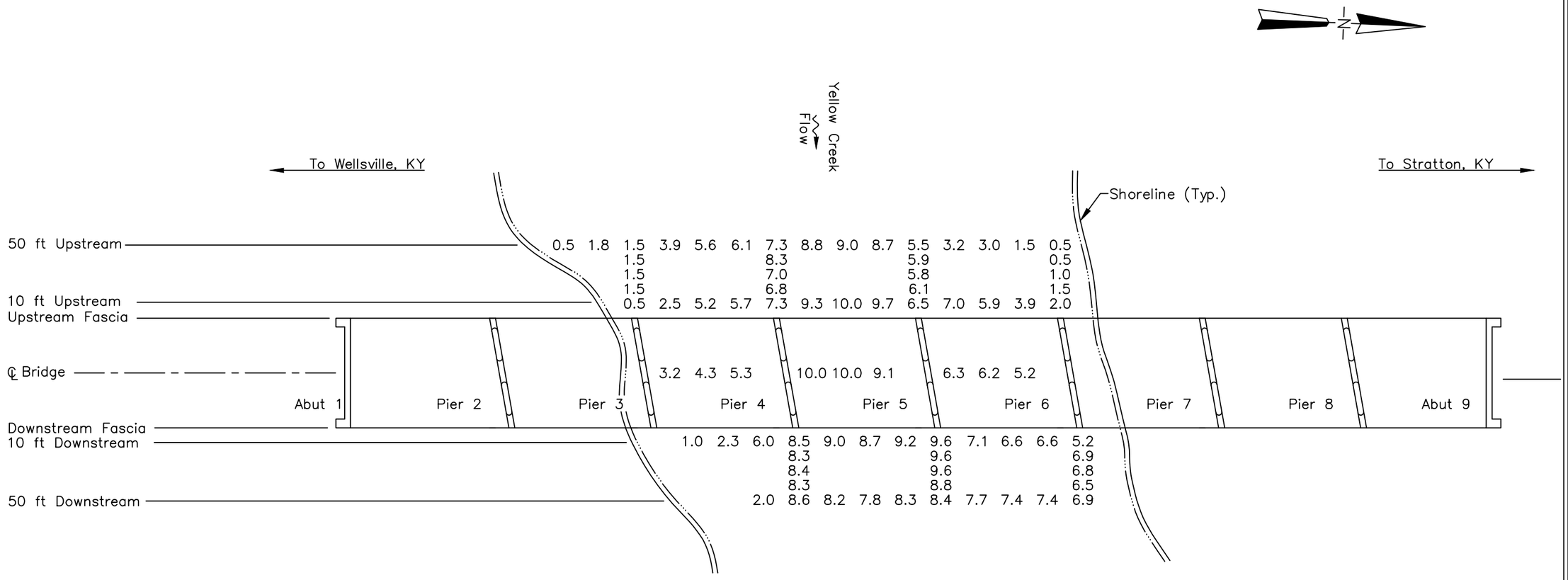

SOUNDING PLAN

GENERAL NOTES:

1. Piers 3 through 6 were inspected underwater. Substructure units are labeled according to available record drawings.
2. At the time of inspection on August 4, 2017, the waterline was located approximately 57.9 ft below Top of Deck at downstream nose of Pier 4 (Assumed EL. +100.0 ft). This corresponds with a waterline elevation of +42.1 ft.
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 upstream and downstream fascias, at 1/4 points between the substructure units, and at 10 ft intervals in–line with the piers upstream and downstream up to 50 ft.

LEGEND

X.X Sounding Depth from Waterline (ft)

Timber Debris

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SOUNDING PLAN
JEFFERSON COUNTY, OHIO

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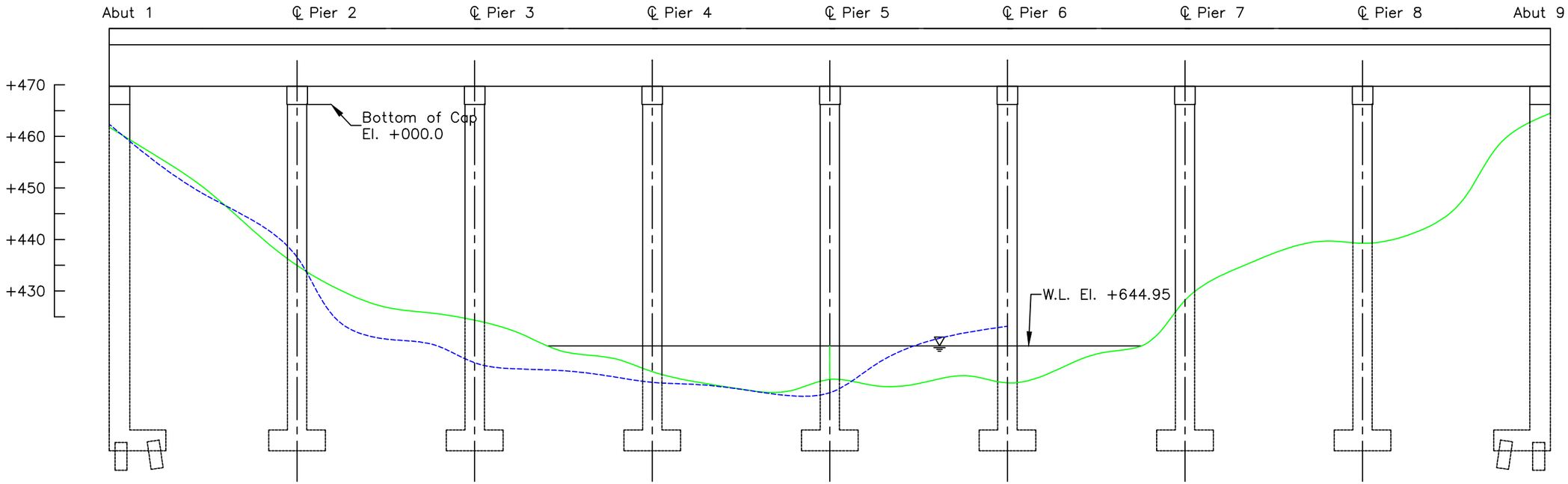

STRUCTURE UPSTREAM
CHANNEL CROSS SECTION
(LOOKING UPSTREAM)

LEGEND

———	2017 – Upstream Fascia
- - - - -	2012 – Upstream Fascia
	Timber Debris
	Water Surface
+450	Elevation (ft)

Note:

Footing elevations unknown due to unavailable record drawings.

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CROSS SECTIONS
JEFFERSON COUNTY, OHIO

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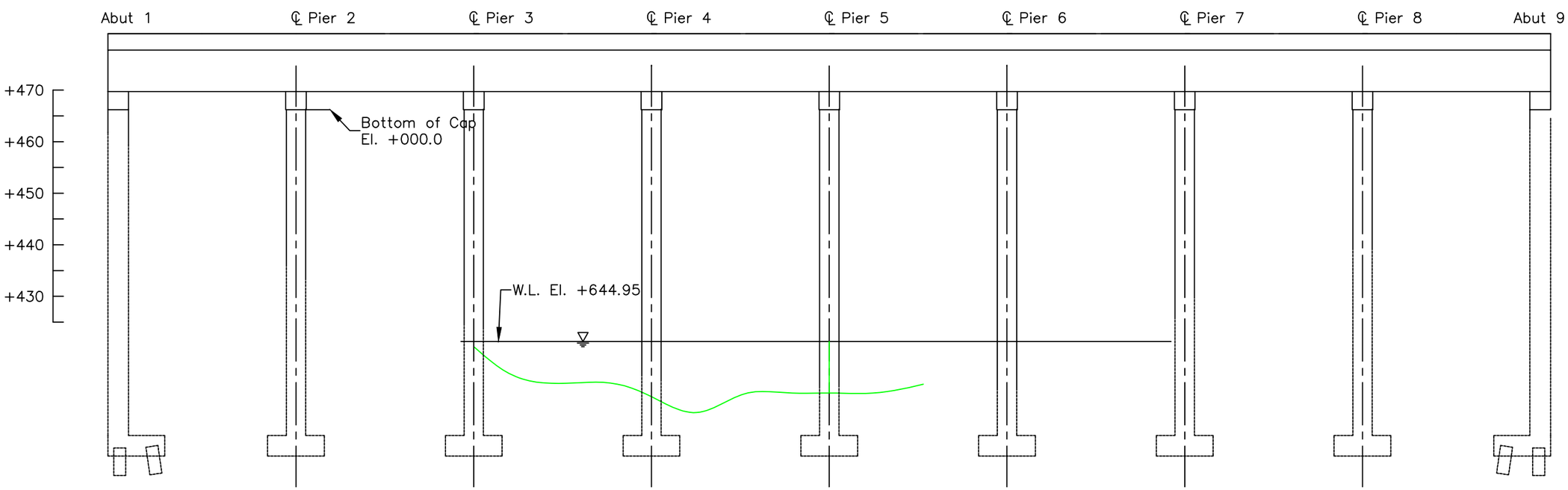

STRUCTURE CENTERLINE
CHANNEL CROSS SECTION
(LOOKING DOWNSTREAM)

LEGEND

———	2017 – Centerline
- - - - - - - - -	2012 – Centerline (No Data)
	Timber Debris
	Water Surface
+450	Elevation (ft)

Note:

Footing elevations unknown due to unavailable record drawings.

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CROSS SECTIONS
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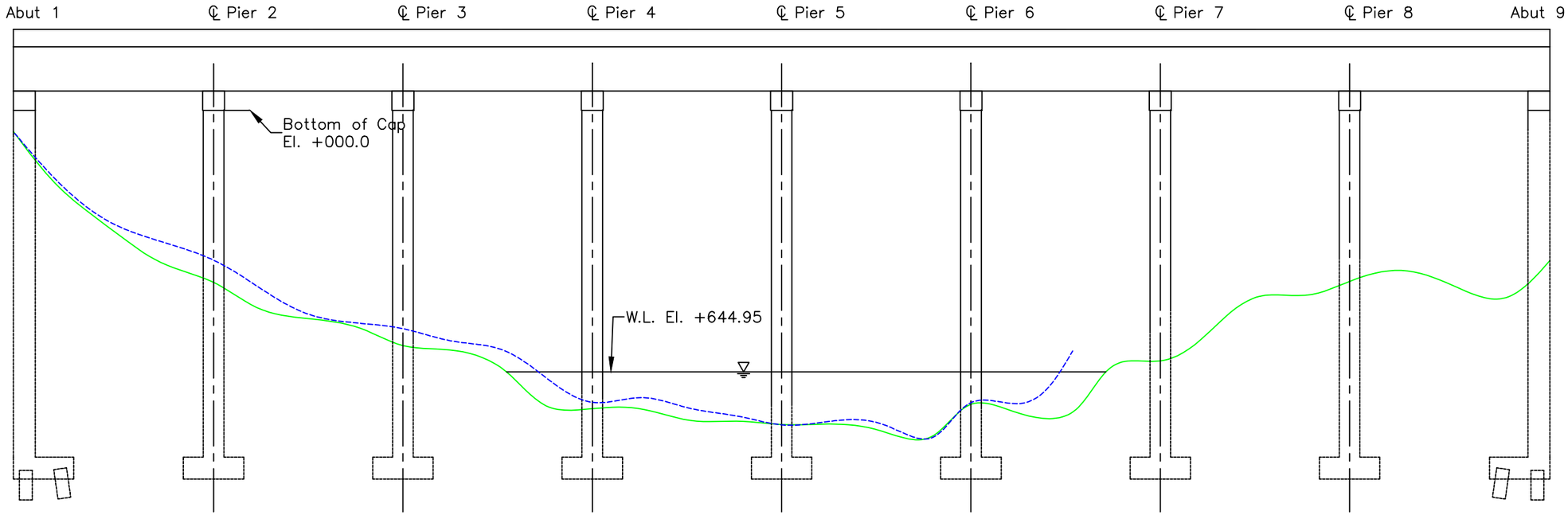

STRUCTURE DOWNSTREAM
CHANNEL CROSS SECTION
(LOOKING DOWNSTREAM)

LEGEND

———	2017 – Downstream Fascia
- - - - -	2012 – Downstream Fascia
	Timber Debris
	Water Surface
+450	Elevation (ft)

Note:

Footing elevations unknown due to unavailable record drawings.

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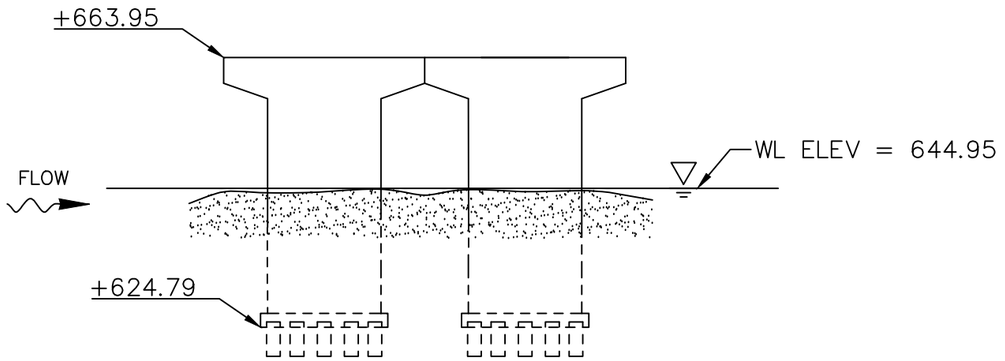
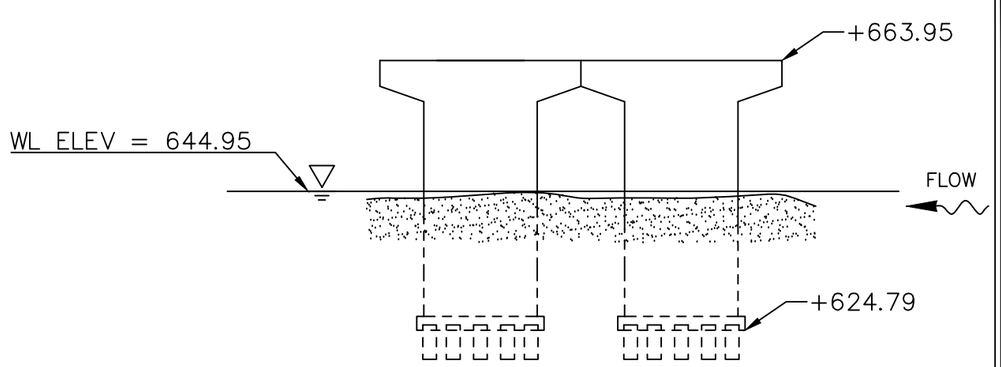
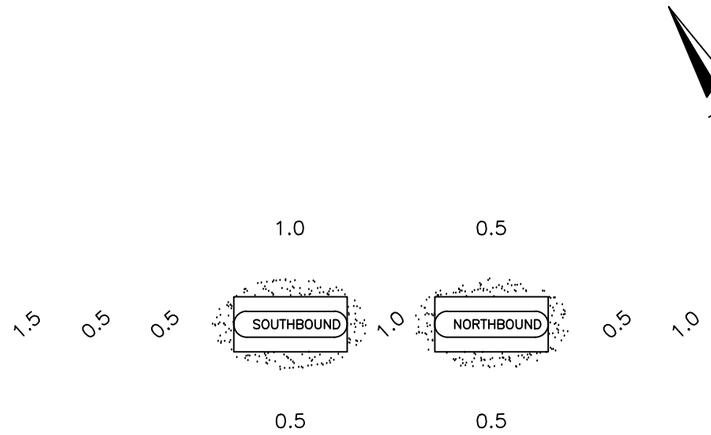


PIER 3
SOUTH ELEVATION
(LOOKING NORTH)



PIER 3
NORTH ELEVATION



PIER 3
PLAN

INSPECTION NOTES:

1. The channel bottom material consisted of sand, gravel and organics with approximately 2 ft probe rod penetration.
2. The submerged portions of the pier were sound and smooth with no defects observed.

LEGEND

———	2017 – Channel Bottom
	Timber Debris
	Water Surface
+450	Elevation (ft)

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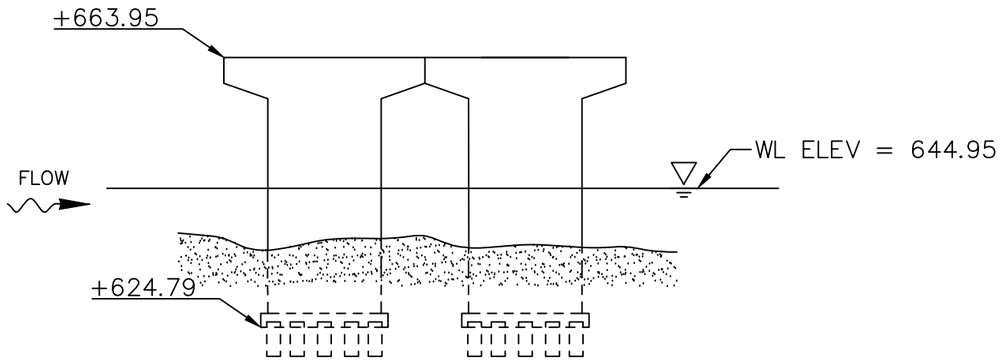
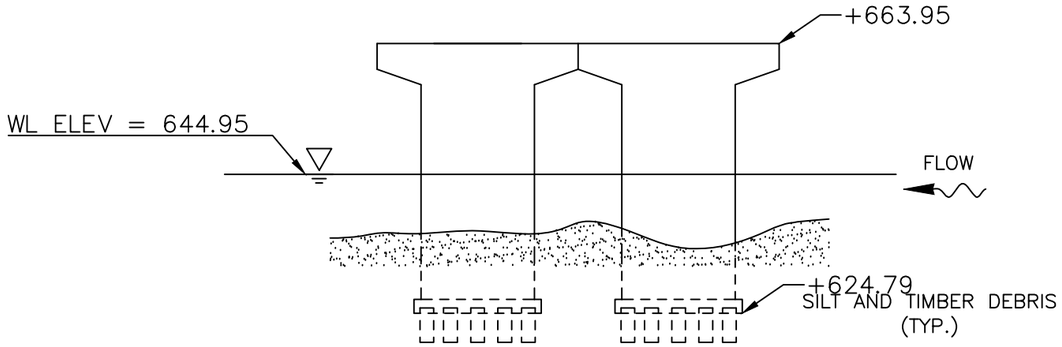
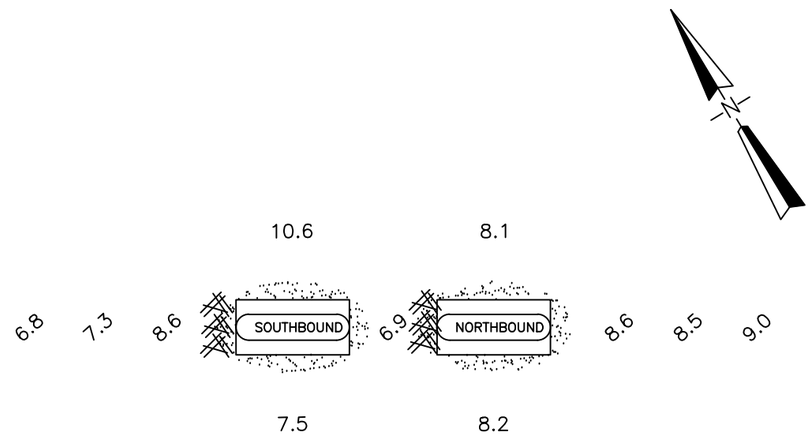


PIER 4
SOUTH ELEVATION
(LOOKING NORTH)



PIER 4
NORTH ELEVATION



PIER 4
PLAN

INSPECTION NOTES:

1. The channel bottom material consisted of sand, gravel and organics with approximately 2 ft probe rod penetration.
2. The submerged portions of the pier were sound and smooth with no defects observed.

LEGEND

———	2017 – Channel Bottom
	Timber Debris
	Water Surface
+450	Elevation (ft)

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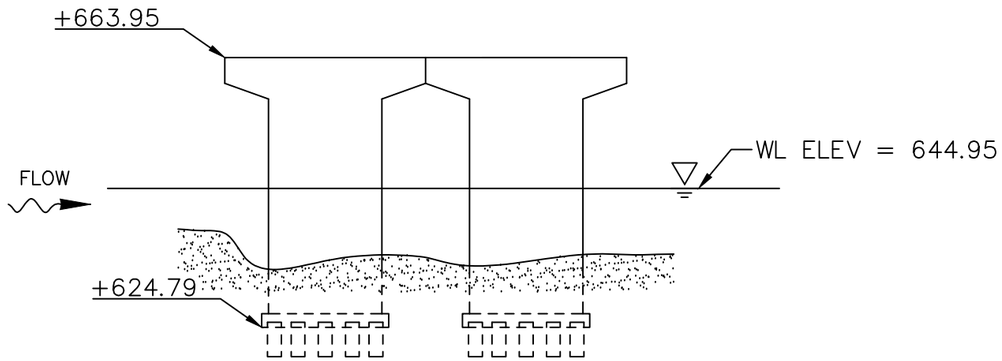
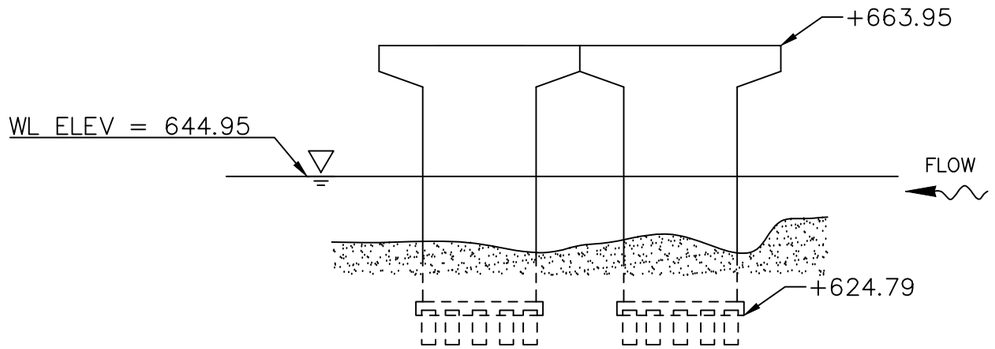
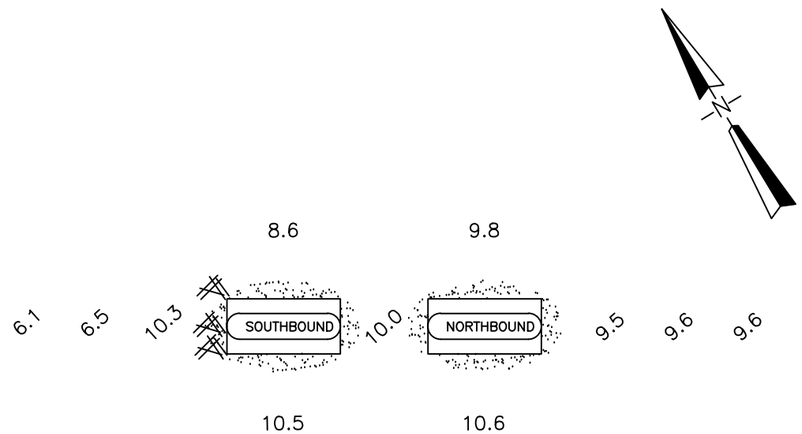


PIER 5
SOUTH ELEVATION
(LOOKING NORTH)



PIER 5
NORTH ELEVATION



PIER 5
PLAN

INSPECTION NOTES:

1. The channel bottom material consisted of sand, gravel and organics with approximately 1 ft probe rod penetration.
2. The submerged portions of the pier showed scale up to 1/4" deep extending from 1 ft below the waterline to the channel bottom.

LEGEND

———	2017 – Channel Bottom
	Timber Debris
———	Water Surface
+450	Elevation (ft)

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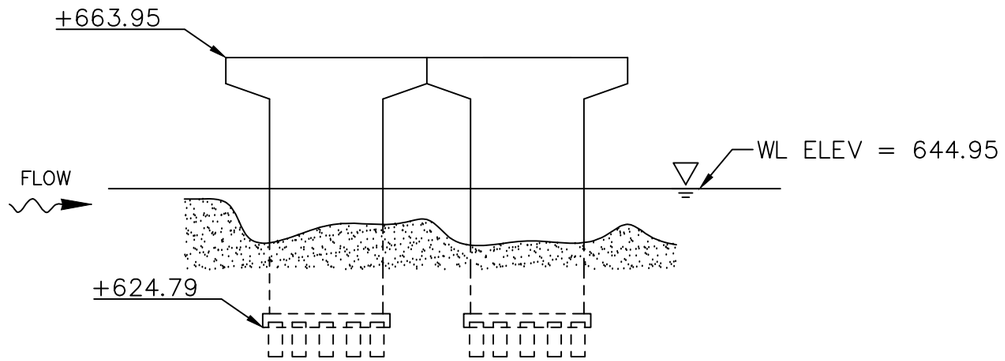
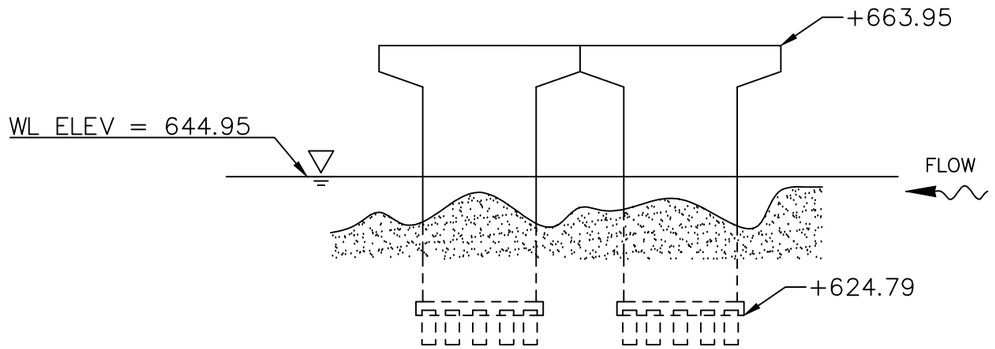
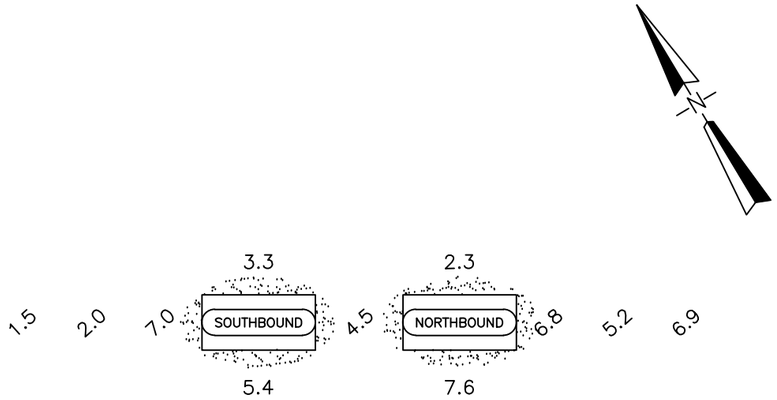


PIER 6
SOUTH ELEVATION
(LOOKING NORTH)



PIER 6
NORTH ELEVATION



PIER 6
PLAN

INSPECTION NOTES:

1. The channel bottom material consisted of sand, gravel and organics with approximately 2 ft probe rod penetration.
2. The submerged portions of the pier were sound and smooth with no defects observed.

LEGEND

———	2017 – Channel Bottom
	Timber Debris
	Water Surface
+450	Elevation (ft)

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JEFFERSON COUNTY, OHIO

CEI PROJECT 55–10356.00
INSPECTED BY: MOR
DRAWN BY: KMM
CHECKED BY: JMJ
DATE: AUG 2017
SHEET NO: 9

EXHIBIT 2 – INSPECTION PHOTOGRAPHS



Photograph No. 1: Overall View of Structure No. JEF-07-3380, Looking West.



Photograph No. 2: Overall View of Structure No. JEF-07-3380, Looking East.



Photograph No. 3: View of the North Embankment Upstream of the Structure, Looking Northwest.



Photograph No. 4: View of the North Embankment at the Structure and the south faces of Piers 7 and 8, Looking North.



Photograph No. 5: View of the North Embankment Downstream of the Structure, Looking North.



Photograph No. 6: View of the South Embankment Upstream of the Structure, Looking South.



Photograph No. 7: View of the South Embankment at the Structure and the north face of Pier 2, Looking South.



Photograph No. 8: View of the South Embankment Downstream of the Structure, Looking South.



Photograph No. 9: View of the North Face of Pier 3, Looking Southwest.



Photograph No. 10: View of the South Face of Pier 3, Looking North.



Photograph No. 11: View of the south Face of Pier 4, Looking North.



Photograph No. 12: View of the north Face of Pier 4, Looking Southwest.



Photograph No. 13: View of the South Face of Pier 5, Looking North.



Photograph No. 14: View of the North Face of Pier 5, Looking Southwest.



Photograph No. 15: View of the South Face of Pier 6, Looking North.



Photograph No. 16: View of the North Face of Pier 6, Looking South.



Photograph No. 17: View of the Typical Concrete Condition at the Waterline on the South Face of Pier 5, Looking North.



Photograph No. 18: View of spall and failed spall repair on the downstream nose of Pier 5, Looking West.