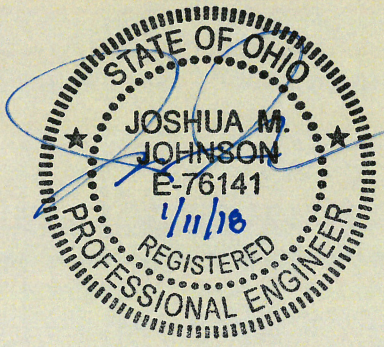




# UNDERWATER BRIDGE INSPECTION REPORT

**STRUCTURE NO. JEF-07-0245**
**SR 7 OVER SHORT CREEK**
**JEFFERSON COUNTY, OH**
**DISTRICT 11**

**August 2017**




*Prepared for:*

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

*Prepared by:*

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION ..... 1

1.1 Purpose and Scope ..... 1

1.2 General Description of the Structure ..... 1

1.3 Method of Investigation ..... 1

2.0 EXISTING CONDITIONS ..... 2

2.1 General Conditions ..... 2

2.2 Substructure Conditions ..... 3

2.2.1 Pier 1 ..... 3

2.2.2 Pier 2 ..... 3

3.0 EVALUATION AND RECOMMENDATIONS ..... 3

EXHIBIT 1 – FIGURES ..... 5

LOCATION MAP

SOUNDING PLAN

UPSTREAM CHANNEL CROSS SECTIONS

CENTERLINE CHANNEL CROSS SECTIONS

DOWNSTREAM CHANNEL CROSS SECTIONS

PIER 1

PIER 2

EXHIBIT 2 – INSPECTION PHOTOGRAPHS ..... 13

Photograph No. 1: Overall View of Structure No. JEF-07-0245, Looking West.

Photograph No. 2: Overall View of Structure No. JEF-07-0245, Looking East.

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

Photograph No. 4: View of the North Embankment at the Structure, Looking North.

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

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

Photograph No. 7: View of the South Embankment at the Structure, Looking South.

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

Photograph No. 9: View of the North Face of Pier 1, Looking Southwest.

Photograph No. 10: View of the South Face of Pier 1, Looking North.

Photograph No. 11: View of the North Face of Pier 2, Looking South.

Photograph No. 12: View of the South Face of Pier 2, Looking Northwest.

Photograph No. 13: View of the Typical Concrete Condition at the Waterline on the West Face of Pier 2, Looking East.

# 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 – John Strub, E.I.T. – Collins Engineers, Inc.
Team Member – Matthew Rogers, E.I.T. – Collins Engineers, Inc.

***Inspection Date(s):*** August 5, 2017

| | | | |
|---|---|---|---|
| ***Water Visibility:*** | <1 ft | ***Water Velocity:*** | <1 ft/s |
| ***Water Temperature:*** | 71 °F | ***Weather:*** | Cloudy – 80 °F |
| ***Waterline Elevation:*** | 644.95 ft | ***Type of Boat:*** | 23 ft Carolina Skiff |
| ***Coordinates:*** | 40.187275°N, 80.686543°W | | |
| ***Access Location:*** | Rayland Marina, 0.5 mi Northeast of JEF-07-0245 | | |
| ***Dive Mode:*** | Surface Supplied Air | | |
| ***Waterline Reference:*** | 24.3 ft below the bottom of cap at the downstream nose of Pier 2. | | |
| ***Maximum Depth at SSU:*** | 10.8 ft – Upstream Nose of Pier 3 | | |
| ***Shoreline Conditions:*** | The north and south shorelines consisted of large rock at a mild slope and mild vegetation with large trees. | | |

***Summary of Findings:***

- **Pier 1:**
  - No noteworthy deficiencies.
- **Pier 2:**
  - Heavy timber debris accumulation consisting of logs up to 2 ft diameter was observed at the upstream nose and along the north and south faces of the pier column.

***Summary of Recommendations:***

- Remove timber debris accumulation at Pier 2.

***Underwater Inspection Coding:***

**NBI Ratings:**

| Item | Description | Coding | Condition |
|---|---|---|---|
| 60 | Substructure | 7– Good Condition | No noteworthy deficiencies. |
| 61 | Channel | 6 – Satisfactory Condition | Timber Debris Accumulation |
| 62 | Culvert | N/A | |
| 92B | UW Insp. Frequency | 60 Months | |
| 93B | Insp. Date | 08/05/17 | |
| 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 | 60 | 60 | 0 | 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 Short Creek in Jefferson County, OH. Collins Engineers, Inc. (Collins) conducted the underwater investigation for the Ohio Department of Transportation (ODOT) on August 5, 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-07-0245 spans 212.5 ft, carrying SR 7 over Short Creek and is approximately 77.8 ft wide. The bridge superstructure is constructed of 10 steel girders. The roadway orientation of the longitudinal axis of the bridge is north to south. The substructure units are labeled as Piers 1 and 2. Existing design drawings were not available at the time of the inspection. 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 a 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 1 and 2 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 thru 7 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-07-0245 was located approximately 24.3 feet below the top of the deck at Pier 1, 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 large rock at a mild slope and mild vegetation with large trees. 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 1*

The channel bottom material around Pier 1 consisted of soft silt with approximately 24 in. probe rod penetration. Refer to Figure 4 in Exhibit 1 for detailed inspection notes of Pier 1. Refer to Photographs 9 through 11 in Exhibit 2 for views of Pier 1 and typical concrete condition at the waterline.

### *2.2.2 Pier 2*

The channel bottom material around Pier 2 consisted of soft silt with approximately 24 in. probe rod penetration. Heavy timber debris accumulation consisting of logs up to 2 ft diameter was observed at the upstream nose and along the north and south faces of the pier column. Refer to Figure 4 in Exhibit 1 for detailed inspection notes of Pier 2. Refer to Photographs 9 through 11 in Exhibit 2 for views of Pier 2 and typical concrete condition at the waterline.

## 3.0 EVALUATION AND RECOMMENDATIONS

Overall, the inspected substructure units of Structure No. JEF-07-0245 were in good condition. A comparison of the soundings recorded during the previous inspection on September 18, 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.

The timber debris accumulation at Pier 2 did not significantly affect the channel flow, and as a result, does not require removal at this time. If the debris accumulation increases in size or density, it may be necessary to remove the debris to reduce excessive lateral loads on the pier, limit further debris accumulation, and reduce the likelihood of channel bottom degradation resulting from obstructed flow.

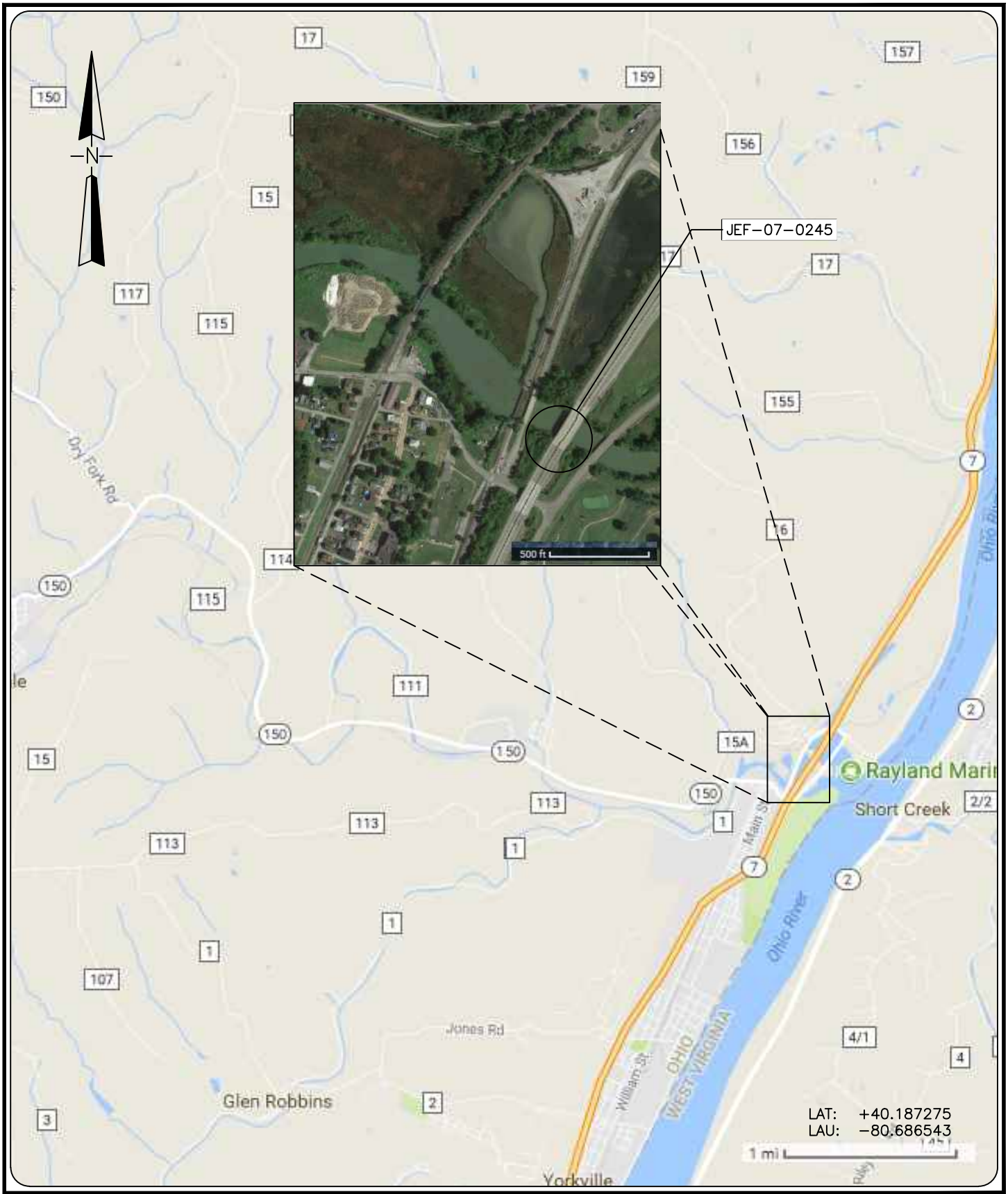
It is recommended that the submerged substructure units of Structure No. JEF-07-0245 be next inspected underwater at an interval not to exceed 60 months, no later than August 5, 2022.

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 SHORT CREEK
# BRIDGE NO. JEF-07-0245

## LOCATION MAP

JEFFERSON COUNTY, OHIO

| | |
|---|---|
| INSPECTED BY: JMJ | CEI PROJECT: 55−10356.00 |
| DRAWN BY: BBM | DATE: AUGUST 2017 |
| CHECKED BY: JMJ | SHEET NO: 1 |

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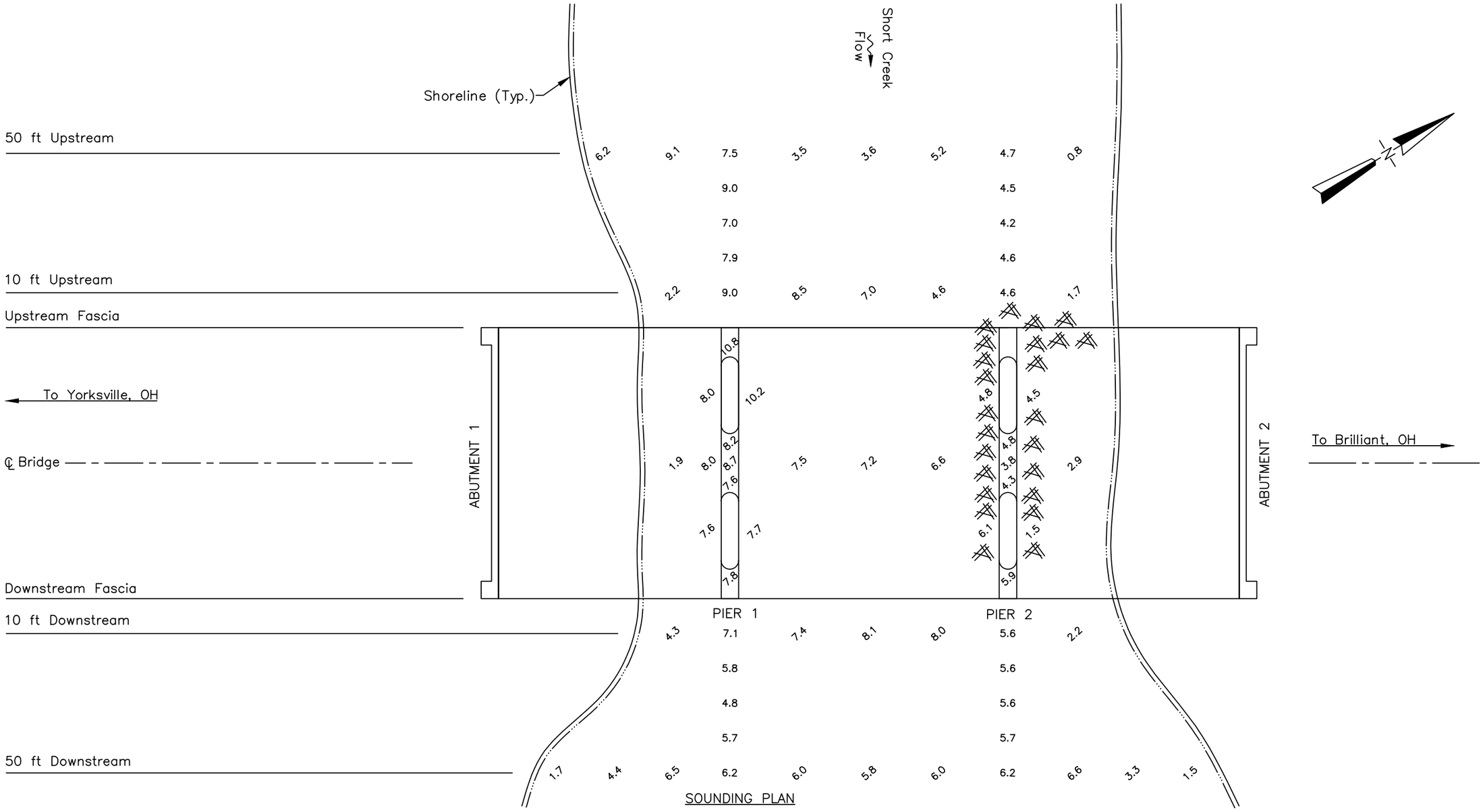


SOUNDING PLAN

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater. Substructure units are labeled according to available record drawings.
2. At the time of inspection on August 5, 2017, the waterline was located approximately 24.3 ft below the top of the deck at Pier 1, Downstream (East) Side. (Assumed EL. +100.0 ft). This corresponds with a waterline elevation of +644.95 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 10 ft intervals 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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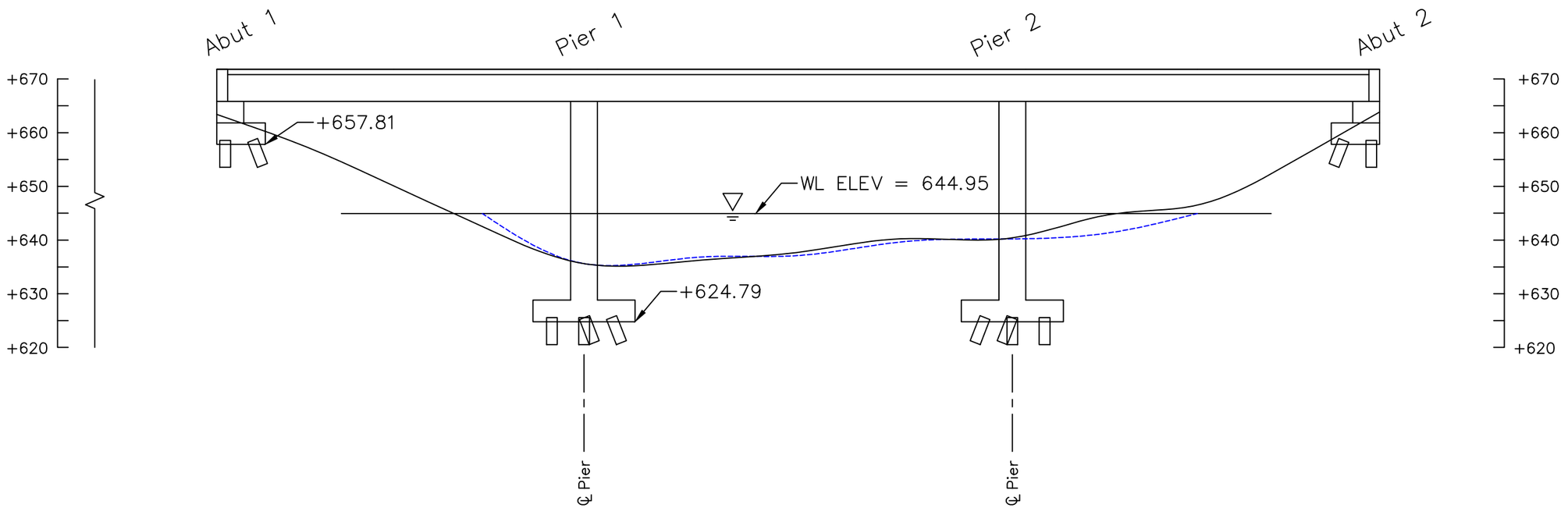
SR 7 OVER SHORT CREEK
BRIDGE NO. JEF-07-0245
SOUNDING PLAN
JEFFERSON COUNTY, OHIO

CEI PROJECT 55–10356.00
INSPECTED BY: JJS
DRAWN BY: BBM
CHECKED BY: JMJ
DATE: AUG 2017
SHEET NO: 2




STRUCTURE CENTERLINE
CHANNEL CROSS SECTION
(WEST ELEVATION)

LEGEND

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

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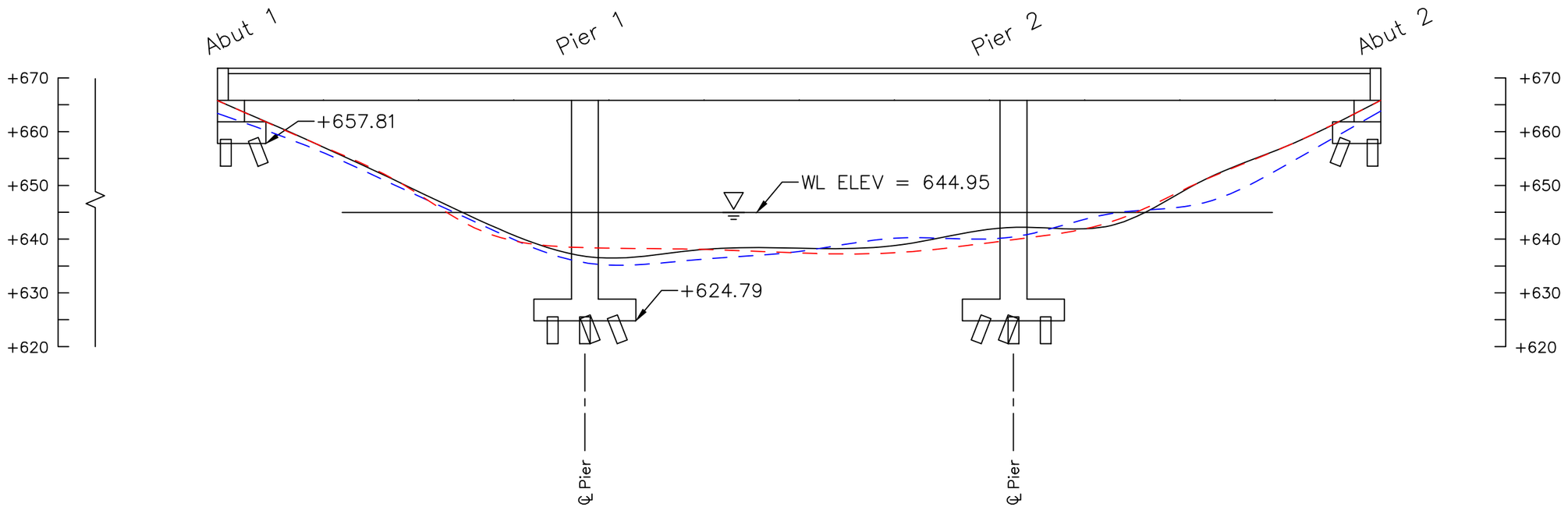
SR 7 OVER SHORT CREEK
BRIDGE NO. JEF-07-0245
CROSS SECTIONS
JEFFERSON COUNTY, OHIO

| | |
|---|---|
| CEI PROJECT | 55–10356.00 |
| INSPECTED BY: | JJS |
| DRAWN BY: | BBM |
| CHECKED BY: | JMJ |
| DATE: | AUG 2017 |
| SHEET NO: | 3 |




STRUCTURE CENTERLINE
CHANNEL CROSS SECTION
(CENTERLINE ELEVATION)

LEGEND

| | |
|---|---|
| ——— | Centerline – August 2017 |
| - - - - - | Upstream Fascia – August 2017 |
| – – – – – | Downstream Fascia – August 2017 |
| | Timber Debris |
| | Water Surface |
| +450 | Elevation (ft) |

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CROSS SECTIONS
JEFFERSON COUNTY, OHIO

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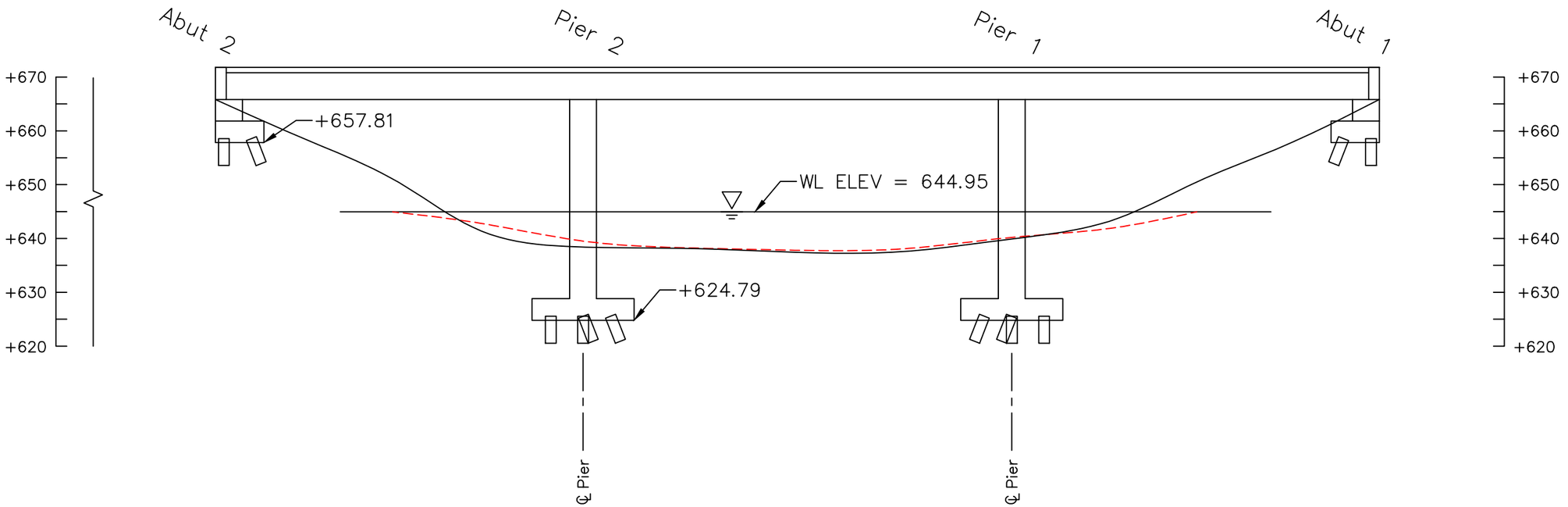
| INSPECTED BY: | JJS |
| DRAWN BY: | BBM |
| CHECKED BY: | JMJ |
| DATE: | AUG 2017 |
| SHEET NO: | 4 |




STRUCTURE CENTERLINE
CHANNEL CROSS SECTION
(EAST ELEVATION)

LEGEND

| | |
|---|---|
| ——— | Downstream Fascia – August 2017 |
| – – – – – | Downstream Fascia – September 2012 |
| | Timber Debris |
| | Water Surface |
| +450 | Elevation (ft) |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JEFFERSON COUNTY, OHIO

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|---|---|
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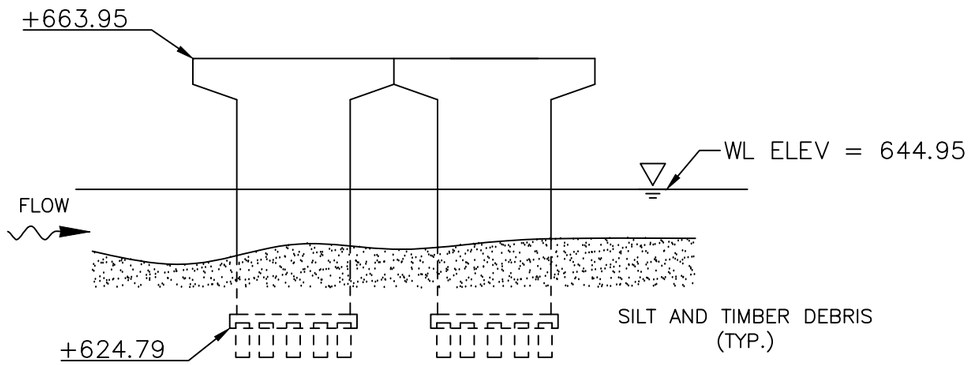
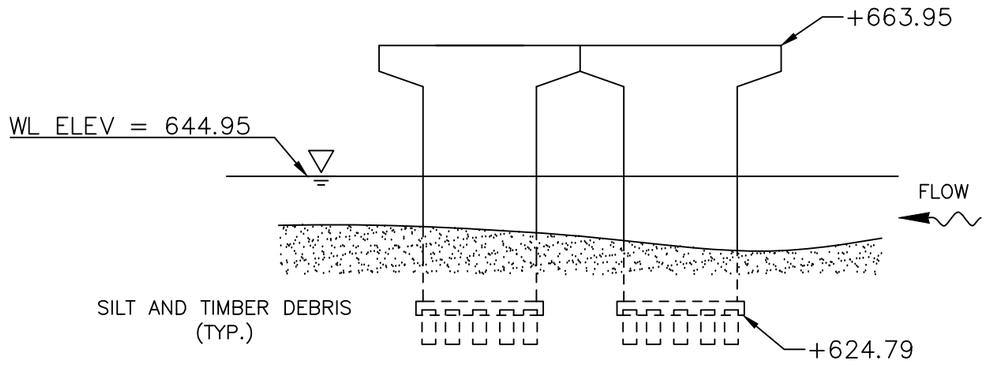
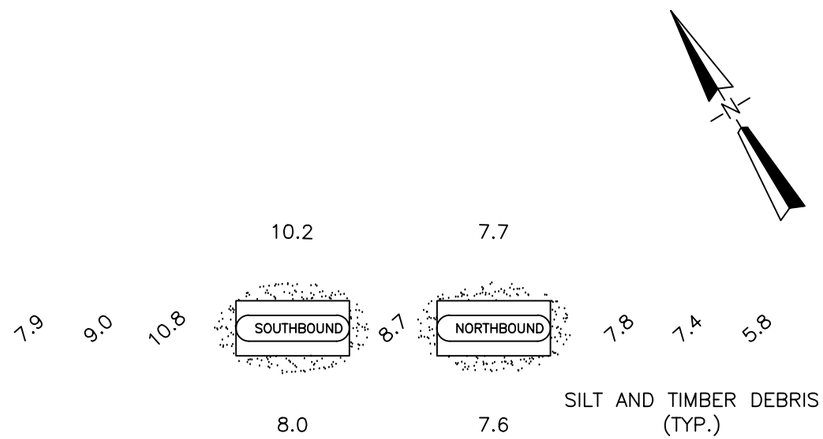
| INSPECTED BY: | JJS |
| DRAWN BY: | BBM |
| CHECKED BY: | JMJ |
| DATE: | AUG 2017 |
| SHEET NO: | 5 |




PIER 1
SOUTH ELEVATION
(LOOKING NORTH)




PIER 1
NORTH ELEVATION




PIER 1
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

| | |
|---|---|
| X.X | Sounding Depth from Waterline (ft) |
| ——— | Approximate Channel Bottom – July 2015 |
| | Timber Debris |
| | Water Surface |

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PIER 1
JEFFERSON COUNTY, OHIO

| | |
|---|---|
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| DRAWN BY: | BBM |
| CHECKED BY: | JMJ |
| DATE: | AUG 2017 |
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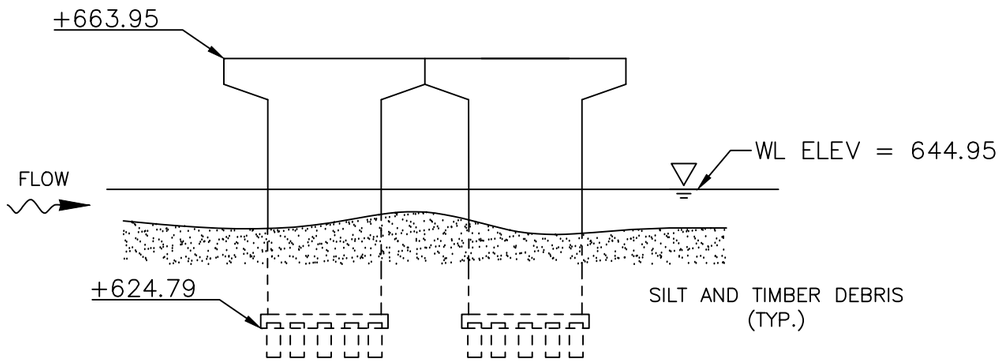
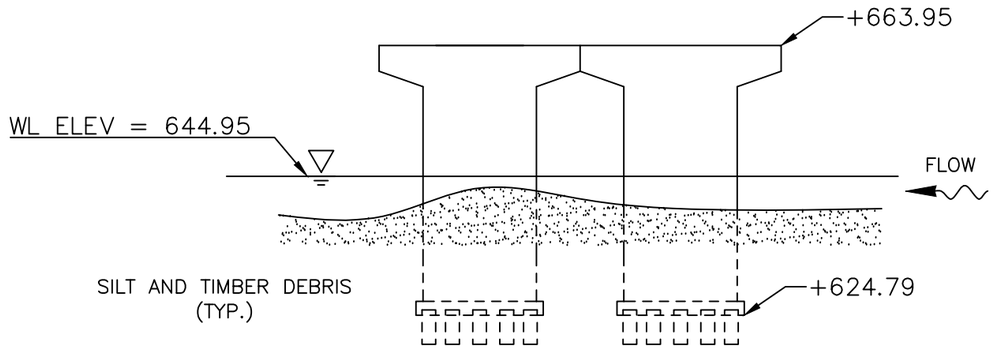
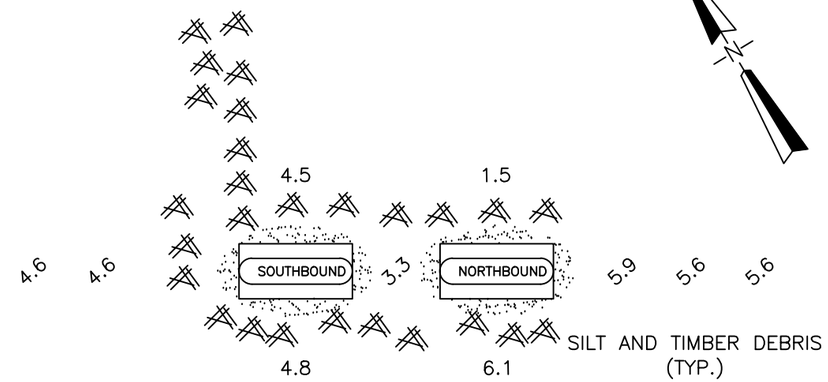



PIER 2
SOUTH ELEVATION
(LOOKING NORTH)




PIER 2
NORTH ELEVATION




PIER 2
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

| | |
|---|---|
| X.X | Sounding Depth from Waterline (ft) |
| ——— | Approximate Channel Bottom – July 2015 |
| | Timber Debris |
| | Water Surface |

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PIER 2
JEFFERSON COUNTY, OHIO

| | |
|---|---|
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| INSPECTED BY: | JJS |
| DRAWN BY: | BBM |
| CHECKED BY: | JMJ |
| DATE: | AUG 2017 |
| SHEET NO: | 7 |

# EXHIBIT 2 – INSPECTION PHOTOGRAPHS




Photograph No. 1: Overall View of Structure No. JEF-07-0245, Looking West.




Photograph No. 2: Overall View of Structure No. JEF-07-0245, Looking East.




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




Photograph No. 4: View of the North Embankment at the Structure, Looking North.




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




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




Photograph No. 7: View of the South Embankment at the Structure, Looking South.




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




Photograph No. 9: View of the North Face of Pier 1, Looking Southwest.




Photograph No. 10: View of the South Face of Pier 1, Looking North.




Photograph No. 11: View of the North Face of Pier 2, Looking South.




Photograph No. 12: View of the South Face of Pier 2, Looking Northwest.




Photograph No. 13: View of the Typical Concrete Condition at the Waterline on the West Face of Pier 2, Looking East.