



UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 6200044 (OTT-2-0016)
SR 2 OVER CRANE CREEK
OTTAWA COUNTY, OH
DISTRICT 2

April 2020

Prepared for:



10/9/2020

Prepared by:

COLLINS
ENGINEERS INC.

124 Venture Court, Suite 10

Lexington, Kentucky 40511

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EXECUTIVE SUMMARY

Project:	ODOT District 2 Underwater Bridge Inspections - 2020		
Purpose of Project:	To perform a detailed visual and tactile underwater investigation of scour critical bridges for District 2 of the Ohio Department of Transportation.		
Inspection Team:	Team Leader – Joshua Johnson, P.E. – Collins Engineers, Inc. Team Member – Matthew Rogers, E.I.T. – Collins Engineers, Inc. Team Member – Nicholas Lane – Collins Engineers, Inc.		
Inspection Date(s):	April 21, 2020		
Water Visibility:	0 ft	Water Velocity:	0 ft/s
Water Temperature:	48 °F	Weather:	Overcast – 45 °F
Waterline Elevation:	99.75 ft	Type of Boat:	N/A
Coordinates:	41.620498°N, -83.259874°W		
Access Location:	Gravel Drive on the Northeast Shore		
Dive Mode:	Surface Supplied Air		
Waterline Reference:	0.25 ft below the bottom of cap at the upstream nose of Pier 1.		
Maximum Depth at SSU:	6.6 ft – Downstream Nose of Pier 2		
Shoreline Conditions:	The north and south shorelines consisted of well-protected, well-vegetated, mild slopes with no signs of erosion.		

Summary of Findings:

- **Bent 1:**
 - The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration.
 - Typical steel H-piles were in good condition with no defects noted.
 - Hairline cracks were observed throughout the pier cap at full height.
 - A crack measuring ¼ in. was observed on the top of diaphragm.
- **Bent 2:**
 - The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration.
 - Typical steel H-piles were in good condition with no defects noted.
 - Hairline cracks were observed throughout the pier cap at full height.
 - A hairline crack was observed measuring 2 in. long on the north pier cap between H-Piles A and B.
 - Light timber debris consisting of branches measuring up to 3 in. diameter was observed on the upstream nose extending up to 5 ft from both faces from the channel bottom to the waterline.

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Summary of Recommendations:

- Monitor cracking on the diaphragm for further propagation.
- Monitor typical hairline cracking throughout the pier caps for further propagation.

Underwater Inspection Coding:

NBI Ratings:

Item	Description	Coding	Condition
60	Substructure	7 – Good Condition	Concrete Cracking
61	Channel	8 – Very Good Condition	No Defects Observed
62	Culvert	N/A	
92B	UW Insp. Frequency	60 Months	
93B	Insp. Date	04 21 20	
113	Scour Critical Bridges	5 – Above Foundation Limits	Stable (Inspector Recommended)

AASHTO National Bridge Element (NBE) Ratings:

Element #	Description	Units	Total	Condition State			
				1	2	3	4
225	Steel Pile	EA	14	14	0	0	0
234	Pier Cap, Reinforced Concrete	LF	80	62	12	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.

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1.0 INTRODUCTION

1.1 Purpose and Scope

This report consists of the results of a detailed underwater investigation performed at the SR 2 Bridge over Crane Creek in Ottawa County, OH. Collins Engineers, Inc. (Collins) conducted the underwater investigation for District 2 of the Ohio Department of Transportation (ODOT) on April 21, 2020. 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.
- Obtain channel profile cross sections at the upstream and downstream fascias.
- 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. 6200044 (OTT-2-0016) spans 90 ft, carrying SR 2 over Crane Creek and is approximately 40 ft wide. The bridge superstructure is constructed of three prestressed concrete composite box beam spans. The roadway orientation of the longitudinal axis of the bridge is south to north. The substructure units are labeled as Abutments 1 and 2 and 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.

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A three-person team consisting of a professional engineer-diver and team leader (Joshua Johnson, P.E.) an engineer-divers (Matthew Rogers, E.I.T.) and an engineer-technician (Nicholas Lane) 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, a digital fathometer, and a pneumofathometer. Soundings were collected at quarter points along the bridge centerline as well as at quarter points along the upstream and downstream fascias and 50 ft fascias. Additional soundings were collected adjacent to Piers 1 and 2 and at 10 foot 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 through 5 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 6200044 (OTT-2-0016) was located approximately 0.25 ft below the bottom of cap at the upstream nose of Pier 1, which corresponds to an assumed waterline elevation of 99.75 ft. During the inspection, the waterway was flowing at approximately 0 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 well-protected, well-vegetated, mild slopes with no erosion. Refer to Photographs 3 through 8 in Exhibit 2 for views of the shorelines near the structure.

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



2.2 Substructure Conditions

2.2.1 *Bent 1*

The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration. Typical steel H-piles were in good condition with no defects noted. Hairline cracks were observed throughout the bent cap at full height. A crack measuring 1/4 in. was observed on the top of diaphragm. Refer to Figure 6 in Exhibit 1 for detailed inspection notes of Bent 1. Refer to Photographs 9 and 10 in Exhibit 2 for views of Bent 1.

2.2.2 *Bent 2*

The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration. Typical steel H-piles were in good condition with no defects noted. Hairline cracks were observed throughout the pier cap at full height. A hairline crack was observed measuring 2 in. long on the north bent cap between H-Piles A and B. Refer to Figure 7 in Exhibit 1 for detailed inspection notes of Bent 2. Refer to Photographs 11 through 13 in Exhibit 2 for views of Bent 2 and typical concrete condition at the waterline.

3.0 EVALUATION AND RECOMMENDATIONS

Overall, the inspected substructure units of Structure No. 6200044 (OTT-2-0016) were in good condition. A comparison of the soundings recorded during the previous inspection on June 23, 2015 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 bent footings remain adequately embedded in the channel bottom.

The cracking observed on Bents 1 and 2 are not a structural concern at this time given its size compared to the overall pier size, and as a result, no repairs are recommended. This area should be monitored during future inspections for increasing extent or severity of the cracking and exposure of reinforcing steel. If the extent or severity of the cracking is observed to be increasing or reinforcing steel becomes exposed, it may be necessary to repair the area at that time.

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Ottawa County, OH • April 2020



It is recommended that the submerged substructure units of Structure No. 6200044 (OTT-2-0016) be next inspected underwater at an interval not to exceed 60 months, no later than April 21, 2025.

Respectfully Submitted,
COLLINS ENGINEERS, INC.

A handwritten signature in black ink, appearing to read "J. Johnson", is placed over a light gray rectangular background.

Joshua Johnson, P.E.
Project Manager

Originated by:
Kevin Mitchell, E.I.T.



EXHIBIT 1 – FIGURES



COLLINS ENGINEERS

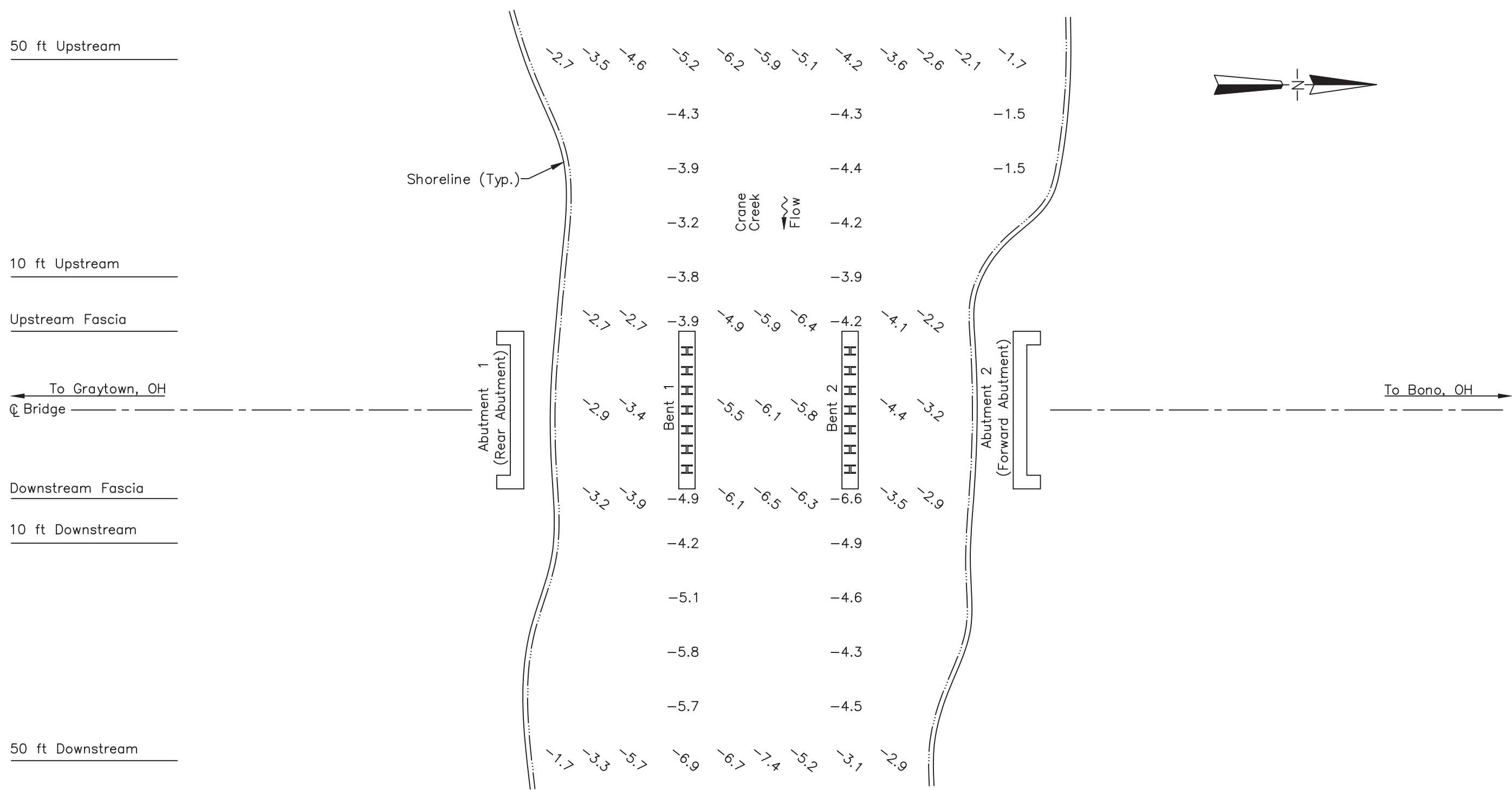
124 Venture Court, Ste 10
Lexington, KY 40511
Phone: 859-367-0097
Fax: 859-367-0140



Ohio Department of
Transportation, District 2
317 East Poe Rd.
Bowling Green, OH 45601
Phone: 419-353-8131

SR-2 OVER CRANE CREEK
STRUCTURE NO. 6200044
(OTT-2-0016)
LOCATION MAP
OTTAWA COUNTY, OHIO

INSPECTED BY: MOR	CEI PROJECT: 55-12239.00
DRAWN BY: BLV	DATE: 21 APR 2020
CHECKED BY: JMJ	SHEET NO: 1



SOUNDING PLAN

GENERAL NOTES:

1. Bents 1 and 2 were inspected underwater. Substructure units are labeled according to available record drawings.
2. At the time of inspection on April 21, 2020, the waterline was located approximately 0.25 ft below Bottom of Cap at upstream nose of Bent 1 (Assumed EL. +100.0 ft). This corresponds with a waterline elevation of +99.75 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 bents upstream and downstream up to 50 ft.

LEGEND

- 2.7 Sounding Depth from Waterline (ft)
- Timber Debris

COLLINS ENGINEERS
 124 Venture Court, Ste 10
 Lexington, KY 40511
 Phone: 859-367-0097
 Fax: 859-367-0140

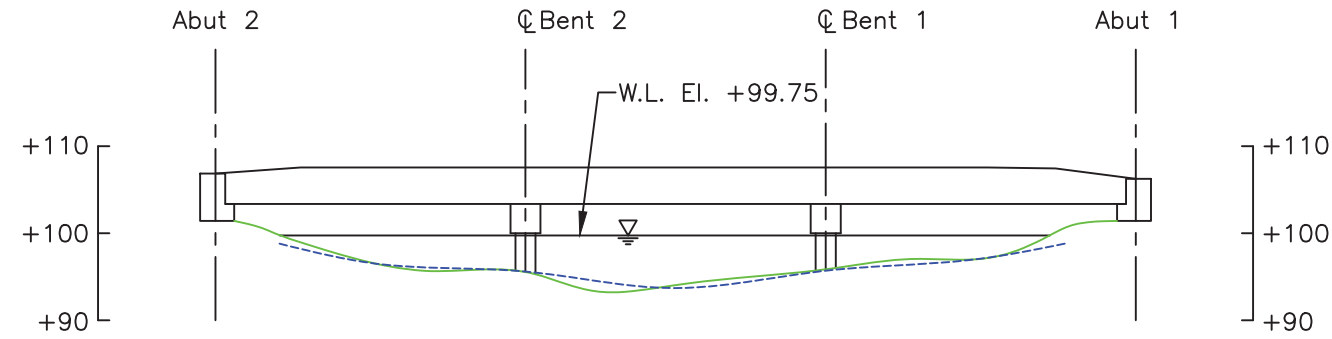
Ohio Department of Transportation, District 2
 317 East Poe Rd.
 Bowling Green, OH 45601
 Phone: 419-353-8131

SR-2 OVER CRANE CREEK
 STRUCTURE NO. 6200044 (OTT-2-0016)
 SOUNDING PLAN
 OTTAWA COUNTY, OHIO

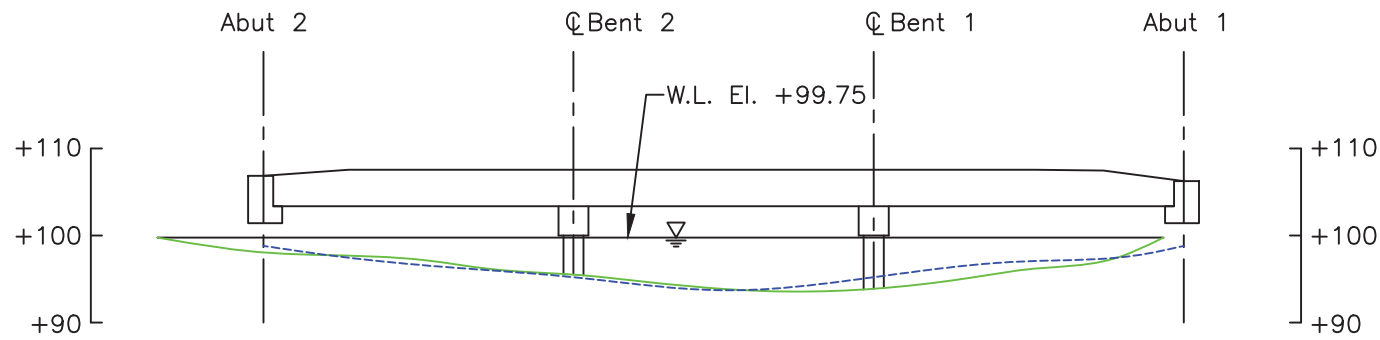
CEI PROJECT
 55-12239.00
 INSPECTED BY:
 MOR
 DRAWN BY:
 BLV
 CHECKED BY:
 JMJ
 DATE:
 APR 2020
 SHEET NO:
 2

UPSTREAM FASCIA LOOKING DOWNSTREAM	
Location	Y(ft)*
A2	7.1
1/4	7.8
1/2	10.0
3/4	11.9
B2	12.0
1/4	14.2
1/2	13.7
3/4	12.7
B1	11.7
1/4	10.5
1/2	10.5
3/4	7.7
A1	6.5

*Profile taken from top of rail to channel bottom



CHANNEL CROSS SECTION
UPSTREAM FASCIA
(LOOKING DOWNSTREAM)



CHANNEL CROSS SECTION
50 FT UPSTREAM
(LOOKING DOWNSTREAM)

LEGEND

- Approximate Channel Bottom – April 2020
- - - Approximate Channel Bottom – June 2015
- - - Approximate Channel Bottom – June 2010 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

Note:

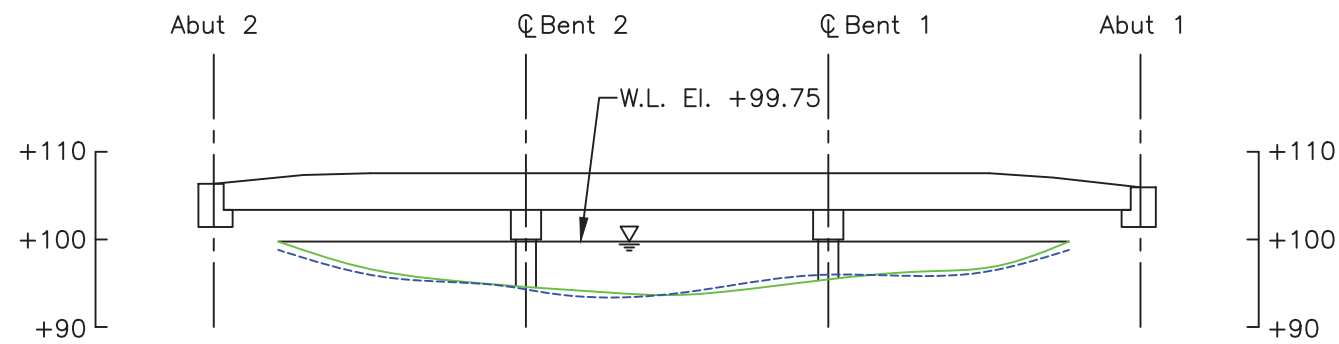
Footing elevations unknown due to unavailable record drawings.

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Phone: 419-353-8131

SR-2 OVER CRANE CREEK
STRUCTURE NO. 6200044 (OTT-2-0016)
CROSS SECTIONS - UPSTREAM
OTTAWA COUNTY, OHIO

CEI PROJECT
55-12239.00
INSPECTED BY:
MOR
DRAWN BY:
BLV
CHECKED BY:
JMJ
DATE:
APR 2020
SHEET NO:
3



CHANNEL CROSS SECTION
 STRUCTURE CENTERLINE
 (LOOKING DOWNSTREAM)

LEGEND

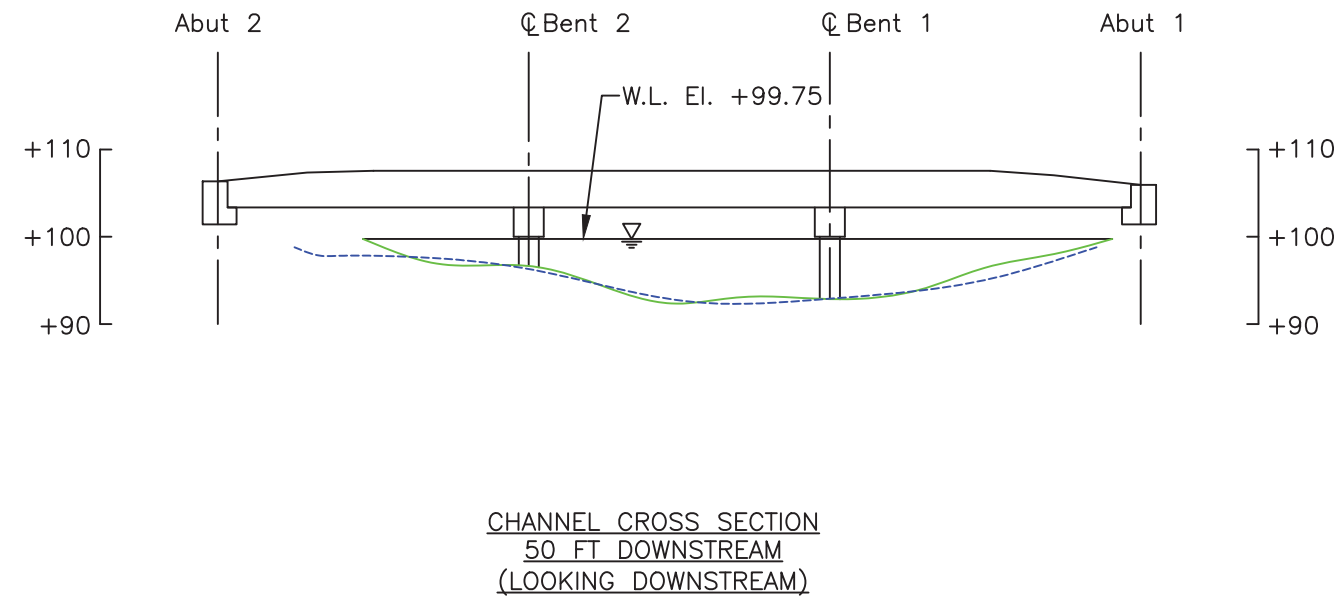
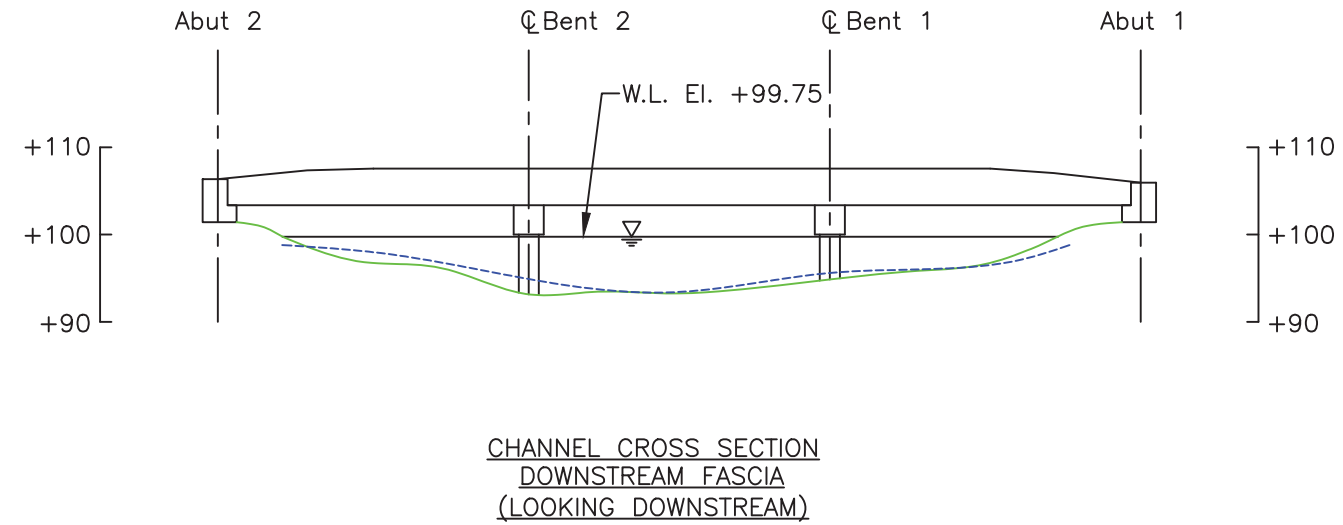
- Approximate Channel Bottom - April 2020
- - - Approximate Channel Bottom - June 2015
- - - Approximate Channel Bottom - June 2010 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

Note:

Footing elevations unknown due to unavailable record drawings.

DOWNSTREAM FASCIA LOOKING DOWNSTREAM	
Location	Y(ft)*
A2	6.6
1/4	7.6
1/2	10.7
3/4	11.3
B2	14.4
1/4	14.1
1/2	14.3
3/4	13.9
B1	12.7
1/4	11.7
1/2	11.0
3/4	7.3
A1	6.2

*Profile taken from top of rail to channel bottom



LEGEND

- Approximate Channel Bottom – April 2020
- - - Approximate Channel Bottom – June 2015
- - - Approximate Channel Bottom – June 2010 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

Note:

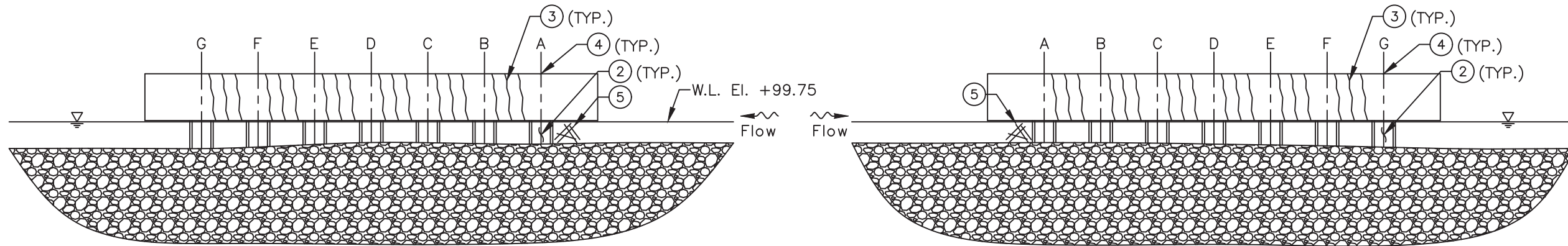
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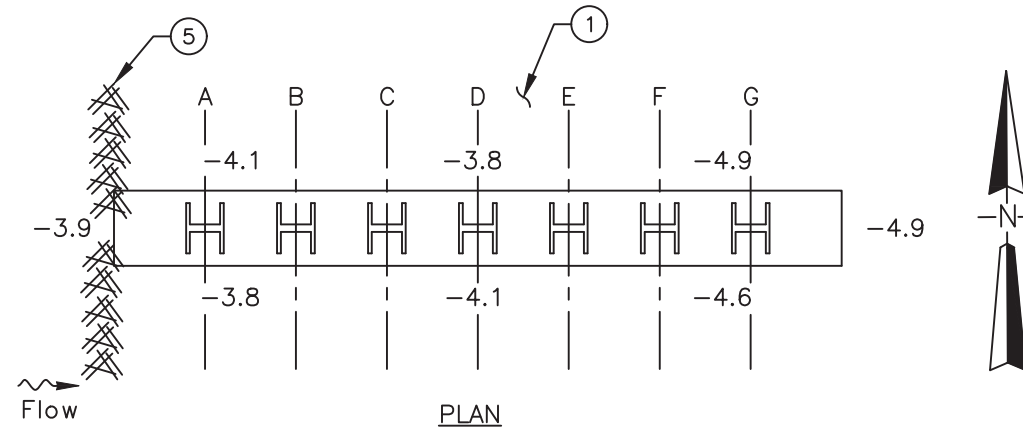
SR-2 OVER CRANE CREEK
 STRUCTURE NO. 6200044 (OTT-2-0016)
 CROSS SECTIONS - DOWNSTREAM
 OTTAWA COUNTY, OHIO

CEI PROJECT
 55-12239.00
 INSPECTED BY:
 MOR
 DRAWN BY:
 BLV
 CHECKED BY:
 JMJ
 DATE:
 APR 2020
 SHEET NO:
5



NORTH ELEVATION
 (LOOKING SOUTH)
 (REAR)

SOUTH ELEVATION
 (LOOKING NORTH)
 (FORWARD)



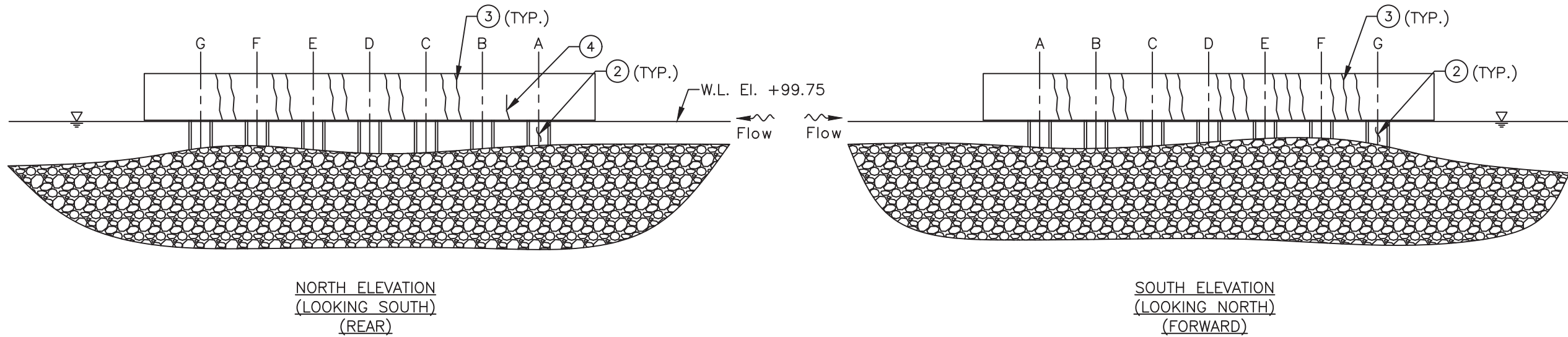
PLAN

INSPECTION NOTES:

- ① The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration.
- ② Typical steel H-piles were in good condition with no defects noted.
- ③ Hairline cracks were observed throughout the bent cap at full height.
- ④ A crack measuring 1/4 in. was observed on the top of diaphragm.
- ⑤ Light timber debris consisting of branches up to 3 in. diameter was observed on the upstream nose extending up to 5 ft from both faces from the channel bottom to the waterline.

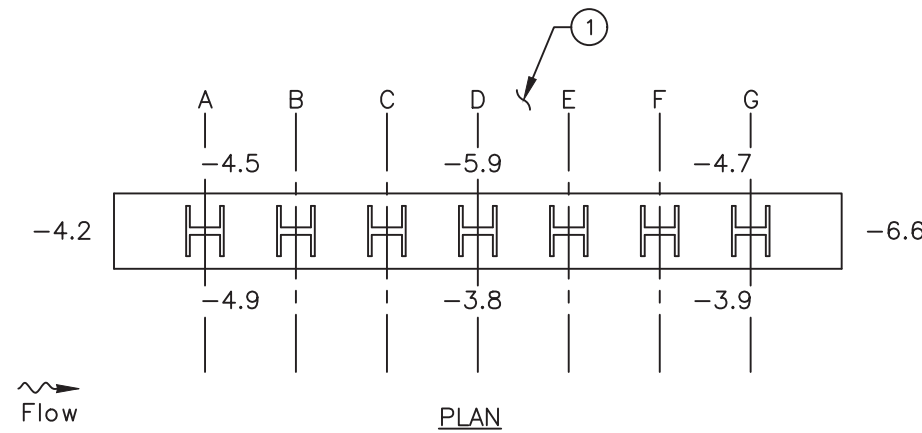
LEGEND

- 2.7 Sounding Depth from Waterline (ft)
- Approximate Channel Bottom - April 2020
- ⊗ Timber Debris
- ∇ Water Surface



NORTH ELEVATION
 (LOOKING SOUTH)
 (REAR)

SOUTH ELEVATION
 (LOOKING NORTH)
 (FORWARD)



PLAN

INSPECTION NOTES:

- ① The channel bottom material consisted of very light marine growth, rocks, and clay with approximately 2 in. probe rod penetration.
- ② Typical steel H-piles were in good condition with no defects noted.
- ③ Hairline cracks were observed throughout the bent cap at full height.
- ④ A hairline crack was observed measuring 2 in. long on the north bent cap between H-Piles A and B.

LEGEND

- 2.7 Sounding Depth from Waterline (ft)
- Approximate Channel Bottom - April 2020
- ⊘ Timber Debris
- ▽ Water Surface



EXHIBIT 2 – INSPECTION PHOTOGRAPHS

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



Photograph No. 1: Overall View of Structure No. 6200044 (OTT-2-0016), Looking Southwest.



Photograph No. 2: Overall View of Structure No. 6200044 (OTT-2-0016), Looking Southeast.

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



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, Looking North.

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



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



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

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



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 Southeast.

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



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



Photograph No. 10: View of the South Face of Bent 1, Looking Northeast.

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



Photograph No. 11: View of the North Face of Bent 2, Looking Southeast.



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

UNDERWATER INSPECTION

SR 2 over Crane Creek • Structure No. 6200044 (OTT-2-0016)

Ottawa County, OH • April 2020



Photograph No. 13: View of the Typical Concrete Condition at the Waterline, Looking South.



EXHIBIT 3 – UNDERWATER DIVE INSPECTION PROCEDURE CHECKLIST

Underwater Dive Inspection Procedure Checklist

Acceptable written procedures communicate to the next dive team what is necessary to ensure a safe and successful inspection. Each bridge requiring underwater dive techniques must have a unique written inspection procedure. The prior inspection report does not suffice for the required procedures. It is valuable to review the last inspection notes, but they do not serve the same purpose as a stand-alone inspection procedure.

This document shall be completed for all underwater dive inspections. This document shall be reviewed prior to performing the field work and it shall be updated when necessary.

I. Bridge Identification

a. Agency with Inspection Responsibility: ODOT DISTRICT 2

Dive Frequency: 60 months

SFN: 6200044 Bridge Number (County-Route-SLM-SD): OTT-2-0016

Superstructure Type Main Span Type: PRESTRESSED CONCRETE COMPOSITE BOX BEAMS

Approach Span: REINFORCED CONCRETE

Substructure Type Abutment Type: REINFORCED CONCRETE

Pier Type: REINFORCED CONCRETE

Total Pier Count: 2

Total Pier Count in water: 2

Foundations: UNKNOWN

Feature Intersected CRANE CREEK

b. Photographs

Endview



Elevation



Underside

II. Office and Field Assessment

Prior to the inspection, obtain and review copies of the previous underwater inspection reports, routine inspection reports, scour and hydraulic information, and design plans in preparation of the inspection.

Divers should pay particular attention given to any observed areas of deterioration, the channel conditions and factors that may accelerate material deterioration. Changes shall be noted in the inspection procedure. Site conditions should be reviewed prior to diving.

a. Channel Conditions

- Waterway features
- Rapid stream flows,
- Significant debris accumulation
- Constricted waterway openings
- Soft or unstable streambeds
- Meandering channels
- Other which may promote scour and undermining of substructure elements
- Navigable Waterway
- Flow Controls

b. Anticipated Water conditions which may affect the inspection

- Cold Water (Apprx. Temp___)
- Black water
- Rapid stream flows
- Near military facility
- Tribal fishing
- Water quality
- History of Log jams

c. Identify factors that may accelerate the deterioration of the bridge elements:

- Highly corrosive water
- Unprotected steel members
- Other

Risk Factor Narrative:

III. **Contacts Prior to Work**

District 2 Bridge Engineer: David Geckle, P.E.

Email: david.geckle@dot.ohio.gov – Phone: 419-373-4377

Point of contact for immediate action such as closing the bridge due to findings

Contact Bridge Owner 14 (number) days before the proposed underwater inspection.

Special contracting and scheduling procedures prior to inspection, include recommended lead time

Entity	Contact Name and Title	Contact Phone	Lead Time
Coast Guard			
Property Owner			
Access Equipment			
Lake or River draw-down			
Canal dry time			
Tree removal			
Other:			
Other:			

IV. **Dive Team Shall Include the Following:**

Dive Team Narrative:

The dive team consisted of one Team Leader (NBIS, P.E., ADCI) and two Team Members (NBIS, UW, ADCI).

Example: The Bridge shall be investigated using a three-member dive team: one supervisor to monitor rack box and take notes, one diver, and one tender/standby diver. There shall be one NBIS Team Leader onsite at all times.

V. **Site Information**

Navigable waterway:	Y / <u>N</u>	Anticipated current	<u>0</u> ft
If Yes, waterway river point	_____	Scour Critical (item 113):	<u>5</u>
Anticipated water visibility depth	<u>0</u> ft	POA in place:	Y/ <u>N</u>
Anticipated Dive depth	<u>6.6</u> ft	Scour Monitoring devices present:	Y/ <u>N</u>

Verify the Scope of Services when work is contracted for the procedure for underwater elements that are not in water during an inspection.

Site Information Narrative:

The underwater inspection consists of a visual and tactile examination of the accessible surfaces of the substructure items in water. Additional items should reference the scope of services in the contract.

For reference the following items are in water:

Item	Number of Units	Level of Inspection (1, 2 or 3) with Commentary
Piers and Number of Columns	2	100% LEVEL I 10% LEVEL II
Abutment	N/A	
Culvert	N/A	
Scour Countermeasures	N/A	
Fenders or Dolphins	N/A	

Photographs should be taken, if water clarity permits, for typical conditions, conditions that have changed since last inspection and significant or noteworthy deficiencies. 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 shall be quantified. Include depth, length, height and location of deficiencies.

VI. Equipment and Field Logistics

a. The inspection should be conducted

using:

Chest waders

Hip waders

Diving equipment

SCUBA (Note that ADCI Consensus Standards require communication systems be employed for both SCUBA and Surface-Supplied (whether air or mixed-gas) dive modes)

SCUBA with communication

Surface Supplied with

communication

b. The channel bottom should be sounded

utilizing

Digital fathometer

Telescoping survey rod

acoustic imaging

c. During the inspection, the divers should

work from

Shore

Boat

Either

The note taker should work alongside the dive team.

d. Access to the waterway should be obtained from the shore (north bank, southwest quadrant, driveway 30 yards north etc.)

GRAVEL DRIVE ON THE NORTHEAST SHORE

e. The maximum depth of the channel is typically measured _____ feet from

50FT. DOWNSTREAM FASCIA BETWEEN PIERS 1 AND 2

Reference Datum: .25FT. BELOW THE BOTTOM OF CAP AT THE UPSTREAM NOSE OF PIER 1.

Soundings should be dictated by the scope of work. When not detailed in the scope they should be repeated from the previous soundings. If neither exist then they need to be taken in a grid pattern between substructure units 100' upstream and 100' downstream.

VII. Inspection Procedure History

Created: COLLINS ENGINEERS Date: 09/25/2020

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

VIII. Other Narrative Not Included In Previous Sections