UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 6201628 (OTT-163-2511)
SR 163 OVER PORTAGE RIVER
OTTAWA COUNTY, OH
DISTRICT 2

May 2020

10/9/2020

Prepared for:

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Prepared by:

COLLINS ENGINEERS INC.

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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): May 11, 2020

Water Visibility:	1 ft	***Water Velocity:***	>1 ft/s
Water Temperature:	50 °F	***Weather:***	Overcast – 45 °F
Waterline Elevation:	576.0 ft	***Type of Boat:***	23 ft Carolina Skiff
Coordinates:	41.515258°N, -82.943047°W		
Access Location:	Portage River Wildlife Access		
Dive Mode:	Surface Supplied Air		

Waterline Reference: 5.2 ft below the top of cap at the midpoint on Abutment 2.

Maximum Depth at SSU: 23.0 ft – Southwest corner of Pier 2

Shoreline Conditions: The north and south embankments consisted of well protected moderately sloped shoreline with multiple docks in the vicinity and no signs of erosion.

Summary of Findings:

- **Abutment 1:**
  - The channel bottom material consisted of riprap up to 12 in. diameter with sand in-fill and no probe rod penetration.
  - The submerged portions of the pier exhibited light scaling up to 1/8 in deep from the channel bottom to -0.5 ft below the waterline.
- **Pier 1:**
  - The channel bottom material consisted of sand, gravel, and cobbles with approximately 2 in. probe rod penetration.
  - A spall was observed on the southwest corner of the pier measuring approximately 3 ft vertical by 1 ft horizontal by 8 in. deep with no exposed steel reinforcement at 5 ft below the waterline.
  - An area of poor concrete consolidation was observed along the midpoint of the east face approximately 2 ft horizontal by 1.5 in. deep with 6 vertical steel reinforcement exposed exhibiting light surface corrosion at 10 ft below the waterline.
- **Pier 2:**
  - The channel bottom material consisted of sand, gravel, and cobbles with approximately 2 in. probe rod penetration.
  - A spall was found -4 ft below the waterline on the north face of the pier, 6 ft diameter by 4 in. deep, with soft concrete and no observed rebar.

- Spalls were observed on all corners of the pier typically 12 in. diameter by 2 in. deep with no exposed bar within 2 ft of the waterline.
- An area of poor concrete consolidation was observed along the midpoint of the west face approximately 2 ft horizontal by 1.5 in. deep with 6 vertical steel reinforcement exposed exhibiting light surface corrosion at 10 ft below the waterline.

- **Abutment 2:**
  - The channel bottom material consisted of sand and silt with up to 2 in. probe rod penetration.
  - A band of heavy scaling and poor concrete consolidation was observed along the face measuring up to 1 ft vertical by 3 in. deep with no observed steel reinforcement at 3 ft below the waterline.
  - A spall was observed on the southwest corner measuring approximately 1 ft diameter by 6 in. deep with no exposed steel reinforcement at 5 ft below the waterline.

Summary of Recommendations:

- Monitor light scaling on Abutment 1.
- Monitor area of poor concrete consolidation and spall on Piers 2.
- Repair spalls.

Underwater Inspection Coding:

NBI Ratings:

Item	Description	Coding	Condition
60	Substructure	6 – Satisfactory Condition	Spall, Poor Concrete Consolidation, Light Concrete Scaling
61	Channel	7 – Good Condition	Minor Erosion
62	Culvert	N/A	
92B	UW Insp. Frequency	60 Months	
93B	Previous Insp. Date	05 11 20	
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	216	210	0	6	0
215	Reinforced Concrete Abutment	LF	108	56	56	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 163 Bridge over Portage River in Ottawa County, OH. Collins Engineers, Inc. (Collins) conducted the underwater investigation for District 2 of the Ohio Department of Transportation (ODOT) on May 11, 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. 6201628 (OTT-163-2511) spans 443 ft, carrying OH-163 over Portage River and is approximately 54 ft wide. The bridge superstructure is constructed of nine steel girder 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 record 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 a professional engineer-diver and team leader (Joshua Johnson, P.E.) an engineer-diver (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 and 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 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 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 6201628 (OTT-163-2511) was located approximately 5.2 ft below the top of cap at the midpoint on Abutment 2, which corresponds to a waterline elevation of 576.0 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 embankments consisted of well protected moderately sloped shoreline with multiple docks in the vicinity and no signs of erosion. The south shoreline consisted of mild vegetation and neighboring houses. Refer to Photographs 3 through 8 in Exhibit 2 for views of the shorelines near the structure.

2.2 Substructure Conditions

2.2.1 Abutment 1

The channel bottom material around Abutment 1 consisted of riprap up to 12 in. diameter with sand in-fill and no probe rod penetration. The submerged portions of the pier exhibited light scaling up to 1/8 in deep from the channel bottom to -0.5 ft below the waterline. Refer to Figure 6 in Exhibit 1 for detailed inspection notes of Abutment 1. Refer to Photograph 4 in Exhibit 2 for views of Abutment 1.

2.2.2 Pier 1

The channel bottom material around Pier 1 consisted of sand, gravel and cobbles with approximately 2 in. probe rod penetration. A spall was observed on the southwest corner of the pier measuring approximately 3 ft vertical by 1 ft horizontal by 8 in. deep with no exposed steel reinforcement at 5 ft below the waterline. An area of poor concrete consolidation was observed along the midpoint of the east face approximately 2 ft horizontal by 1.5 in. deep with 6 vertical steel reinforcement exposed exhibiting light surface corrosion at 10 ft below the waterline. Refer to Figure 7 in Exhibit 1 for detailed inspection notes of Pier 1. Refer to Photographs 9 and 10 in Exhibit 2 for views of Pier 1.

2.2.3 Pier 2

The channel bottom material around Pier 2 consisted of sand, gravel and cobbles with approximately 2 in. probe rod penetration. A spall was found -4 ft below the waterline on the north face of the pier, 6 ft diameter by 4 in. deep, with soft concrete and no observed rebar. Refer to Figure 8 in Exhibit 1 for detailed inspection notes of Pier 2. Spalls were observed on all corners of the pier typically 12 in. diameter by 2 in. deep with no exposed bar within 2 ft of the waterline. An area of poor concrete consolidation was observed along the midpoint of the west face approximately 2 ft horizontal by 1.5 in. deep with 6 vertical steel reinforcement exposed exhibiting light surface corrosion at 10 ft below the waterline. Refer to Photographs 11 through 13 in Exhibit 2 for views of Pier 2 and typical concrete condition at the waterline.

2.2.4 Abutment 2

The channel bottom material consisted of sand and silt with up to 2 in. probe rod penetration. A band of heavy scaling and poor concrete consolidation was observed along the face measuring up to 1 ft vertical by 3 in. deep with no observed steel reinforcement at 3 ft below the waterline. A spall was observed on the southwest corner measuring approximately 1 ft diameter by 6 in. deep with no exposed steel reinforcement at

5 ft below the waterline. Refer to Figure 9 in Exhibit 1 for detailed inspection notes of Abutment 2. Refer to Photograph 7 in Exhibit 2 for views of Abutment 2.

3.0 EVALUATION AND RECOMMENDATIONS

Overall, the inspected substructure structures of Structure No. 6201628 (OTT-163-2511) were in satisfactory condition. A comparison of the soundings recorded during the previous inspection on November 18, 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 pier footings remain adequately embedded in the channel bottom.

The scaling observed on Abutment 1 is 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 scaling and exposure of reinforcing steel. If the extent or severity of the scaling is observed to be increasing or reinforcing steel becomes exposed, it may be necessary to repair the area at that time.

The spalls and at Piers 1 and 2 and Abutment 2 are not structural concerns at this time; however, they should be repaired to prevent further deterioration. The repairs should include removal of unsound concrete to a minimum of 1 inch behind the reinforcing steel, cleaning and replacing reinforcing steel as required, and placing concrete designed to provide high durability with low permeability.

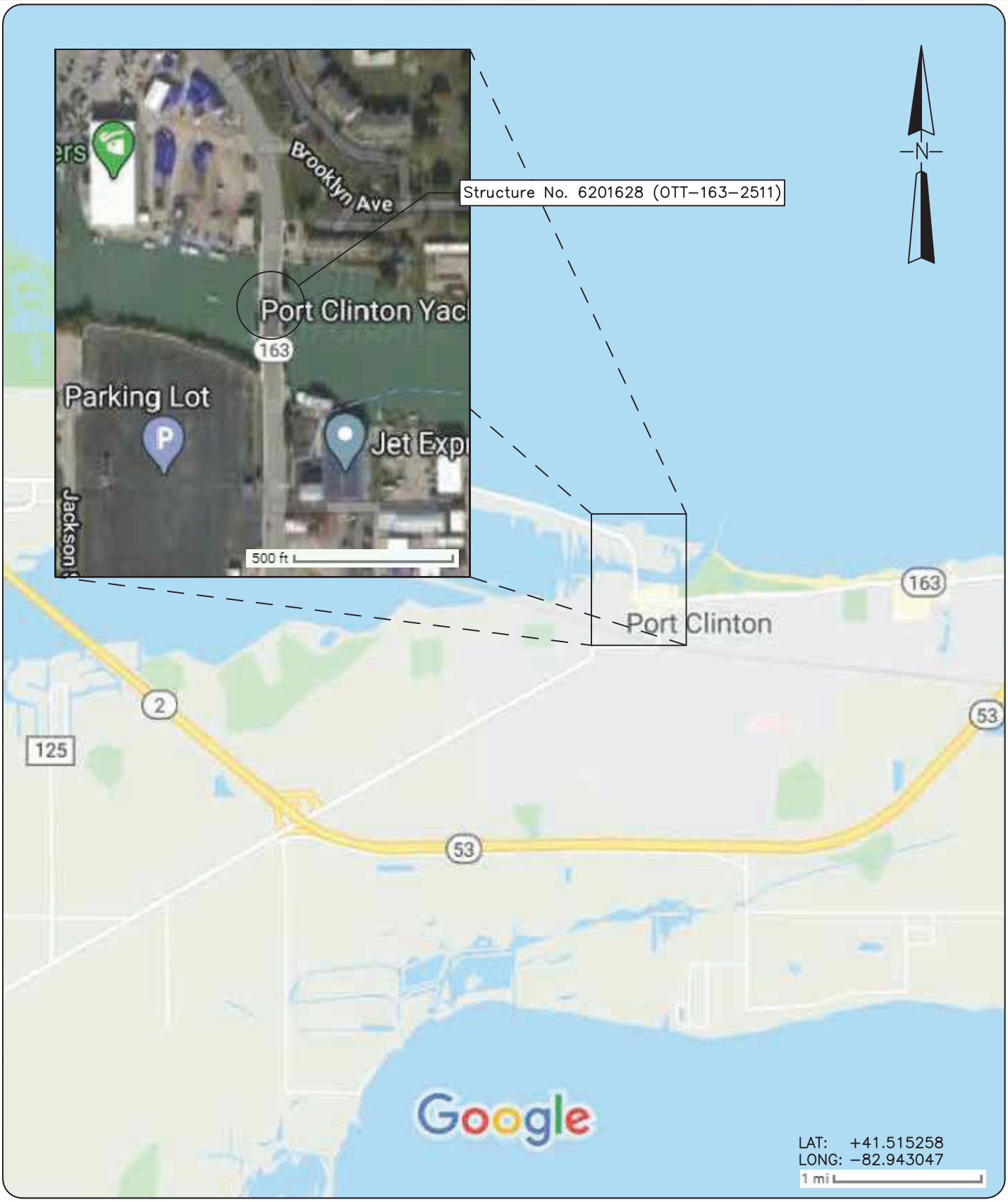
It is recommended that the submerged substructure units of Structure No. 6201628 (OTT-163-2511) be next inspected underwater at an interval not to exceed 60 months, no later than May 11, 2025.

Respectfully Submitted,
COLLINS ENGINEERS, INC.

Joshua Johnson, P.E.
Project Manager

Originated by:
Brad Mitchell

EXHIBIT 1 – FIGURES



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SR-163 OVER PORTAGE ROAD
STRUCTURE NO. 6201628
(OTT-163-2511)
LOCATION MAP
OTTAWA COUNTY, OHIO

INSPECTED BY: MOR	CEI PROJECT: 55–12239.00
DRAWN BY: BLV	DATE: 11 MAY 2020
CHECKED BY: JMJ	SHEET NO: 1

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