







UNDERWATER & NBI

CULVERT INSPECTION

STRUCTURE NO. SFN0705187

(BEL-149-3157)

SR-149 OVER MASONRY CULVERT

BELMONT COUNTY, OH

DISTRICT 11

November 2023

Prepared for:

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

STATE OF OHIO
MATTHEW ROGERS
PE.87504
REGISTERED
PROFESSIONAL ENGINEER

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 West Headwall 3
2.2.2 East Headwall 3
2.2.3 Culvert Interior 3
2.2.4 Channel Bottom and Scour Assessment 4
3.0 EVALUATION AND RECOMMENDATIONS 5
EXHIBIT 1 – FIGURES 7
LOCATION MAP
SOUNDING PLAN
CHANNEL CROSS SECTIONS – UPSTREAM QUARTER POINT
CHANNEL CROSS SECTIONS – STRUCTURE CENTERLINE
CHANNEL CROSS SECTIONS – DOWNSTREAM QUARTER POINT
WEST HEADWALL
EAST HEADWALL
CULVERT INTERIOR .....
EXHIBIT 2 – INSPECTION PHOTOGRAPHS 16
Photograph No. 1: Overall View of Structure No. SFN0705187 West Headwall (Outlet), Looking East.
Photograph No. 2: Overall View of Structure No. SFN0705187 East Headwall (Inlet), Looking West.
Photograph No. 3: Overall View of the Upstream Channel, Looking East.
Photograph No. 4: Overall View of the Downstream Channel, Looking West.
Photograph No. 5: View of the North Embankment Upstream of the Structure, Looking North.
Photograph No. 6: View of the North Embankment Downstream of the Structure, Looking North.
Photograph No. 7: View of the South Embankment Upstream of the Structure, Looking South.

Photograph No. 8: View of the South Embankment Downstream of the Structure, Looking Southwest.
Photograph No. 9: View of the Broken Stone and Area of Erosion at the West Headwall, Looking East.
Photograph No. 10: View of the Typical West Headwall Cracking, Looking East.
Photograph No. 11: View of the Typical West Headwall Separation and Masonry Crack, Looking South.
Photograph No. 12: View of the West Headwall Masonry Crack, Looking North.
Photograph No. 13: View of the East Headwall Separation, Looking Northwest.
Photograph No. 14: View of the East Headwall Erosion, Looking Northwest.
Photograph No. 15: View of the Typical Block Condition at the Headwalls, Looking South.
Photograph No. 16: View of the Typical Broken Stone at the Headwalls, Looking East.
Photograph No. 17: View of the Typical Ceiling Condition, Looking East.
Photograph No. 18: Typical View of Wall 1 (South Wall), Looking Southeast.
Photograph No. 19: Typical View of Wall 2 (North Wall), Looking Northeast.
Photograph No. 20: View of the Typical Sediment Leaching, Looking South.
Photograph No. 21: View of the Heavy Efflorescence at the Downstream Quarter Point, Looking Southwest.
Photograph No. 22: View of the Typical Masonry Cracking, Looking Northwest.
Photograph No. 23: View of the Crushing at the Eastern End, Looking West.
Photograph No. 24: View of the Wall Displacement at the Eastern End Crushing , Looking Southeast.
Photograph No. 25: View of the Longitudinal Crack in the Obvert near the Area of Crushing, Looking West.
Photograph No. 26: View of the Typical Interior Masonry Condition, Looking South.
Photograph No. 27: View of the Typical Masonry Condition at the Waterline on the North Wall, Looking North.
EXHIBIT 3 – DIVE PROCEDURES CHECKLIST 31

EXECUTIVE SUMMARY

Project: ODOT D11 Underwater Bridge Inspections - 2023

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

Inspection Team: Team Leader – Matthew Rogers, P.E. – Collins Engineers, Inc.
Team Member – Kevin Mitchell, E.I.T. – Collins Engineers, Inc.
Team Member – Olivia Farmer, E.I.T. – Collins Engineers, Inc.
Team Member – Nicholas Lane – Collins Engineers, Inc.

Inspection Date(s): November 8, 2023

Water Visibility:	2 ft	***Water Velocity:***	0 ft/s
Water Temperature:	50 °F	***Weather:***	Clear – 35 °F
Waterline Elevation:	78.5 ft	***Type of Boat:***	N/A
High-water Elevation:	80.0 ft		
Coordinates:	40.14608°N, 81.06806°W		
Access Location:	West Entrance from Depot Street		
Dive Mode:	Wading		
Waterline Reference:	21.5 ft below the obvert at the west headwall.		
Maximum Depth at SSU:	4.0 ft – Downstream Quarter Point of Wall 1		
Shoreline Conditions:	The east and west embankments exhibited steep, moderately vegetated slopes with no evidence of erosion at the embankments. Moderate erosion channels were observed behind both headwalls.		

Summary of Findings:

- **West Headwall:**
  - Diagonal cracks measuring up to 1/4 in. wide by 20 ft long were observed along the masonry joint.
  - Scattered cracks measuring up to 1/4 in. wide were observed throughout the west headwall.
  - An area of failed masonry block measuring 10 ft vertical by up to 6 ft wide with 1 exposed anchor rod disconnected at the bottom was observed at the south end of the west headwall.
  - A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the west headwall and the brick culvert interior section.
  - A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed 6 ft from the joint between the west headwall and the brick culvert interior section.
  - A moderate erosion channel approximately 15 ft in diameter was observed behind the west headwall.
- **East Headwall:**
  - A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the east headwall and the brick culvert interior section.

- A moderate erosion channel approximately 10 ft in diameter was observed behind the east headwall.

- **Culvert Interior:**
  - The arch bricks typically exhibited scattered hairline cracking up to 1/16 in. wide with efflorescence.
  - The walls and ceiling exhibited areas of active seepage with sediment infiltration.
  - Heavy efflorescence extending from the channel bottom to 6 ft above the waterline was observed along both walls at the downstream quarter point.
  - Both walls exhibited horizontal cracks up to 1 in. wide extending from the center point of the culvert to the eastern end.
  - The eastern end of the culvert exhibited crushing with arch distortion and downward compression up to 5 in. vertical. Both walls were observed to be pushed outward up to 5 in., and a 2 in. wide crack was observed at the eastern end of this area.
  - A longitudinal crack approximately 1/4 in. wide was observed in the obvert extending from the upstream quarter point to the area of culvert crushing.

Summary of Recommendations:

- Monitor area of crushing near the eastern end of the culvert.
- Monitor cracks throughout the culvert.
- Monitor erosion behind the headwalls.

Underwater Inspection Coding:

NBI Ratings:

Item	Description	Coding	Condition
B.C.04	Culvert	4 – Poor Condition	Crushing, Cracks
B.C.09	Channel Cond. Rating	8 – Very Good Condition	
B.C.10	Channel Protection Cond.	N – Not Applicable	
B.C.11	Scour Cond. Rating	8 – Very Good Condition	
B.C.15	Underwater Cond. Rating	4 – Poor Condition	
B.IE.03	UW and NBI Insp. Date	November 8, 2023	
B.IE.05	UW Insp. Interval	24 Months	

AASHTO National Bridge Element (NBE) Ratings:

Element #	Description	Units	Total	Condition State			
				1	2	3	4
244	Masonry Culvert	LF	1500	0	0	1499	1

Note: Ratings were developed using the FHWA Specifications for the National Bridge Inventory and AASHTO Manual for Bridge Element Inspection, 2nd Ed. 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 and NBI investigation performed at SR-149 over a masonry culvert in Belmont County, OH. Collins Engineers, Inc. (Collins) conducted the underwater investigation for the Ohio Department of Transportation (ODOT), District 11 on November 8, 2023. 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 culvert fascias, upstream and downstream of the culvert, and around the submerged substructure units.
- Determine the condition of the shorelines in the vicinity of the structure.
- Obtain photographs of the culvert and any significant defects.

In addition, an 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. SFN0705187 (BEL-149-3157) spans approximately 1500 ft, carrying SR-149 over Unnamed Stream and is approximately 30 ft wide. The culvert superstructure is constructed of one span, consisting of a single masonry arch culvert. The roadway orientation of the longitudinal axis of the culvert is west to east. The substructure units are labeled as Walls 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 culvert. Refer to Photographs 1 and 2 in Exhibit 2 for overall views of the culvert.

1.3 Method of Investigation

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

A four-person team consisting of professional engineer-diver and team leader (Matthew O. Rogers, P.E.), two engineer-divers (Kevin Mitchell, E.I.T. and Olivia Farmer, E.I.T.), and a technician-diver (Nicholas Lane) conducted the underwater inspection. The inspection was conducted through wading. During the inspection, the inspectors worked from the shore and a note taker on the shore 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. 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. Soundings were taken parallel to the culvert at the upstream and downstream fascias, at the midpoint between the substructure units, and at quarter intervals along the substructure units; the waterline was referenced to a known elevation on the culvert. 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 was located approximately 21.5 ft below the obvert of the arch at the west entrance, which corresponds to an assumed waterline elevation of 78.5 ft. During the inspection, the waterway was not flowing below the structure. The approximate high-water elevation was observed to be 80.0 ft.

The culvert pier skew was consistent with the channel alignment and does not require attention at this time. The north and south embankments exhibited moderately vegetated, steep embankments with moderate erosion channels observed behind both headwalls. Refer to Photographs 3 through 8 in Exhibit 2 for views of the shorelines near the structure.

2.2 Substructure Conditions

2.2.1 West Headwall

Diagonal cracks measuring up to 1/4 in. wide by 20 ft long were observed along the masonry joint. Scattered cracks measuring up to 1/4 in. wide were observed throughout the west headwall. An area of failed masonry block measuring 10 ft vertical by up to 6 ft wide with 1 exposed anchor rod disconnected at the bottom was observed at the south end of the west headwall. A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the west headwall and the brick culvert interior section. A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed 6 ft from the joint between the west headwall and the brick culvert interior section. A moderate erosion channel approximately 15 ft in diameter was observed behind the west headwall. Refer to Figure 6 in Exhibit 1 for detailed inspection notes of the west headwall. Refer to Photographs 9 through 12 in Exhibit 2 for views of the west headwall.

2.2.2 East Headwall

A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the east headwall and the brick culvert interior section. A moderate erosion channel approximately 10 ft in diameter was observed behind the east headwall. Refer to Figure 7 in Exhibit 1 for detailed inspection notes of the east headwall. Refer to Photographs 12 through 16 in Exhibit 2 for views of the east headwall and typical headwall conditions.

2.2.3 Culvert Interior

The channel bottom material around Walls 1 and 2 consisted of soft silt over gravel with approximately 7 in. probe rod penetration. The arch bricks typically exhibited scattered hairline cracking up to 1/16 in. wide with efflorescence. The walls and ceiling exhibited areas of active seepage with sediment infiltration, mainly at the ends of the culvert. Heavy efflorescence extending from the channel bottom to 6 ft above the waterline was observed along both walls at the downstream quarter point. Both walls exhibited horizontal cracks up to 1 in. wide extending from the center point of the culvert to the eastern end. The eastern end of the culvert exhibited crushing with arch distortion and downward compression up to 5 in. vertical. Both walls were observed to be pushed outward up to 5 in., and a 2 in. wide crack was observed at the eastern end of this area. A longitudinal crack approximately 1/4 in. wide was observed in the obvert extending from the upstream quarter point to the area of culvert crushing. Refer to Figure 8 in Exhibit 1 for detailed inspection notes of the culvert interior. Refer

to Photographs 17 through 27 in Exhibit 2 for views of the culvert interior and typical masonry condition above and at the waterline.

2.2.4 Channel Bottom and Scour Assessment

At the time of the inspection, the creek was experiencing normal flow and the channel bottom appeared stable for the type of material. The channel bottom was primarily soft silt over gravel surrounding the substructure units. No additional scour, undermining, or scour countermeasures were observed.

3.0 EVALUATION AND RECOMMENDATIONS

Overall, the inspected substructure units of Structure No. SFN0705187 (BEL-149-3157) were in Poor Condition. Since no design or as-built plans were available for the culvert, the amount of embedment of the culvert in the channel bottom is unknown. As a result, the channel bottom configuration should continue to be monitored during future underwater inspections to verify that localized scour or overall channel degradation is not occurring and that the culvert remains adequately embedded in the channel bottom. Design or as-built drawings for the culvert should be obtained and reviewed, if possible, prior to the next underwater inspection to determine the exact construction of the masonry culvert.

The area of crushing at the east end of the culvert should be monitored during future inspections for any significant changes. While the area noted is a structural concern at this time, there is no imminent risk to the roadway carried as the east end of the culvert is approximately 370 ft way from the end of easternmost road, Stratton Lane.

The cracks in the interior of the culvert are not structural concerns at this time. However, the cracks do provide a means for water infiltration and freeze-thaw damage. It is therefore recommended that these cracks be monitored during future underwater inspections. If further crack propagation or increased crack widths are observed, it may be necessary to repair the cracks by injection or patching with a repair material suitable for underwater applications.

The erosion behind the headwalls is not a concern at this time. However, the erosion should continue to be monitored during future inspections for evidence of increasing extent and severity that may threaten the structural integrity of the culvert.

It is recommended Structure No. SFN0705187 (BEL-149-3157) be next inspected above and underwater at an interval not to exceed 24 months, no later than November 8, 2025.

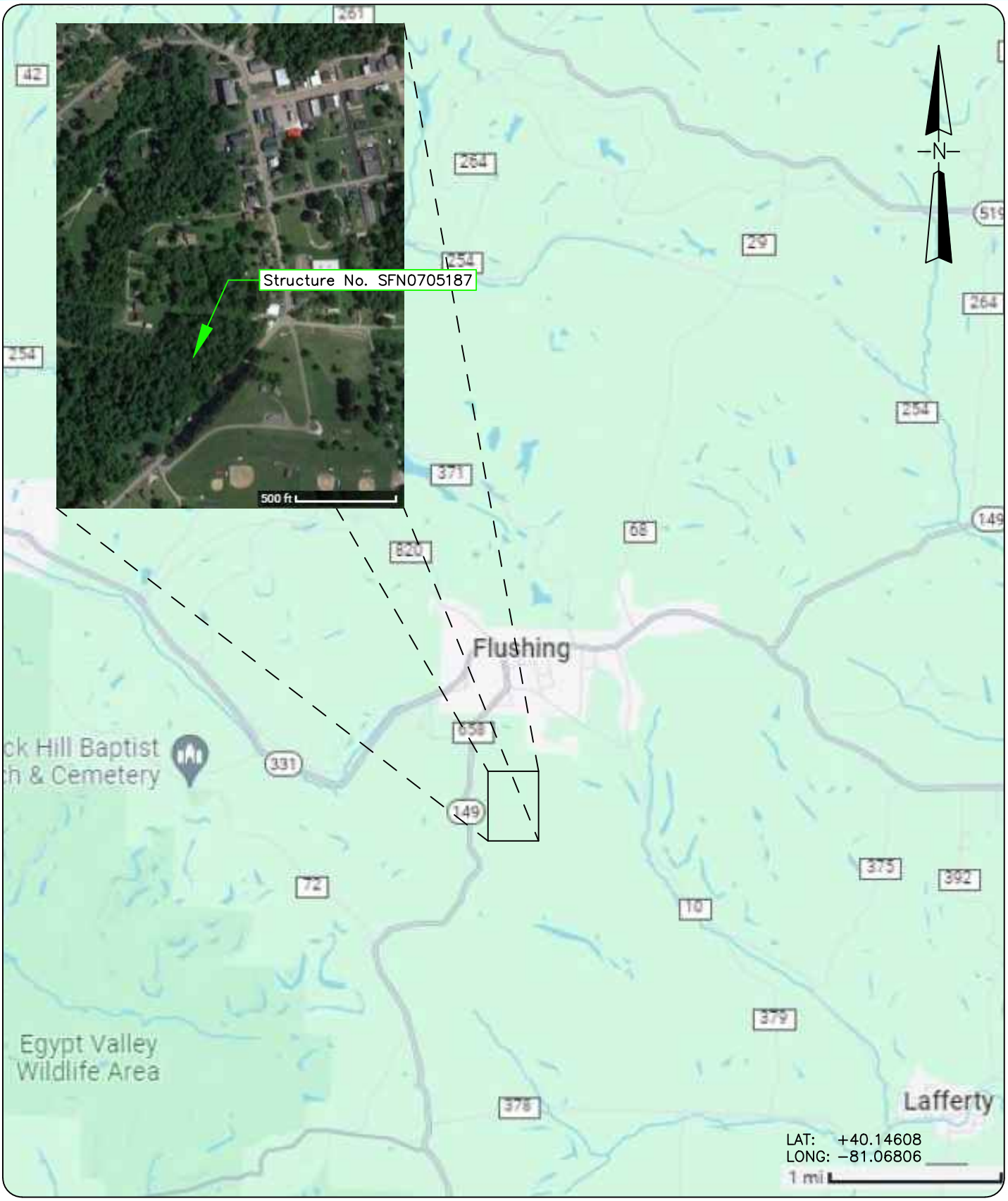
Respectfully Submitted,
COLLINS ENGINEERS, INC.



Matthew Rogers, P.E.
Project Manager/Team Leader

Originated by:
Olivia Farmer, E.I.T.

EXHIBIT 1 – FIGURES



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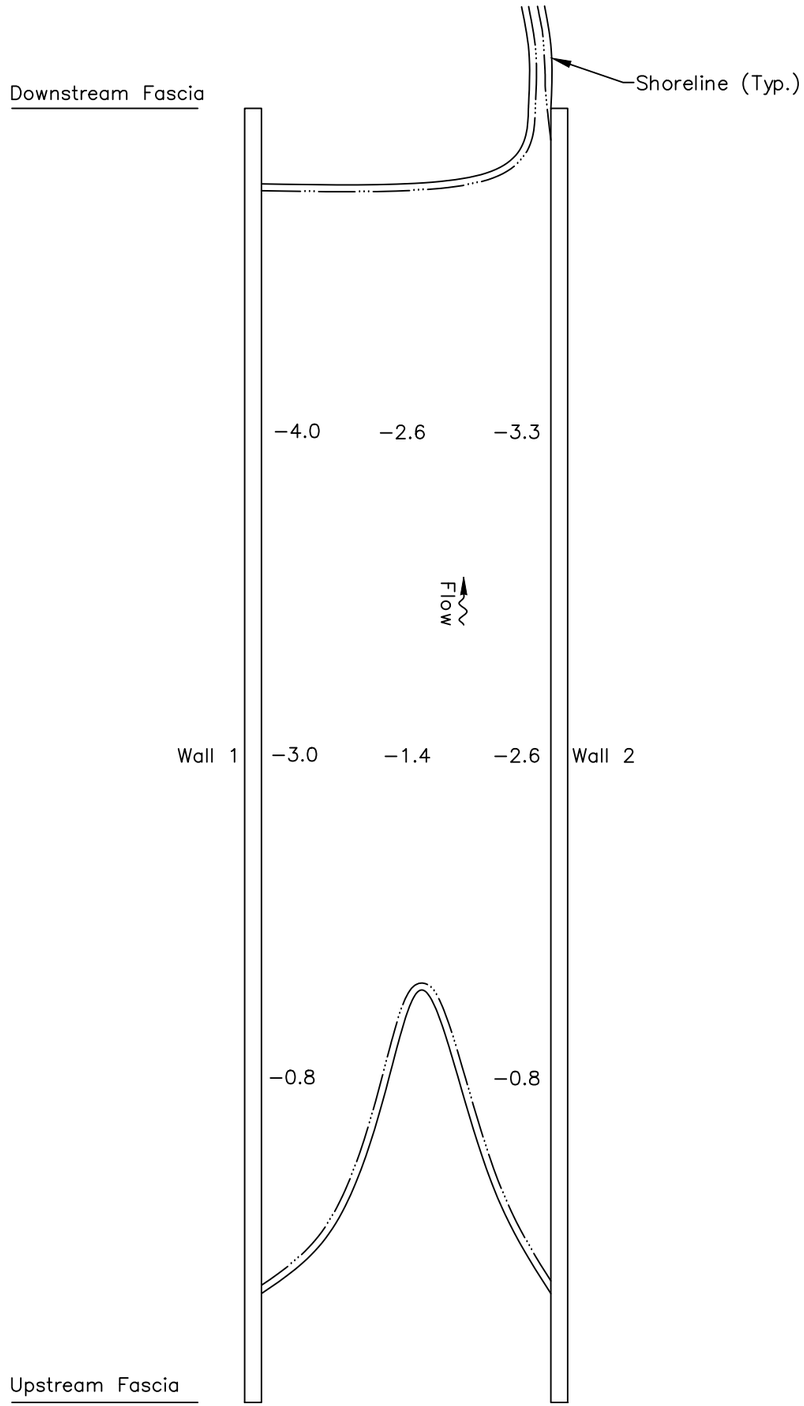
SR-149 OVER MASONRY CULVERT
STRUCTURE NO. SFN0705187

LOCATION MAP

BELMONT COUNTY, OHIO

INSPECTED BY: MOR	CEI PROJECT: 55−13380.02
DRAWN BY: OPF	DATE: 08 NOV 2023
CHECKED BY: JMJ	SHEET NO: 1

\\NASUNI-IL\KY\PROJECTS\55 - KENTUCKY\55-13380.02 - ODOT D11 UW BRIDGE INSP (2023)\ENGINEERING\DRAWINGS\SFN0705187 (BEL-149-3157)\SFN0705187_DRAWINGS.DWG12/14/2023 11:00:19 AM



SOUNDING PLAN

GENERAL NOTES:

1. Walls 1 and 2 were inspected underwater. Substructure units are labeled south to north.
2. At the time of inspection on November 8, 2023, the waterline was located approximately 21.5 ft below the obvert at the west headwall (EL. +100.0 ft). This corresponds with a waterline elevation of +78.5 ft.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the culvert at the upstream and downstream fascias, at the midpoint between the substructure units, and at quarter intervals along the substructure units.

LEGEND

−2.7 Sounding Depth from Waterline (ft)

Timber Debris

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SR-149 OVER MASONRY CULVERT
STRUCTURE NO. SFN0705187
SOUNDING PLAN
BELMONT COUNTY, OHIO

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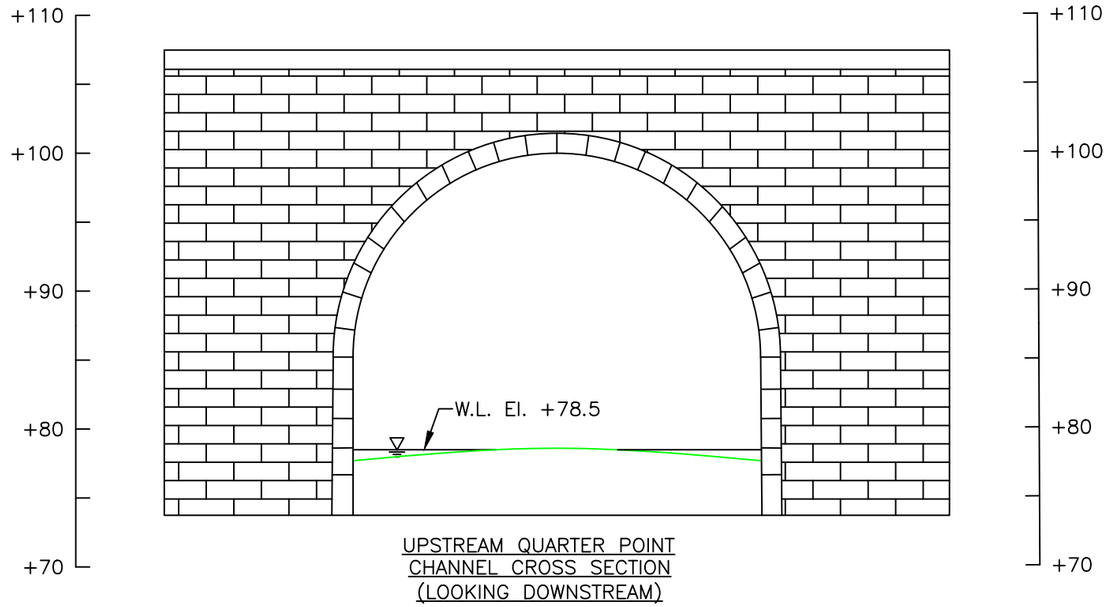

UPSTREAM QUARTER POINT
CHANNEL CROSS SECTION
(LOOKING DOWNSTREAM)

Note:

Footing elevations unknown due to unavailable record drawings.

LEGEND

- Approximate Channel Bottom – Nov. 2023
- Approximate Channel Bottom – Nov. 2018 (No Data)
- Approximate Channel Bottom – Nov. 2013 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

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SR-149 OVER MASONRY CULVERT
STRUCTURE NO. SFN0705187
CROSS SECTIONS
BELMONT COUNTY, OHIO

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DATE: NOV 2023
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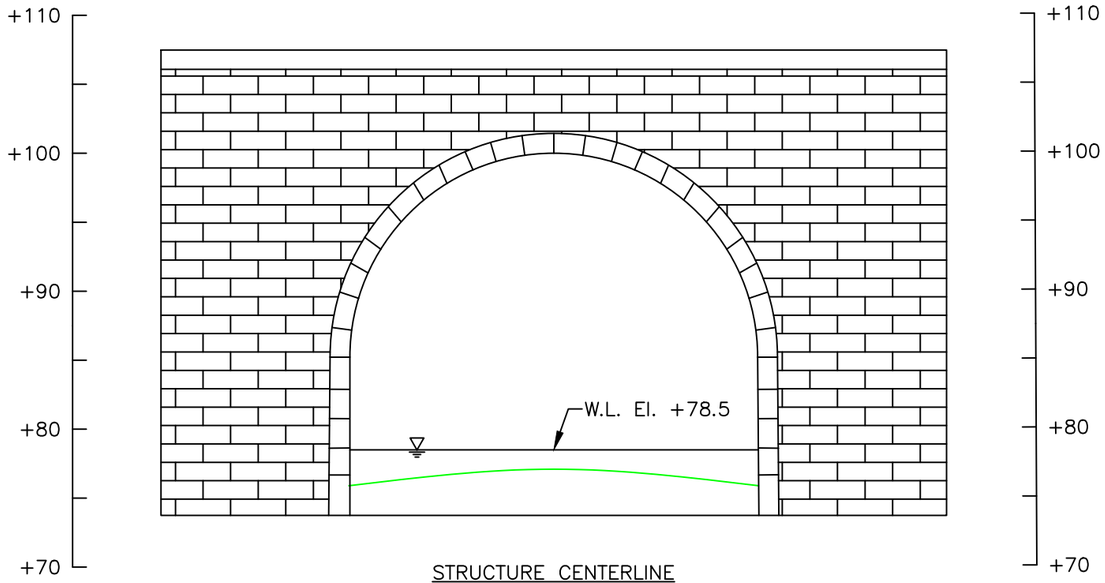

STRUCTURE CENTERLINE
CHANNEL CROSS SECTION
(LOOKING DOWNSTREAM)

Note:

Footing elevations unknown due to unavailable record drawings.

LEGEND

- Approximate Channel Bottom – Nov. 2023
- Approximate Channel Bottom – Nov. 2018 (No Data)
- Approximate Channel Bottom – Nov. 2013 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

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BELMONT COUNTY, OHIO

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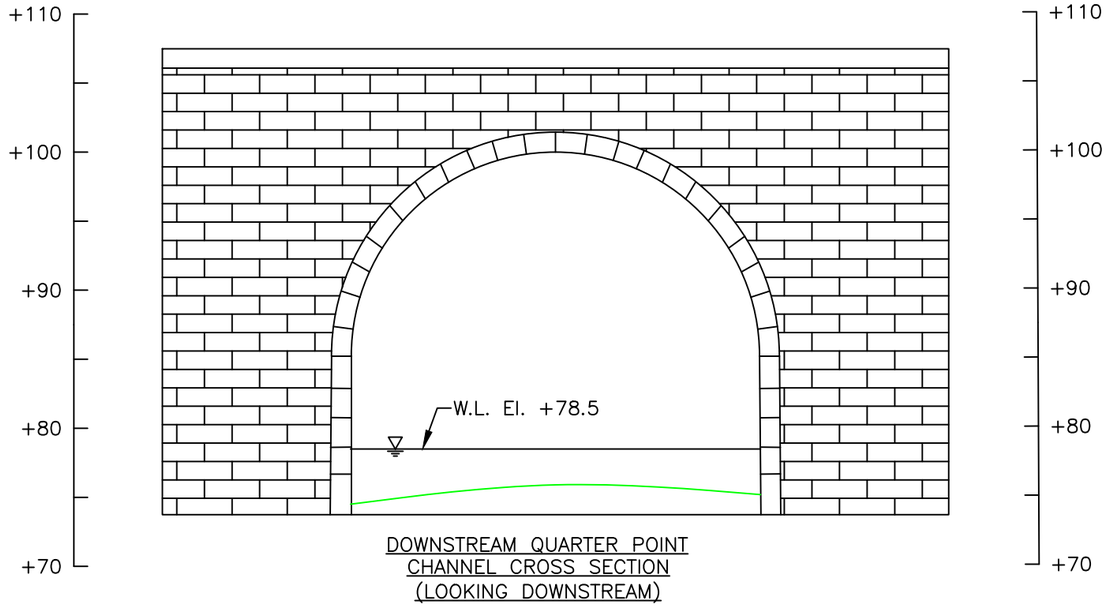

DOWNSTREAM QUARTER POINT
CHANNEL CROSS SECTION
(LOOKING DOWNSTREAM)

Note:

Footing elevations unknown due to unavailable record drawings.

LEGEND

- Approximate Channel Bottom – Nov. 2023
- Approximate Channel Bottom – Nov. 2018 (No Data)
- Approximate Channel Bottom – Nov. 2013 (No Data)
- Timber Debris
- Water Surface
- +450 Elevation (ft)

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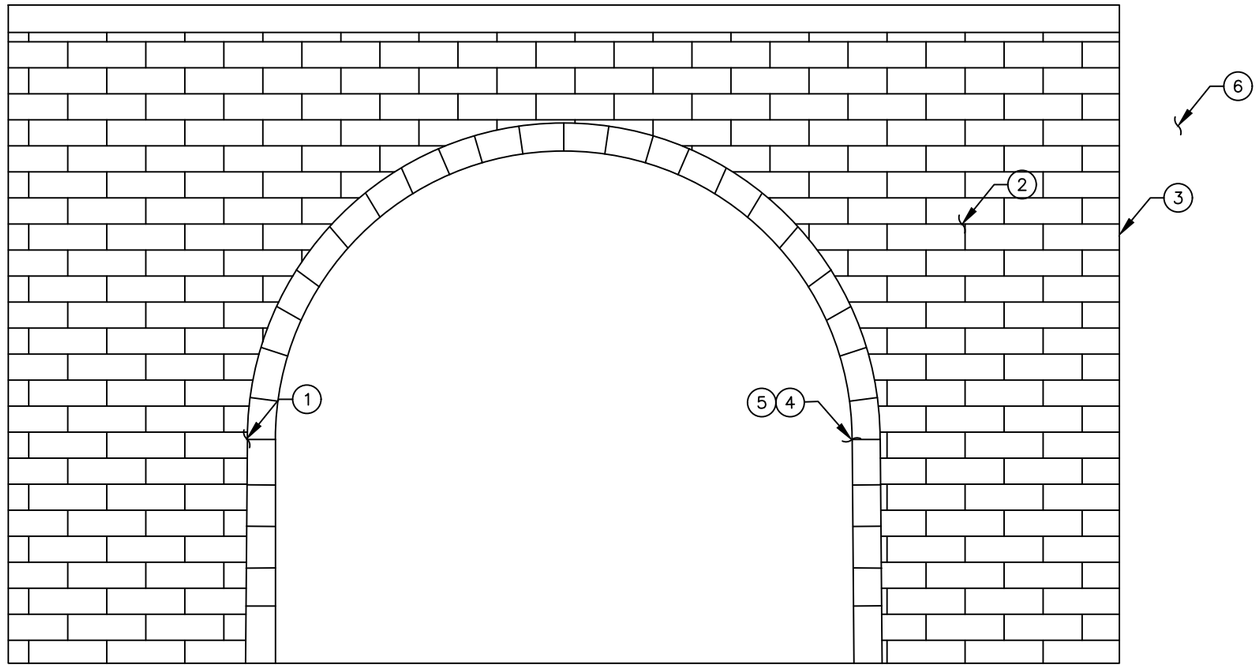

WEST ELEVATION
(LOOKING EAST)

INSPECTION NOTES:

1. Diagonal cracks measuring up to 1/4 in. wide by 20 ft long were observed along the masonry joint.
2. Scattered cracks measuring up to 1/4 in. wide were observed throughout the west headwall.
3. An area of failed masonry block measuring 10 ft vertical by up to 6 ft wide with 1 exposed anchor rod disconnected at the bottom was observed at the south end of the west headwall.
4. A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the west headwall and the brick culvert interior section.
5. A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed 6 ft from the joint between the west headwall and the brick culvert interior section.
6. A moderate erosion channel approximately 15 ft in diameter was observed behind the west headwall.

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SR-149 OVER MASONRY CULVERT
STRUCTURE NO. SFN0705187
WEST HEADWALL
BELMONT COUNTY, OHIO

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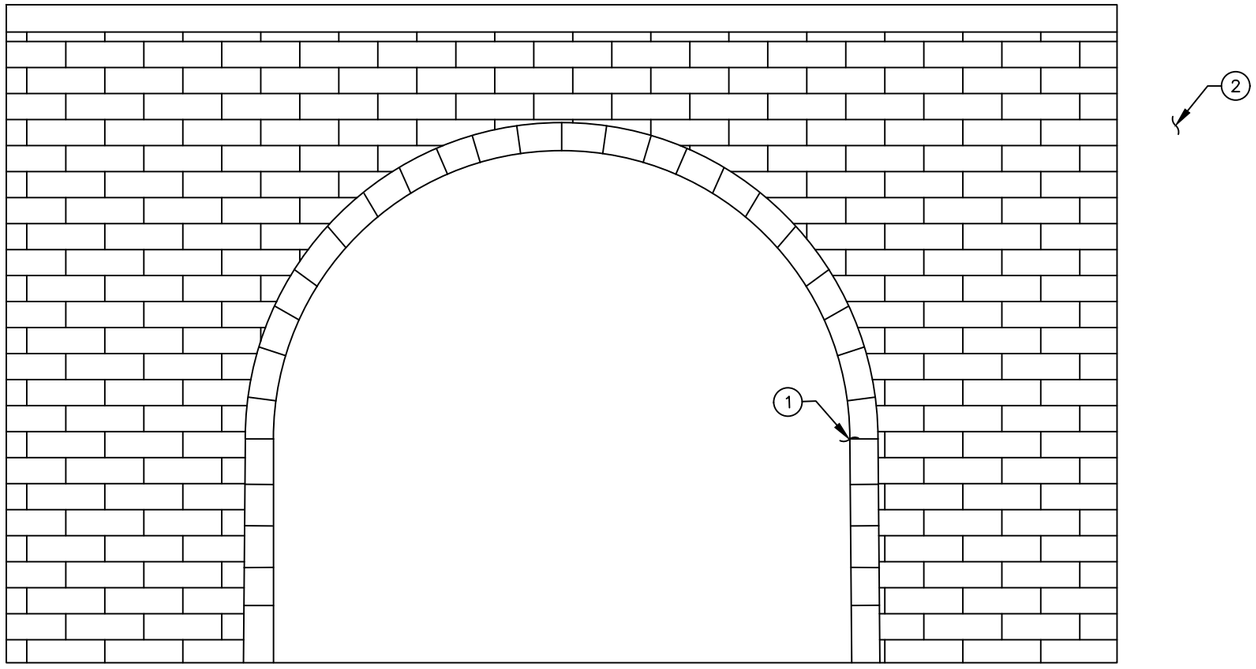
DATE:	NOV 2023
SHEET NO:	6



EAST ELEVATION
(LOOKING WEST)

INSPECTION NOTES:

1. A crack with separation measuring up to 3/4 in. wide and extending up to 10 ft in length was observed at the joint between the east headwall and the brick culvert interior section.

2. A moderate erosion channel approximately 10 ft in diameter was observed behind the east headwall.

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EAST HEADWALL
BELMONT COUNTY, OHIO

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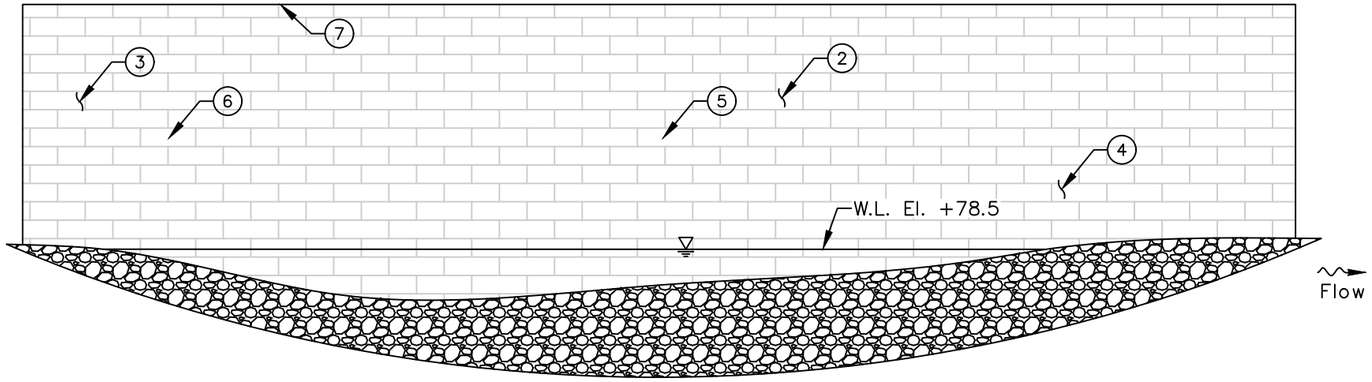
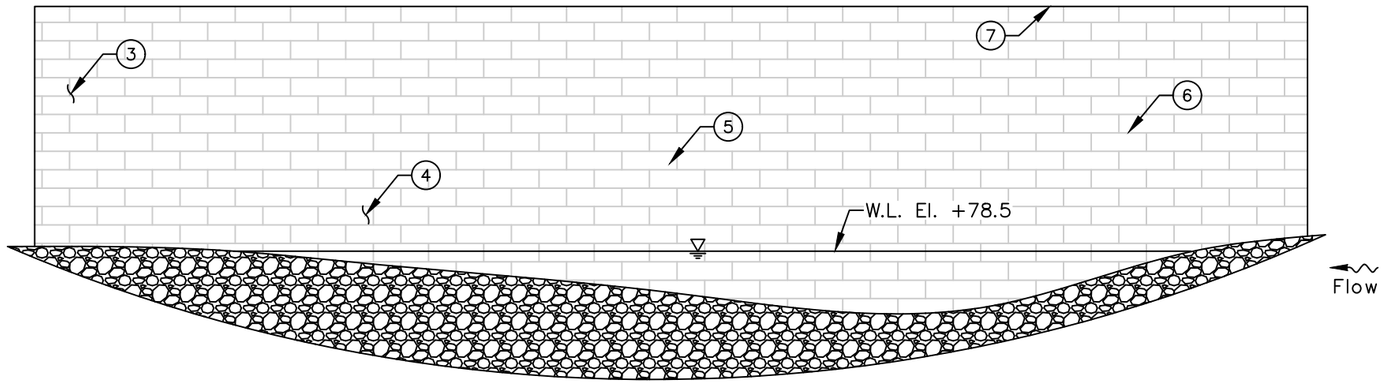


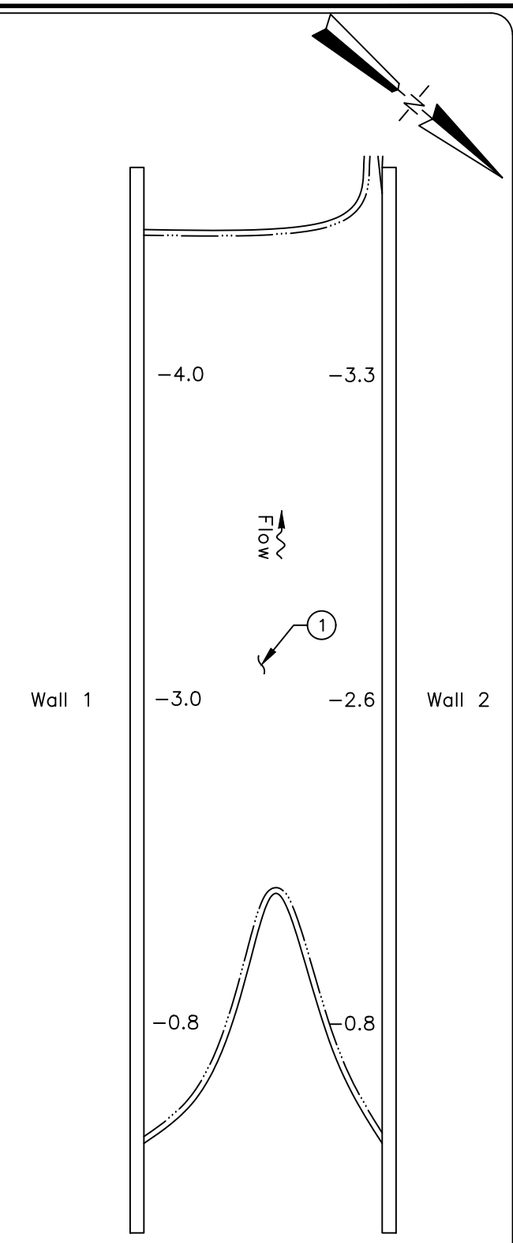
WALL 1
NORTH ELEVATION
(LOOKING SOUTH)



WALL 2
SOUTH ELEVATION
(LOOKING NORTH)

INSPECTION NOTES:

1. The channel bottom material around Walls 1 and 2 consisted of soft silt over gravel with approximately 7 in. probe rod penetration.
2. The arch bricks typically exhibited scattered hairline cracking up to 1/16 in. wide with efflorescence.
3. The walls and ceiling exhibited areas of active seepage with sediment infiltration, mainly at the ends of the tunnel.
4. Heavy efflorescence extending from the channel bottom to 6 ft above the waterline was observed along both walls at the downstream quarter point.
5. Both walls exhibited horizontal cracks up to 1 in. wide extending from the center point of the tunnel to the eastern end.
6. The eastern end of the tunnel exhibited crushing with arch distortion and downward compression up to 5 in. vertical. Both walls were observed to be pushed outward up to 5 in., and a 2 in. wide crack was observed at the eastern end of this area.
7. A longitudinal crack approximately 1/4 in. wide was observed in the obvert extending from the upstream quarter point to the area of tunnel crushing.



LEGEND

−2.7	Sounding Depth from Waterline (ft)
———	Approximate Channel Bottom – Nov. 2023
	Timber Debris
	Water Surface

COLLINS ENGINEERS
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SR-149 OVER MASONRY CULVERT
STRUCTURE NO. SFN0705187
TUNNEL INTERIOR
BELMONT COUNTY, OHIO

CEI PROJECT	55–13380.02
INSPECTED BY:	MOR
DRAWN BY:	OPF
CHECKED BY:	JMJ
DATE:	NOV 2023
SHEET NO:	8

EXHIBIT 2 – INSPECTION PHOTOGRAPHS



Photograph No. 1: Overall View of Structure No. SFN0705187 West Headwall (Outlet), Looking East.



Photograph No. 2: Overall View of Structure No. SFN0705187 East Headwall (Inlet), Looking West.



Photograph No. 3: Overall View of the Upstream Channel, Looking East.



Photograph No. 4: Overall View of the Downstream Channel, Looking West.



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



Photograph No. 6: View of the North Embankment Downstream of the Structure, Looking North.



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



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



Photograph No. 9: View of the Broken Stone and Area of Erosion at the West Headwall, Looking East.



Photograph No. 10: View of the Typical West Headwall Cracking, Looking East.



Photograph No. 11: View of the Typical West Headwall Separation and Masonry Crack, Looking South.



Photograph No. 12: View of the West Headwall Masonry Crack, Looking North.



Photograph No. 13: View of the East Headwall Separation, Looking Northwest.



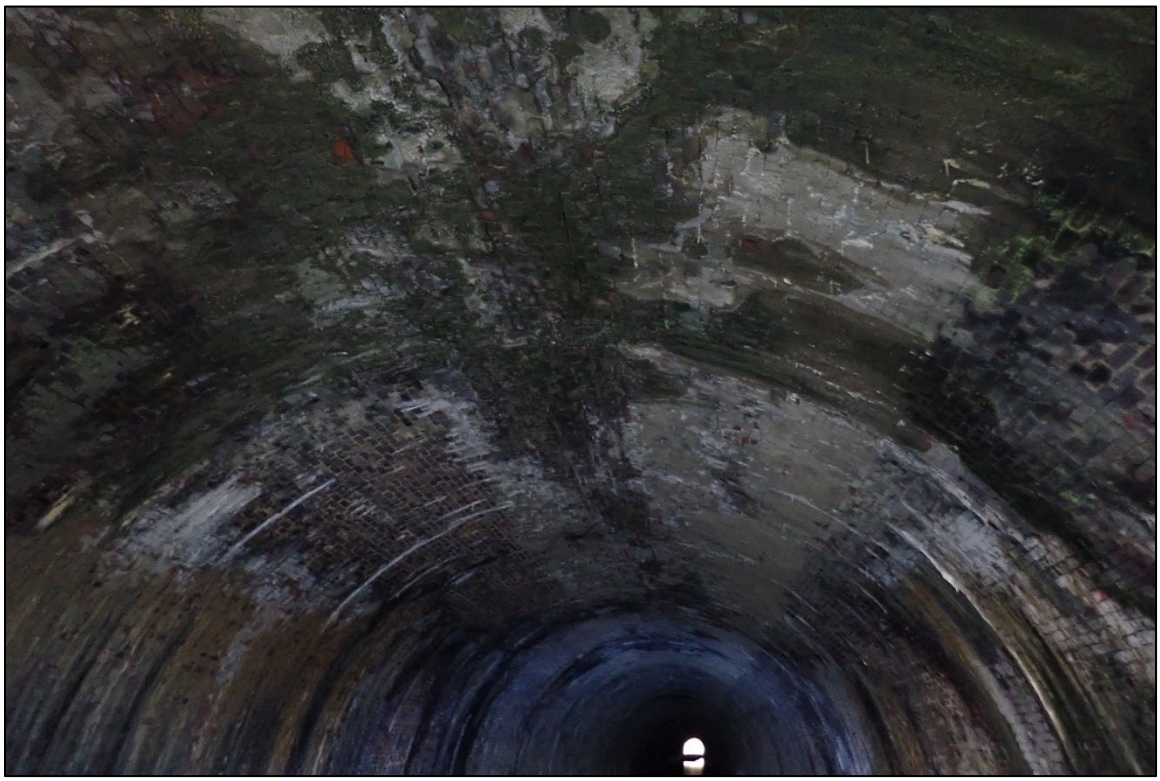
Photograph No. 14: View of the East Headwall Erosion, Looking Northwest.



Photograph No. 15: View of the Typical Block Condition at the Headwalls, Looking South.



Photograph No. 16: View of the Typical Broken Stone at the Headwalls, Looking East.



Photograph No. 17: View of the Typical Ceiling Condition, Looking East.



Photograph No. 18: Typical View of Wall 1 (South Wall), Looking Southeast.



Photograph No. 19: Typical View of Wall 2 (North Wall), Looking Northeast.



Photograph No. 20: View of the Typical Sediment Leaching, Looking South.



Photograph No. 21: View of the Heavy Efflorescence at the Downstream Quarter Point, Looking Southwest.



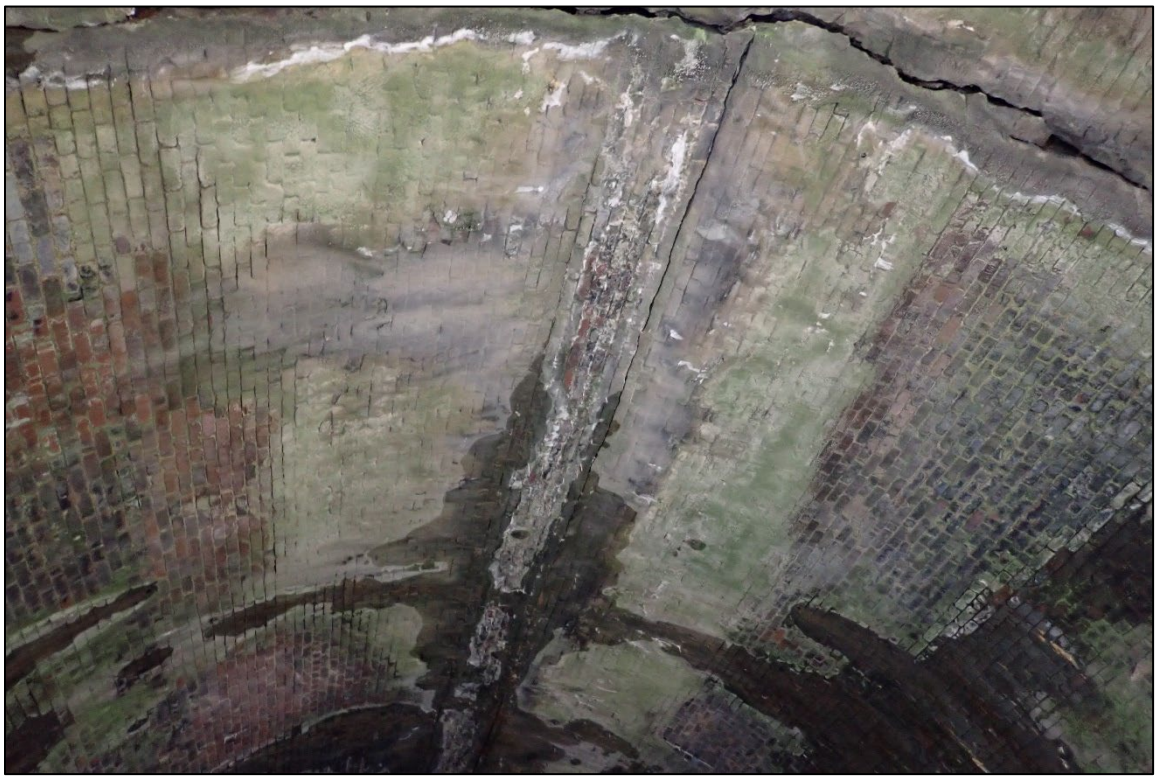
Photograph No. 22: View of the Typical Masonry Cracking, Looking Northwest.



Photograph No. 23: View of the Crushing at the Eastern End, Looking West.



Photograph No. 24: View of the Wall Displacement at the Eastern End Crushing , Looking Southeast.



Photograph No. 25: View of the Longitudinal Crack in the Obvert near the Area of Crushing, Looking West.



Photograph No. 26: View of the Typical Interior Masonry Condition, Looking South.



Photograph No. 27: View of the Typical Masonry Condition at the Waterline on the North Wall, Looking North.

EXHIBIT 3 – DIVE PROCEDURES 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 11_____

Dive Frequency: _____24_____ months

SFN: 0705187_____ Bridge Number (County-Route-SLM-SD): BEL-149-3157

Superstructure Type — Main Span Type: N/A

Approach Span: N/A

Substructure Type — Abutment Type: MASONRY BLOCK

Pier Type: N/A

Total Pier Count: 2

Total Pier Count in water: 2

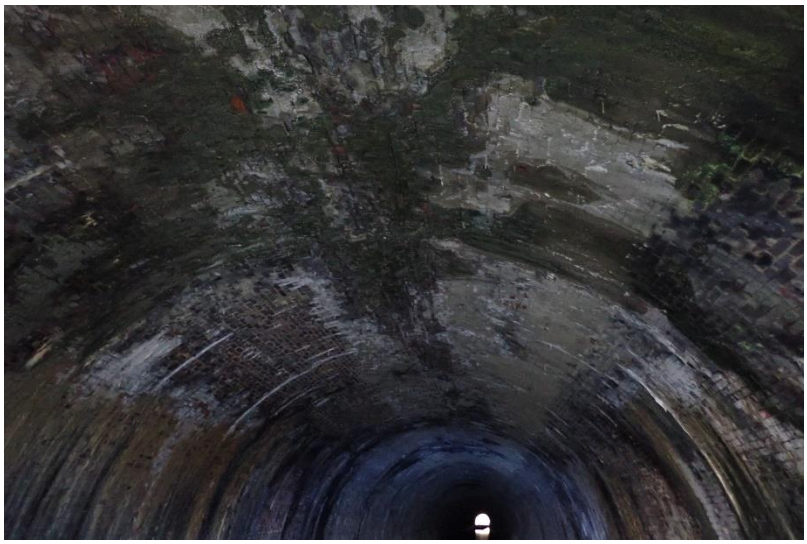
Foundations: Unknown

Feature Intersected: MASONRY CULVERT

b. Photographs



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

_X__Cold Water (Apprx. Temp 50 °F)

____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**

Dr. Waseem Khalifa, Ph. D., P.E.

District Bridge Engineer

2201 Reiser Avenue SE

New Philadelphia, OH 44663

(330) 308-7873

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	N/A	N/A	N/A
Property Owner	N/A	N/A	N/A
Access Equipment	N/A	N/A	N/A
Lake or River draw-down	N/A	N/A	N/A
Canal dry time	N/A	N/A	N/A
Tree removal	N/A	N/A	N/A
Other:	N/A	N/A	N/A
Other:	N/A	N/A	N/A

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

Dive Team Narrative:

The structure shall be investigated using a three-member dive team: one dive supervisor to monitor communications and air supply while taking notes, one diver, and one tender/standby diver. There shall be one NBIS Team Leader onsite at all times.

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 / **N**	Anticipated current	___0___ ft
If Yes, waterway river point	_____	Scour Critical (item 113):	___8_____
Anticipated water visibility depth	__2___ ft	POA in place: Y/**N**	
Anticipated Dive depth	__4___ ft	Scour Monitoring devices present: Y/**N**	

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		
Abutment		
Culvert	1	100% Level 1 10% Level 2
Scour Countermeasures		
Fenders or Dolphins		

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

__X__Hip waders

__X__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

__X__Surface Supplied with communication

b. The channel bottom should be sounded utilizing

____Digital fathometer

__X__Telescoping survey rod

____ acoustic imaging

c. During the inspection, the divers should work from

__X__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.)

_WEST ENTRANCE FROM DEPOT STREET

_____

_____

_____

e. The maximum depth of the channel is typically measured 4.0 feet from THE DOWNSTREAM QUARTER POINT OF WALL 1

Reference Datum OBVERT AT THE WEST HEADWALL

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, INC. Date: 11/8/2023

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

Updated By: _____ Date: _____

VIII. Other Narrative Not Included In Previous Sections