

HISTORIC BRIDGE ALTERNATIVES ANALYSIS

BRIDGE NUMBER: 027-38-06182 C

DESIGNATION NUMBER: 1702940

ROUTE IDENTIFICATION AND FEATURE CROSSED:
US 27 over Salamonie River

COUNTY: Jay

NBI NUMBER: 007350

PROJECT LOCATION: 0.11 miles South of SR 26,
in Section 20 and 21, T-23-N, R-14-E,
Wayne Township, Jay County



PREPARED BY: Jennifer Pittman, PE
Lochmueller Group, Inc.

DATE: December 16, 2019

This bridge was evaluated by personnel from the Indiana Department of Transportation (INDOT) Bridge Design Unit, the District Office and the designer. The attached Draft Historic Bridge Alternatives Analysis has been reviewed by the INDOT Bridge Design Unit and Cultural Resources Office for thoroughness of the rehabilitation option and compliance with INDOT design policies. Concurrence by INDOT with the proposed Scope of Work does not constitute Final Approval of the Historic Bridge Alternatives Analysis. This draft HBAA may now be distributed to the historic consulting parties for review.

TABLE OF CONTENTS

I.	Existing Structure Data	3 – 4
II.	Existing Conditions	5 – 6
III.	Purpose and Need.....	6 - 7
IV.	Alternatives	7 – 9
V.	Minimization and Mitigation.....	9 - 10
VI.	Preliminary Preferred Alternative	10
VII.	Appendices	
	Appendix A: Maps	
	Appendix B: Photographs	
	Appendix C: Drawings	
	Appendix D: Cost Estimate	
	Appendix E: Bridge Existing Conditions and Applicable Design Criteria Table	
	Appendix F: Alternatives Analysis Table	

I. EXISTING STRUCTURE DATA

A. Identification/History

US 27 over Salamonie River, Meridian Street Bridge, is a single span concrete through arch built in 1914. The structure is located downtown in the City of Portland, 0.11 miles south of SR 26, in Sections 20 and 21, Township 23-N, Range 14-E, in Wayne Township, Jay County, Indiana. US 27 is a principal urban arterial with approximately 7,299 vpd (2019) average daily traffic. The surrounding area is residential and commercial.

Bridge No.: 027-38-06182 B (a.k.a Meridian Street Bridge)

Project Location: 0.11 miles South of SR 26, in Section 20 & 21, T-23-N, R-13-E,
Wayne Township, Jay County, Indiana

Designation No.: 1702940

Year Built: 1914

Years Repaired: 1997 – Contract B-22869; Bridge Deck Reconstruction, Column and
Floorbeam Replacement, Railing Replacement
2012 – Contract B-33346; Bridge Thin Deck Overlay

Most Recent Field Inspection Date: 05/15/2019

Average Daily Traffic (ADT)/Year of ADT: 7,439 vpd Construction Year (2021);
8,839 vpd Design Year (2041)

Percentage of Commercial Vehicles: 9.73%

Low Volume Road: No

Functional Classification: Urban Principal Arterial

Detour Length: 24 miles (SR 28 and SR 67)

Unofficial Detour Length: 0.4 miles (Water Street, Wayne Street and E 3rd Street)

Load Rating: 60 tons (HS Operating)

30 tons (HS Inventory)

20 tons (H Inventory)

Sufficiency Rating: 69.9

National Register of Historic Places Status: Listed. Contributing resource within the
National Register-listed Portland Commercial Historic District.

Historic Bridge Prioritization Status: Select

Historic Character-Defining Features: Reinforced concrete through arches and lamps cast
from molds from the original structure.

The existing reinforced concrete through arch structure replaced a wrought iron bowstring through arch structure built circa 1870. In 1913, O.O. Clayton, the city civil engineer, prepared a design for the proposed new bridge that would serve as a monument to the city and also keep the Salamonie River waterway as

unobstructed as possible in an effort to limit the damage and inconvenience caused by frequent flooding. Although challenged by Daniel Luten with the lowest bid at \$9,840, probably for a filled-spandrel concrete arch, the commissioners honored "the Clayton plan" and awarded the contract to I.E. Smith of Richmond for \$10,240.

B. Structure/Dimensions

Surface Type: Reinforced Concrete Deck with "Flexogrid" epoxy overlay

Out to Out of Copings: 52'-8"

Out to Out of Bridge Floor: 119'-6"

Clear Roadway Width: 29'-2"

Number of Lanes on Structure: 2

Skew: 0°

Type of Superstructure: Reinforced Concrete Through Arch

Spans: 1 @ 111'-6"

Type of Substructure/Foundation: Concrete Abutments (Unknown Foundation)

C. Appurtenances

Bridge Railing: Concrete Rail Posts with Steel Railing, 3'-6" tall

Curbs: 6" tall curb on both sides of the roadway

Sidewalks: 6'-2" (clear) sidewalk, curb, arch and railing on both sides of the roadway

Utilities: Electric conduit through the bridge for the lamp posts in each corner; aerial lines crossing US 27 in the north and south approach roadway

Railroad: None within vicinity of bridge.

D. Approaches

Roadway Width: 29'-2"

Surface Type: Asphalt

Guardrail: W-beam guardrail transition in northwest and southeast corner

Guardrail End Treatment: W-beam buried end section in northwest and southeast corners of the bridge

II. EXISTING CONDITIONS

Photos of the existing conditions can be found in Appendix B.

A. Bridge Deck

1. General. The overall condition of the bridge deck is good (rated 7 out of 9).
2. Overlay. The existing “Flexogrid” epoxy overlay was installed in 2012 and is in poor condition (rated 4 out of 9). Transverse and longitudinal hairline cracks are present throughout the surface. Large portions of the overlay have spalled. Transverse reflective cracks are present above each floor beam and at the longitudinal joints between precast concrete panels. See Photo 9 and 10 in Appendix B.
3. Surface Condition. Hairline longitudinal cracks can be seen through the spalled areas of the overlay. Closely spaced transverse hairline cracks are present at the sidewalks over the floor beams.
4. Underside Condition. Prestressed concrete deck panels are in good condition (rated 7 out of 9). There is minor leakage and efflorescence present between the exterior and first interior panel. See Photo 11 in Appendix B.
5. Joints. There are no bridge deck expansion joints on the structure.
6. Drainage. There are slot drains in the curbs on both sides of the deck. The drains are clogged and do not appear to be draining properly.
7. Bridge Railing. The existing bridge railing consists of concrete posts with steel railing. There is some peeling of the paint, surface rust and pitting, without significant section loss, on the steel railings. There is no protection of the arch rings from traffic. See Photo 17 and 18 in Appendix B.
8. Curbs or Sidewalks. There are two 6'-2" (clear) sidewalks, curbs, arches and railings. The sidewalk and curb exhibit transverse reflective cracking over each floor beam. See Photo 19 in Appendix B.

B. Superstructure

1. General. Overall, the reinforced concrete through arch superstructure is in satisfactory condition (rated 6 out of 9) with minor longitudinal cracks, scalling and small spalls. See Photo 13 and 14 in Appendix B. The existing masonry coating is discolored, cracked and starting to peel on the arch ring. There is an existing concrete patch on the third column from the north on the east arch. The patch material is inconsistent with the original concrete material, porous and poorly bonded along its edges. See Photo 16 in Appendix B.
2. Fracture-Critical Member or Low-Fatigue-Life Details. None.

3. Damage. None.

C. Substructures and Foundations

1. General. Overall, the condition of the reinforced concrete abutments is satisfactory (rated 6 out of 9) with map cracking and light to moderate efflorescence on the face of the abutments.
2. Scour. The bridge is considered stable for scour conditions. The banks are well vegetated with scattered riprap. The channel/channel protection is in satisfactory condition (rated 6 out of 9). There is localized erosion at both spill slopes resulting in exposure of existing gas and sewer utility lines. See Photo 20 in Appendix B.

D. Approaches

1. General. The overall condition of the approach pavement is satisfactory with longitudinal and transverse unsealed cracks. See Photo 12 in Appendix B. The approach pavement will undergo an HMA overlay as part of the HMA overlay, preventative maintenance project on US 27 Des. No. 1700811.

E. Slopedwall

1. There are no slopedwalls on the structure.

III. PURPOSE AND NEED

The need for this project is due to the deteriorated existing bridge thin deck overlay. According to the most recent bridge inspection report, dated May 15, 2019, the wearing surface is in poor condition (rated 4 out of 9). The bridge inspection report noted several deficiencies in the wearing surface as outlined in the existing conditions section of this document. The remaining bridge elements are in satisfactory or good condition (rated 6 or 7 out of 9) and do not warrant rehabilitation work at this time.

Secondary to the primary need of the project, is improving the appearance and condition of the coatings on the structure and its features. The paint coat on the existing steel railing and lamp posts is peeling and exposing the steel underneath. In addition, the existing masonry coating on the arch and columns is discolored, cracked and starting the peel. The City of Portland also desires improvements to the appearance of the bridge as the bridge serves as a gateway to the historic downtown area.

The primary purpose of this project is to improve the condition of the deck wearing surface to at least very good (a rating of 8 out of 9) to extend the overall life of the structure.

The secondary purpose of the project is to improve the appearance of the structure and its features which will act to slow future deterioration and meet the desires of the City of Portland.

IV. ALTERNATIVES

A. No Build/Do Nothing

This alternative allows the existing structure to remain in place with no improvements. No federal funds would be expended, and no action would occur for this alternative. This alternative is an avoidance alternative. This alternative is not prudent for the following reason:

This alternative does not address the purpose and need for the project. This alternative does not address the deteriorated condition of the wearing surface. Without replacement, the existing overlay will continue to deteriorate. This continued deterioration will spread and accelerate deterioration of the underlying bridge deck floor system requiring a more extensive rehabilitation to address the condition in the future.

Without repairs, the estimated service life of the existing wearing surface is 5 years.

B. Rehabilitation for Continued Vehicular Use (two-lane or one-lane option) Meeting Secretary of Interior's Standards for Rehabilitation

This alternative would include rehabilitating the structure for continued vehicular use for two lanes across the bridge.

The scope of the anticipated rehabilitation is as follows:

1. Bridge Deck

The existing bridge thin deck overlay will be removed by a milling operation. All unsound concrete on the deck will be removed and patched with partial depth patching. A new flexible polymeric concrete bridge deck overlay will be installed.

2. Bridge Railing

The existing steel railing components and light fixtures will be removed from the bridge. The existing paint system will be completely removed. The steel components will be shop galvanized and then painted using a powder coating

method in a black matte finish to match the original appearance. The newly painted steel components will be reinstalled on the bridge with all new steel hardware.

3. Superstructure

The existing masonry coating on the arch, columns, and concrete portion of the railing will be cleaned using a masonry cleaner and hand tools, following the National Park Service U.S. Department of the Interior Preservation Brief No. 15, Preservation of Historic Concrete. The existing concrete patch on the east arch column will be removed along with any deteriorated concrete on the other columns, arch or concrete portion of the railing. Patching concrete structures, with a special microsilica concrete mix, and welded steel wire reinforcement will be used to patch the areas of removed concrete. A patch material consisting of a concrete mix with microsilica will match the texture and color of the existing concrete components.

After cleaning and patching the existing arch, columns and concrete portion of the railing, the appearance of the concrete components will be reviewed. If the appearance of the cleaned masonry coating is not a good representation of the existing structure aesthetic, the masonry coating will be completely removed using a chemical concrete cleaner and stain removal and hand tools. Once removed, the concrete components will be surface sealed with a tinted seal for protection. The tint would provide color uniformity on the structure and closely resemble the existing masonry coating.

4. Sidewalk

The surface of the sidewalk, curbs and face of the curbs will be surface sealed with a sealer/healer coating. This will repair existing open cracks, preventing the underlying bridge deck floor system from penetrating chloride infiltration, slowing future deterioration.

The proposed scope of work would fall under INDOT's preventative maintenance guidance, and level one design criteria would not need to be reviewed. However, as shown in Appendix F, it is anticipated that maintaining the existing roadway section across the bridge will satisfy all level one design criteria.

No structural members will need to be replaced.

During construction the bridge will be closed to vehicular traffic. Traffic will be detoured around the structure. The arch work will be staged so that only one half of the bridge is

under construction at a time. This will allow one sidewalk to be open to pedestrian traffic at all times.

The estimated construction cost of this alternative is \$325,500. The expected service life of the rehabilitated structure is 15 years.

See Appendix C for preliminary drawings showing the scope of work for rehabilitation. The drawings included in Appendix C are conceptual illustrations and do not represent 30% plans. See Appendix D for a preliminary cost estimate.

This alternative meets the minimum design standards in the Indiana Design Manual and the Secretary of the Interior's Standards for Rehabilitation without the use of design exceptions. Under this alternative, rehabilitation of the bridge is able to be accomplished at a reasonable cost (13% of the likely cost to replace [\$2,500,000]). This alternative is considered feasible and prudent and satisfies the identified purpose and need.

V. MINIMIZATION AND MITIGATION

A. Minimization

For the preferred alternative, efforts to minimize the impacts to the historic bridge:

1. **Maintain Historic Aesthetics:** Steel railing components and light fixtures will be painted in a black matte finish to maintain the aesthetic of the existing bridge. Tinted surface seal will be used to match the existing masonry coating and create a uniform look, if the existing masonry coating cannot be maintained.
2. **Minor Rehabilitation Measures:** The scope of the project has been minimized to replacing the bridge thin deck overlay and cleaning and restoring the concrete and steel elements on the structure. This will minimize the changes to the existing historic structure while increasing the service life.
3. **Similar Materials:** Patching materials will utilize concrete mixes that resemble the appearance of the existing concrete. This will provide uniformity between the new and patched concrete.

B. Bridge Marketing

Bridge marketing is not necessary for this Select bridge.

C. Mitigation

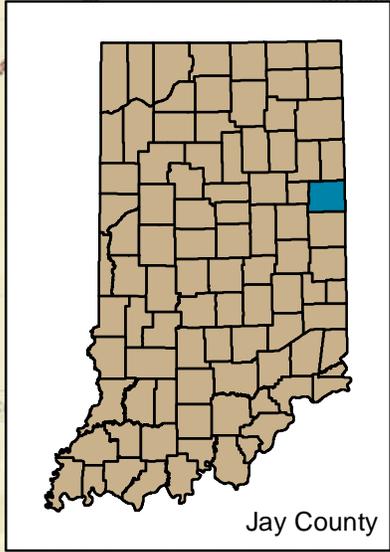
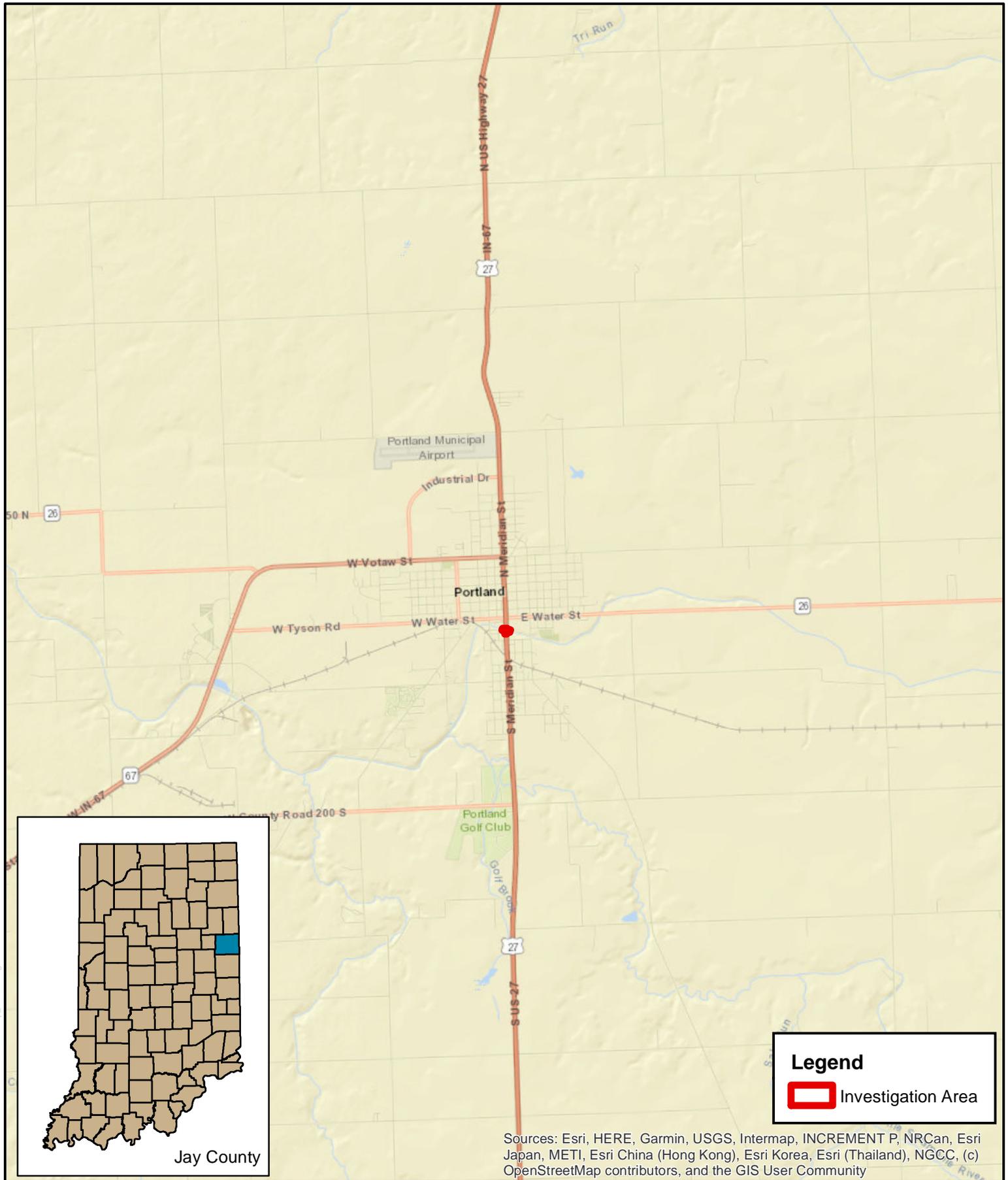
Mitigation measures will include photo documentation of the existing bridge in accordance with the Historic Bridge Programmatic Agreement if requested by the Indiana SHPO. INDOT will coordinate with the Indiana SHPO as appropriate. Per the "Standard Treatment Approach for Historic Bridges" from the Historic Bridges Programmatic Agreement, INDOT will provide rehabilitation plans to the Indiana SHPO when the design is approximately 30% complete, 60% complete, and when final design plans are complete. The purpose of these reviews is to ensure compliance with the Secretary of the Interior's Standards for Rehabilitation, and to incorporate context sensitive design features, where practicable. The drawings included in Appendix C are conceptual illustrations and do not represent 30% plans.

VI. PRELIMINARY PREFERRED ALTERNATIVE

Alternative B - Rehabilitation for Continued Vehicular Use (two-lane option) Meeting Secretary of the Interior's Standards for Rehabilitation is considered feasible and prudent and is the preferred alternative for this project.

See Appendix F for the alternatives analysis table.

Appendix A:
Maps



Legend

Investigation Area

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

LOCHMUELLER GROUP

3502 Woodview Trace, Suite 150
 Indianapolis, IN 46268
 Phone: (317) 222-3880
 Fax: (317) 222-3881

General Location Map

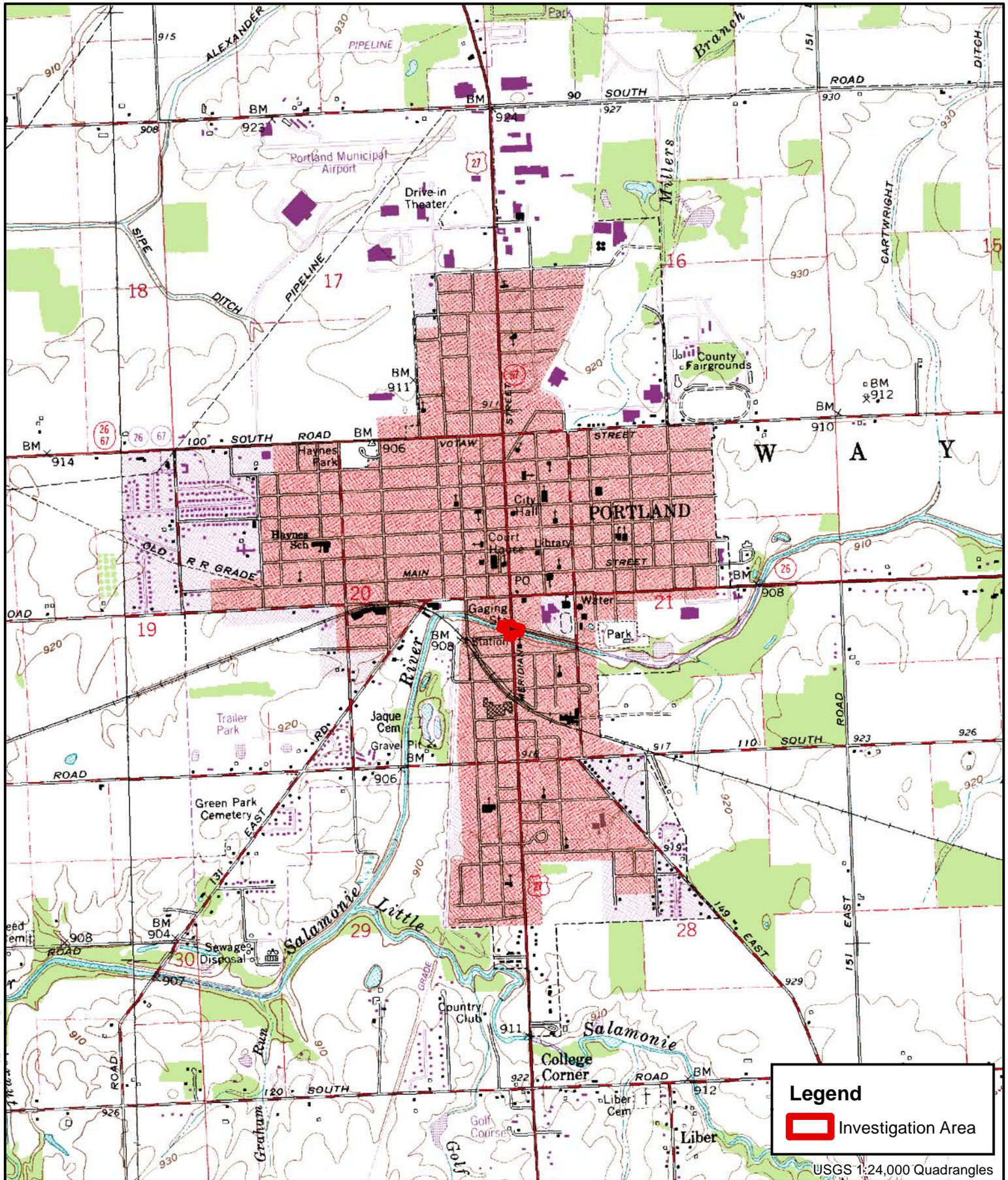
Figure 1

0 0.5 1 Miles

County: Jay
 Township: Wayne
 State: Indiana

Bridge Deck Overlay
 US 27 over Salamonie River
 Created: 11/5/2019, RHook

S:_20140219-20151010\H\Environment\Waters\Attachments\mxd\GeneralLocationMap_US27Bridge.mxd



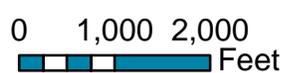
Legend

Investigation Area

USGS 1:24,000 Quadrangles

USGS Topographic Map

Figure 2



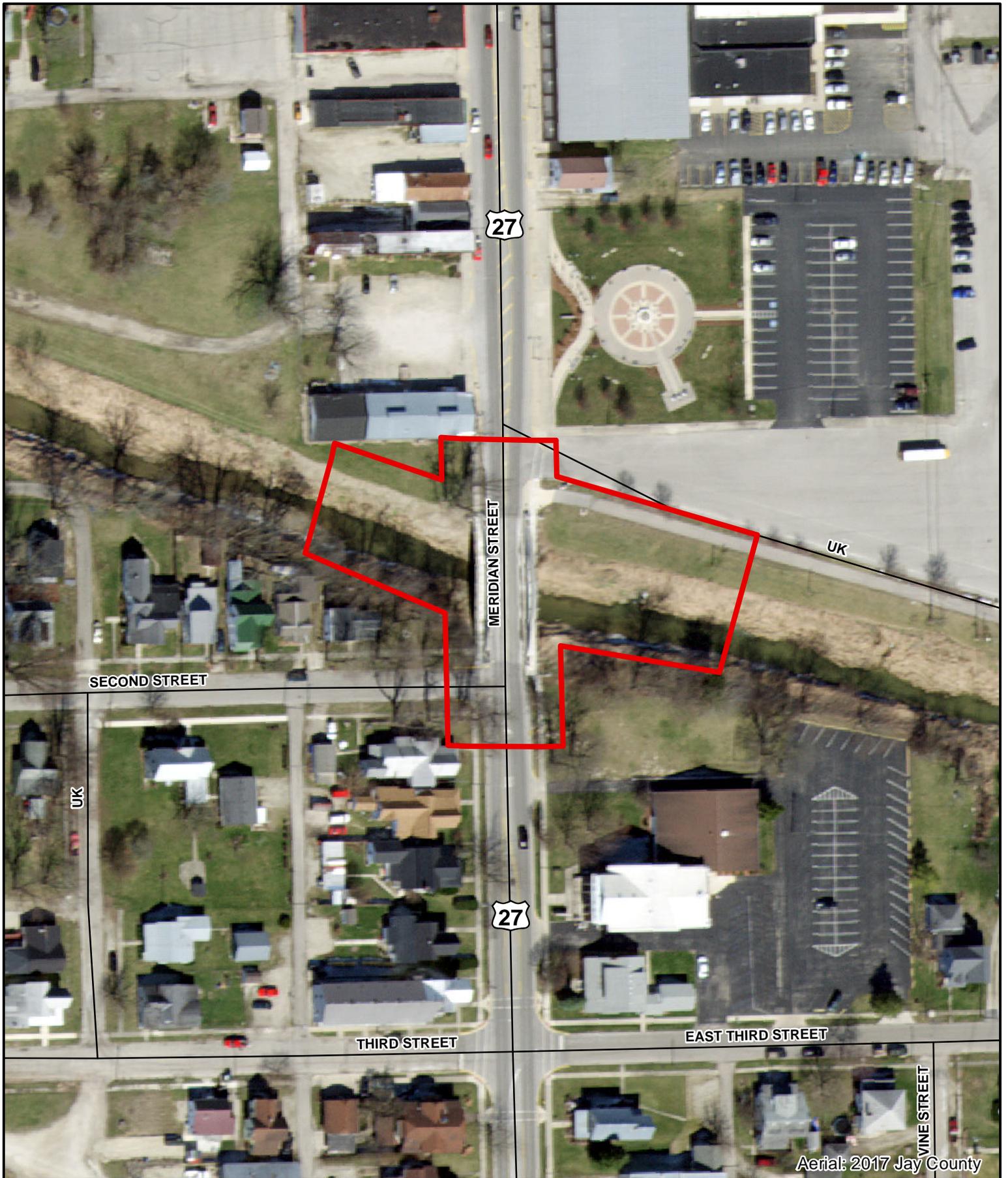
County: Jay Quadrangle: Portland
 Township: Wayne
 State: Indiana

Bridge Deck Overlay
 US 27 over Salamonie River
 Created: 11/5/2019, RHook



3502 Woodview Trace, Suite 150
 Indianapolis, IN 46268
 Phone: (317) 222-3880
 Fax: (317) 222-3881

S:\2018\0219-0018\1018\Environment\Water\A\Task\mms\msh\TopoMap_152781dgr.mxd

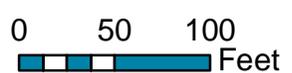


Aerial: 2017 Jay County

LOCHMUELLER GROUP
 3502 Woodview Trace, Suite 150
 Indianapolis, IN 46268
 Phone: (317) 222-3880
 Fax: (317) 222-3881

Aerial Map

Figure 3



County: Jay
 Township: Wayne
 State: Indiana

Bridge Deck Overlay
 US 27 over Salamonie River
 Created: 11/20/2019, RHook

S:\L20160219-00151101\Enviro\Mapes\MX\B\airrail_fool_P_U527\Bridgpe.mxd

Appendix B:
Photographs



Photo 1:

- a. East Side of Structure
- b. Looking West
- c. East Elevation



Photo 2:

- a. Northeast Quadrant
- b. Looking Southwest
- c. East Elevation



Photo 3:

- a. South Approach
- b. Looking North
- c. Bridge Typical Section



Photo 4:

- a. South Approach
- b. Looking North
- c. National Register of Historic Places Sign



Photo 5:

- a. Underside of Structure
- b. Looking West
- c. Downstream



Photo 6:

- a. Underside of Structure
- b. Looking East
- c. Upstream



Photo 7:

- a. South Approach
- b. Looking South
- c. Land use adjacent to south approach is residential.



Photo 8:

- a. North Approach
- b. Looking North
- c. Land use adjacent to north approach is commercial.



Photo 9:

- a. Southeast Corner of Bridge Deck
- b. Looking Northwest
- c. Deterioration of existing bridge deck overlay in northbound lane. Overlay is cracked and spalled.



Photo 10:

- a. Bridge Deck
- b. Looking Down
- c. Typical longitudinal and transverse cracks and spalls in the deck underneath spalled wearing surface.



Photo 11:

- a. From Underside of Bridge
- b. Looking Up at Bottom of Structure
- c. Typical condition of precast deck panels, no deterioration present.



Photo 12:

- a. North Approach
- b. Looking West
- c. Typical longitudinal and transverse cracks and settlement in approach pavement at ends of bridge.



Photo 13:

- a. From East Sidewalk
- b. Looking West
- c. Typical stained condition of masonry coating on arch surface.



Photo 14:

- a. Roadway
- b. Looking East
- c. Cracking with efflorescence near top of east arch west face.



Photo 15:

- a. From West Sidewalk
- b. Looking East
- c. Typical stained condition of masonry coating, honeycombing and cracks on column surface.



Photo 16:

- a. From East Sidewalk
- b. Looking West
- c. Existing patch on third column from north at east arch. Patch material is inconsistent with original concrete, porous and poorly bonded along its edges.



Photo 17:

- a. From West Sidewalk
- b. Looking West
- c. Typical railing.



Photo 18:

- a. From West Sidewalk
- b. Looking West
- c. Typical condition of steel portion of railing. Paint is peeling. The exposed steel railing exhibits surface rust with minor pitting.



Photo 19:

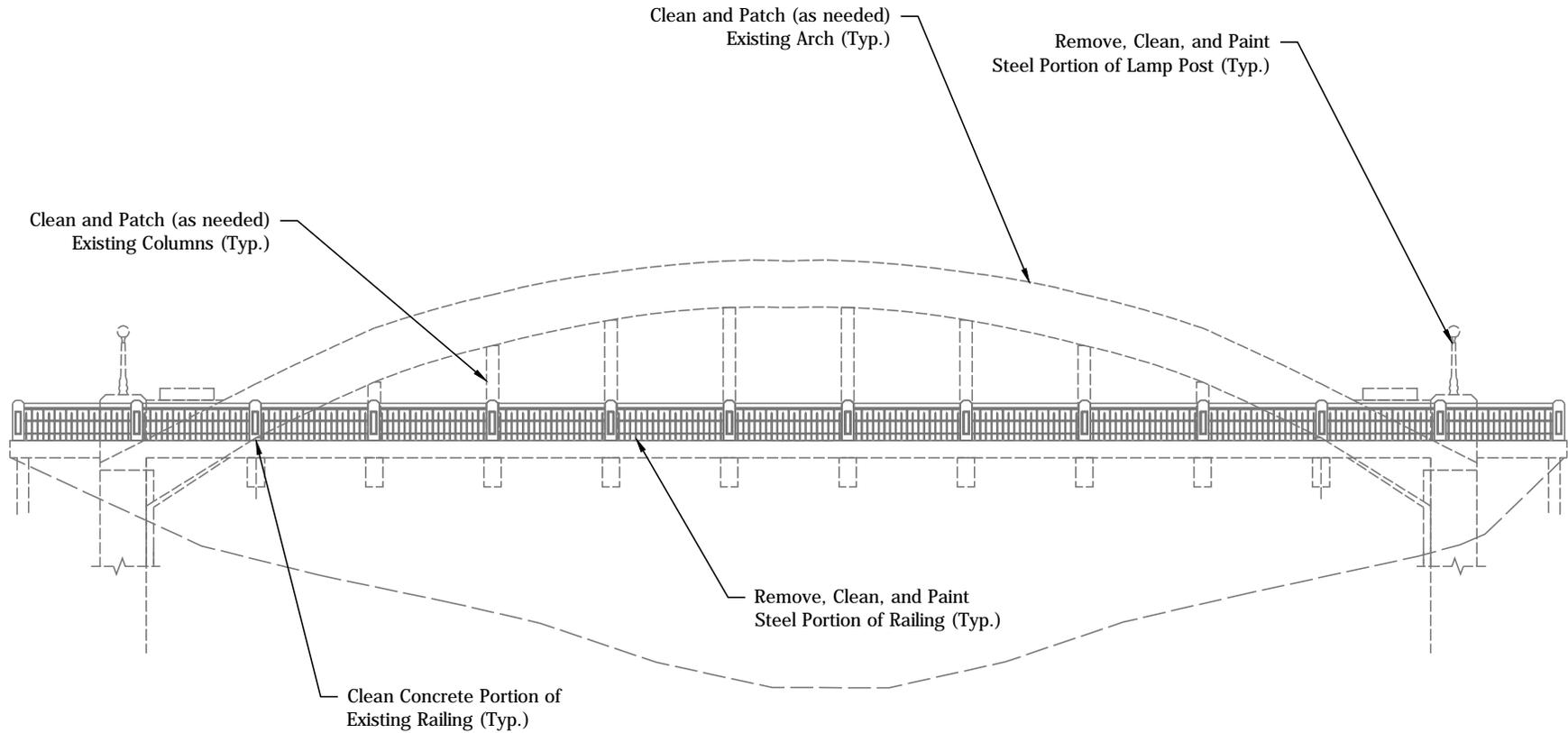
- a. From West Sidewalk
- b. Looking South
- c. Typical transverse cracks on sidewalk.



Photo 20:

- a. From South Spill Slope
- b. Looking North
- c. Localized erosion on north spill slope exposing existing gas and sewer utilities.

Appendix C:
Drawings

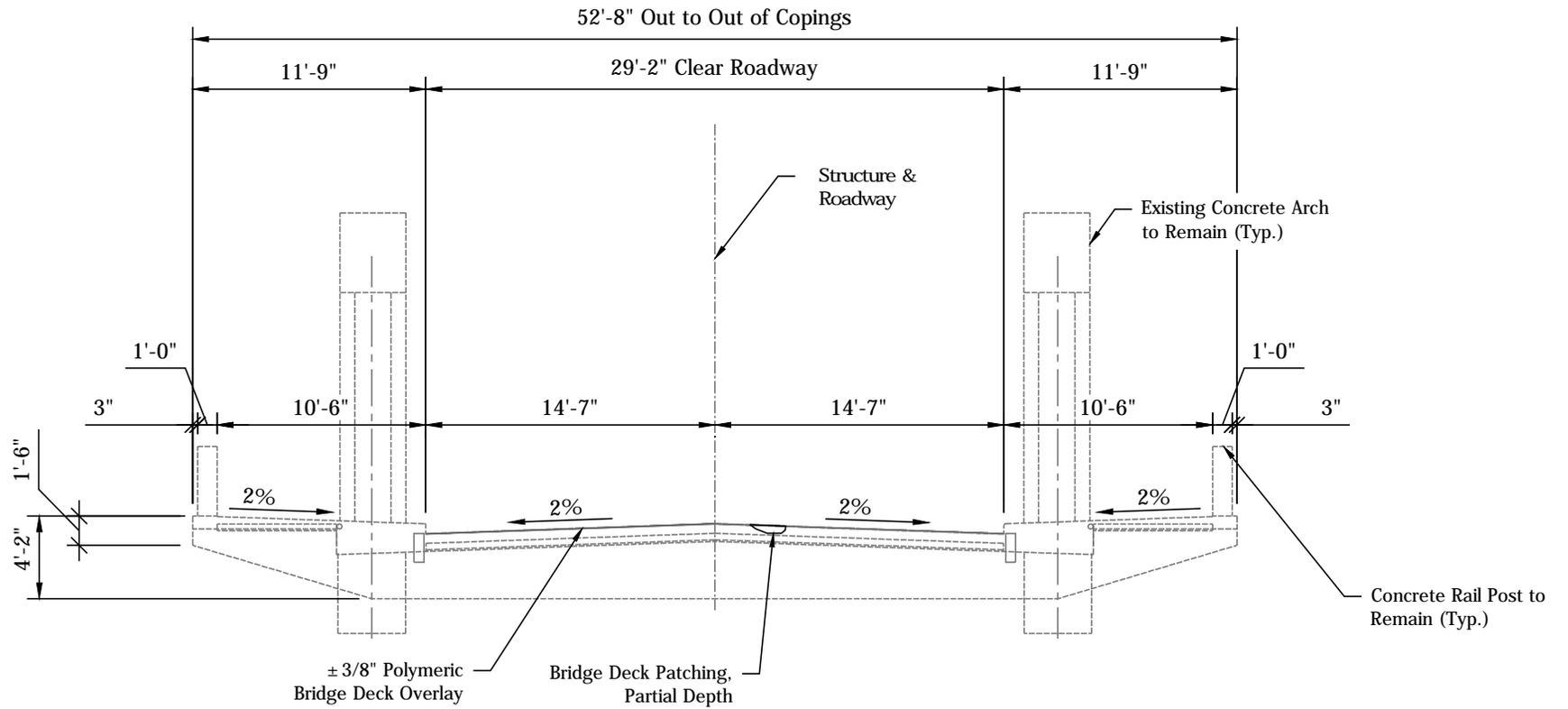


LOCHMUELLER GROUP
 112 West Jefferson Blvd, Suite 500
 South Bend, Indiana 46601
 574.334.5460

Drawing not to scale.

Drawing 1
US 27 over Salamonie River - Elevation

Designed By:	JHP
Date:	12/16/19



112 West Jefferson Blvd, Suite 500
 South Bend, Indiana 46601
 574.334.5460

Drawing not to scale.

Drawing 2
US 27 over Salamonie River - Typical Section

Designed By:	JHP
Date:	12/16/19

Appendix D:
Cost Estimate

Appendix D – Cost Estimate

**Rehabilitation for Continued Vehicular Use (two-lane or one-lane option)
Meeting Secretary of the Interior’s Standards for Rehabilitation**

Pay Item No.	Pay Item Descriptions	Quantity	Unit	Unit Price	Extended
105-06845	CONSTRUCTION ENGINEERING	1	L.S.	\$5,000.00	\$5,000.00
110-01001	MOBILIZATION AND DEMOBILIZATION	1	L.S.	\$10,000.00	\$10,000.00
619-00000	CLEANING OF EXISTING CONCRETE STRUCTURE	1	L.S.	\$25,000.00	\$25,000.00
619-00001	REMOVAL OF MASONRY COATING	1	L.S.	\$20,000.00	\$20,000.00
619-12460	DISPOSAL OF CLEANING WASTE NONHAZARDOUS, BRIDGE NO {1}	1	L.S.	\$10,000.00	\$10,000.00
708-51814	WELDED STEEL WIRE REINFORCEMENT	27	S.F.	\$12.00	\$324.00
709-51821	SURFACE SEAL	1	L.S.	\$20,000.00	\$20,000.00
709-51821	SURFACE SEAL, MODIFIED	1	L.S.	\$8,000.00	\$8,000.00
710-09158	PATCHING CONCRETE STRUCTURES	27	S.F.	\$250.00	\$6,750.00
722-12463	BRIDGE DECK, REMOVE EXISTING CONCRETE OVERLAY	388	SYS	\$30.00	\$11,640.00
722-51852	BRIDGE DECK PATCHING, PARTIAL DEPTH	282	S.F.	\$40.00	\$11,280.00
738-09456	POLYMERIC CONCRETE BRIDGE DECK OVERLAY	388	S.Y.	\$75.00	\$29,100.00
801-03290	CONSTRUCTION SIGN, C	2	EACH	\$250.00	\$500.00
801-04308	ROAD CLOSURE SIGN ASSEMBLY	6	EACH	\$220.00	\$1,320.00
801-06625	DETOUR ROUTE MARKER ASSEMBLY	15	EACH	\$100.00	\$1,500.00
801-06640	CONSTRUCTION SIGN, A	15	EACH	\$150.00	\$2,250.00
801-06645	CONSTRUCTION SIGN, B	2	EACH	\$75.00	\$150.00
801-06775	MAINTAINING TRAFFIC	1	L.S.	\$40,000.00	\$40,000.00
801-07118	BARRICADE, III-A	96	L.F.	\$15.00	\$1,440.00
801-07119	BARRICADE, III-B	48	L.F.	\$15.00	\$720.00
801-08400	TEMPORARY TRAFFIC BARRIER, TYPE 1 {BRIDGE 1}	240	L.F.	\$25.00	\$6,000.00
805-12219	POWDER COATING {STEEL RAILING}	1	L.S.	\$60,000.00	\$60,000.00

Subtotal	\$270,974.00
Contingency (20%)	\$54,500.00
Total	\$325,474.00

Appendix E:
Bridge Existing Conditions and Applicable Design Criteria Table

Appendix E – Summary of Bridge Existing Conditions and Applicable Design Criteria

<i>Design Element</i>	<i>Design Manual Reference</i>	<i>Minimum Design Criteria</i>	<i>Existing Condition</i>	<i>Proposed Condition</i>	<i>Design Exception Required</i>
<i>Travel Lane</i>	IDM Figure 55-3F Built Up	10'-0"	12'-0"	12'-0"	No
<i>Curb Offset</i>	IDM Figure 55-3F Built Up	1'-0"	2'-7"	2'-7"	No
<i>Structural Capacity</i>	IDM Figure 55-3F	HS-20	HS-20	HS-20	No
<i>Cross Slope</i>	IDM Figure 55-3F	1.5% (Existing Bridge to Remain in Place)	2%	2%	No
<i>Clear Roadway Width</i>	IDM Figure 55-3F	29'-2"	29'-2"	29'-2"	No
<i>Vertical Clearances</i>	IDM Figure 55-3F	N/A	N/A	N/A	No

Appendix F:
Alternatives Analysis Table

Appendix F – Alternatives Analysis Table

<i>Alternative</i>	Meets Project Purpose & Need?	Construction Cost	ROW Amounts & Cost	Total Cost	Other Factors	Feasible and Prudent?
<i>A – No Build</i>	No	N/A	None	N/A	Deterioration of the wearing surface would continue and lead to deterioration of the deck, requiring a more extensive rehabilitation.	The alternative is not prudent because it does not meet the project purpose and need.
<i>B - Rehabilitation for Continued Vehicular Use (Rehab = No Adverse Effect)</i>	Yes	\$325,500	No new ROW Required	\$325,500	This alternative meets the purpose and need without the use of design exceptions.	Yes