

State-Level Recordation

BLUE CREEK TWIN ARCH BRIDGE

Kanawha County, West Virginia

State Project S320-52-3.63
Federal Project STP-0052(249)D



**West Virginia Department
of Transportation**

Division of Highways
Engineering Division
Environmental Section
304.558.2885

December 2017

STATE-LEVEL RECORDATION

**BLUE CREEK TWIN ARCH BRIDGE
NBI Structure No. 20A128**

Location: Kanawha County Route 52 (New Hope Road) over Blue Creek
Blue Creek
Kanawha County
West Virginia

USGS Blue Creek, West Virginia Quadrangle. The bridge is located at latitude 38.265156, longitude -81.272226. The coordinate represents the center of the bridge at mid-span. The coordinate was obtained on September 5, 2017, using Google Earth computer software. The coordinate's datum is World Geodetic System 1984 (WGS84). The bridge's location has no restriction on its release to the public.

Date of Construction: 1926

Engineer/Builder: Luten Bridge Company, York, Pennsylvania.

Present Owner: West Virginia Department of Transportation
Division of Highways
1334 Smith Street
Charleston, WV 25301

Present Use: Vehicular Bridge

Significance: The Blue Creek Twin Arch Bridge is significant under National Register Criterion C as a distinctive example of a reinforced concrete Luten arch bridge, specifically, a spandrel braced arch bridge with arch ribs supporting the deck.

Project Information: The project has been undertaken due to the poor condition of the bridge. Any future deterioration of the bridge would result in its closure. The existing bridge warrants replacement. This documentation was undertaken in October 2016 in accordance with a Memorandum of Agreement among the West Virginia Division of Highways, West Virginia State Historic Preservation Officer, and the Federal Highway Administration. These measures are required prior to replacement of this National Register of Historic Places (NRHP)-eligible structure.

Katie K. Reed, Preservation Planner
Michael Baker International, Inc.
100 Airside Drive
Moon Township, PA 15108
December 2017

Summary Description of Bridge and Setting

Originally constructed in 1926, the Blue Creek Twin Arch Bridge (NBI Structure No. 20A128) carries Kanawha County Route 52 (New Hope Road) across Blue Creek, connecting the census-designated place of Elkview (west side of the creek) to the unincorporated community of Blue Creek (east side of the creek). The bridge is located about 15 miles east of Charleston, just south of the confluence of the Elk River and Blue Creek.

The Blue Creek Twin Arch Bridge was constructed by the Luten Bridge Company of York, Pennsylvania. The bridge is classified as a Spandrel Braced Arch Bridge. In a Spandrel Braced Arch Bridge, the deck is cantilevered over spandrel bracing, unlike a typical arch bridge which uses vertical members (spandrel columns) or earth fill to transmit the load from the deck to the arch. In Luten's designs, the reinforced concrete spandrel braces contain two tiers of longitudinal reinforcing rods that help support the bridge deck that is cantilevered over it. This design's lack of an arch barrel ring and earth fill results in light arches and efficient construction through minimum use of steel.¹

The Blue Creek Twin Arch Bridge has two arches, which meet mid-span at a monolithic, reinforced concrete center pier. The edges of the arch rings are beveled, which is a generic treatment not believed to be specific to Daniel Luten himself (as was an ornamental rounded edge element). At each end of the bridge are reinforced concrete abutments. The solid, reinforced concrete parapets are ornamented with incised rectangular panels on both their inner and outer faces. The deck is supported by two spandrel-braced arch ribs, which feature a solid (closed) spandrel wall.

The bridge superstructure is 126' long, and each span is equidistant. The structure has 4" x 6" concrete curbs and 3" diameter drains along each side of the approximately 15'-wide roadway. The reinforced concrete deck slab is 6" thick. The deck's wearing course is 2" of asphalt overlay².

The Blue Creek Twin Arch Bridge retains a high level of integrity and exhibits no major modifications. After a 1995 inspection, a W-shape galvanized steel guardrail was installed at the bridge approaches, and state contractors installed steel plate retaining walls at both abutments. After a 2003 inspection, repairs were made to the underside of the deck overhang. The resource retains integrity of location, design, setting, materials, workmanship, feeling, and association.

¹ M&H Architecture, Inc. *Indiana Historic Bridge Inventory*. D-10.

² KCI Technologies, Inc. and Mead & Hunt, Inc. *West Virginia Statewide Historic Bridge Survey: Final Survey Report*.

Technological and Historical Significance

The Blue Creek Twin Arch Bridge is significant in the area of engineering as an example of a spandrel braced, reinforced concrete arch bridge designed by the Luten Bridge Company. Because West Virginia has a large population of bridges constructed by the Luten Bridge Company or associated directly with Daniel B. Luten, the West Virginia Statewide Historic Bridge Survey provides specific evaluation methodology for determining NRHP-eligibility.

Following the methodology outlined in that document, the Blue Creek Twin Arch Bridge is uncommon and significant as a spandrel braced arch bridge with arch ribs supporting the deck. Further, the methodology states that the “multi-span examples... are uncommon nationally”.³ When applying points for evaluation, the bridge falls under “Category 1 – Uncommon subtypes” for a spandrel-braced design with arch ribs supporting the deck. In this way, the bridge is awarded four (4) significance points for its uncommon subtype. Because the bridge does not have rounded arch ring bevels or a nonsymmetrical arch design, it cannot be attributed directly to Daniel B. Luten. However, it is associated with the Luten Bridge Company and is therefore awarded two (2) significance points for the work of a master with regional significance. The bridge also receives two (2) significance points for the artistic treatment of the paneled parapet. The sum of significance points equals eight (8), though only two points are required for NRHP eligibility. No points are deducted for integrity because the bridge is unaltered and retains good integrity.

Historical Background

Road travel into the heart of Kanawha County remained slow and difficult into the twentieth century, when more people had access to automobiles and roads began to improve. Prior to that, early highways included the James River & Kanawha Turnpike; the Giles, Fayette & Kanawha Turnpike; the Charleston & Point Pleasant Turnpike; the Charleston & Ravenswood Turnpike; and the Guyandotte & Charleston Turnpike. Neither the 1897 or 1907 USGS quadrangle maps, nor the 1933 county atlas, shows a road in the trajectory of present-day Route 52. The road finally appears on the 1957 USGS quadrangle, indicating the road was constructed between 1933 and 1957. An earlier, local road network likely took advantage of the various railroad rights-of-way, as evidenced in a ca. 1912 photograph (Figure 1). Prior to construction of the highway bridge, Blue Creek residents were known to cross Blue Creek via the Charleston, Clendenin, and Sutton Railroad (CC&S) bridge. They would occasionally drive their cars across the railroad bridge. The subject bridge, carrying Kanawha County Route 52 over Blue Creek, was constructed in 1926 by the Luten Bridge Company of York, Pennsylvania.

³ KCI Technologies, Inc. and Mead & Hunt, Inc. *West Virginia Statewide Historic Bridge Survey: Final Survey Report*.

Luten Bridge Company

Daniel B. Luten (1869-1946) was a bridge engineer based out of Indianapolis, Indiana. He developed innovative bridge engineering concepts to improve the capabilities and functions of bridges. His designs helped to promote concrete as an important alternative to steel, made bridges lighter, and increased efficiency through use of fewer building materials. By 1915, he held “39 patents on concrete bridge plans and had designed about 6,000 bridges in the United States, Mexico, and Canada.”⁴ Within ten years, his number of patents increased to 50. While Luten designed and built bridges, other firms also used his designs, including The Luten Bridge Company of York, Pennsylvania. The Luten Bridge Company built bridges using Luten’s designs, but also sold other, similar concrete arch bridge designs. In West Virginia, the Statewide Historic Bridge Survey identified 215 reinforced concrete arch bridges which were associated with the Luten Bridge Company, and/or with Daniel B. Luten himself.⁵

⁴ KCI Technologies, Inc. and Mead & Hunt, Inc. *West Virginia Statewide Historic Bridge Survey: Final Survey Report*.

⁵ Ibid.

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- Molnar, Katherine. *Historic Resources Survey and Determination of Eligibility Report: Blue Creek Twin Arch Bridge Replacement Project, Kanawha County, WV*. Moon Township, PA: Michael Baker International, Inc., 2016.
- U.S. Geological Survey. *Blue Creek, WV*, 1957 ed., photorevised 1971, 7.5 Minute Topographic Quadrangle. Reston, VA: USGS, 1957.

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Figure 1: Ca. 1912 image showing Blue Creek Community, at the juncture of the Blue Creek and the Elk River. Note the railroad rights-of-way also serving as a route for pedestrians and automobiles.

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Name of Property: Blue Creek Twin Arch Bridge
(NBI Structure No. 20A128)
City or Vicinity: Blue Creek
County: Kanawha County
State: West Virginia
Name of Photographer: Jesse A. Belfast
Date of Photographs: October 25, 2016
Location of Original Digital Files: Michael Baker International
100 Airside Drive, Moon Township, PA 15108

Photo # 1 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0001)
OVERVIEW OF NORTHWEST ELEVATION OF BRIDGE FROM SOUTH BANK OF BLUE CREEK, FACING NORTHEAST.

Photo # 2 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0002)
NORTHWEST ELEVATION OF BRIDGE FROM RAILROAD BRIDGE OVER BLUE CREEK, FACING EAST.

Photo # 3 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0003)
NORTHWEST ELEVATION OF BRIDGE FROM NORTHEAST BANK OF BLUE CREEK SHOWING DETAIL OF PANELED PARAPET, FACING SOUTH.

Photo # 4 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0004)
NORTHWEST ELEVATION OF BRIDGE FROM NORTH BANK OF BLUE CREEK, FACING SOUTHEAST.

Photo # 5 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0005)
SOUTHEAST ELEVATION OF BRIDGE, FACING SOUTHWEST.

Photo # 6 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0006)
SOUTHEAST ELEVATION OF BRIDGE SHOWING DETAIL OF SPANDREL WALL AND NORTHEAST ABUTMENT, FACING NORTH.

Photo # 7 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0007)
SOUTHEAST ELEVATION OF BRIDGE SHOWING DETAIL OF PANELED PARAPET AND CANTILEVERED DECK, FACING NORTHWEST.

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Photo # 8 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0008)
DETAIL OF WEST WING WALL NEXT TO SOUTHWEST ABUTMENT, FACING
SOUTHEAST.

Photo # 9 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0009)
SOUTHEAST ELEVATION AND UNDERSIDE OF BRIDGE SHOWING DETAIL OF
SOUTHWEST ABUTMENT, CANTILEVERED DECK, AND CLOSED SPANDREL
BRACED ARCHES, FACING SOUTHWEST.

Photo # 10 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0010)
SOUTHEAST ELEVATION AND UNDERSIDE OF BRIDGE SHOWING DETAIL OF
CENTER PIER AND CLOSED SPANDREL BRACED ARCHES, FACING SOUTHWEST.

Photo # 11 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0011)
UNDERSIDE OF BRIDGE SHOWING DETAIL OF CENTER PIER AND CLOSED
SPANDREL BRACED ARCHES FROM NORTHEAST ABUTMENT, FACING
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Photo # 12 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0012)
UNDERSIDE OF BRIDGE SHOWING DETAIL OF NORTHEAST ABUTMENT AND
CLOSED SPANDREL BRACED ARCHES, FACING NORTHEAST.

Photo # 13 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0013)
SOUTHWEST APPROACH TO BRIDGE, FACING NORTHEAST.

Photo # 14 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0014)
DETAIL OF SOUTHWEST PARAPET SHOWING PANELED PARAPET
SECTIONS AND PLAIN END POST, FACING SOUTHWEST.

Photo # 15 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0015)
DETAIL OF SOUTHWEST PARAPET WITH BRIDGE PLAQUE, FACING NORTH.

Photo # 16 (WV_WV_KanawhaCounty_BlueCreekTwinArchBridge_0016)
DETAIL OF BRIDGE PLAQUE ON INSIDE OF NORTHWEST PARAPET (READS: "1926 /
LUTEN BRIDGE CO. / YORK, PA."), FACING NORTHWEST.

Photo # 17 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0017)
DETAIL OF BRIDGE PLAQUE ON INSIDE OF SOUTHEAST PARAPET (READS: "OMER
GIVEN, PRES. / GRANT COPENHAVER COUNTY COURT / W.H. O'DELL / R.R.
BARTON, COUNTY ROAD ENGINEER"), FACING SOUTHEAST.

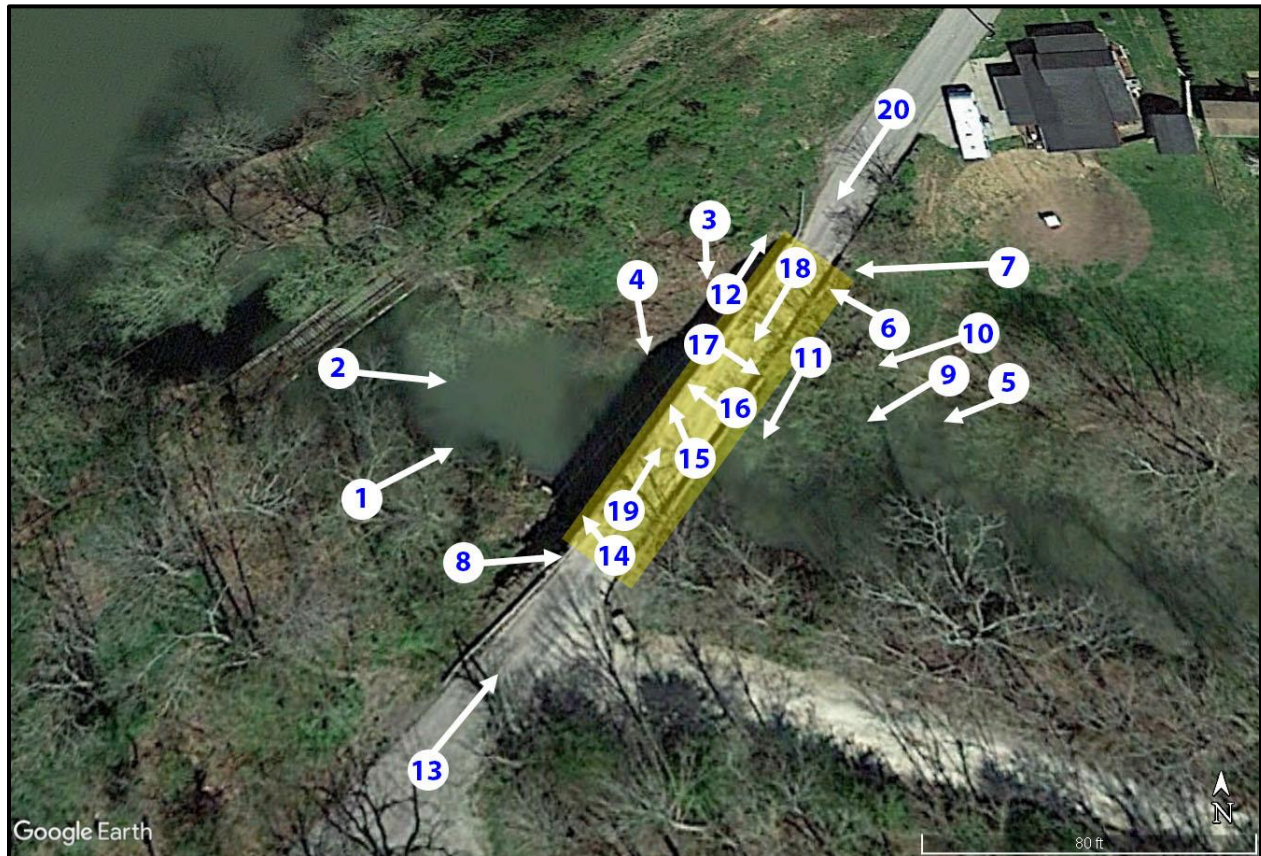
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Photo # 18 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0018)
BRIDGE DECK FROM CENTER OF BRIDGE SHOWING PANELED PARAPETS WITH
BRIDGE PLAQUES, FACING SOUTHWEST.

Photo # 19 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0019)
BRIDGE DECK FROM CENTER OF BRIDGE SHOWING PANELED PARAPETS WITH
BRIDGE PLAQUES, FACING NORTHEAST.

Photo # 20 (WV_KanawhaCounty_BlueCreekTwinArchBridge_0020)
NORTHEAST APPROACH TO BRIDGE, FACING SOUTHWEST.

PHOTOGRAPH KEY



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PHOTO 1 OVERVIEW OF NORTHWEST ELEVATION OF BRIDGE FROM SOUTH BANK OF
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PHOTO 2 NORTHWEST ELEVATION OF BRIDGE FROM RAILROAD BRIDGE OVER BLUE CREEK, FACING EAST.

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PHOTO 3 NORTHWEST ELEVATION OF BRIDGE FROM NORTHEAST BANK OF BLUE CREEK SHOWING DETAIL OF PANELED PARAPET, FACING SOUTH.

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PHOTO 4 NORTHWEST ELEVATION OF BRIDGE FROM NORTH BANK OF BLUE CREEK,
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PHOTO 5 SOUTHEAST ELEVATION OF BRIDGE, FACING SOUTHWEST.



PHOTO 6 SOUTHEAST ELEVATION OF BRIDGE SHOWING DETAIL OF SPANDREL
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PHOTO 7 SOUTHEAST ELEVATION OF BRIDGE SHOWING DETAIL OF PANELED
PARAPET AND CANTILEVERED DECK, FACING NORTHWEST.



PHOTO 8 DETAIL OF WEST WING WALL NEXT TO SOUTHWEST ABUTMENT, FACING SOUTHEAST.



PHOTO 9 SOUTHEAST ELEVATION AND UNDERSIDE OF BRIDGE SHOWING DETAIL OF SOUTHWEST ABUTMENT, CANTILEVERED DECK, AND CLOSED SPANDREL BRACED ARCHES, FACING SOUTHWEST.



PHOTO 10 SOUTHEAST ELEVATION AND UNDERSIDE OF BRIDGE SHOWING DETAIL OF CENTER PIER AND CLOSED SPANDREL BRACED ARCHES, FACING SOUTHWEST.



PHOTO 11 UNDERSIDE OF BRIDGE SHOWING DETAIL OF CENTER PIER AND CLOSED SPANDREL BRACED ARCHES FROM NORTHEAST ABUTMENT, FACING SOUTHWEST.



PHOTO 12 UNDERSIDE OF BRIDGE SHOWING DETAIL OF NORTHEAST ABUTMENT AND
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PHOTO 13 SOUTHWEST APPROACH TO BRIDGE, FACING NORTHEAST.



PHOTO 14 DETAIL OF SOUTHWEST PARAPET SHOWING PANELED PARAPET SECTIONS
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PHOTO 15 DETAIL OF SOUTHWEST PARAPET WITH BRIDGE PLAQUE, FACING NORTH.



PHOTO 16 DETAIL OF BRIDGE PLAQUE ON INSIDE OF NORTHWEST PARAPET (READS: "1926 / LUTEN BRIDGE CO. / YORK, PA."), FACING NORTHWEST.

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PHOTO 17 DETAIL OF BRIDGE PLAQUE ON INSIDE OF SOUTHEAST PARAPET (READS: "OMER GIVEN, PRES. / GRANT COPENHAVER COUNTY COURT / W.H. O'DELL / R.R. BARTON, COUNTY ROAD ENGINEER"), FACING SOUTHEAST.

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PHOTO 18 BRIDGE DECK FROM CENTER OF BRIDGE SHOWING PANELED PARAPETS
WITH BRIDGE PLAQUES, FACING SOUTHWEST.

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PHOTO 19 BRIDGE DECK FROM CENTER OF BRIDGE SHOWING PANELED PARAPETS
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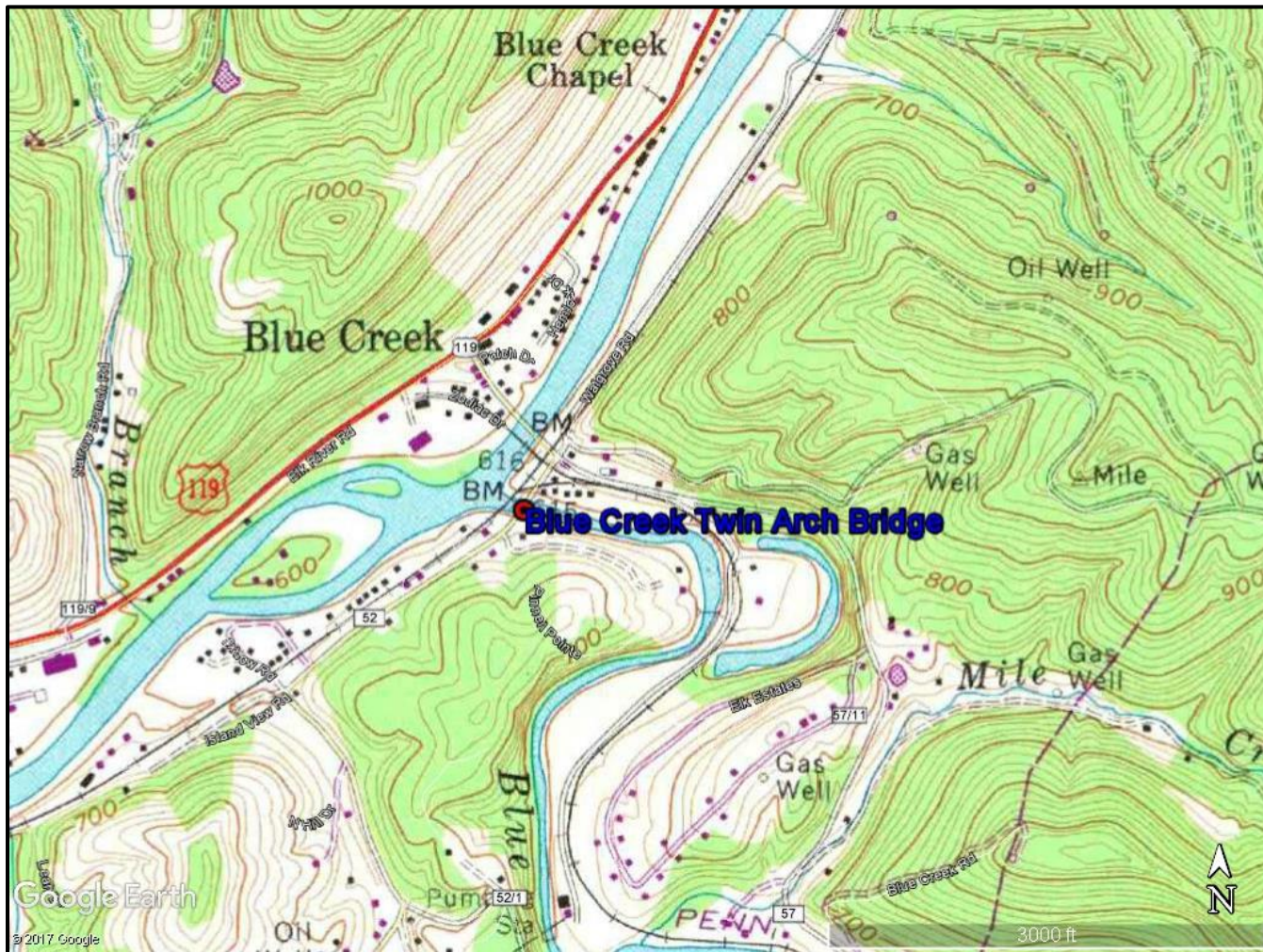


PHOTO 20 NORTHEAST APPROACH TO BRIDGE, FACING SOUTHWEST.

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ATTACHMENTS

- PROJECT MAPPING
- MEMORANDUM OF AGREEMENT

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Blue Creek Twin Arch Bridge, as shown on the 1957 *Blue Creek, WV 7.5'* topographic quadrangle (photorevised 1971).

**MEMORANDUM OF AGREEMENT
BY AND AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
AND THE WEST VIRGINIA DIVISION OF HIGHWAYS**

**REGARDING IMPLEMENTATION OF THE BLUE CREEK TWIN ARCH
BRIDGE PROJECT
STATE PROJECT #S320-52-3.63
FEDERAL PROJECT #STP-0052(249)D
KANAWHA COUNTY, WEST VIRGINIA
AUGUST 2017**

WHEREAS, the Federal Highway Administration (FHWA), in cooperation with the West Virginia Division of Highways (WVDOH), proposes to replace the Blue Creek Twin Arch Bridge, which spans the Blue Creek in Kanawha County, West Virginia, hereinafter referred to as the Project. The improvements involve the construction of a new bridge downstream of the current location while maintaining traffic on the existing bridge and approaches during construction; and

WHEREAS, the FHWA has determined that the Project will have an adverse effect upon the Blue Creek Twin Arch Bridge, a property on or eligible for the National Register of Historic Places (NRHP); and

WHEREAS, the FHWA has consulted with the West Virginia State Historic Preservation Officer (WVSHPO) pursuant to 36 CFR Part 800 Implementing Section 106 of the National Historic Preservation Act; (16 U.S.C., 470f); and

WHEREAS, the FHWA has determined that the Project will not affect archaeological properties; and

WHEREAS, The WVDOH has contacted the Kanawha Valley Historical & Preservation Society and the Coal Heritage Highway Authority/National Coal Heritage Area regarding the project. No comments were received from the groups.

WHEREAS, in accordance with 36 CFR 800.6 (a) (1), the FHWA has notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination providing the specified documentation, and the ACHP has chosen not to participate in the consultation pursuant to 36 CFR 800.6 (a) (1) (iii);

NOW, THEREFORE, the FHWA, the WVSHPO, and the WVDOH agree that the undertaking will be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties.

STIPULATIONS

The FHWA shall ensure that the following stipulations are carried out:

Blue Creek Twin Arch Bridge Project

- I. The Blue Creek Twin Arch Bridge will be documented in its present historic setting. The documentation package will include 5" x 7" black and white digital prints in accordance with the National Register of Historic Places and National Historic Landmarks Survey Photo Policy Expansion of January 2009.
- II. A brief history of the structure and the area will be included along with fully completed West Virginia Historic Property Inventory forms and copies of any available drawings of the bridge from the WVDOH bridge files.
- III. The WVDOH will install a historic marker explaining the history of the bridge along with the history of the Blue Creek/Elk River Area. The marker will be located in the proximity of the new bridge. The WVSHPO will be given the opportunity to review the marker prior to fabrication.
- IV. 150 color brochures of the Blue Creek Twin Arch Bridge will be developed by the WVDOH and distributed to the Elk Valley Branch Library, Elk Valley Express Library and the Kanawha Valley Historical & Preservation Society. The WVSHPO will be given the opportunity to review all educational materials developed for this stipulation. A CD containing the brochure will also be given to all the groups to print brochures when the original total has been exhausted.
- V. The Blue Creek Twin Arch Bridge will be documented on the West Virginia historic bridge website: Highways Through History (<http://www.highwaysthroughhistory.com>).

VI. Duration

This MOA will expire if its stipulations are not carried out within five (5) years from the date of its execution. At such time, and prior to work continuing on the undertaking, the FHWA shall either (a) execute an MOA pursuant to 36 CFR 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. Prior to such time, FHWA may consult with other signatories to reconsider the terms of the MOA and amend it in accordance with Stipulation X below. FHWA shall notify the signatories as to the course of action it will pursue.

VII. Post-Review Discoveries

If any unanticipated discoveries of historic properties or archaeological sites, including human burial sites and/or skeletal remains, are encountered during the implementation of this undertaking, work shall be suspended in the area of the discovery until the

WVDOH has developed and implemented an appropriate treatment plan in consultation with the WVSHPO pursuant to 36 CFR 800.13 (b).

VIII. Monitoring and Reporting

Each year following the execution of this MOA until it expires or is terminated, FHWA shall provide all parties to this MOA a summary report detailing work carried out pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in FHWA's efforts to carry out the terms of this MOA.

IX. Dispute Resolution

Should any signatory or concurring party to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, FHWA shall consult with such party to resolve the objection. If FHWA determines that such objection cannot be resolved, FHWA will:

- A. Forward all documentation relevant to the dispute, including the FHWA's proposed resolution, to the ACHP. The ACHP shall provide FHWA with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, FHWA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories and concurring parties, and provide them with a copy of this written response. FHWA will then proceed according to its final decision.
- B. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, FHWA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, FHWA shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories and concurring parties to the MOA, and provide them and the ACHP with a copy of such written response.
- C. FHWA's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

X. Amendments

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

XI. Termination

If any signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other parties to attempt to develop an amendment per Stipulation X, above. If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

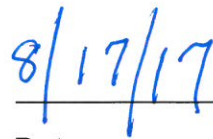
Once the MOA is terminated, and prior to work continuing on the undertaking, FHWA must either (a) execute a MOA pursuant to 36 CFR 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. FHWA shall notify the signatories as to the course of action it will pursue.

EXECUTION of the Memorandum of Agreement by the FHWA, WVSHPO, the WVDOH and the Council, and implementation of its terms evidence that the FHWA has afforded the Council an opportunity to comment on the Blue Creek Twin Arch Bridge Project and its effects on historic properties, and that the FHWA has taken into account the effects of the undertaking on the historic properties.

Signatories Page

Federal Highway Administration

Date



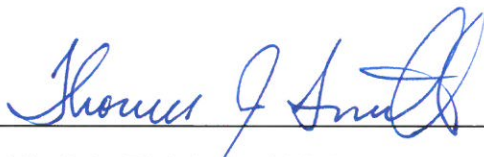
West Virginia Deputy State Historic Preservation Officer

Date

Advisory Council on Historic Preservation

Date

INVITED SIGNATORY:



West Virginia Division of Highways

Date