NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

FINAL

**United States Department of the Interior**
**National Park Service**

# National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

## 1. Name of Property

historic name **Putnam County Bridge # 159**

other names/site number Reelsville Bridge 133-530-45023

## 2. Location

street & number County Rt. 650 West over Big Walnut Creek N/A ☐ not for publication

city or town Reelsville N/A ☐ vicinity

state Indiana code IN county Putnam code 133 zip code 46170

## 3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☒ locally. ( ☐ See continuation sheet for additional comments.)

Signature of certifying official/Title — Date: 2-1-99

Indiana Department of Natural Resources
State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ( ☐ See continuation sheet for additional comments.)

Signature of certifying official/Title — Date

State or Federal agency and bureau

## 4. National Park Service Certification

I hereby certify that the property is:

| | Signature of the Keeper | Date of Action |
|---|---|---|
| ☐ entered in the National Register. ☐ See continuation sheet. | | |
| ☐ determined eligible for the National Register ☐ See continuation sheet. | | |
| ☐ determined not eligible for the National Register | | |
| ☐ removed from the National Register | | |
| ☐ other, (explain:) _____ | | |

Putnam County Bridge # 159 — Name of Property

Putnam IN — County and State

## 5. Classification

**Ownership of Property**
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

**Category of Property**
(Check only one box)

- ☐ building
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

**Number of Resources within Property**
(Do not include previously listed resources in the count)

| Contributing | Noncontributing | |
|---|---|---|
| 0 | 0 | buildings |
| 0 | 0 | sites |
| 1 | 0 | structures |
| 0 | 0 | objects |
| 1 | 0 | Total |

**Name of related multiple property listing**
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

**Number of contributing resources previously listed in the National Register**

N/A

## 6. Function or Use

**Historic Functions**
(Enter categories from instructions)

TRANSPORTATION: Road-Related (vehicular)

**Current Functions**
(Enter categories from instructions)

TRANSPORTATION: Road-Related (vehicular)

## 7. Description

**Architectural Classification**
(Enter categories from instructions)

REINFORCED CONCRETE: Open Spandrel

**Materials**
(Enter categories from instructions)

foundation: CONCRETE

walls:

roof:

other: METAL: Steel
STONE: Limestone

**Narrative Description**
(Describe the historic and current condition of the property on one or more continuation sheets.)

Putnam County Bridge # 159
Name of Property

Putnam IN
County and State

## 8. Statement of Significance

**Applicable National Register Criteria**
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property is associated with events that have made a significant contriibution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

**Criteria Considerations**
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C** a birthplace or grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

**Areas of Significance**
(Enter categories from instructions)

TRANSPORTATION
ENGINEERING

**Period of Significance**

1929-1948

**Significant Dates**

1929

**Significant Person**
(Complete if Criterion B is marked above)

**Cultural Affiliation**

**Architect/Builder**

Luten, Daniel B.
Luten Engineering Company of Indianapolis (builder)

**Narrative Statement of Significance**
(Explain the significance of the property on one or more continuation sheets.)

## 9. Major Bibliographic References

**Bibliography**
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

**Primary location of additional data:**

- ☒ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Name of repository:

Indiana Historic Bridge Inventory

Putnam County Bridge # 159
Name of Property

Putnam IN
County and State

## 10. Geographical Data

**Acreage of Property** <1

**UTM References**
(Place additional UTM references on a continuation sheet.)

| | Zone | Easting | Northing |
|---|---|---|---|
| 1 | 16 | 503090 | 4378130 |
| 2 | | | |
| 3 | | | |
| 4 | | | |

☐ See continuation sheet

**Verbal Boundary Description**
(Describe the boundaries of the property on a continuation sheet.)

**Boundary Justification**
(Explain why the boundaries were selected on a continuation sheet.)

## 11. Form Prepared By

name/title Scott E. Zimmerman, Program Assistant, Western Regional Office

organization Historic Landmarks Foundation of Indiana date 1-13-98

street & number 643 Wabash Avenue telephone 812/232-4534

city or town Terre Haute state IN zip code 47807

## Additional Documentation

Submit the following items with the completed form:

**Continuation Sheets**

**Maps**

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

**Photographs**

Representative **black and white** photographs of the property.

**Additional items**
(Check with the SHPO or FPO for any additional items)

## Property Owner

**(Complete this item at the request of SHPO or FPO.)**

name County Commissioners, Putnam County

street & number Putnam County Court House telephone 765/653-5513

city or town Greencastle state IN zip code 46170

Putnam County Bridge #159
Putnam County, Indiana

**DESCRIPTION:**

Putnam County Bridge #159 spans Big Walnut Creek, connecting the rural communities of Reelsville and Pleasant Gardens, Indiana (photo 1). Known locally as the Reelsville bridge, it is situated at the foot of the notorious "Reelsville Hill,'' a steep and dangerous climb or descent (photo 2). The covered bridge which spanned the creek became part of the National Road in 1875 when the county commissioners redirected the road over the covered bridge. By 1909, a metal truss "extension" span had replaced the northern portion of the bridge and the entire bridge was replaced in 1928 when a truck pushed the covered bridge off its masonry abutment.

The southern approach is at the bottom of the Reelsville Hill after the road leaves the town and begins to wind through the countryside (photo 2). The northern approach rises from the river's flood plain (photo 3).

The bridge's open-spandrel concrete arch and its approaches incorporates the creativity of one of Indiana's most inventive bridge designers, Daniel B. Luten of the Luten Engineering Company of Indianapolis, Indiana. The single span structure measuring 171'6" in length, consists of five reinforced concrete beam approaches (three to the North) and a 120'6" open-spandrel span at the center. The Reelsville Bridge was completed in 1929.

Because Big Walnut Creek used to carry a considerable volume of water in freshets (photo 4) and given the high southern approach to the bridge, the more expensive to build open-spandrel design made sense over the generally less expensive filled one. Like Luten's designs generally, his open-spandrels are light and graceful. The main central span carries two parallel ribs about 2' deep at the crown and 3' at the haunches. The ribs are anchored in horizontal beams running between the ribs and the abutments.

The braces are used to support the approaches and deck against swaying (photo 5). Columns support the end of each section of the upper rail, putting those end columns close to, but not touching, each other (photo 6). Additional columns are spaced between each end column. The first section from the south has two columns with the southern end

resting on the breastwall, the next section has five, the middle section has two, the next section has five and the final section at the north end has three. Each column ties into the extados of the arch with a 1′ X 1′ X 1′ plinth.

The vertical and horizontal bracing also adds an interesting visual element while adding additional stability to the structure(photo 7). End columns on each section are cross-braced vertically from top to bottom. End columns are cross-braced horizontally at the bottom. As the arch rises, the bottom horizontal brace starts higher than the one before. At that same level each column is braced directly across, tying each arch ring together (photo 8).

Spalling on the east rib has exposed the rebar, both tiers of reinforcement and stirrups (photo 5).There are five rebar per tier (intrados and extrados) surrounded by extra support of the stirrups, approximately every 4′ (photo 9).

Square, chamfered spandrel columns carry cross beams which are cantilevered about 4′ beyond both the center-span ribs and the approach-span beams on each side. The transverse beams support a concrete deck with 16′ asphalt roadway between paneled parapet walls. After capping the cut-stone abutments of the previous bridge with concrete, they were then incorporated into the current structures.

A series of columns support the deck and transfer the loads to the ribs or ring. Massive support is encompassed by the beams and slabs that carry the floor. The arch bridge is a Deck Arch which has spandrel columns above the arch and below the roadway. The arch consists of two parabolic ribs about 2′ deep at center and 3′ at the piers. Spandrel columns support longitudinal cross beams, which are cantilevered about 4′ beyond both the center-span ribs and the approach-span beams on each side to support the concrete deck with it′s 16′ asphalt roadway.

The panels are bush-hammered, creating a textured and darker finish in contrast to the smoother and lighter finish to the rest of the structure (photo 10). This was a hallmark of Luten's design work and is one of the few "frills" he specified for the project. The rails are coped and carry inset, filled panels.

Each parapet is composed of 5 sections of paneled rails bracketed by a post, followed with an expansion joint (photo 11). Starting from the north side, the first section has two panels, the next section four panels, the middle section seven panels, then four panels, and finally two panels. The panels are approximately 11" high by 64" wide. Of all the sections, the center section of the west rail exhibits the most spalling with exposed rebar. The second section from the end on the east side exhibits spalling between the panel and the road bed. There is 40.5'' distance from the roadway to the top of the coping, 36" from the top of the curb, and 16' 9'' between columns. The end posts are 48'' long and 9'' wide on each side. The copings and posts are chamfered, creating a slightly decorative element. Chamfered edges also reduce the deterioration since hard edges are more easily chipped.

A dedication plaque mounted on the north end post, west side reads (photo 12):

COUNTY COMMISSIONERS
M. E. COOPER ORA J. DAY
J. G. BRITTON
WILLIS E. GILL, AUDITOR
ORVILLE O'NEAL, COUNTY ENGINEER
ELMER F. BLUE, ROAD SUPERINTENDENT
GEO. FOX, INSPECTOR
LUTEN ENGINEERING CO., CONTRACTOR
INDIANAPOLIS -- 1929

The southern approach is at the bottom of the Reelsville Hill and incorporates the 1873 abutment of a covered bridge on that site (photo 13). The northern approach rises from the river's flood plain and rests on an abutment possibly built in 1907-08 for a metal-truss "extension" span.

The north end of the concrete abutment has wingwalls that provide support (photo 9). There are smaller concrete wings anchored in front of those wings to provide extra support. These were probably left from the previous metal bridge. The south side of the bridge doesn't have this display of double wing support, but does have a natural support from the existing Reelsville hill. The abutment on the south side, constructed of limestone used from the covered bridge, provides buttressed support to the existing bridge. There has been a vertical breastwall of concrete laid on top of the eleven courses of limestone to provide extra stability and to support the roadway. An additional breastwall of concrete has been added at the base of the abutment. Cement has been haphazardly poured on the west side of the southern approach to prevent soil erosion.

The Indiana Flood Control and Water Resources Commission has placed a bronze bench mark tablet on the top of the top cement breastwall which reads " Indiana Flood Control and Water Resources Commission" around the edge and has the following information in the center:
"Putnam Co. 27
E1 EW FT
Bench Mark"

**STATEMENT OF SIGNIFICANCE:**

Putnam County Bridge #159, also known as the Reelsville Bridge, is eligible for inclusion to the National Register of Historic Places under Criterion C for its significance in engineering. This is one of only two surviving open-spandrel bridges which Putnam County officials built before 1930 and, one of only five survivors in Putnam County to have been designed by renowned engineer Daniel Luten (1869-1946).

Engineers first developed reinforced concrete bridge designs in France and Switzerland in the mid 1800s. Ernest Ransome designed the first American concrete arch, built in San Francisco in 1889. American engineers, along with Europeans working in the United States, experimented with several systems of reinforcing in the 1890s, including the use of wire mesh, iron bars, and steel I-beams. As a young engineer, Luten was excited to be introduced to this new design.

"Daniel B. Luten did more than any other single person to advance the movement from concrete-steel to reinforced concrete bridge design and to bring the latter to maturity in Indiana during the first decades of the twentieth century," writes James L. Cooper in Artistry and Ingenuity in Artificial Stone. Raised in a farm family of Dutch immigrants near Grand Rapids, Michigan, Luten sought escape from manual labor through education. He earned a bachelor of science degree in civil engineering from the University of Michigan in 1894 and served as Instructor of Civil Engineering and Surveying there for the 1894-95 academic year. He then moved to Indiana to join the faculty of Purdue University, where among other things he taught arch design as Instructor of Architectural and Sanitary Engineering. There he excelled at integrating professional engineering and commercial profitability, arguing that the design of concrete bridges was "largely a commercial proposition."

Luten deviated from the widely accepted American practice of open webbed arched girders of concrete-steel. The concrete-steel system tended to split the concrete along the lower edge of the arch ring since steel conducts heat more quickly than concrete. "I consider them [the concrete-steel systems] simply steel structures encased in concrete," said Luten.

The use of the old abutments, absence of massive piers, and lightness of the ribs and columns are all hallmarks of Lutens interest in fitting a structure into its environment with simplicity and economy. Luten defined an engineer as one who best adapts the forces of nature to human needs at the least expenditure of dollars. Appearance mattered to Luten, as did design. Luten stated that "design must be tailored to the site, and the bridge's parts need to work together as an integrated system."

Luten improved a true reinforced concrete system established by Joseph and Jean Monier which dated back to an 1873 patent for an iron reinforced system for concrete bridges. Early Monier arches were slender and typically made from mortar - a combination of cement and sand - with a network of thin rods placed midway between the upper and lower edges of the ring. In the 1890s, Joseph Melan, a noted Viennese engineer, retrograded the priority of iron and concrete for load bearing structures and gave priority to metal. His ribs became a structural skeleton encased in concrete. Americans preferred the Melan system since the Monier system produced a bridge which looked "too light" to carry heavy loads.

Luten incorporated theories on elasticity -- the ability of a material to recover its original size and shape after force has been applied to it. He was greatly influenced by Charles E. Greene while at Michigan and Professor Malverd A. Howe who wrote *Treatise on Arches* in 1897. Both men were nationally known authorities on the subject. Taking all these theories and training into account allowed him to reduce the amount of metal necessary to reinforce concrete. He also looked at the structure as a whole, not designing each element (spandrels, piers, abutments, wingwalls, etc.) to be functionally independent, thus reducing the amount of material assigned to each part and creating a continuous elastic body. Less could prove to be more where structural members become appropriately integrated.

In 1900, his last year at Purdue, Luten applied for and secured his first patent. It was rare and almost unacceptable for an academician to take that entrepreneurial action at that time. He felt this was one way to publicize new ideas and test them in the market place. Ultimately, he ended his teaching career of five years by moving to

Indianapolis where he started the National Bridge Company (later, Luten Engineering Co.). He organized a staff of eleven assistant engineers and twenty-four associate engineers located in every part of the United States.

He became one of America's leading bridge designers, creating spans used all over the world and in the USA. Some of his more notable bridges include: San Luisito Bridge in Monterey, Mexico; Nashua Hudson Bridge in Nashua, NH; Kennebec
Bridge in Waterville, Maine; Pittsburgh Street Bridge in Newcastle, and East Washington Street Bridge in Indianapolis, IN.

Daniel B. Luten had put Indiana at the forefront of reinforced concrete bridge design. He held more patents on concrete bridge design than all other Americans combined. Between 1900 and 1933 over ten thousand Luten design bridges were built across the continent, including Reelsville Bridge. Putnam County still has five structures representing three forms of Luten design (Dills Ford or #111, Keene or #62, Alle or #193, Staley or #229). The Reelsville Bridge is perhaps Luten's most important work in the county and has significance for its involvement in the history of the National Road in Putnam County.

Originally, a covered bridge spanned the Big Walnut Creek and improvements were made to it in 1873. A flood in 1875 carried away the covered bridge west of Pleasant Gardens but left the Reelsville Bridge securely atop its new masonry pedestals. The county commissioners did not replace the Pleasant Gardens Bridge, rather, they relocated the National Road so it went north from Pleasant Gardens, over the Reelsville Hill and Bridge.

In 1919, the state designated the National Road as a state highway and returned the route to the more directly westwardly path it had followed before the 1875 flood. In 1928, a truck lost its brakes on the Reelsville Hill and pushed the covered bridge off its masonry abutments.

Despite these factors the Reels and their neighbors convinced the commissioners to construct a new bridge. The county engineer, Orville O'Neal, planned a metal replacement estimated to cost just under $8,000. Vincennes Bridge Company proposed a steel structure on the county's plan for $8,536, and Luten Engineering Company of Indianapolis offered a Luten-designed concrete arch with beam approach spans for $8,988. The Luten proposal was accepted in April 1929.

The bridge continues as an important part of Putnam County's road system although it was slated for replacement by the Putnam County Commissioners in 1996. Efforts lead by local residents and Historic Landmarks Foundation of Indiana have stalled replacement, however, a bypass bridge could still compromise the historic character of this landmark.

Putnam County Bridge #159
Putnam County, Indiana

**Bibliography:**

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Cooper, James L. "The Reelsville Bridge: A Slender Anchor For Community," Greencastle Monthly Vol.6 Issue 1, January 1997. P. 5-6.

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Liebenberg, A. C. Concrete Bridges: Design and Construction. Longman Scientific and Technical, 1992. P. 31.

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**United States Department of the Interior**
**National Park Service**

# National Register of Historic Places Continuation Sheet

Section number__10_____ Page__10____

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Putnam County Bridge #159
Putnam County, Indiana

**VERBAL BOUNDARY DESCRIPTION:**

The Reelsville Bridge is part of the Northwest quarteer of Secgion 21, Township13 North, Range 5 West, Washington Township, Putnam County, Indiana. The bridge carries County Road 650W over the Big Walnut Creek. The nominated resource includes the bridge bed, abutments, other structural elements associated with the bridge, and a 20' approach on CR 650W on either side of the bridge.

**BOUNDARY JUSTIFICATION:**

The boundary encompasses the entire bridge plus a small buffer of roadway.