NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

985

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 **Furnas Mill Bridge**

other names/site number County Bridge #7080

2. Location

street & number Pisgah Road over Sugar Creek, Atterbury Fish and Wildlife Area N/A ☐ not for publication

city or town Edinburgh ☒ vicinity

state Indiana code IN county Johnson code 081 zip code 46124

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.)

John C. SE D·SHPO 7·23·01

Signature of certifying official/Title Date

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:

☑ 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:) _____

Signature of the Keeper

Entered in the National Register

Date of Action

9/16/01

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

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: Road-Related

Current Functions
(Enter categories from instructions)

TRANSPORTATION: Pedestrian-Related

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: Pratt through truss

Materials
(Enter categories from instructions)

foundation: STONE: Limestone
walls:
roof:
other: METAL

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

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)

ENGINEERING
TRANSPORTATION

Period of Significance

1891-1945

Significant Dates

1891

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

King Iron Bridge Company

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:

Furnas Mill Bridge
Name of Property

Johnson IN
County and State

10. Geographical Data

Acreage of Property less than 1 acre

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

	Zone	Easting	Northing
1	16	586300	4359450
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 Christopher Baas, Landscape Architect

organization IDNR Division of Engineering date 12-01-2000

street & number 402 W. Washington St. Rm. 299 telephone 317-232-4157

city or town Indianapolis state IN zip code 46204

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 IDNR - Division of Fish and Wildlife

street & number 402 W. Washington St. Rm 273 telephone 317-733-8250

city or town Indianapolis state IN zip code 46204

Furnas Mill Bridge, Johnson County, Indiana

The Furnas Mill Bridge is a two span iron truss bridge manufactured by the King Iron Bridge and Manufacturing Company. It is located where Pisgah Road crosses Sugar Creek in the Indiana Department of Natural Resource's Camp Atterbury Fish and Wildlife Area. The property is owned and managed by the department's Division of Fish and Wildlife.

The bridge is oriented northeast-southwest over the southeast flowing creek. The northeastern span is over open water, and the southwestern span is over wooded floodplain. Trees line the creek's banks, and a gravel road leads to the crossing. Each span measures 120 feet in length, has 115 feet of clear span between abutment and pier, and has a 16 foot wide roadway.

The spans rest on limestone block abutments and central pier. The blocks are rock faced and set in a common bond pattern, and both the abutments and pier have a capstone. The abutments are three sided wing walls that retain the creek bank and approaching roadways. The pier's northern most end is v-shaped and perpendicular to the creek's southerly flow. Its south end is squared with tooled corners.

At the central pier the bridge rests on non-expansive bearings, and on a nest of roller bars on each abutment. A large metal base plate rests between each bearing point and the capstone.

The bridge was manufactured from two different materials. Wrought iron was used for members in tension, for example the diagonals and bottom chords. Steel, a cheaper product, was used for members in compression, for example the verticals and top chords. The bridge displays considerable rust on its steel members, and shows no indication of its original paint color.

Each of the half-hip, pin-connected trusses are subdivided into eight panels. Instead of single manufactured pieces, the top-chords and end-posts are crafted from three plates riveted together with angles. Metal strip battens reinforce the bottom-side. It is speculated that crafted members, as opposed to rolled, were more rigid.

Each hip vertical is two squared eyebars, and the vertical posts are lace connected channels that decrease in size towards mid-span. The bottom chord is two die-forged rectangular eyebars somewhat smaller in length towards the center. Round rods, threaded for adjustment, comprise both top and bottom lateral bracing. The diagonals are two squared eyebars angled towards the span's middle. The mid-span vertical has two single squared eyebars angled towards each span's ends.

Furnas Mill Bridge, Johnson County, Indiana

The portal bracing is latticed struts with curved knee braces decorated with King's hallmark trio of crossed circles. The intermediate struts are lace-connected angles with straight knee braces.

The bridge's deck is poured concrete, but would have originally been wood. The triangular girder floor beams are connected to the verticals by U-bolt hangers. The girders are tied together, like the top chord, with lateral bracing made of round rods. The main stringers connecting the girders are rolled I-beams with the top flange embedded in the bottom of the concrete deck. The outside stringers are channels with thin webs that cap the edge of the concrete. The guardrail is two horizontal channels hung from the verticals.

Furnas Mill Bridge, Johnson County, Indiana

Located on Sugar Creek in northeast Johnson County, the Furnas Mill Bridge is a two span iron truss bridge. It is eligible for the National Register for its significance in the broad patterns of transportation history and as an excellent example of a Pratt through truss type of iron bridge. The bridge is in fair condition and maintains its historical integrity.

Early bridges were constructed of wood, or wood reinforced by iron. Unfortunately, wood as a building material held intrinsic problems of fire, decay, design limits, and availability. Although Indiana has iron bridges dating to the 1850's, wide scale acceptance of iron over wood took place in the 1880's. Simply stated, the value of the iron truss was its ability to span longer distances by assembling shorter members into triangles to create a longer beam. The strength of a bridge was then dependent more upon the strength limits of the material and less on the ability of the connections. The transition to steel cost more, but as a man-made material it had a more dependable quality and supply, lasted longer, and was easier to maintain. As bridge companies became more prolific the cost lowered.

Bridge historian James L. Cooper concluded that the mid-nineteenth century expansion of the railroads, along with legislative changes that regulated the construction of public transportation facilities, most affected the development of the iron truss bridge in Indiana. Railroads were growing in tandem with the state's population, and the resulting production increases of agricultural, coal and limestone, and manufactured goods. Rail companies were seeking bridges that were stronger, longer, and more dependable. About the same time, the state legislation shifted local transportation development to county commissioners who were seeking cost-effective ways of improving archaic road conditions. The iron truss bridge provided both the railroads and local officials dependable, strong, affordable, low maintenance, and easily built structures.

The increased demand for bridges resulted in business for both established and upstart manufacturers. While the earliest iron bridges were typically constructed in Pennsylvania and Ohio, later bridges were manufactured in many Indiana communities. Gary, Muncie, Lafayette, and Indianapolis had bridge companies, as well as smaller towns like New Castle and Rochester. To remain competitive bridge companies would purchase patented designs, or had engineering staffs continually attempt to improve their product.

Furnas Mill Bridge, Johnson County, Indiana

In 1844 Caleb and Thomas Pratt patented a truss type that was described as the "most seminal nineteenth-century design for metal truss bridges." The typical Pratt truss had horizontal parallel chords connected by verticals, inclined endposts, and diagonals. Pratt through trusses had both sway and lateral bracing. The design was the most popular in Indiana through the last two decades of the nineteenth-century peaking at 80% of all bridges constructed in the 1880's.

The Furnas Mill Bridge was constructed to support the commercial interests of a small Blue River Township community. In 1875 Orlando Furnas bought the Foster Mill located on the west bank of Sugar Creek. By the 1880's he had turned it into "one of the most successful mills" in Johnson County by introducing the "roller process" that allowed a "capacity of 60 barrels per day." The success of the mill depended upon area farmer's ability to deliver grain to the mill, and Furnas's ability to transport the finished product to market.

County Commission records indicate that, at least by 1890, Furnas and his neighbors lobbied for an iron bridge across Sugar Creek, and offered to construct the earthen approaches. In January 1891, following a visit to the site, the commissioners agreed to erect an iron bridge on stone abutments and central pier. They accepted a bond from local citizens for the construction of two earthen approaches: 1,130 feet from the west and 268 feet from the east. In April the commissioners accepted three proposals to construct the bridge. They selected the King Iron Bridge and Manufacturing Company proposal to construct two 120 foot spans for $19.95 per lineal foot, or $4800. Each "bridge" had a 115 foot clear span between abutment and pier, and a 16 foot roadway. In May, William E. Gray of Shelby County was hired to construct the stone pier and abutments from St. Paul Blue Limestone.

The King Iron Bridge Company was one of the country's most successful and prolific bridge companies of the latter half of the 19th century. Its founder, Zenas King, learned the bridge trade working as an agent for the Mosley Bridge Company of Cincinnati. In this position he learned the methods of iron bridge fabrication and how the workings of local politics were important in gaining public contracts.

Furnas Mill Bridge, Johnson County, Indiana

King located his own company in Cleveland in 1860. It was built around his patented version of the bowstring bridge that could be mass-produced with wrought-iron boiler plate riveted into a rectangular tube. Since the bridge maximized the use of materials, for instance using less iron where the truss was not in compression, it was less expensive than other designs.

A criticism of the bowstring was its lack of overhead bracing that limited side sway in the truss. So, as a whole, the country was shifting to the Pratt through-truss, and King ultimately transitioned his business to where the Pratt became his main product in the middle 1880's.

King divided his company into sales, design, fabrication, and construction units. His fabrication shop was located near main shipping and railroad facilities organized to receive raw materials and distribute finished product. As much of the bridge was constructed in the shop as possible to eliminate erection time and varying field conditions. In the 1880's the company's growth caused a move of its 360 employees to a new manufacturing plant on the outskirts of Cleveland, and a modernization of its methods and equipment.

The company's national success was caused by its use of a network of salesmen located in major cities, and in the country's developing western regions. To handle the large number of salesmen located in the west, King opened a Des Moines sales office to provide coordination and supervision. A common business practice of the day, King joined a pool of 16 other bridge companies that divided sales turf and reduced competition for public bids. Thirteen percent of bridge costs went into the pool and were redistributed among pool members. Essentially, the pool compensated bridge companies for not competing outside their territory, which allowed for higher public bids. This explains how companies were able to dominate geographic regions, a practice federal and state laws would eventually declare illegal. Ultimately, King's company was dissolved in 1906 after his sons, who had inherited the company, were found guilty of "illegal restraint of trade," the very practice that aided their success.

Furnas Mill Bridge, Johnson County, Indiana

There are seven surviving King bridges in Indiana: two bowstrings, two Pratts, and three plate girders. The Furnas Mill Bridge is one of two remaining iron bridges in Johnson County, and has two unique money-saving characteristics. The endposts were crafted of a flat plate and two angles riveted together instead of the typical rolled channel. Also, the bridge is constructed of two different metals: wrought iron for tension members and the less expensive steel for compression. As the bridge aged, the steel members deteriorated while the wrought iron remained intact.

The Furnas Mill Bridge became part of Camp Atterbury in 1942 when, with war looming, the Army established a camp in northeast Johnson County. The farmhouses and communities surrounding the bridge were purchased and razed, and the bridge became a part of the camp's interior road system. The camp was declared excess in 1963, and since no other federal agency expressed interest, the Indiana Department of Natural Resources, Division of Fish and Wildlife purchased it in 1969. The bridge then provided access to more than 6,000 acres of hunting and fishing opportunities until it was closed in the 1990's when it could no longer meet modern weight requirements.

Furnas Mill Bridge, Johnson County, Indiana

Bibliography

Banta, D. D. History of Johnson County. Chicago: Braun & Fuller, 1888.

Barker, J. A. Inspection and Appraisal of the Camp Atterbury Truss Bridge. Report to the Indiana Department of Natural Resources, 1999.

Cooper, J. L. Furnas Mill Bridge: History and Description. Indianapolis: Letter and report to Indiana Department of Natural Resources, Division of Engineering, January 15, 2000.

Cooper, J. L. Iron Monuments to Distant Posterity: Indiana's Metal Bridges, 1870-1930. Indianapolis: Indiana Department of Natural Resources, 1987.

Newbery, R. and H.W. Guy Meyer. "Ordinary Highway Bridges," Wisconsin Academy Review, March 1984.

Saldibar, J. P. Historic Iron Bridges in Indiana. Indianapolis: Indiana History Bulletin, 70:2, June 1999.

Simmons, D. A. "Bridge Building on a National Scale: The King Iron Bridge Company," The Journal of the Society for Industrial Archaeology, Vol. 15, No.2, 1989.

Taulman, L. and Don Wertz. The Atterbury File. Franklin: Central Nine Vocational-Technical School, 1983.

Furnas Mill Bridge, Johnson County, Indiana

Verbal Boundary Justification

In plan, a rectangle measuring 340'x80' centered on the bridge's pier and the centerline of the bridge's roadway. The rectangle's long sides parallel the bridge chords and the short ends parallel the portal bracing.

Boundary Justification

The rectangular boundary includes the bridge, pier, and abutments with approximately 30' of buffer off each side and 50' off each end.

Furnas Mill Bridge, Johnson County, Indiana

Photographs (October 1999)

1. View looking north at easternmost span.
2. View looking west at pier and spans.
3. View looking east at central pier and underside of bridge.
4. View looking east.
5. View looking west near central pier.
6. View looking east near central pier.
7. View of portal knee brace.
8. View of vertical at mid-span showing top chord, single eyebar diagonals, and intermediate struts.
9. View of typical bridge detail showing bridge deck, vertical, double eyebar diagonals, and double eyebar bottom chord.
10. View of bridge's underside showing diagonals, double eyebar bottom chord, floor beam, and U-bolt hanger.