



**John G. Lewis Memorial Bridge
Route 673 (Featherbed Lane)
Bridge over Catoctin Creek in
Loudoun County**

National Register Listing “Catoctin Creek Bridge”

Presentation January 29, 2015



What we know.

- The Bridge is on the National Register of Historic Places.
- Section 106 of the National Historic Preservation Act of 1966 requires that Federal agencies allow the Advisory Council on Historic Preservation an opportunity to comment on all projects affecting historic properties either listed in or determined eligible for listing in the National Register.
- Qualification for Federal grants for historic preservation, when funds are available.



“John G. Lewis Memorial Bridge”

Historical Significance

(extrapolated from the National Register Listing)

- **January 25, 1974 – Entry Date**
- “Modern guardrails are located along the sides but the wooden plank roadbed is intact.”
- “The ends are set on fieldstone abutments.”
- “On the Eastern End is a damaged circular plaque reading:
“The Variety Iron Works Cleveland O. Bridge Builder.”
- The condition blocks are checked as **Good** and **Unaltered**



“John G. Lewis Memorial Bridge”

Statement of Significance

“The Catoctin Creek Bridge is an excellent example of the metal truss bridges once prevalent on the secondary roads throughout the state. Like the covered bridges they superseded, the metal truss bridges are a fast disappearing piece of Americana. This particular example is virtually the only bridge of its size and type left in northern Virginia, and it is given added distinction by its unusually picturesque setting in the beautiful farming region near the Quaker community of Waterford. The shaded unpaved county road served by the bridge, and wooden plank roadbed on the bridge itself add nostalgia to the scene.

The bridge was produced by the Variety Iron Works of Cleveland, Ohio, around 1900. It originally was located on Route 7 across Goose Creek east of Leesburg. It was dismantled and moved to its present location around 1932.”



“John G. Lewis Memorial Bridge”

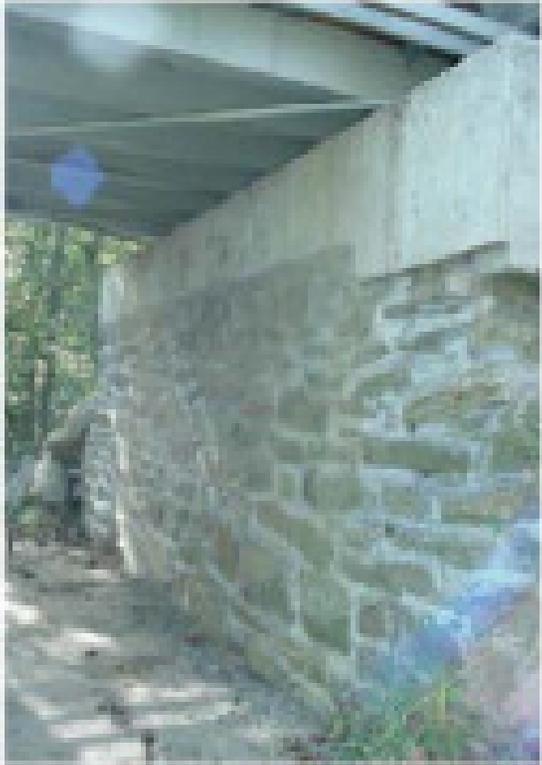
Alterations / Changes over the Years

- Per the Baker inspection report, and as noted in the National Register, The bridge was originally built in 1889 on the Leesburg & Alexandria Turnpike (Route 7) over Goose Creek. In 1932 it was dismantled and moved to its present location.
- In 1967 the stringers were replaced.
- Truss joints were retrofitted and several truss bracings were replaced.
- Guardrail was added continuously across the bridge.
- The bridge was metalized thus changing its appearance from original. (2003)
- After damage by a fallen tree 2 eye-bar members were replaced. (2003)
- Numerous other retrofit details were applied during rehabilitations. (2003)
- Stone masonry abutments have been capped and pointed. (2003)
- Roller type bearings have been replaced. (2003)



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Stringers on Abutment



Before Metalizing



After Metalizing



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Tree Impact on Metalized Truss
(Reconstruction in 2003)



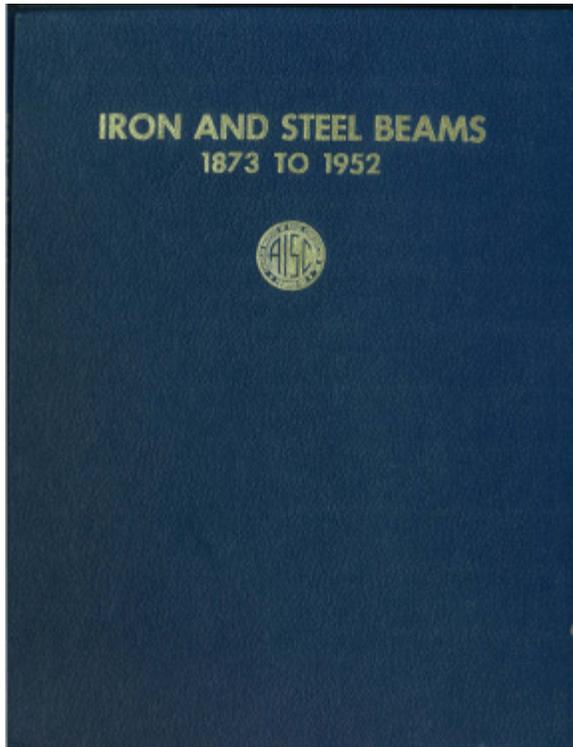
Current Structural Issues

- Chemical composition of the material (steel or wrought iron?) is unknown, thus the susceptibility to brittle fracture is unknown. What is known is that it was manufactured in 1889.



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Wrought Iron or Steel? Built in 1889?



EARLY UNIT STRESSES USED IN TABLES OF ALLOWABLE LOADS AS PUBLISHED IN CATALOGS OF THE FOLLOWING MILLS

FOR WROUGHT IRON

Year	Rolling Mill	Unit Stress
1873	Carnegie Kloman & Co. ("Factor of Safety 3")	14000 psi
1874	New Jersey Steel & Iron Co.	12000 psi
1881-1884	Carnegie Brothers & Co., Ltd.	{ 12000 psi 10000 psi
1884	The Passaic Rolling Mill Co.	{ 12000 psi 10000 psi
1885	The Phoenix Iron Company	12000 psi
1885-1887	Pottsville Iron & Steel Co.	12000 psi
1889	Carnegie Phipps & Co., Ltd.	{ 12000 psi 10000 psi

FOR STEEL

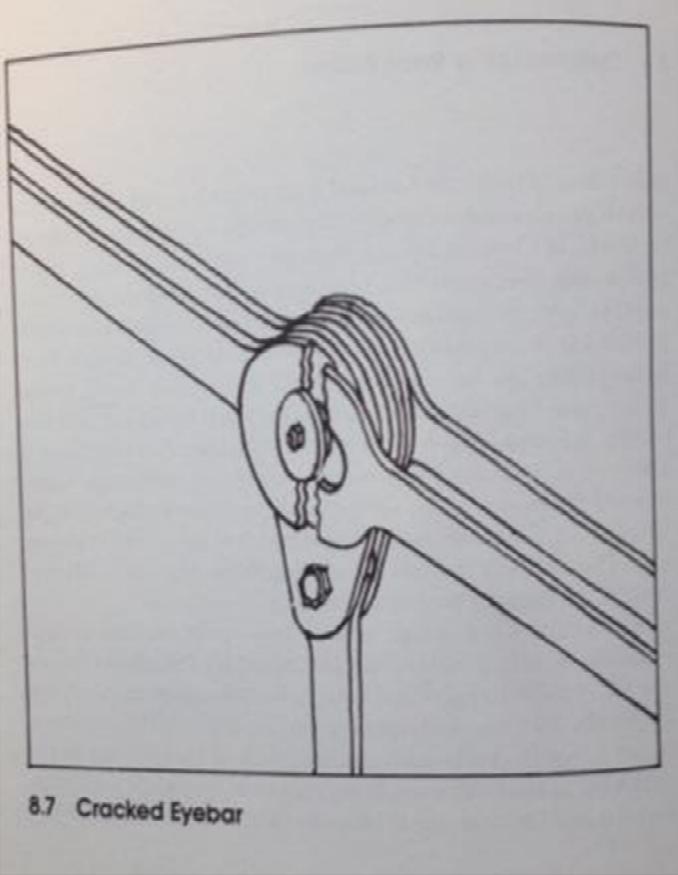
1887	Pottsville Iron & Steel Co.	15600 psi
1889-1893	Carnegie Phipps & Co., Ltd. (Bldgs.) (Bridges)	{ 16000 psi 12500 psi
1893-1908	Jones & Laughlins Ltd. } Jones & Laughlin Steel Co. }	{ 16000 psi 12500 psi
1896	Carnegie Steel Co., Ltd. (Bldgs.) (Bridges)	{ 16000 psi 12500 psi
1897-1903	The Passaic Rolling Mills Co.	{ 16000 psi 12000 psi
1898-1919	Cambria Steel Co.	{ 16000 psi 12500 psi
1900-1903	Carnegie Steel Company (Bldgs.) (Bridges)	{ 16000 psi 12500 psi
1907-1911	Bethlehem Steel Co. (Bldgs.) (Moving loads)	{ 16000 psi 12500 psi
1915	Lackawanna Steel Co.	{ 16000 psi 12500 psi

Current Structural Issues

- The bridge is a fracture critical structure with 2 – eye bar chains for the lower chord. Should one eye-bar fail, doubling the load on the 2nd eye bar, it too would be expected to fail.
- Eye-bars of this vintage typically would have high carbon content and fewer alloys thus making them more brittle and susceptible to brittle fracture.



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Current Structural Issues (cont.)

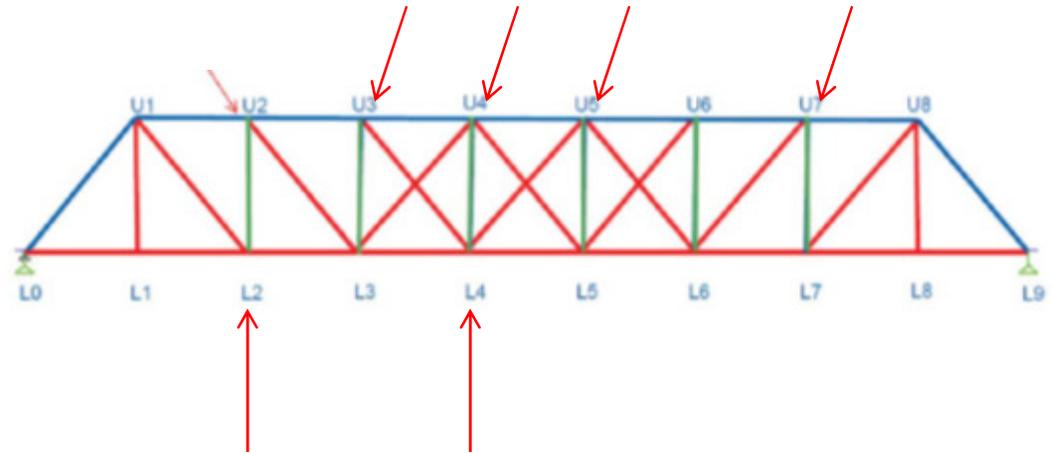
- Metalizing may have altered the surface metal properties.
- Inspection of the pin connections, is difficult for inspectors and requires additional inspections.
- The structure has noticeable loss of section (pitting)
- The structure has a mixture of rivets, machine bolts (unacceptable structurally) and H.S. Bolts. Some bolts have improper thread lengths.
- The abutments are/were stone masonry.



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Cracking has been prevalent on the structure and can now be observed at:

1. Joint U2N truss member,
2. Joint U3N several locations,
3. Joint U7N,
4. Near U4N,
5. Near U2S,
6. Upper Chord outer web near U5 downstream
7. Floorbeam support plate at L2 Downstream
8. Floorbeam support plate L4 Downstream,
9. In the bracing plate at U4 Downstream,
10. U2 angle bracket upstream,
11. Lateral bracing connection at L4 upstream.



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Added Splice Plates



Horizontal Crack at Retrofitted Joint U2
(Hole drilled to prevent crack propagation)



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Location of Crack

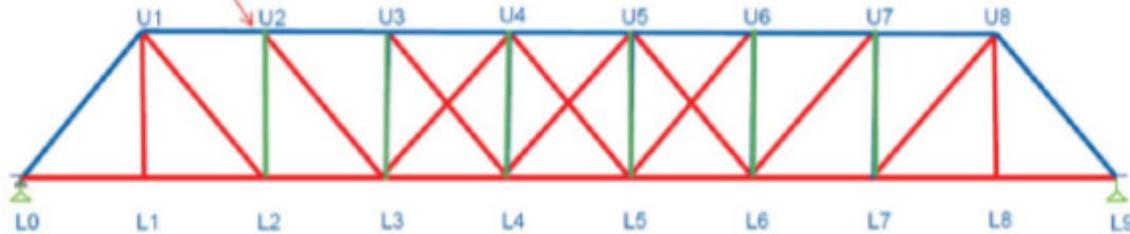


Exhibit 11. Cracking in Upper Chord



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Joint U7 N



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Near U4 N



Near U2 S

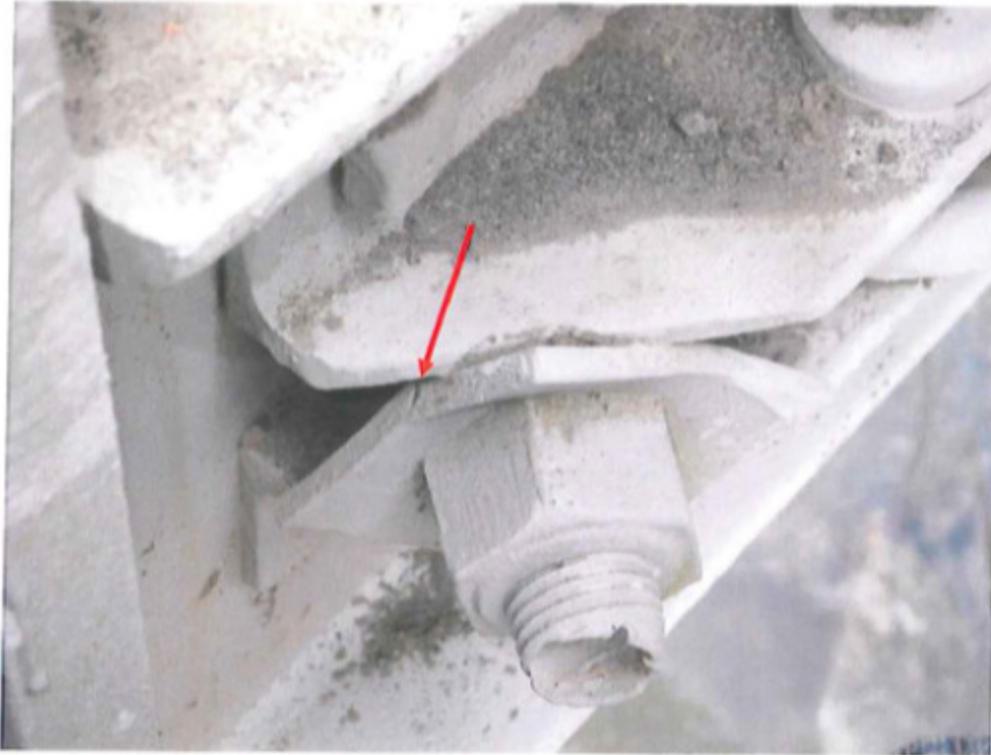


PHOTO 27 - CRACK IN LATERAL BRACING CONNECTION WASHER AT L4, UPSTREAM



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PHOTO 12 - CRACK IN UPPER CHORD OUTER WEB NEAR U5, DOWNSTREAM



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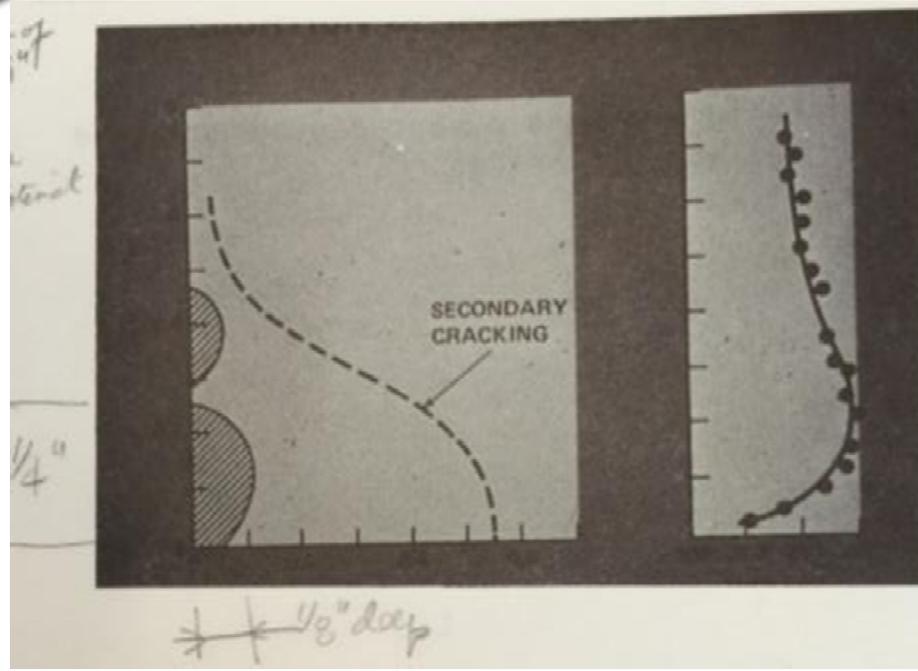


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Fatigue, Fracture and Crack Propagation



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Posting Limits

Year	Posted Limit
2003 Rehab	15 Tons
2008	8 Tons
2014	3 Tons



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POSTING LIMITS...

What posting limits? I never saw that sign!



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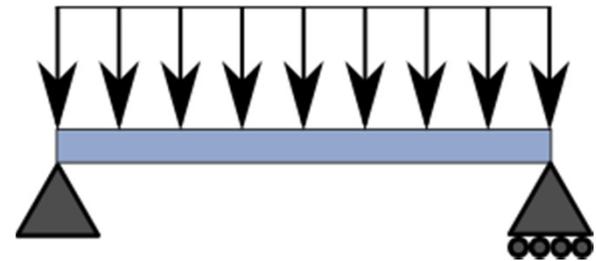
Geometric Issues

- The existing roadway width is only 11' – 2"
Thus making the structure...
Functionally Obsolete.

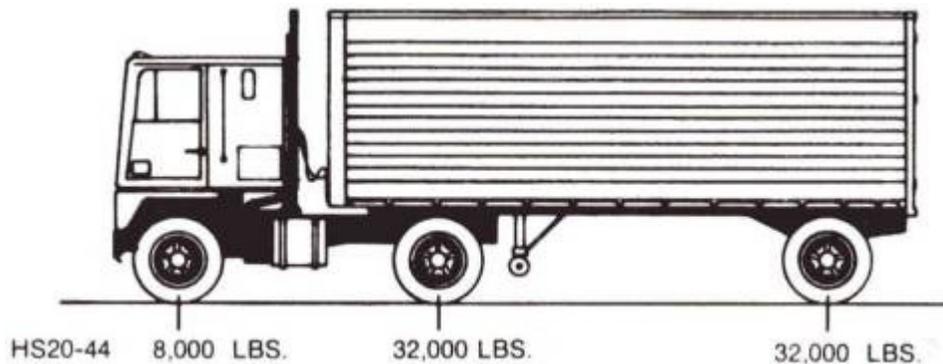


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Design Live Load ???



100 Lbs./SF



25
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What to Do? Guiding Principles

Mission Statement

Our mission is to plan, deliver, operate and maintain a transportation system that is **safe**, enables easy movement of people and goods, enhances the economy and improves our quality of life.



VDOT Mission • Shared Values • Code of Ethics

MISSION STATEMENT

Our mission is to plan, deliver, operate and maintain a transportation system that is safe, enables easy movement of people and goods, enhances the economy and improves our quality of life.

SHARED VALUES IN PUBLIC SERVICE

- Be responsive to customer needs, consider what VDOT does in terms of how it benefits our customers, and treat customers with respect, courtesy, and fairness
- Commit to safety and continuous improvement in everything we do, learning from mistakes and successes alike
- Trust, respect, support, and encourage each other
- Respect and protect the public investment
- Make decisions based on facts and sound judgment and accept accountability for our actions
- Strengthen our expertise in using information, tools, and technology to achieve high performance and stay on the cutting edge
- Think ahead, acting and planning creatively for today and tomorrow

CODE OF ETHICS

As an employee of the Commonwealth of Virginia and its Department of Transportation, I will:

- Commit to be a trusted steward of public resources
- Act with integrity in all relationships and actions in the work environment
- Abide by Virginia's Standards of Conduct for employees
- Not engage in conflicts of interest between my private interest and my professional role
- Not use public resources for personal gain
- Not accept or give gifts in violation of the State and Local Government Conflict of Interest Act
- Not knowingly make a false or fraudulent statement
- Not knowingly conduct or condone any illegal or improper activity

Employees should report any ethics violations to their immediate supervisor or call the Agency Ethics Office at 804-786-6725.




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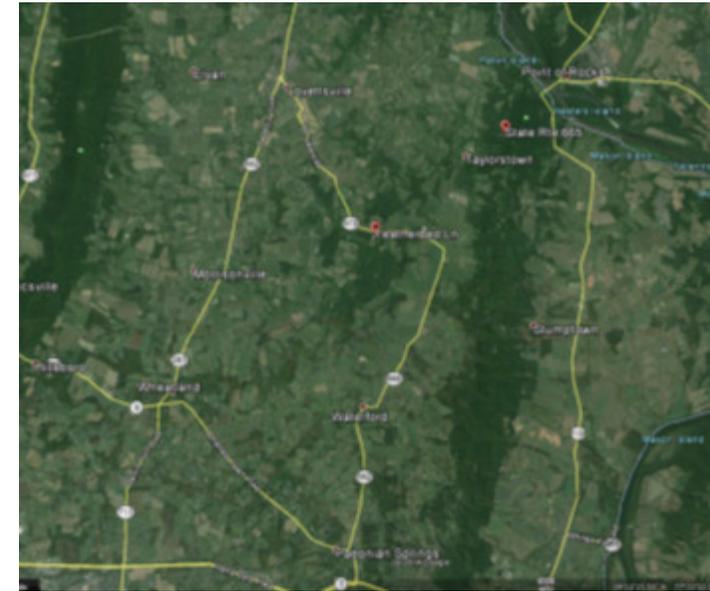
What to Do?

Guiding Principles

1. Safe – both structurally and functionally
 - Provides for the movement of People and Goods
 - Provides a 75 year service life
 - Recognizes the Historical Significance of the Existing Bridge
 - Is serviceable
 - Makes the best use of limited resources
 - Enhances the community
 - Others

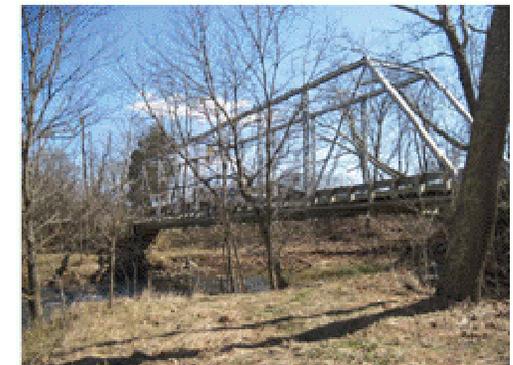


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Detour Route

Is 11.5 miles long and, per Bing, is approximately a 25 minute drive.



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Options for Discussion

- Do Nothing. This could mean closing the bridge.
- Repair the existing bridge, modified with a redundant load path. (i.e. supplemental support structure)
- Replace the bridge with a new structure in the same location.
- Build a parallel structure.
- Preservation of the bridge in some form/location.
- Others?



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