

SALT CREEK BRIDGE

(Johnson Mill Bridge)

Spanning Big Salt Creek, bypassed section of Arch Hill Road (CR  
82)

Norwich vicinity

Muskingum County

Ohio

HAER OH-127

*OH-127*

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

U.S. Department of the Interior

1849 C Street NW

Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

SALT CREEK BRIDGE  
(Johnson Mill Bridge)

HAER No. OH-127

LOCATION: Spanning Big Salt Creek at bypassed section of Arch Hill Road (County Road 82), Norwich vicinity, Muskingum County, Ohio  
UTM: 17.428301.4427999, Norwich, Ohio, Quadrangle

STRUCTURAL TYPE: Warren through truss covered bridge

DATE OF CONSTRUCTION: 1876; rehabilitated 1998

DESIGNER/  
BUILDER: Thomas Fisher, superstructure; Jesse Romine, masonry

OWNER: Owned by Muskingum County, Ohio; Maintained by Ohio Historic Bridge Association

PREVIOUS USE: Vehicular bridge

PRESENT USE: Historic landmark and tourist attraction

SIGNIFICANCE: Salt Creek Bridge is the only surviving pure Warren truss covered bridge in the United States. Although the Warren truss, patented in 1848, was originally designed as a timber/iron truss, it did not become popular in American until after 1860 with its development in an all-metal version. By the late nineteenth century, it was one of the two most popular truss types for metal bridges, the Pratt truss being the other.

HISTORIAN: Researched and written by Lola Bennett, October 2003

PROJECT INFORMATION: The National Covered Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Historic American Buildings Survey/Historic American Engineering Record, a division of the National Park Service, U.S. Department of the Interior. The Federal Highway Administration funded the project.

## **Chronology**

- 1803 Ohio becomes seventeenth state admitted to the Union.
- 1805 America's first covered bridge built at Philadelphia.
- 1809 Ohio's first covered bridge built across Little Beaver Creek in Columbiana County.
- 1848 Warren truss patented in England.
- 1850 Squire Whipple uses Warren truss design in America.
- 1875 Citizens petition Muskingum County for a bridge at this site.
- 1876 Salt Creek Bridge constructed.
- 1879 Salt Creek Bridge covered.
- 1953 Salt Creek Bridge bypassed; title reverts to adjacent property owner.
- 1960 Southern Ohio Covered Bridge Association formed to purchase Salt Creek Bridge.
- 1962 Salt Creek Bridge stabilized; original shake roof replaced with corrugated metal.
- 1974 Salt Creek Bridge listed on the National Register of Historic Places.
- 1983 Salt Creek Bridge repaired.
- 1995 Muskingum County reassumes ownership of Salt Creek Bridge to apply for funding.
- 1996 Ohio Department of Transportation awards \$54,000 Intermodal Surface Transportation Efficiency Act (ISTEA) grant for Salt Creek Bridge rehabilitation.
- 1998 Salt Creek Bridge rehabilitated; volunteers replace flooring and siding.
- 2003 Salt Creek Bridge recorded by the Historic American Engineering Record.

## Introduction

The first documented covered bridge in Ohio was built in 1809 across Beaver Creek in Columbiana County.<sup>1</sup> Historians estimate that there were once as many as 4,000 covered bridges in Ohio, more than any other state in the nation. Over time, these structures were lost to fire, floods, neglect and replacement. A list published by the state in 1937 indicates that, at that date, there were 609 covered bridges in Ohio. That number dropped dramatically in the 1950s, as covered bridges were replaced with modern spans. Today, Ohio has 135 surviving covered bridges.

## Description

Salt Creek Bridge is a single-span timber Warren truss covered bridge on cut stone abutments. The length of the truss is 83'-0", with a clear span of 70'-0". The housing extends about 2' beyond the ends of trusses, making the overall length of the bridge approximately 87'. The bridge is 14'-0" high from the top of the upper chord to the bottom of the lower chord and 14'-0" wide overall, with a roadway width of 11'-6" feet.

Each truss is composed of eight panels approximately 10' wide. The upper chord is two 7"x7" timbers scarfed along its length and bolted together. The lower chord is two 6"x12" timbers scarfed and bolted together. Vertical end posts and a series of diagonal timbers (6"x8" in the four center panels, 6"x9" at the two panels at each end) connect the upper and lower chords. The tension members, angling up towards the ends of the bridge, pass through the chords where they are notched and bolted through the chord with a 3/4" diameter threaded bolt fastened with a nut. The compression members, angling down towards the ends of the bridge, are notched into and braced against the tension diagonals at their upper and lower ends.

The lower chords of the bridge rest on large bed timbers on top of the abutment facewalls. Transverse 6"x10" wooden floor beams are seated on the lower chords at each panel point. There are thirteen lines of stringers laid longitudinally on top of the floor beams. Two-inch thick, rough-sawn, variable-width plank flooring is laid diagonally on top of the stringers. Lower lateral bracing consists of 2 1/2"x6" members bolted to the underside of the floor beams.

The upper lateral system is composed of 7"x7" transverse tie beams seated on the upper chord at each panel point. There is 2"x6" diagonal bracing crossing between the tie beams. This bracing is placed above the tie beams and is nailed to the outer ends of the beams. There are 3"x4" wooden sway braces between the diagonal members of the truss and the tie beams; these braces are nailed to the truss and bolted to the tie beams. There is a longitudinal member (possibly 4"x6") seated on the outer ends of the tie beams to support the rafters (approximately 2"x4", spaced at 18"). The gable roof has a slight overhang and is covered with standing seam galvanized metal roofing fastened to wooden purlins on top of the rafters.

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<sup>1</sup> Miriam Wood, *The Covered Bridges of Ohio, an Atlas and History* (Columbus: Old Trail Printing Company, 1993), p.119.

Stained, variable-width (1x12" typical) vertical board sheathing covers the exterior of the bridge to about 1' below the eaves. The sheathing is fastened to 2x4" longitudinal nailers on the exterior faces of the trusses. The straight portals have board and batten siding and slightly arched openings. There are 5' shelter panels inside the openings at each end of the bridge.

The dry-laid stone abutments and wingwalls are built of large squared blocks of granite and appear to be original. The wingwalls extend back at an angle along the approaches to the bridge.

## History

In the early nineteenth century Christopher Shuck established a saw mill near this site on Big Salt Creek.<sup>2</sup> By 1875, James S. Johnson owned and operated the mill. Arch Hill Road was laid out an unknown date prior to 1833, when it appears in a somewhat different alignment on Wyllys Buell's map of Muskingum County. No documentation has been found concerning a previous bridge at this site, and county records suggest that there was a ford at this location until 1875, when a group of local citizens petitioned the Muskingum County Commissioners for a bridge "over Big Creek near Jas. Johnson's saw mill."<sup>3</sup> The county commissioners approved the request and, in June 1876, awarded the masonry contract to Jesse Romine and the superstructure contract to Thomas Fisher.<sup>4</sup> The bridge was completed in the fall of 1876. County records show payments totaling \$746.00 to Fisher and \$556.22 to Romine.<sup>5</sup>

Salt Creek Bridge carried traffic for seventy-seven years. In 1953, the county realigned a major curve in the road and bypassed the covered bridge, erecting a steel pony truss bridge just upstream. In exchange for the right-of-way, the county gave the covered bridge to an adjacent landowner who used it as a storage shed for farm machinery. In 1960, the Southern Ohio Covered Bridge Association purchased the bridge in order to preserve it. Shortly after acquiring the bridge, a group of volunteers replaced the original shake roof with corrugated metal. While this was a positive step, the structure was already deteriorating from moisture and dry rot. In 1983, the ends of the lower chords were replaced. This project, however, inadvertently led to further damage and did nothing to address previous structural problems.<sup>6</sup> In 1997-98 the association, by now renamed the Ohio Historic Bridge Association, undertook a major rehabilitation project with a \$54,000 ISTEAG grant.<sup>7</sup> The bridge is now in an excellent state of repair and is maintained as an historic landmark and tourist attraction.

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<sup>2</sup> Shuck's Mill appears northwest of the present bridge site on Wyllys Buell's 1833 "Map of the County of Muskingum." F.W. Beers' 1866 *Atlas of Muskingum County* shows a saw and gristmill at this location.

<sup>3</sup> *Muskingum County Commissioners Journals*, Book 6 (1873-79), p. 162.

<sup>4</sup> According to Muskingum County Records, Dresden contractor Thomas Fisher built at least a dozen bridges for the county in the 1860s and 70s.

<sup>5</sup> *Muskingum County Commissioners Journals*, Book 6, p. 246, 250, 261 and 265.

<sup>6</sup> The contractors replaced the rotted ends of the lower chords with red oak, which tends to absorb moisture easily. This led to further rot and insect infestation.

<sup>7</sup> In order to obtain this funding, the Muskingum County Commissioners agreed to reassume ownership of the bridge and give the Ohio Historic Bridge Association a ninety-nine-year lease.

## Design

In 1848, James Warren and Theobald Monzani patented the Warren truss in England. A year or two later, American civil engineer Squire Whipple (1804-1888) gave this type of truss its first practical application in the United States.<sup>8</sup> The Warren truss has parallel upper and lower chords with inclined web members sloping in opposite directions to form a series of triangles. The uniform size of the members made fabrication and erection economical, and the simple configuration allowed the diagonals to alternately carry tensile or compressive stresses under moving loads. Warren truss bridges of wood appear to have been limited to Ohio, where three covered bridges of this type survive.<sup>9</sup>

35-57-36	Jasper Road Bridge	Montgomery County, OH	50' Warren truss w/ arch	J.W. McLain	1869	Moved 1964
35-57-03	Feedwire Road Bridge <sup>10</sup>	Montgomery County, OH	42' Warren truss w/ arch	R.W. Smith	1870	Moved 1948
35-60-31	Salt Creek Bridge	Muskingum County, OH	87' Warren truss	T. Fisher	1875	Bypassed 1953

While never common for wood bridges, the Warren truss gained popularity in the latter half of the nineteenth century, as it was adapted to iron and steel. By the end of the nineteenth century, the Warren truss was one of the leading metal truss bridges types in America.

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<sup>8</sup> Whipple states “The author built several small bridges upon this [Warren] plan, to carry a railroad track over common highways, in 1849 or 1850, believed to have been the first application of this form of truss.” [Squire Whipple, *An Elementary and Practical Treatise on Bridge Building* (New York: D. Van Nostrand, 1883), footnote, p.69.]

<sup>9</sup> According to Ohio covered bridge historian Miriam Wood, there were once at least thirteen Warren truss covered bridges in Greene County, Ohio, some built by the Smith Bridge Company and some by Henry Hebble. E.B. Henderson also built a Warren truss bridge in Washington County in the 1870s. Muskingum County’s covered bridges were mostly built on the Buckingham truss plan. [Wood, p.14, 37.]

<sup>10</sup> In 2003, Matthew Reckard of Indiana raised the possibility that this bridge may actually be a “Smith Type 2 single truss.” [See HAER No. PA-622, Kidd’s Mill Bridge.]

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