

HISTORIC AMERICAN ENGINEERING RECORD

SWALLOW'S BRIDGE (Best's Bridge)

HAER No. VT-36

LOCATION: Spanning Mill Brook at Churchill Road, 2.5 miles west of Brownsville,
West Windsor, Windsor County, Vermont
UTM: 18.702335.4814029, Mount Ascutney, Vermont Quadrangle

STRUCTURAL
TYPE: Wood covered bridge; tied arch

DATE OF
CONSTRUCTION: 1889; rehabilitated 1991

DESIGNER/
BUILDER: Stephen F. Hammond

PRESENT OWNER: Town of West Windsor, Vermont

PREVIOUS USE: Vehicular bridge

PRESENT USE: Vehicular bridge

SIGNIFICANCE: Swallow's Bridge is one of four surviving tied arch bridges in the United States. Presumably a regional tradition, the tied arch is of technological interest as part of the overall context of arch bridge design.

HISTORIAN: Researched and written by Lola Bennett, summer 2004

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

- 1836 Stephen F. Hammond born at West Windsor, Vermont.
- 1848 West Windsor separated from the Town of Windsor.
- 1855 Adjacent property owned by Z. Sanders.
- 1855 Road and crossing appear on Doton's map of Windsor County.
- 1869 Adjacent property owned by Amasa Swallow.
- 1869 Flood washes out bridges along Mill River at West Windsor.
- 1887 Stephen F. Hammond builds Bower's Bridge at West Windsor.
- 1888 Stephen F. Hammond builds Buck's Bridge at West Windsor.
- 1888 Stephen F. Hammond builds Culligan Bridge at Windsor.
- 1889 Stephen F. Hammond builds Swallow's Bridge at West Windsor.
- 1896 Adjacent property owned by William Best.
- 1913 Stephen F. Hammond dies.
- 1973 Original stone abutments replaced with concrete abutments.
- 1974 Best's Bridge (Swallow's Bridge) listed on the National Register of Historic Places.
- 1991 Swallow's Bridge rehabilitated.
- 1995 Swallow's Bridge reinforced with additional arch lamina.
- 2003 Swallow's Bridge recorded by the Historic American Engineering Record.

Description

Swallow's Bridge is a single span tied arch covered bridge on modern poured concrete abutments (originally stone masonry abutments).¹ The bridge is 37' long and 15'-6" wide, with a 33' clear span and a 12'-6" wide roadway.

The lower chord is comprised of five parallel planks laid on edge and bolted together. The 9½"x14" arches are comprised of seven (originally five) lamina laid flat and bolted together. The arches span 33' and rise to a height of 6'-0" at the crown. The ends of the arches are seated in saw-tooth cuts in the ends of the lower chords. Five vertical tension rods fastened with nuts at both ends support the lower chords. The construction date, 1889, is carved into the inner face of south arch.

The bridge is covered with a freestanding housing that rests on the outer ends of the floor beams. The post and beam frame is comprised of 6"x8" posts, 8"x8" endposts, and 6"x6" tie beams. It is covered with vertical board siding painted gray and a steeply pitched (12/12) standing seam metal roof. The portals are straight and square. There is no ornamentation.

Vermont Covered Bridges

The first documented covered bridge in Vermont was an arch-truss toll bridge built in 1824 across the Mississquoi River at Highgate Falls. By the end of the nineteenth century an estimated 500 covered bridges had been built in Vermont.² Over time, however, the covered bridges were replaced with new structures, or lost to floods, fires, vandalism, neglect or decay. After the flood of 1927 only 200 were left standing. By 1946, there were 169. Today there are 104.³ Swallow's Bridge is one of four surviving tied arch covered bridges in the United States.

History of Bridge and Site

Present-day Churchill Road was laid out as the farm-to-market road between West Windsor and Weathersfield sometime prior to 1855, when the road and crossing appear on Hosea Doton's map of Windsor County. No records have been found concerning the first bridge at this location, but it was presumably a wood structure.

A flood in October 1869 reportedly washed out all the bridges on Mill Brook between Reading and Windsor.⁴ No information has been found concerning a replacement bridge at this site. The 1886 *West Windsor Annual Report* lists payments to Oliver Stone for "work on Swallow Bridge"

¹ The bridge's names come from Amasa Swallow, who owned the adjacent farm in the 1880s, and William Best, who purchased the property in 1896.

² Richard Sanders Allen, *Covered Bridges of the Northeast* (Brattleboro: Stephen Greene Press, 1957), p.50.

³ National Society for the Preservation of Covered Bridges, *World Guide to Covered Bridges* database.

⁴ Muriel E. Best, "Reminiscences on Best's Bridge," *Covered Bridge Topics*, Spring 1975, p.4.

and to W.D. Hook and J. Nichols for “drawing stone for Swallow Bridge.”⁵ Presumably the stone was used to build abutments and wingwalls for the present covered bridge, completed in 1889 by Stephen F. Hammond, a local wheelwright.⁶ The 1889-90 *West Windsor Annual Report* contains the following entry:⁷

Cost of new covered bridge by A.W. Swallows⁸:

| | | |
|---------|---|----------|
| June 29 | E.H. Spaulding ⁹ , timber and nails, | \$119.52 |
| | W. Sykes ¹⁰ , pins and drawing lumber, | \$ 16.11 |
| | S.F. Hammond ¹¹ , labor self and others, | \$ 90.00 |
| | Chas. Hastings ¹² , labor on irons, | \$ 2.75 |
| Oct. 14 | E.C. Howard ¹³ & Co., bolts, | \$ 21.70 |
| | | \$250.13 |

The bridge has served the local community for well over a century, and continues to carry traffic, including heavy farm equipment. In 1973, a freshet damaged the original stone abutments and new poured concrete abutments were built alongside the old stone wingwalls. The bridge underwent structural repairs in 1993. The housing was rebuilt and a new roof added at that time. Sometime after 1995 two lamina were added to the arches of Swallow's Bridge.

Stephen F. Hammond

Stephen F. Hammond (1836-1913) was the son of Daniel Hammond (1812-1882), a master carpenter, whose work included churches and other prominent buildings in the Windsor area.¹⁴

⁵ *West Windsor Annual Reports*, 1886.

⁶ Modern sources state that A.W. Swallow[s] built this bridge, an error that may have originated in a misreading of the 1889 town report. Documentary evidence suggests that the notation, “new covered bridge by A.W. Swallow,” is actually a reference to the bridge's location, and that local wheelwright S.F. Hammond was the builder of Swallow's Bridge.

⁷ *West Windsor Town Records* were not found during the course of this research, although they are cited in Mary Beardsley Fenn's 1977 *Parish and Town: The History of West Windsor, Vermont*.

⁸ Amasa W. Swallow is listed as a Brownsville farmer and wool grower in Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*.

⁹ Eugene H. Spaulding is listed as West Windsor town treasurer and representative in Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*.

¹⁰ According to Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*, Wilbert Sykes operated a wooden ware and ladder manufactory at Brownsville.

¹¹ Stephen F. Hammond is listed as a Brownsville carpenter and wheelwright in Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*.

¹² According to Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*, Charles Hastings was a Brownsville blacksmith.

¹³ E.C. Howard is not listed in the West Windsor directory in Hamilton Child's 1884 *Gazetteer and Business Directory of Windsor County, Vermont*.

¹⁴ Winston Hammond, *The Hammonds of West Windsor, Vermont* (Windsor, Vermont: *The Windsor Chronicle Press*, 1979), p.1.

Stephen Hammond had a wheelwright shop at Brownsville, but he also devoted his skills to building covered bridges. He built the Culligan Bridge at Windsor in 1888 and at least three tied arch bridges at West Windsor in the late 1880s.¹⁵ Remarkably similar in appearance and located only a few miles apart, Swallow's Bridge (1889) and Bower's Bridge (1887) are the two known surviving examples of Stephen Hammond's work.

Tied Arch Bridges

The ancient structural form of the arch utilizes the principle of compression to span long distances and is the only way to construct long-span bridges of masonry. Early American bridge builders also relied on the arch form, but because they were working with wood instead of stone, they combined arches with trusses to keep them from buckling. In 1806 and 1817, bridge builder Theodore Burr (1771-1822) obtained a patent for a parallel chord truss with superimposed arches that extended past the lower chords to the piers or abutments. The Burr truss was used for hundreds of covered bridges throughout the United States and some of the longest timber spans ever built were based on this design.

Unlike the Burr truss, the tied arch was never part of the mainstream of covered bridge building.¹⁶ In a tied arch, the ends of the arch are fitted into slots in the lower chord rather than extending to the abutments. The lower chord "ties" the ends of the arch together, resisting the horizontal thrust that would otherwise necessitate substantial masonry. Tied arches are economical because they do not rely on heavy masonry or truss framing, but their relative lack of stiffness makes them suitable only for short spans. Swallow's Bridge is one of four surviving tied arch covered bridges in the United States:¹⁷

| | | | | |
|-------------------|--------------------------|------|------|----------------------|
| Swallow's Bridge | West Windsor, Vermont | 1889 | 36' | Stephen F. Hammond |
| Bower's Bridge | West Windsor, Vermont | 1887 | 44' | Stephen F. Hammond |
| Lincoln Bridge | Woodstock, Vermont | 1877 | 136' | R.W. and B.H. Pinney |
| Lake Shore Bridge | Charlotte, Vermont | 1898 | 40' | Leonard Sherman |

¹⁵ *Vermont Journal*, September 22, 1888, p.4; *West Windsor Annual Reports*, 1886-1890.

¹⁶ The tied arch design was more successful for iron bridges, with many more surviving examples.

¹⁷ There are a number of other bridges that have tied arches as part of a Burr arch system. These are primarily located in Illinois, New York and Ohio. In addition, Virginia has several examples of segmented arch bridges, in which the arch is not dependent upon a truss

Sources

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ADDENDUM TO:
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National Covered Bridges Recording Project
Spanning Mill Brook at Churchill Road
Windsor
Windsor County
Vermont

HAER VT-36
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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

ADDENDUM TO:

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The following pages are an addendum to a 6-page report that was previously transmitted to the Library of Congress in 2005. Since no photographs accompanied the original report, HAER hired Martin Stupich to take both large format and digital photographs of the bridge, shot in April 2015.

ILLUSTRATED APPENDIX

This illustrated appendix is an addendum to the HAER report previously transmitted to the Library of Congress in 2005. Historic images (fig. 1-2) are courtesy the Richard Sanders Allen Collection, National Society for the Preservation of Covered Bridges. All color digital photographs (fig. 3-12) were taken by Martin Stupich, April 2015.

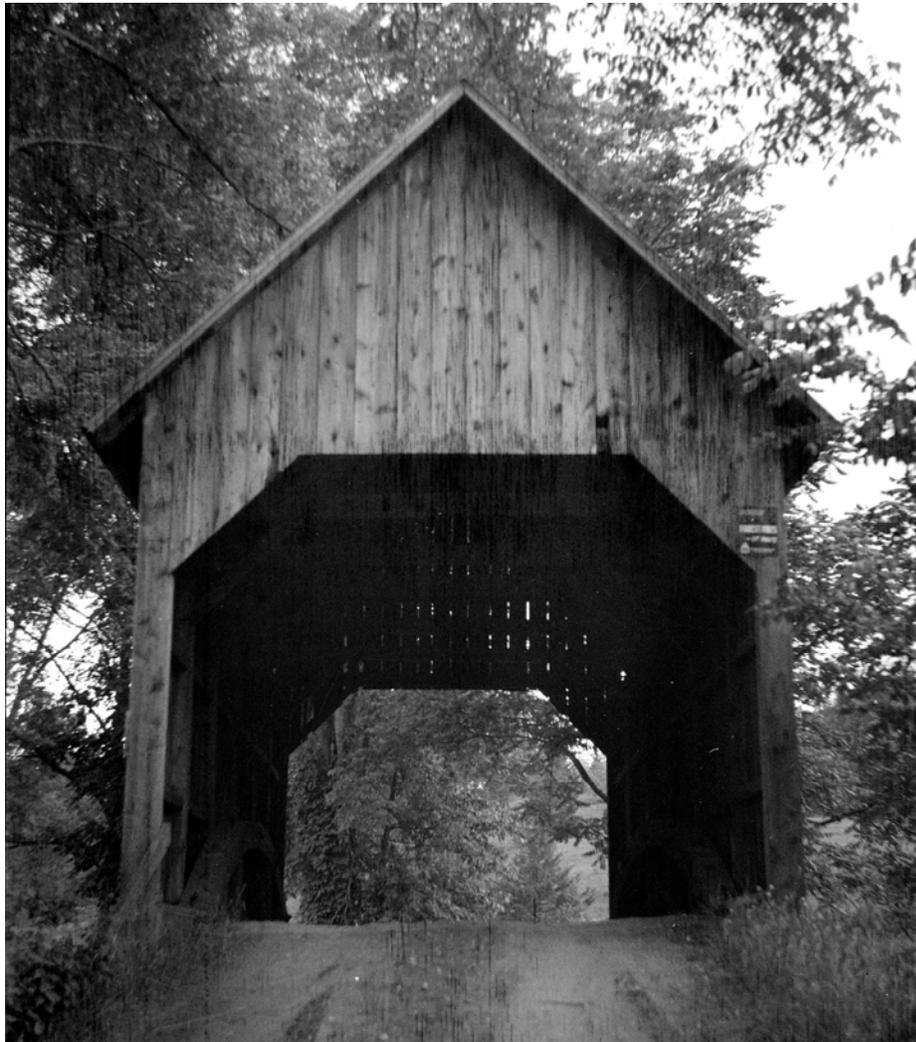


Figure 1. East portal elevation of bridge. Photograph courtesy Richard Sanders Allen Collection, June 27, 1940.



Figure 2. View of north elevation of bridge, crossing Mill Brook. Photograph courtesy Richard Sanders Allen Collection, June 27, 1940.



Figure 3. General view of south elevation of bridge, view to southwest.



Figure 4. Detail of west abutment, showing early stone and later concrete, view to southwest.



Figure 5. Detail of northeast corner of abutment.



Figure 6. East abutment, showing bolster beams supported by concrete, view to northwest.



Figure 7. Detail of bolster beam, lateral bracing, and floor beams on east abutment, looking northeast.



Figure 8. View through bridge, facing northeast.



Figure 9. Structural detail of north arch, view to southwest.



Figure 10. Interior detail of tied arch (originally five-ply, with two planks added in 1991), view to southwest.



Figure 11. Detail of lower lateral bracing and threaded rod connections, view to west.



Figure 12. Sub-deck detail of south lower chord, lower lateral bracing, and floor beams, view to southwest.