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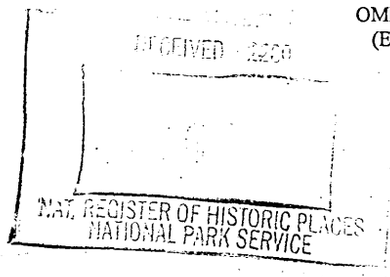
NPS Form 10-900
(Rev. Aug. 2002)

OMB No. 1024-0018
(Expires Jan. 2005)



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 any 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: Bridge 31

other names/site number: Winooski Street Bridge

2. Location

street & number: Winooski Street not for publication N/A

city or town: Waterbury and Duxbury vicinity: N/A

state: Vermont code: VT county: Washington code: 023 zip code: 05676

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this X 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 36 CFR Part 60. In my opinion, the property X meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ____ nationally X statewide X locally. (See continuation sheet for additional comments.)

Suzanne C. Jamele National Register Specialist 6-22-06
Signature of certifying official Date

Vermont State Historic Preservation Office
State or Federal Agency or Tribal government

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

Signature of commenting official or other official and title Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
__V__ 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 | **Date of Action**

Carson D. Beall | 8.9.06

5. Classification

Ownership of Property: (Check as many boxes as apply)
____ private
__x__ public-local
____ public-state
____ public-Federal

Category of Property: (Check only one box)
____ building(s)
____ district
____ site(s)
__x__ structure(s)
____ object(s)

Number of Resources Within Property:

	Contributing	Noncontributing
buildings:	____	____
districts:	____	____
sites:	____	____
structures:	1	____
objects:	____	____
total:	1	____

Number of Contributing Resources Previously Listed in the National Register: 0

Name of Related Multiple Property Listing: Metal Truss, Masonry, and Concrete Bridges in Vermont
(Enter "N/A" if property is not part of a multiple property listing.)

6. Function or Use

Historic Functions: (Enter categories and subcategories from instructions)

Category:	Subcategory:
Transportation	Road-related

Current Functions: (Enter categories and subcategories from instructions)

Category:	Subcategory:
Transportation	Road-related

7. Description

Architectural Classification: (Enter categories from instructions)

other: Parker through truss

Materials: (Enter categories from instructions)

foundation: concrete abutments
roof:
walls:
other: steel structural elements

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

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)

x A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
____ B. Property is associated with the lives of persons significant in our past.
x 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.)

____ A. Owned by a religious institution or used for religious purposes.
____ B. Removed from its original location.
____ C. A birthplace or a 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 with the past 50 years.

Areas of Significance: (Enter categories from instructions)	**Period of Significance:**
Transportation	1928-1955
Engineering	

Significant Person: (Complete if Criterion B is marked above)	**Significant Dates:**
N/A	1928

Cultural Affiliation:
N/A

Architect / Builder:
Hauser, H.L., Building Company, general contractors
Bethlehem Steel Company, fabricator

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

9. Major Bibliographical References

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

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 for the National Register.
____ Designated a National Historic Landmark.
____ Recorded by Historic American Buildings Survey No. _____
____ Recorded by Historic American Engineering Record No. _____

Primary Location of Additional Data:
____ State Historic Preservation Office.
__x__ Other state agency: Vermont Agency of Transportation
____ Federal agency.
__x__ Local government.
__x__ University.
____ Other. Name of repository: Vermont State Library

10. Geographical Data

Acreage of Property: Less than one

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

	Zone	Easting	Northing		Zone	Easting	Northing
1.	18	678249	4911754	2.	____	_____	_____
3.	____	_____	_____	4.	____	_____	_____

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

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

11. Form Prepared By

Name / Title: William J. Thrane, Intern, and Robert McCullough

Organization: Vermont Agency of Transportation, Historic Bridge Program Date: August, 2000; revised 2006

Street & Number: National Life Building, Drawer 33 Telephone: 802-828-3615

City or Town: Montpelier State: VT Zip Code: 05633-5001

12. 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)

13. Property Owner

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

Name / Title: Towns of Waterbury and Duxbury

Organization: _____ Date: _____

Street & Number: 51 South Main Street Telephone: 802-244-8447

City or Town: Waterbury State: VT Zip Code: 05676

Street & Number: 5421 Vermont Route 100 Telephone: 802-244-6660

City or Town: Duxbury State: VT Zip Code: 05676

Narrative Description

Bridge 31, erected in 1928 with steel fabricated by the Bethlehem Steel Company, is a Parker through truss, and it carries Winooski Street (Town Highway 4) in Waterbury across the Winooski River, the boundary between the towns of Waterbury and Duxbury. On the Duxbury side of the crossing, Winooski Street briefly becomes Town Highway 2, ending almost immediately at its intersection with Town Highway 1, which then follows the river corridor in both easterly and westerly directions. Bridge 31 is one of two, much-used crossings over the Winooski River in Waterbury, and the bridge provides the principal means for residents of rural Duxbury to reach the center of Waterbury village -- and the adjoining interstate corridor -- from a westerly direction. The bridge was rehabilitated in 1997 and retains a high degree of integrity in terms of location, design, setting, materials, workmanship, feeling and association. The structure will remain in continued highway use under the Vermont Historic Bridge Program's Preservation Plan for Metal Truss Bridges, and the two towns have jointly enrolled Bridge 31 in that program, conveying a preservation easement for the bridge as part of that agreement. A plate attached to the structure confirms the bridge's date, fabricator, and builder, the H. L. Hauser Building Contract Company, Inc., of Boston.

Bridge 31 crosses the Winooski River in a single, 202 foot clear span (center to center of bearings), with eight panels, each panel 25.25 feet, and an overall width of 23 feet (center of truss to center of truss); truss depth at center span is 35.25 feet. The four center panels of each truss are reinforced by horizontal stiffeners, approximately fifteen feet above the deck surface, and full-length diagonals in the two center panels are braced by counter-diagonal struts. Diagonals, stiffeners and struts replace the full-height, diagonal and counter-diagonal web-design commonly used in the center panels of many Pratt and Parker trusses. The trusses are also reinforced laterally by a web of sway bracing, the base of which connects the horizontal stiffeners, with diagonals then crossing to connect opposite top chords. Top chords are braced, as well, by lateral and diagonal members and by portal bracing. Floor beams and stringers support a bituminous concrete deck, and the superstructure stands on abutments of reinforced concrete, constructed over earlier masonry abutments, portions of which remain; box-beam guard railings frame the travel corridor. A sidewalk, 5.5 feet in width and installed in 1997 with wooden plank decking, extends from the downstream or westerly truss. The sidewalk's steel railing is assembled with vertical posts, horizontal box beams top and bottom, and narrow spindles. Galvanized w-beam guard rails protect bridge approaches.

Original plans for the bridge, dated March 17, 1928, were designed by L. H. Shoemaker and approved by Arthur Bishop, Chief Bridge Engineer for the Vermont Agency of Transportation. The bridge was designed for a two lane, H-15 live-load capacity, conforming to design specifications established by the American Association of State Highway Officials for 1926, and meeting standards established in the U.S. Department of Agriculture's Bulletin 1259, "Standard Specifications for Steel Highway Bridges." Truss members were assembled in the shops of the Bethlehem Steel Company, where holes for field connections

Narrative Description (continued)

were reamed or drilled in preparation for the assembly process and members match-marked; steel members were joined by 7/8 inch rivets, inserted into 15/16 inch rivet holes. Floor beam and stringer connections were aligned with use of a template, and the deck system was designed with diagonal cross bracing hung at the point of intersection from L brackets attached to stringer webs. The new bridge was constructed on the abutments of the bridge destroyed by the 1927 flood, but abutment elevations were reduced in height and capped with reinforced concrete, old and new joined by 3 foot iron dowels set 1.5 feet into the old abutments. All edges of the concrete abutments, except the tops of rail caps, were chamfered with a chamfer face of 1 inch. Channel beam railings were installed to protect the trusses in the travel corridor, originally 20 feet in width. Bethlehem Steel Company applied a shop coat of red lead paint and oil. Original plans reveal extensive details about the bridge, including its 276,000 pounds of structural steel, 120 cubic yards of concrete, and 20,300 pounds of reinforcing steel.

During the early 1970s, the trusses were jacked to accommodate repairs to the abutments. Deteriorated abutment concrete was removed to sound concrete, exposed surfaces were then coated with an epoxy bonding compound, and new concrete caps and facing then added. The entire south abutment backwall was removed and replaced. Wings were patched as required, and surviving portions of the stone abutments were repointed. All exposed concrete was then treated with epoxy coating compound.

In its present form, Bridge 28 reveals most of its original features. Top chords are box girders with lattice undersides, and bottom chords are paired channel beams joined by stay plates located at intervals of approximately 3 feet. Verticals and principal diagonals are rolled I-beams. Diagonal struts, horizontal stiffeners, and lateral cross bracing connecting the top chords are all girders assembled with paired angle sections and lattice bars. Sway bracing extending diagonally from the top chords to the horizontal stiffeners opposite, and vertical struts rising to the intersections of that sway bracing, are all single angle sections. Portal bracing was designed with two panels of heavy angles joined by lattice bars, framing a web of angle sections in cross pattern with a single vertical strut, all connected with large gusset plates. During rehabilitation in 1994, the floor system was replaced, including concrete deck, curbs, floor beams, stringers, and diagonal cross-bracing. New truss expansion bearings and fixed expansion bearing assemblies were installed, but some of the bearing shoes were retained, as were bearing pins. The sidewalk is 5.5 feet in width and is attached to the outside of the downstream truss, with joints reinforced by small gusset plates and angle struts. The roadway width is now 20 feet 1 inch, curb to curb, and 21 feet 1 inch between the face of each truss.

Statement of Significance

Bridge 31 in Waterbury and Duxbury is being nominated pursuant to the existing multiple property submission titled "Metal Truss, Masonry, and Concrete Bridges in Vermont," under the property type, "metal truss bridges," and the crossing clearly meets the registration requirements for this property type. The crossing is significant for its period of construction following the 1927 flood and for its representative Parker truss design, a frequently-used truss type for longer-span crossings rebuilt after the flood. Although a common design, Bridge 31 is one of only two Parker truss bridges remaining in the scenic Winooski River corridor, which flows across the north-central part of the state and empties into Lake Champlain, where it forms the boundary between Winooski and Colchester. As in other important river corridors in Vermont, metal truss bridges are very visible landmarks, albeit increasingly scarce.

The bridge was erected in 1928 during the aftermath of the 1927 flood, an event that destroyed more than 1200 bridges of all types throughout the state. This devastation resulted in a dramatic public rebuilding campaign, marking one of Vermont's most important periods of bridge and highway construction, and metal truss bridges played a key role in that rebuilding drive. Bonds authorized by the state legislature generated funding for this enormous undertaking, but federal assistance had also become available by then. The state's bridge department expanded in size, and engineers emphasized standard building methods for different types of bridges to reduce costs and speed the process. Efforts to develop standard designs had begun in Vermont after World War I, part of a broader, national trend that emerged as state highway departments sought federal funding, contingent on approval of plans or written specifications. Although a process for developing standard plans had already begun to take shape in Vermont, the flood nevertheless furnished a powerful, added incentive to produce standard designs, and the practice became a principal component of all bridge-building programs in Vermont soon after the flood. This reliance on standard designs also forced increasing dependence on review by state and federal engineers, once a matter left to the complete discretion of towns.

During the flood reconstruction, engineers assigned specific types of bridges uniformly according to each crossing's length. Steel truss bridges became available in increments of 10 feet for spans shorter than 100 feet; 20 feet for longer bridges. Pratt through trusses became standard for structures between 100 and 160 feet, and Parker trusses were typically specified for greater lengths. The polygonal upper chords of the Parker design increased the depth (and strength) of the trusses at mid-span, the area of greatest stress, allowing a corresponding increase in span length. Most structures were 21 feet wide, and only a few bridges were individually designed for specific sites. The appearance of truss bridges also changed, becoming more stout. Rolled I-beams requiring no assembly often were used as verticals and diagonals in truss webs, and the size of these steel components distinguished bridges erected after 1927 from earlier, lightly-built spans. Improvements in rolling mills and steel alloys made production of these larger, stronger I-beams economical.

Statement of Significance (continued)

Bridge 31 reveals several of these advances in steel manufacturing, notably the rolled beams used as verticals and diagonals in the truss webs. Its rivet-assembled girders also reveal greater breadth than those of earlier truss types. In addition, by enrolling the bridge in Vermont's Historic Bridge Program, the towns of Waterbury and Duxbury participated in an effort to demonstrate the feasibility of using metal truss bridges for continued highway use, as well as the fiscal wisdom of rehabilitating and maintaining these structures. By adding the sidewalk to the outside of the downstream truss, engineers have also displayed the ability of these truss bridges to provide sufficient travel-corridor width and, at the same time, accommodate pedestrians.

Although reinforced-concrete slab and T-beam bridges dominated the construction of new bridges during the 1920s and early 1930s in Vermont, span lengths for these structures were limited, and metal truss bridges thus continued to be built in substantial numbers. Two companies, United States Steel Corporation and Bethlehem Steel Corporation, became the country's largest manufacturers of steel, and these rival firms both supplied materials for Vermont bridges. Bethlehem Steel, based in the Lehigh Valley of eastern Pennsylvania, traces its origins to 1857 and to the manufacture of iron for railroad rails, first under the name Saucona Iron Works. A few years later, the firm took the name of the city, Bethlehem, in which its iron works were located. In 1901, Charles Schwab, one of the founders of U.S. Steel, acquired control of the Bethlehem concern and, with Joseph Wharton, reorganized the company in 1904 as the Bethlehem Steel Corporation. Diversification in ordnance products, mining, and shipbuilding followed, and as the company expanded, it acquired plants at numerous locations throughout the country. Its Bethlehem works, however, gained prominence following introduction of the revolutionary grey rolling mill and production of the country's first wide-flange steel beams. These innovations placed Bethlehem in the fore of the construction industry, and it supplied steel for many of America's most important buildings. The steel for Bridge 31 came from the company's fabrication and erection shops at Bethlehem.

Though its origins have not been established with certainty, Winooski Street probably opened in 1860, possibly as late as 1865. Neither the street nor a bridge at the crossing in question appears on the Wallings Map of 1858, but road surveys from the spring of 1860 and the fall of 1865 suggest that Winooski Street had been opened to public use for at least some of its current length. The 1873 Beers Atlas shows a short length of Winooski Street but no crossing. By the 1890s, however, annual town reports show payments made for snowing the upper and lower bridges across the Winooski River, confirming that covered bridges stood at both sites. By 1924, the Winooski Street Bridge had been replaced by a steel truss fabricated by the Pittsburgh-Des Moines Steel Company. The flood of 1927 destroyed the bridges then standing at both sites, and Waterbury's rebuilding campaign after the flood included paving streets as well as building bridges. These developments represented a sharp reversal of public opinion from the years preceding the flood, when voters had rejected road improvements. The principal road west, leading to Bolton, received a concrete surface in 1929, as did Main Street along most of its length a few years later.

Major Bibliographic References

Lewis, Theodore G. History of Waterbury, Vermont. 1763-1915. Waterbury: Harry Whitehill, 1915.

Paskoff, Paul F., ed., Iron and Steel in the Nineteenth Century. New York: Facts on File, 1989.

Sabin, James, ed., History of Waterbury Vermont. 1915-1991. Waterbury: Waterbury Historical Society, 1991.

Seely, Bruce, et al, ed., Iron and Steel in the Twentieth Century. New York: Facts on File, 1994.

Town of Waterbury, Annual Reports (1895), 7

Town of Waterbury, Annual Reports (1924), 9-11.

Town of Waterbury, Annual Reports (1925), 7, 11.

"Survey of Roads from Winooski Turnpike to Onion River," Town of Waterbury Book of Deeds, Volume 16 (May 18, 1860: 105).

"Survey of Road from Waterbury Street to Duxbury," Town of Waterbury Book of Deeds, Volume 19 (September 19, 1865: 220)

Vermont State Highway Board, "Status of Federal Aid Projects in Vermont," in Second Biennial Report (June 30, 1924).

Waterbury Historical Society, Waterbury Bridges the 20th Century. Waterbury: Waterbury Historical Society, 2000.

Section 10: Geographical Data

Verbal Boundary Description

The boundary of the property is the bridge and its abutments. The bridge carries Winooski Street (Town Highway 4) in Waterbury across the Winooski River, the boundary between the towns of Waterbury and Duxbury. On the Duxbury side of the crossing, Winooski Street briefly becomes Town Highway 2, ending almost immediately at its intersection with Town Highway 1.

Boundary Justification

The boundary includes all the land historically associated with the bridge.

Section 12: Photograph Labels

The following information is the same for all photographs:

Name of Property:	Bridge 31
Location:	Waterbury and Duxbury, Washington County, Vermont
Credit:	Robert McCullough
Date:	October, 2005
Negatives:	Filed at the Vermont Division for Historic Preservation

Photograph No. 1:	View from Winooski Street (Waterbury), looking southwesterly
Photograph No. 2:	View from Town Highway No. 1 (Duxbury), looking northwesterly
Photograph No. 3:	View from Town Highway No. 2 (Duxbury), looking northerly