NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM



	NATIONAL PARK SERVICE
1. Name of Property	
historic name: <u>GLEN FALLS BRIDGE</u>	
other name/site number: <u>Brunswick Avenue Br</u>	idge, Bridge No. 4402
======================================	
street & number: <u>Brunswick Avenue over Mo</u> c	
city/town:Plainfield	not for publication: <u>N/A</u> vicinity: <u>N/A</u>
state: CT county: Windham	code: <u>015</u> zip code: <u>06374</u>
3. Classification Ownership of Property: <u>public-local</u>	
Category of Property: <u>structure</u>	
Number of Resources within Property:	
Contributing Noncontributing	
buildings sites structures objects 0 Total	
Number of contributing resources previously Register: _0	listed in the National
Name of related multiple property listing: _	N/A

======================================	ederal Agency Certification		
As the des of 1966, a request fo standards Historic P set forth	rignated authority under the last amended, I hereby certify or determination of eligibility for registering properties is claces and meets the proceduration 36 CFR Part 60. In my open not meet the National Registering	National Historic Preserthat this X nomination not meets the documentation the National Register al and professional requirion, the property X	vation Act on on of cirements meets
Signature	of certifying official	Date	
	annahan, Director, Connecticut Hist	orical Commission	
	ederal agency and bureau	011001 00101111111111111111111111111111	
In my opin Register c	ion, the property meets riteria See continuation	does not meet the on sheet.	National
Signature	of commenting or other offic	ial Date	
5. Nationa 1, hereby enter deter Nati deter Nati remov	dederal agency and bureau Telegrater agency age	Ball	Date of Action
======================================	n or Use	= V ==========	========
========	=======================================		========
Historic:	TRANSPORTATION	Sub: <u>road-related</u>	
Current:	Not in use	Sub:	

 \underline{X} See continuation sheet.

7. Description			
Architectural Classification:	======		: === ====
Other: lenticular through truss			
Other Description: N/A			
Materials: foundationwalls	_ other	METAL: iron CONCRETE	
Describe present and historic physical sheet.	appearanc	e. <u>X</u> See	continuation
8. Statement of Significance			
Certifying official has considered the relation to other properties: <u>state</u>	significa	nce of this p	
Applicable National Register Criteria:	A,C		
Criteria Considerations (Exceptions) :	N/A		
Areas of Significance: ENGINEERING INDUSTRY			
Period(s) of Significance: <u>1878-1900</u>			
Significant Dates: 1886		_	
Significant Person(s): N/A			
Cultural Affiliation: N/A		_	
Architect/Builder: <u>Berlin Iron Bridge</u>	Company (<u>fabricator)</u>	
State significance of property, and jus considerations, and areas and periods o			

9. Major Bibliographical References				
X See continuation sheet.				
Previous documentation on file (NPS):				
<pre>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 #</pre>				
Primary Location of Additional Data:				
<pre>X State historic preservation office X Other state agency Federal agency Local government</pre>	Connecticut Historical Commission 59 South Prospect Street Hartford, Connecticut 06106			
University Other Specify Repository:	Connecticut Dept. of Transportation Newington, Connecticut 06111			
10. Geographical Data				
UTM References: Zone Easting Northing	Zone Easting Northing			
A <u>19 261910 4622090</u> B C <u> </u>				
See continuation shee	t.			
Verbal Boundary Description: See continuation sheet. The nominated property includes the bridge, abutments, and roadway.				
Boundary Justification: See continuation sheet. The boundary includes only the components of the bidge itself.				
11. Form Prepared By				
Name/Title: <u>Bruce Clouette and Hoang</u>	Tinh, reviewed by John Herzan,			
Organization: <u>Historic Resource Consul</u>	Conn. Hist. Commission tants Date: <u>April 8, 1998</u>			
Street & Number: <u>55 Van Dyke Avenue</u>	Telephone: 860-547-0268			
City or Town: <u>Hartford</u>	State: <u>CT</u> Zip: <u>06106</u>			

NPS Form 10-900-a (8-86)

United States Department of the Interior National Park Service

NATIONAL REGISTER OF HISTORIC PLACES CONTINUATION SHEET

Description

Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT

Glen Falls Bridge (Photographs 1-4) is a single-span wrought-iron lenticular through truss fabricated in 1886 by the Berlin Iron Bridge Company for the Town of Plainfield, Connecticut. It crosses the Moosup River immediately adjacent to the former Glen Falls woolen mill, a now-vacant complex of stone and brick industrial buildings and waterpower features, dating from about 1881, that lies at the eastern end of the part of Plainfield called Almyville. The road carried by the bridge, now known as Brunswick Avenue, was once part of the main road between Connecticut and Rhode Island, but it was bypassed by the current alignment of State Route 14 in 1940. The bridge has been closed for more than ten years.

The bridge is divided into 8 panels and has an overall length of 124 feet. It provides a roadway width of 18 feet (incorrectly listed as 24 feet in the official state bridge log). The depth of the truss at its greatest point is 18 feet, and typically the bridge crosses at a level about 10 or 12 feet above the surface of the water in the river below. The original stone abutments have been replaced by reinforced concrete abutments (Photograph 5).

The connections between the bridge's components are made with large pins threaded at each end and secured by nuts (Photographs 6 and 7). upper chord and end posts take the form of a box girder, built up of plates, angles, and a double set of lacing bars, that measures 7" by 14" in section. The lower chord is a chain of paired 3" eyebars. members are all 4" by 8" lattice girders; a similar member is used as a diagonal stiffener running from the bottom of the end post to the first lower joint. Each panel has cross-bracing of 1 1/4" rods tensioned with turnbuckles; in addition, there is a longitudinal 5/8"-rod brace, running at a level midway up the truss and anchored at the second top joints. The two sides of the bridge are connected across the top with latticegirder struts and tension-rod top cross-bracing, and there are diagonal angle-iron knee braces at each panel to provide sway bracing. present raised-up plate-girder portal struts are c.1920 replacements of the original struts, which simply ran between the second upper joints, providing much less overhead clearance.

The wood-plank deck, broken through in several places, is supported on timber stringers which in turn rest on tapered plate-girder floor beams, varying in depth from 12" at the ends to 24" at the center. The beams are hung from the lower joints by U-shaped pins, known as "hairpins"

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Description

Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT

formed from 1" bars; the pins are secured by plates and nuts below the lower flange of the floor beams (Photograph 8). Longitudinal tension-rod bracing runs the length of the bridge from the end posts through the ends of all the floor beams, and there is crossbracing between the beams beneath the roadway (Photographs 5 and 8).

The present guardrail is a simple three-rail wooden fence bolted to the inside of the trusses (Photograph 9); this is the same railing (though not likely the same wood) which appears in an 1895 photograph of the structure.

The lower chord-end post connection on the northeast corner is covered on the top surface by a cast-iron plate with the date of construction, 1886 (Photograph 10); the casting originally extended down the front of the end post, where now the ends of the lower-chord eyebars are visible. Similar castings originally covered each portal joint.

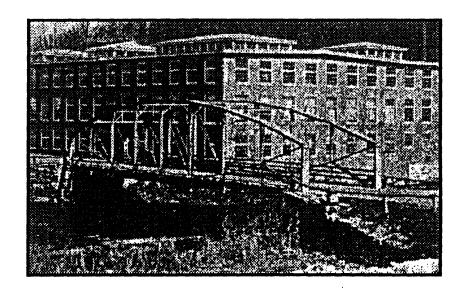
In addition to the raised portal struts and other modifications already cited, alterations to the bridge include I-beam replacements for some of the upper struts, added welded plate to reinforce some of the north-side verticals, and replacement of the northwest end post. Metal bars have been welded across the end posts at each end, and chain-link fencing further restricts access to the bridge by both vehicles and pedestrians.

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Description

Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT



View of bridge and mill, from Burgess (1895), p. 65.

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Significance

Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT

Summary

The Glen Falls Bridge is significant as a representative example of late 19th-century bridge engineering (Criterion C) and as a product of the Berlin Iron Bridge Company, a major manufacturing concern and Connecticut's only large 19th-century bridge fabricator (Criterion A). Although the Berlin Iron Bridge Company built hundreds of bridges throughout the Northeast, relatively few have survived to the present. The Glen Falls Bridge is one of 15 lenticular trusses remaining in the company's home state of Connecticut; only four are the larger throughtruss type, and one of these is scheduled for demolition.

The Glen Falls Bridge embodies many distinctive characteristics of the early years of metal-truss design, including wrought iron as the principal material, pinned connections, and an unusual truss pattern. By 1900, all of these features had virtually disappeared from American bridge building. In their place, a standardized design emerged for highway bridges based on the use of steel members, riveted connections, and only two major truss patterns, the Warren and the Pratt trusses. The Glen Falls Bridge represents a rare survivor of the era before standardization prevailed.

Engineering Significance

The Glen Falls Bridge's lenticular truss was one of a myriad of patented designs that characterized the American bridge industry in its formative stage. In part, such designs were an attempt to improve the technology of bridge building, but they also served to distinguish the products of one fabricator from another. Berlin Iron Bridge's design offered some savings of material over a comparably sized Pratt truss, though the savings was somewhat offset by the greater complexity in fabricating the curved top chord's multiple angles. Nevertheless, the design's unique profile provided something distinctive that Berlin agents could refer to when trying to convince local highway officials of their product's superiority.

In other respects, the Glen Falls Bridge's truss is similar to the vast majority of its contemporaries. In the 1880s, steel had not yet superseded wrought iron for structural forms, so most bridges at the time were built with wrought iron members. Similarly, pinned joints were only beginning to give way to riveted joints. Pinned connections were popular because they simplified the erection of the bridge,

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Significance

Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT

requiring only large wrenches to join prefabricated members instead of the more demanding technique of field rivetting. Many engineers also claimed that pinned joints allowed forces to be transferred less ambiguously, though all agreed that riveted bridges were more rigid. A final characteristic of the period evident in the Glen Falls Bridge is the use of complicated details such as the tapered floor beams, which achieved a minor savings in weight and material but at the cost of more complicated fabrication. Like the lenticular truss itself, such idiosyncratic details soon gave way to simpler, more standard forms.

The Berlin Iron Bridge Company

Unlike most American bridge firms, which were closely tied to iron and steel makers, Connecticut's leading manufacturer of bridges began as an offshoot of the tinware industry. Roys and Wilcox, an East Berlin maker of tinner's tools and other metal-forming machines, set up a company in 1868 to market sheet-iron products made with its rolling machines. The Corrugated Metal Company, as it became known, produced roofing material and metal-clad firedoors and shutters; the company became involved in structural iron work when it began to provide roof trusses as well as the exterior material. The company was not particularly successful until a new investor in 1877, S. C. Wilcox, realized that the plant had the capacity to manufacture highway bridges. The following year, the Corrugated Metal Company purchased rights to William Douglas's patented "parabolic" truss and produced the first of the lenticular bridges that would soon dot the landscape of the Northeast. Douglas, educated as an engineer at West Point, joined the company as treasurer and executive manager and continued to refine his design; he was awarded a second patent in 1885 (for the end-panel struts seen in this bridge), by which time the company had changed its name to the Berlin Iron Bridge Company.

The late 19th century was a good time to be in the bridge business. As the industry developed, the price of iron trusses steadily dropped until they were competitive with wooden spans, especially when their superior durability was figured in (wooden bridges had an average lifetime of about 25 years). The only other alternative, for shorter spans only, was building in stone, which remained very expensive. Throughout America, local highway officials opted to replace their wooden bridges with iron, and firms such as the Berlin Iron Bridge Company were happy to oblige.

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Significance Glen Falls Bridge

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(Brunswick Avenue Bridge, Bridge No. 4402) Plainfield, Windham County, CT

At its height, the Berlin Iron Bridge Company was probably the largest structural fabricator in New England. Some 400 workers were employed at its East Berlin plant (no longer extant), with many additional workers in the field during the construction season. There is no definitive count of the company's bridges; at least 600 are known to have been completed during its first ten years, and the company calculated their ten-year total at over 1,000. Most were in the Northeast (where the company claimed to have built 90 percent of the region's iron highway bridges), but some were sent as far away as Texas and Hawaii. Many towns brought the company repeated business; Plainfield, for example, bought three large Berlin bridges for its major Moosup River crossings.

The company built multiple-span bridges as long as 1,000 feet; most were more modest, with through-trusses such as the Glen Falls Bridge for lengths over 100 feet and pony trusses for shorter spans. The lenticular design accounted for the bulk of the company's output, though it is known to have produced several other truss types, sometimes to designs furnished by railroad or city engineers, as well as suspension bridges. The company also furnished ironwork for buildings and specialized industrial structures.

The Berlin Iron Bridge Company was absorbed in 1900 by the American Bridge Company, a largely successful attempt by J. P. Morgan to monopolize the country's structural fabricating industry. The American Bridge Company made only marginal use of its East Berlin plant, preferring to concentrate production at other sites. At the same time, a firm started by former Berlin Iron Bridge employees, the Berlin Construction Company, resumed the fabrication of bridges and recaptured much of its predecessor's influence in the Northeast market; the latter remains in business today under the name Berlin Steel.

Of the hundreds of bridges known to have been built in Connecticut by the Berlin Iron Bridge Company, no more than 20 trusses of all types survive, and only four of the large, through-truss lenticular spans. The four bridges differ in details, each preserving a unique set of the characteristic practices of the Berlin Iron Bridge Company. For example, this bridge and a similar span (soon to be removed) just downstream on River Street in Moosup are the only ones in Connecticut with the struts from Douglas's 1885 patent and the only ones with wooden railings (which the company illustrated in its catalog but did not recommend, instead promoting pipe rails as a low-cost alternative to its ornamental lattice railings). The bridge is also the only one

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Significance Glen Falls Bridge

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(Brunswick Avenue Bridge, Bridge No. 4402)

Plainfield, Windham County, CT

with the date incorporated into the end post casting. Although the Glen Falls Bridge is closed and has undergone some alterations from its original appearance, it remains one of the larger examples from a dwindling pool of heritage resources that illustrate an important chapter in Connecticut industrial history.

Historical Background

The Glen Falls Bridge was one of four major bridges replaced by the Town of Plainfield following the disastrous flood of February 1886. Although the rains that led to the flood were heaviest in Rhode Island, Plainfield and other eastern Connecticut towns were devastated because their rivers originated in the neighboring state. As the Moosup River rose, mill dams broke and the river's banks rapidly overflowed, sweeping ever more debris into the flood. Numerous mill buildings were damaged, and most of Plainfield's bridges were swept away. In order to fund the replacement spans, the town was forced to borrow \$20,000 (the emergency circumstances undoubtedly explain the lack of ornamental urns and railings usually found on large bridges of this type).

The crossing at Glen Falls was one of the most important in the town. From colonial times the road had been a major through route between Rhode Island and Connecticut, so it was especially important to have a reliable bridge at this point. Although the Glen Falls mill itself was not erected until 1891, the dam had already been built in anticipation of the site's use for manufacturing, meaning that heavy wagons loaded with building materials, and later industrial supplies, could be expected.

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- Bibliography Glen Falls Bridge 9-1
 (Brunswick Avenue Bridge, Bridge No. 4402)
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- Burgess, Charles F. (ed.). *Plainfield Souvenir*. Moosup, Connecticut, 1895. Photograph on p. 65.
- Clouette, Bruce and Matthew Roth. Connecticut's Historic Highway Bridges. Connecticut Department of Transportation: 1991.
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- Darnell, Victor. "Lenticular Bridges from East Berlin, Connecticut," *Industrial Archeology* 5 (1979): 19-32.
- Plainfield, Town of. Annual Report, 1886.
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- "The Plant of the Berlin Iron Bridge Company," *Engineering News* 26 (October 3, 1891): 316-18.

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Photographs Glen Falls Bridge

Photos-1

(Brunswick Avenue Bridge, Bridge No. 4402)

Plainfield, Windham County, CT

All photographs:

- 1. Glen Falls Bridge (Brunswick Avenue Bridge, Bridge No. 4402
- 2. Plainfield, Windham County, CT
- 4. April, 1998
- 5. Negative filed with Connecticut Historical Commission Hartford, CT

Captions:

East end of bridge, Glen Falls Mill in background, camera facing northwest Photograph 1 of 10

West end of bridge, camera facing east Photograph 2 of 10

South elevation of bridge, camera facing northeast Photograph 3 of 10

North elevation of bridge, camera facing south Photograph 4 of 10

Underside of bridge from west end, camera facing southeast Photograph 5 of 10

Detail of northeast portal joint, camera facing northeast Photograph 6 of 10

Detail of typical lower joint, north side, camera facing north Photograph 7 of 10

Detail of floor-beam hanger, north side, camera facing south Photograph 8 of 10

Detail of wooden railing (replacement-in-kind of original), north side, camera facing north
Photograph 9 of 10

Detail of date casting, northeast end post, camera facing northwest Photograph 10 of 10