NPS Form 10-900
(3-82)

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United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
received JAN 15 1987
date entered FEB 12 1987

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic N/A

and or common Saugatuck River Bridge

2. Location

street & number Route 136 over the Saugatuck River N/A not for publication

city, town Westport X vicinity of Saugatuck Village

state Connecticut code 09 county Fairfield code 001

3. Classification

Category	Ownership	Status	Present Use	
___ district	x public	x occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
x structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	___ yes: restricted	___ government	___ scientific
	___ being considered	x yes: unrestricted	___ industrial	x transportation
	n/a	___ no	___ military	___ other:

4. Owner of Property

name Commissioner J. William Burns
Connecticut Department of Transportation

street & number 24 Wolcott Hill Rd.

city, town Wethersfield ~~n/a~~ vicinity of state CT

5. Location of Legal Description

courthouse, registry of deeds, etc. Westport Town Clerk

street & number Town Hall, 110 Myrtle Street

city, town Westport state CT

6. Representation in Existing Surveys

title State Register of Historic Places has this property been determined eligible? (12-18-84) x yes ___ no

date 1986 ___ federal x state ___ county ___ local

depository for survey records Connecticut Historical Commision
59 South Prospect Street

city, town Hartford state CT

7. Description

Condition		Check one	Check one
___ excellent	___ deteriorated	___ unaltered	XX original site
XX good	___ ruins	XX altered	___ moved date ___
___ fair	___ unexposed		

Describe the present and original (if known) physical appearance

Saugatuck River Bridge, a wrought-iron, pin-connected swing bridge erected in 1884, carries Route 136 over the Saugatuck River in the village of Saugatuck, town of Westport. Built by Central Bridge Works of Buffalo, New York, it has two spans: a fixed span (Photographs 1,2,3,4) to the east consisting of a single Pratt through truss (144' long), and a hand-operated swing span (Photographs 6,7,8,9,10) to the west consisting of two Pratt through trusses (each 71' long) set end-to-end and meeting over the swing pier. The trusses are approximately 16' deep between top and bottom chords, and they accomodate a roadway about 20' wide. The lower chords run some 10' above mean high water. The area surrounding the bridge is densely built up, with closely spaced commercial buildings on the west bank, and more widely spaced residences to the east. The bridge carries substantial automobile traffic; limitations of vertical clearance and load capacity preclude its use by trucks.

The substructure features two abutments, a pier beneath the junction of the two spans, and a swing (or pivot) pier beneath the center of the movable span. The swing pier is a cylinder with walls of cast-iron plate, filled with gravel and sand. The abutments and the other pier are ashlar masonry with concrete patching. Timber fenders extend upstream and downstream from both piers, to ward off winter ice and errant boats (Photographs 4,5,6,7,8).

The superstructure of the fixed span is a standard Pratt truss (Photographs 1,5). Its compression members (inclined end posts, top chords, web verticals) and struts (crosspieces over the roadway) are built-up girders using various combinations of wrought-iron plates, channels and lacing bars (Photographs 1,2,3,4). The portal struts at either end of the bridge (Photographs 1,10) have shallow pointed arches, now filled by plain steel plate, but formerly the location of cast-iron builder's plates. Tension members are wrought-iron eyebars of two types. Loop-welded eyebars appear at locations of minimal load, notably the hip verticals (those descending from the portal joints). Die-forged eyebars appear at the more demanding locations, such as the lower chords and the web diagonals. (Photograph 4 illustrates the two types of eyebars: the hip vertical connected to the top of the floor beam in the foreground is loop-welded; the bottom-chord members connected to the bottom of the floor beams are die-forged.) The diagonals consist of paired eyebars and some have been stiffened by means of small pieces of steel I-section welded between the bars (Photograph 3). The floor beams (Photograph 4) are girders of plates and angles. Rolled steel I-section stringers set atop the floor beams, and smaller I-sections laid across the stringers, are modern replacement material, as is the deck of steel grating, the curbing of steel channel, the steel W-section rail, and

(continued)

Representation in Existing Surveys (continued):

Connecticut: An Inventory of Historic Engineering and Industrial Sites.

1986 Federal/state

Records deposited with Connecticut Historical Commission

Description (continued):

the plank sidewalk resting on steel beams patched into the floor system. The pinned joints are relatively simple because they were not made to accomodate every possible intersecting member: the struts are mounted above the top chords by means of riveted plates (Photograph 2), and the floor beams are interposed between the bottom of the verticals and the bottom chord, allowing two simple joints above and below the floor beams rather than one complex joint connecting everything (Photograph 4).

The swing span trusses (Photographs 5,6,7,9,10) also take the standard Pratt configuration and use many similar members, but differ in two ways from the fixed truss. First, because each of the trusses in the swing span is about half as long as the fixed span, several analogous members are lighter: the swing span trusses have loop-welded diagonals in the center panels instead of die-forged (Photographs 9,10), and its verticals are built-up of laced angles instead of channels (Photographs 9,10). Second, and more important, the swing span trusses were designed to accomodate the reversal of stress distribution when the span opened to allow boats to pass. Thus the hip vertical, which transmits insignificant load in a static Pratt truss, must resist major compressive forces when the ends of the truss swing freely in the air, so a lattice girder appears in that location rather than the light eyebars used in the fixed truss (Photograph 10). And the bottom chord, under light tensile loading in the fixed span, is placed under maximum compression when the span is open; these members in the swing span take the same form as the top chord and inclined end posts--box girders with channel-section sides--rather than the eyebars used in the fixed span (Photograph 6). The demands of movement also dictated the placement of the floor beams below the bottom chords (not above as in the the fixed span); otherwise they would have pushed upward and buckled the roadway when he bridge stood open. Finally, the two trusses of the swing span are connected across the tops of the portals where they butt together (Photograph 9). Four die-forged eyebars run between the upper portal joints of the two spans. When the span is closed these eyebars have no function; when it is open, they resist the downward forces at the ends of the span.

The drive is very simple. Within two recesses in the deck are square-headed shafts (one to open the span, one to close) that are turned by means of a long T-handled socket wrench, which resides in a locked box along the rail of the bridge when not in use. Pinion gears mounted on the shafts engage a fixed ring gear below the deck. As the pinion advances along the ring gear, the span rotates with it, balanced by two sets of rollers that travel along a metal track affixed to the circumference of the pivot pier. The rollers are mounted on the ends of built-up plate girders that support the entire dead load of the span while it is open (Photograph 8). To operate the bridge, one grips the handle of the wrench, places it over the appropriate shaft, and rotates it.

(continued)

Description (continued):

Repairs to the bridge have not compromised its visual or functional integrity. The major alterations, in the floor system, are not highly visible. And the welded patches on several diagonal members are an unobtrusive way of allowing the members to continue in their original function.

8. Significance

Period	Areas of Significance—Check and justify below			
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture
___ 1600–1699	___ architecture	___ education	___ military	___ social/ humanitarian
___ 1700–1799	___ art	x engineering	___ music	___ theater
x 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	x transportation
___ 1900–	___ communications	___ industry	___ politics/government	___ other (specify)
		___ invention		

Criteria A,C

Specific dates 1884--built **Builder/Architect** Union Bridge Company

Statement of Significance (in one paragraph)

Summary

Saugatuck River Bridge is significant on a national basis as a rare surviving example from the first generation of movable iron bridges (Criterion C). The firm that built it, Union Bridge Company of Buffalo, New York, was a leading, if short-lived, pioneer in swing-bridge production; its spans followed the designs of company president Charles Kellogg and his son Charles H. Kellogg. The bridge is also significant in the history of Westport, because it illustrates the important role of maritime commerce (particularly the shipment of onions) in the town's economy during the 19th century (Criterion A), a role of sufficient importance that the town took on the additional trouble and expense of erecting a bridge that would not limit water-borne traffic.

Local History

As early as the mid-18th century, the agricultural community in what became the town of Westport made use of the protected anchorages in the Saugatuck River to promote modest commercial growth, acting as the mercantile center for the small hinterland drained by the river. Wharves and warehouses went up at the head of navigation (the area of today's downtown Westport), and to a lesser extent in the downstream village now known as Saugatuck (the area surrounding this bridge). The Connecticut Turnpike, which opened in 1807, ran through the upstream village and solidified that area's role as the center of local commerce. As the collapse of staple agriculture in Connecticut during the early 19th century forced farmers into more market-oriented production, Westport and Fairfield became centers of globe-onion cultivation. Local merchants, such as the Jesup family, built a substantial infrastructure of maritime facilities in Westport center, geared toward shipping the region's principal cash crop. That village grew not only through the construction of storehouses, shipping offices and docks, but also through the rise of businesses, such as hotels and taverns, that served the transient residents of the busy port. The village of Saugatuck also benefited from shipping related to the onion trade, as well as from its proximity to the Long Island Sound oyster beds. Thus, in the early 1880s, when the needs of overland transport demanded a new bridge in Saugatuck Village, there was little question but that the bridge would have to accomodate the passage of vessels destined not only for Saugatuck itself, but also for the larger port upstream at Westport center. Ironically, the onion trade declined drastically soon after the bridge was opened, rendering moot the reason for erecting the swing bridge rather than a cheaper and less troublesome fixed crossing. The decline in river traffic probably accounts

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9. Major Bibliographical References

See Continuation Sheet

10. Geographical Data

Acreage of nominated property Less Than 1

Quadrangle name Sherwood Point **Quadrangle scale** 1:24000

UTM References

	Zone	Easting	Northing		Zone	Easting	Northing
A	1 8	6 3 6 8 8 0	4 5 5 3 4 5 0	B			
C				D			
E				F			
G				H			

Verbal boundary description and justification The nominated property includes only the bridge, its piers and abutments. See scaled sketch map.

List all states and counties for properties overlapping state or county boundaries N/A

state	code	county	code

11. Form Prepared By

name/title Matthew Roth & Bruce Clouette, edited by John Herzan, National Register Coordinator

organization Historic Resource Consultants **date** 7/25/86

street & number 55 Van Dyke Avenue **telephone** (203) 547-0268

city or town Hartford **state** CT

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

X national ___ state ___ local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature [signature]

title Director, Connecticut Historical Commission **date** January 8, 1987

For NPS use only

I hereby certify that this property is included in the National Register

Entered in the National Register

[signature] **date** 2-12-87

Keeper of the National Register

Attest: **date**

Chief of Registration

Significance (continued):

for the survival of the bridge: it is unlikely that strong and ascendant maritime interests would have tolerated for very long the slow, awkward hand operation of the swing span.

The Bridge Company

The firm that became Union Bridge Company started in 1870 as an effort at diversification by the Union Iron Works, which set up a bridge-fabrication shop next to its smelting and rolling works. It was a fortuitous time for such a venture, as iron-bridge design and fabrication was just beginning to emerge from being a captive industry of the railroad companies. Innovative designs and production techniques proliferated as the new bridge companies sought to win business by the novelty, technical superiority, or economy of their products. The iron works brought in an experienced bridge man, Charles Kellogg, and his son Charles H. Kellogg, to head the bridge firm's operations. Known as Kellogg Bridge Company, it specialized from the start in movable spans. In 1876 the Kelloggs claimed that their 444'-long swing bridge over the Mississippi River at Louisiana, Missouri, was the longest draw span ever built.[1] The younger Kellogg patented several techniques, notably a design for wrought-iron compression members and a means of producing die-forged wrought-iron eyebars.[2] The latter was particularly important because it eliminated welding, which caused internal stresses in the metal that hampered its use. The availability of die-forged eyebars substantially helped in the growing acceptance of iron trusses.

Despite the technical successes of the Kelloggs, the company lasted barely a decade. Hampered by the financial problems of the parent iron works, and by keen competition among bridge builders, Kellogg Bridge Company sold out in 1881 to Central Bridge Works. Central occupied Kellogg's Buffalo shops and continued using many Kellogg techniques, including the die-forged eyebars made on equipment that remained in the plant. Central Bridge Works fared poorly as well, and in 1884 Union Bridge Company, a new firm that included the elder Kellogg, took over the works. The younger Kellogg remained in Buffalo working as a consulting bridge engineer, presumably including work on projects for his father's new firm. The succession of bridge firms apparently continued the initial specialty of movable spans, so it is not surprising that Westport hired Union Bridge for the Saugatuck project. Union Bridge lasted until 1895, until its plant was engulfed by expansion of the reorganized neighboring iron works.

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Significance (continued):

The Bridge

Swing bridges represented a particularly difficult challenge to the engineers and fabricators of the 1880s. One key problem was that the dead load of the span had to be borne in the center of the bridge when it was open, while the Pratt truss was designed to distribute load to the abutments at the ends of the span. This reversal of ordinary practice required thorough redesign of the standard Pratt truss. The Kelloggs took the redesign as an opportunity also to save some cost, because while some members (bottom chords, hip verticals) are much heavier than in the ordinary Pratt in order to accomodate the non-standard loading, others members (web diagonals) were made lighter to capitalize on the intermediate load-bearing capacity of the pivot pier. The other crucial problem was to devise a means to support the ends of the span when it was open. The most direct approach was to make the truss heavier than normal use would dictate, assuring that the superstructure could transmit the entire dead load to the pivot pier. A variation of this method would eventually be adopted for most swing spans: arching the top chord in the center panels, thus providing more metal and a minor arch effect where the greatest load was concentrated. Examples of this technique include the East Haddam (1913) and Niantic (1921) swing bridges. The Kellogg's solution was dictated both by economy and by familiarity with (and trust in) the use of die-forged eyebars. Rather than simply piling on more metal in the center of a single truss, they made the swing span of two trusses meeting in the center and tied together with four eyebars per side. Their approach was brilliantly simple: they solved the problem of truss stability in the center of the span not by altering the trusses but by removing them from the center.

This highly personalized, even idiosyncratic, approach to bridge design is entirely characteristic of the 1880s. By the end of the following decade, standardization of bridges and economic consolidation in the fabricating industry would preclude any chance for such unusual solutions to design problems. The Saugatuck River Bridge illustrates vividly a distinctive and ephemeral chapter in American bridge-building.

Besides the specific insight it offers into the history of bridge technology, the Saugatuck River Bridge is significant as a rare surviving example of the pin-connected, wrought-iron truss construction characteristic of the 1880s. Pinned connections were superceded by the riveted joints that became nearly universal after 1900. Wrought iron also represents archaic construction: by the mid-1890s, steel had eclipsed structural wrought iron for all but a handful of specialized uses. Finally, the Saugatuck River Bridge is the only example of a hand-operated swing bridge in Connecticut.

Notes

1. Asher and Adams Pictorial Album of American Industry, New York, 1876; reprint, New York: Rutledge Books, 1976 , p.70.
2. Ibid.

Bibliography (continued):

Asher and Adams Pictorial Album of American Industry, New York, 1876; reprint, New York: Rutledge Books, 1976.

Bech's Directory of the City of Buffalo, 1870-1895; courtesy T.E. Leary, Buffalo and Erie County Historical Society.

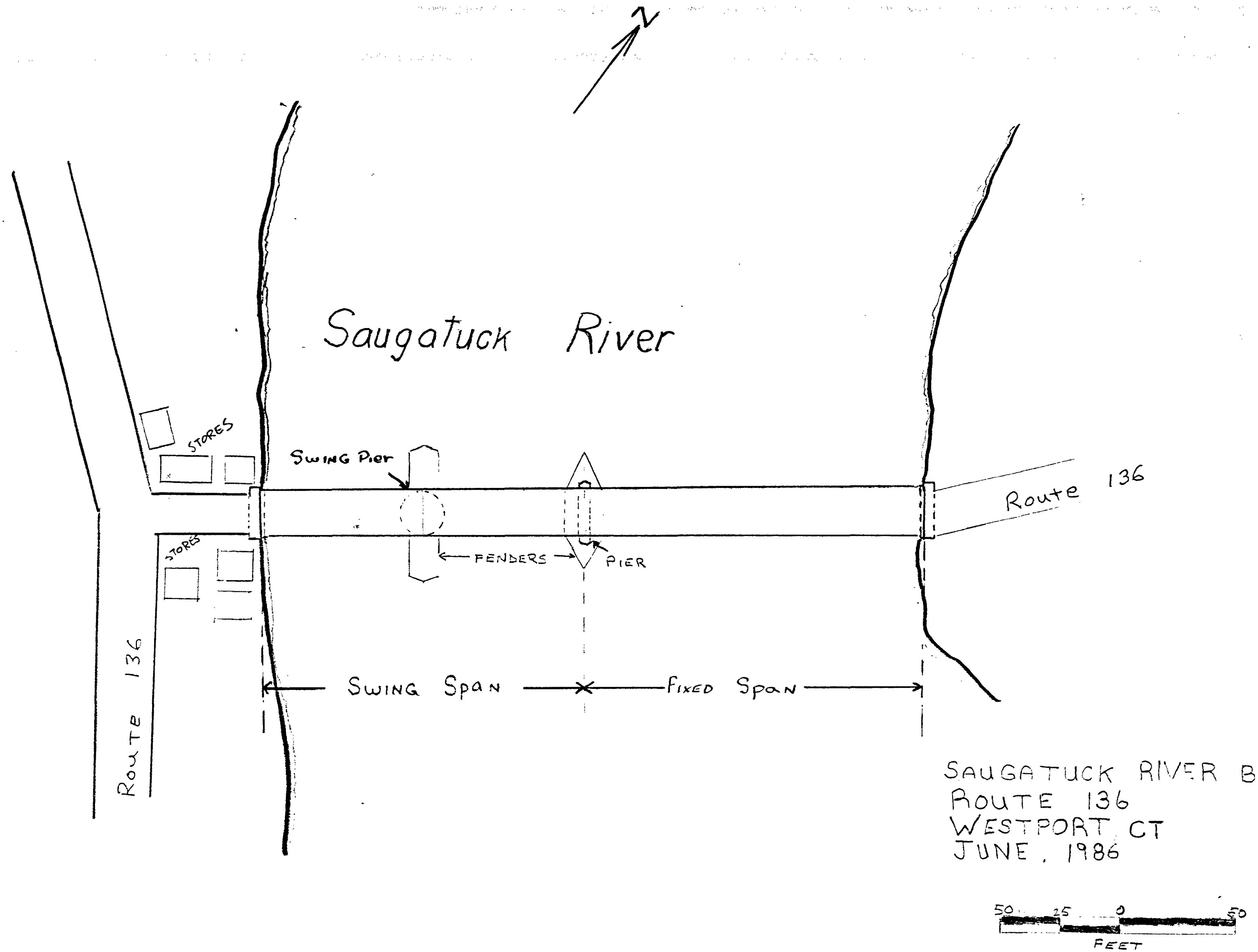
Beers Ellis and Soule [Company], Atlas of New York and Vicinity. Philadelphia, 1867.

Birge, E.C., Westport, Connecticut: The Making of a Yankee Town. (New York, 1926)

Darnell, Victor C., Directory of American Bridge-Building Companies. Washington, D.C., 1984.

Hool, George A. and W.S. Kinne, Movable and Long-Span Bridges. New York, 1923.

Sanborn Map Company, Insurance Maps of Buffalo, New York. New York, 1881, 1884, 1887, 1889; courtesy T.E. Leary, Buffalo and Erie County Historical Society.



SAUGATUCK RIVER BRIDGE
ROUTE 136
WESTPORT CT
JUNE, 1986

HISTORIC RESOURCE CONSULTANTS
HARTFORD, CT