New York, New Haven and Hartford
Railroad, Shaw's Cove Bridge
(Northeast Corridor Project)
Spanning Shaw's Cove
New London
New London County
Connecticut

HAER No. CT-24

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MID-ATLANTIC REGION NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

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Location:	Spanning Shaw's Cove New London, New London County, Connecticut UTM Coordinates: 18.743640.4582930 USGS Quadrangle: New London
Date of Construction:	1913; alterations in 1917, 1932, 1938
Present Owner:	National Railroad Passenger Corporation Suburban Station Building 1617 John F. Kennedy Boulevard Philadelphia, Pennsylvania 19103
Present Use:	Railroad bridge
Significance:	The Shaw's Cove Bridge is a forged steel rim-bearing swing bridge. It is a single-span, pin-connected Pratt through truss with thin diagonal eye-bars serving as tension members. It is significant as part of the transportation link in the shoreline route of the New York, New Haven and Hartford Railroad, and as an individual engineering solution to the need to provide dependable rail service while accommodating river navigation.
Project Information:	The Shaw's Cove Bridge is to be replaced as part of the Northeast Corridor Improvement Project. Under Section 106 of the National Historic Preservation Act of 1966, mitigative documentation was undertaken in April 1983 for the Federal Railroad Administration by historian Janice G. Artemel, with the assistance of Lisa Crye, Ellen Gallagher, and Kristin Heintz.

The national railway network that was to be one of the critical catalysts in the industrialization of the United States was largely completed between 1840 and 1880. Most early railroads were short lines that attempted to tap economic resources of the hinterlands of cities. By the second quarter of the 19th century, cities east of the Mississippi, particularly those in the northeast, began to build longer lines and consolidate shorter ones to tie them more closely together.[1] The New York, New Haven and Hartford Railroad provides an excellent example of how railroad systems were created and how they advanced transportation technology, including movable bridges, with their economic power.

The New York, New Haven and Hartford Railroad was first formed by a consolidation of the Hartford and New Haven Railroad Company with the New York & New Haven Company, when the two railroads entered into a partnership agreement. The capital was divided, and the New York, New Haven & Hartford Railroad was established on August 6, 1892.[2] Lengthy and intricate patterns of acquisiton were common to railroading in the late 19th century. Empires were created as well as monopolies on the transportation of goods. The peak growth years of the American railroads were the early 1900s and, of those, the teens (1911-1919) were the final surge. The decline of the railroads after those years was due partly to the excesses of transportation monopolies in the last quarter of the 19th century and partly to a combination of rising costs and competition from other modes of transportation.[3]

By the end of the 19th century, the New York, New Haven and Hartford Railroad extended from New York to Boston and virtually controlled rail traffic in southern New England, effectively preventing any further major competition along its lines.[4] It then set about to secure its hold with a building program, which occurred mostly between 1911 to 1919. Construction and railroad technologies had advanced to the point that massive quantities of earth and rock could be moved and placed elsewhere; bridges were raised above streets and crossed rivers where bridges had not been possible before. The expenditures were prime examples of the growing capability of an industrialized society to engage in large scale environmental manipulation.[5]

Movable Bridge Types and Technological Developments

Of special significance in the development of railroad technology during this period were the many new bridges built over major water courses, including movable bridges. A movable bridge can be changed in position to allow continued river traffic. There are three types of movable bridges: the swing bridge, in which the movable span turns on a pivot pier; the bascule bridge, which in modern form uses a counterweight to raise one end of the movable span and lift the bridge; and the lift bridge, in which the movable span is actually raised between two towers to open the bridge.

The earlier records of movable iron railway bridges in the United States show the use of the rim-bearing swing type. Among the earliest were a series of parallel swing bridges built across the Charles River in Boston in the early 19th century, which were timber trusses hinged at one end that swun open to allow a narrow channel for navigation.[6] In the 1860s, many of the rim-bearing swing type were built in the Mississippi Valley. The design of the center-bearing swing bridge, which is superior to the rim-bearing in many aspects, was improved greatly between the late 1880s and 1900. After 1900, strong advocacy by C. C. Schneider, a consulting engineer for the American Bridge Company, influenced many engineers to use the center-bearing swing bridge. The modern bascule and lift bridge types were not developed until after 1890, when the electric motor was refined and a method of counter-balancing the weight of a large span had been developed.[7]

Along the eastern seaboard, the large number of navigable rivers and inlets to be crossed resulted in the construction of fifteen movable bridges on what is today the Northeast Corridor rail line: nine bascule bridges, five swing bridges, and one vertical lift bridge. Generally, swing bridge types were preferred over bascule and lift bridges when the waterway was wide enough to allow for clearance on either side. When the waterway was too narrow to provide clearance, as is often the case in the northeast, vertical lift or bascule bridges were used. Bascule bridges are difficult to maintain and repair and present clearance problems for tall vessels, since they cannot be opened to a full 90-degree angle. However, they can be opened and closed more rapidly than swing bridges, which is an advantage to rail operations. Vertical lift bridges also present clearance problems for tall vessels, although they do not need as much maintenance and repair as bascule spans.

The Shaw's Cove Bridge is one of four movable bridges built by the New York, New Haven and Hartford Railroad in Connecticut. These bridges are typical examples of engineering practices in the early part of the twentieth century. All four are shoreline bridges, and each was designed for its location, with particular attention to intended function and possible problems. The bridges were prefabricated at the construction company's plant and then built by unskilled labor at the site. The machinery to operate the bridges was not standardized, and each bridge has unique mechanical components. (See New York, New Haven and Hartford Railroad, Groton Bridge (HAER No. CT-25), Mystic River Bridge (HAER No. CT-26), and Niantic Bridge (HAER No. CT-27).

These bridges reflect the state-of-the-art technology of movable bridges in the period from 1907-1919. Because steamship lines covered Long Island Sound during the 19th century, impetus for completing a through shoreline rail route from New Haven to Boston developed relatively late in the history of New England railroads. Two other rail routes, the Willimantic, Providence and Boston line, and the Springfield line to Hartford, Connecticut, and Springfield, Massachusetts, provided connections between New Haven and Boston

that were approximately the same distance in rail miles. It was not until 1889 that an all rail shoreline route was completed. At about the same time, the technology of removable bridges was being greatly advanced. As the older bridges on the shoreline route deteriorated and became outmoded by the need to carry heavier and faster rail traffic along the shoreline route, they were replaced with new movable bridge representative of bridge technology of the day.

Shaw's Cove Bridge

Shaw's Cove Bridge is located in New London, Connecticut, which prospered as the country's second largest whaling port in the second quarter of the 19th century. The New York, New Haven and Hartford Railroad took over the New Haven, New London & Stonington Railroad in 1870 and operated as the Shore Line Division. The line had operated since the 1850s, but no bridge was built across Shaw's Cove untill889, since a ferry had completed the rail link before that.[8] During the 19th century, periodic filling at the inlet to Shaw's Cove was a key factor in creating a logical site for a bridge at this location.

The central and end stone masonry piers of the pressent Shaw's Cove Bridge are those of a former Pratt truss bridge which spanned the cove. The Berlin Iron Bridge Company of East Berlin, Connecticut, was the contractor for the piers. The bridge is a 136-foot long, single-span, pin-connected Pratt through truss with thin diagonal eye-bars serving as tension members. This older form of Pratt truss was susceptible to failure under heavy loadings. The posts take the compressive loads. The bridge also has a timber pile approach span with a timber ballasted deck.

Shaw's Cove Bridge is a forged steel rim-bearing swing bridge, designed in 1912 by the Office of the Engineer of Structures and Design, New Haven Division of the New York, New Haven & Hartford Railroad. It was constructed by that company's New London Division in 1913. The bridge is one of two rim-bearing swing bridges on the Northeast Corridor rail line. Rim-bearing bridges were commonly used when loads were very heavy, because the distribution of weight is on more rollers. The primary mechanical parts carry a much larger portion of the total load than do those of center bearing bridge, but the load is better distributed and more stable when the bridge is open. Hence, for a large two or four track structure, a rim-bearing bridge was often preferred, although it had more complicated maintenance and repair problems (Shaw's Cove is a two-track bridge).

The dead loads from the through trusses are carried by cross girders which frame into the circulator drum. The circulator drum is supported on rollers that ride on a steel track anchored to the center piers. To open the bridge,

the bridge locks are released and the wedge locks are withdrawn. The drive pinions then swing the bridge to the open position.

The drive machinery is located below the bridge deck at the center of the span. Electric power for the two 20-horse-power motors is supplied by a private local utility company. The bridge's end lock is manually operated. When it is disengaged, a connecting linkage operates a magnetic contractor that transmits power to the bridge by way of a submarine cable.

The bridge has undergone much repair since its construction. In 1917, the Boston Bridge Works, Inc. repaired the steel gears and the link rods and yokes. Also in 1917, the New York, New Haven & Hartford Railrod made changes to the portal bracings and installed reinforcing planks. The gears were again repaired in 1924. In 1932, changes were made to accommodate the new A.C. drive operating machinery made by the Earle Gear and Machine Company of Philadelphia. The last major repairs to the bridge were the 1938 fender repairs, necessitated by the heavy damage of a September hurricane in that year.

Since that time, the bridge has deteriorated, and section loss is typical throughout the superstructure. Construction of a new bridge was determined necessary as part of the Northeast Corridor Improvement Project to facilitate continued safe passage of rail and waterborne traffic at Shaw's Cove.

FOOTNOTES

1 Alfred D. Chandler, "The Beginnings of 'Big Business' in American Industry," Business History Review 33 (Spring 1959): 1-31.

2 George Pierce Baker, Formation of the New England Railroad Systems (New York: Greenwood Prass, 1968), p. 1.

3 John L. Weller, The New Haven Railroad: Its Rise and Fall (New York: Hastings House, 1969).

4 R. Patrick Stanford, Lines of the New York, New Haven & Hartford Railroad Co. (Stanford: Stanford University Press, 1979).

5 Weller.

6 David Plowden, Bridges - The Spans of North America (New York: The Viking Press, 1974)

7 Plowden

8 Robert Owen Decker, The Whaling City (Chester, Connecticut: Pequot Press, 1976), p. 216.

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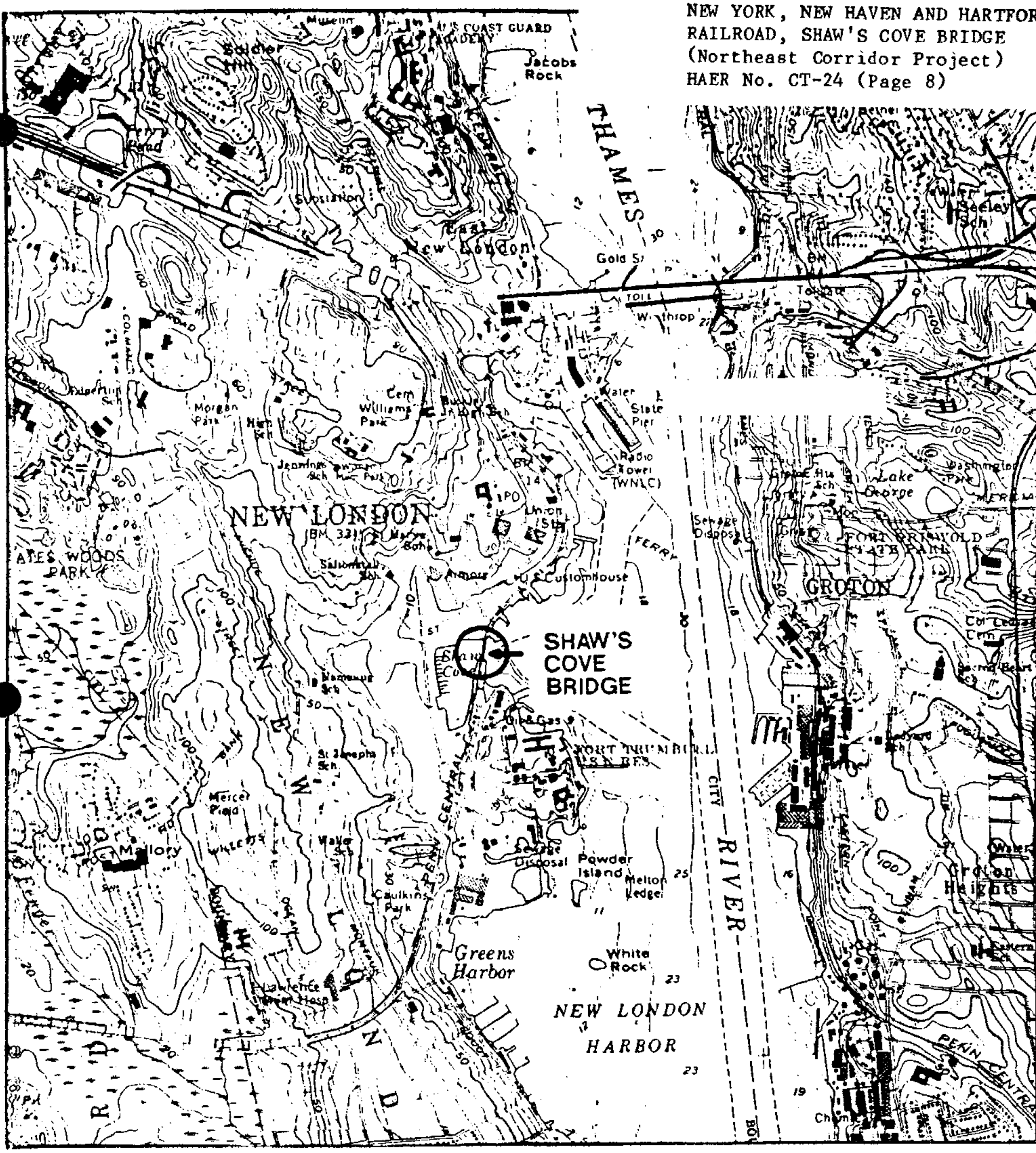

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