NEW HAVEN RAIL YARD, MACHINE SHOP
Vicinity of Union Avenue
New Haven
New Haven County
Connecticut

HAER CT-160-E
CT-160-E

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
PHILADELPHIA SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
U.S. Custom House, 3rd Floor
200 Chestnut Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

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MACHINE SHOP **HAER No. CT-160-E**

Location: Vicinity of Union Avenue
New Haven
New Haven County, Connecticut

USGS New Haven Quadrangle, UTM Coordinates:
18.673520.4573350

Date of Construction: 1870

Present Owner: Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06131

Present Use: Storage

Significance: The Machine Shop is significant as the only major original component still standing from the New York, New Haven and Hartford Railroad's 1870 shop complex. Built by its predecessor, the New York and New Haven Railroad, the complex also included a large roundhouse, forge building, car-building shop, and paint shop, all integrated with transfer tables and connecting tracks. The railroad built many locomotives here, as well as rolling stock for its freight operations, and for many years this was its major repair and maintenance facility. The building also has a feature of great interest for the history of building technology: roof trusses that incorporate cast-iron components.

Project Information: The rail yard is being reconfigured to provide for improved operation of commuter and Amtrak Northeast Corridor trains and to provide a storage yard for commuter equipment. The project requires removal of the building. This documentation was undertaken pursuant to a Memorandum of Agreement among the Federal Transit Administration, the Federal Railroad Administration, the National Railroad Passenger Corporation, the Connecticut Department of Transportation, the Connecticut State Historic Preservation Office, and the Advisory Council on Historic Preservation.

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Description

The Machine Shop is a one-story gable-roofed brick building measuring 182' x 65' in plan, oriented with its long axis in an approximately east-west direction. The building rests on a stone foundation supported on timber piles, with its brick walls rising to a height of 17' (26' at the gable peak). The brickwork pattern is common bond with Flemish variation. Corbeling at the cornice, which forms a partial return across the east-end gable, includes a sawtooth course. The current roof has a rolled-asphalt surface over an old or original wood deck supported on metal trusses. Most of the twenty-six skylights recorded in 1918 were still in place in the 1950s, but none remain today.

Originally the machine shop was part of a U-shaped group of buildings that included a parallel wing for a car-building shop, with a boiler and engine house in between at the west end. After the other parts had been demolished, the machine shop was reduced in length from its original 262'. As a result of this modification, which occurred around 1960, the west end of the building was covered with fiberglass corrugated siding; a portion of the common wall with the adjoining boiler room still remains at the west end of the south elevation. Another modified portion of the machine shop is the one-story shed-roofed addition in the center of the south elevation. Covered with corrugated metal siding, the addition as it now stands is actually the product of a series of additions and removals over the period ca. 1910 to ca. 1980. When first constructed, this portion was a sheet-metal or tin shop, with welding added in the 1920s.

The north elevation as it now stands has eighteen bays. Sixteen are segmental-arched window openings with brick heads and cast-iron sills, of which the one has been altered into a doorway. One bay contains a large round-arched opening, 10' wide by 16' high, that formerly accommodated large double doors for a connecting track to a nearby roundhouse; the mortises for the doors are still visible in the brickwork, and there are six granite blocks with iron pintels for the hinges. A second wide bay for a connecting track has been partly bricked up and fitted with a modern garage door. All other openings have been boarded up. The east elevation has six bays of segmental-arched openings. The south elevation has seven large round-arched openings, like the one on the north side, alternating with segmental-arched windows. Some of the large openings communicate between the main building and the addition; those opening to the exterior are fitted with modern roll-up doors. According to the 1888 Hopkins atlas map, six of the openings were for tracks serviced by a transfer table that occupied the space between the machine ship and the car-building shop, while the seventh was a straight track connecting the two shops. There is no documentary evidence for the transfer table after 1888, and the current concrete slab that covers most of the area has destroyed or obscured any subsurface remains of the transfer table.

At the time of the 1918 valuation survey, the interior of the machine shop was completely open, but today concrete-block partitions divide it in three, with a small two-level plywood and concrete-block office partitioned off in the northwest corner. Except for the westernmost two

bays, where there are (apparently added) intermediate round iron columns, the roof trusses form a clear span over the width of the building. The trusses, spaced 10' on center, are of two types. There are eight double-intersection riveted Warren trusses built up of angles and T-section members; before the building was reduced in length, there were seven other trusses of this type, which probably date from around 1890 or 1900. The remaining ten trusses are cast and wrought-iron Fink-type trusses that probably date to the building's original construction. The compression members of the truss, the inward-slanting diagonals, are cruciform-section cast-iron columns that increase in section toward the middle. The top chords are T-sections and the center vertical, counter-diagonals, and horizontal members are formed from rod with forged eyes at the ends. The members are connected together by semi-circular plates at the bottom chord and by forks at the ends of the cast columns that are bolted into the flange of the top-chord T-section. There is a slight camber to the bottom chords of the trusses.

Historical Background

The machine shop is part of the original shop complex built by the New York and New Haven Railroad in the period 1867-1870, shortly before its merger with the New Haven and Hartford Railroad. In 1867, preparation began with the purchase of 20 acres of low-lying land that lay between its right-of-way and Long Island Sound, land that had formerly been salt marsh. Considerable amounts of fill must have been brought in to raise the land to its present height, and as a consequence all of the early buildings in the yard, like the machine shop, have timber-pile footings below their stone foundations. The reason the railroad gave for building the shop complex was the need for more engines and rolling stock brought about by a great increase in business (once the financial crisis of the late 1850s was over). In addition to the machine shop, the undertaking included a large blacksmith shop with 22 forges, a car-building shop, a paint shop, a brass foundry, storage buildings, and a roundhouse with stalls for at least 40 engines. Early maps and views show the elements integrated with connecting tracks and transfer tables, allowing locomotives and cars to be easily moved within and between the buildings. The railroad reported the total cost to be about $500,000, and estimated that 1.5 million bricks and 110,000 square feet of roofing were needed for the project. Work began in 1869 and was completed by the middle of 1870.

The building remained a machine shop in general support of the entire complex until the 1930s, when it was identified as the machine shop for the "B & B" (Buildings and Bridges) Department. Later, it was under the jurisdiction of the Signal Department, its last use.

Significance

The machine shop is significant as the only major surviving component of the New Haven Railroad's historic New Haven shops. Each part of the 1870 complex was vital in

accommodating specific processes needed for the construction and repair of steam engines and freight cars. Although woodworking processes were needed for the bodies of the freight cars and the cabs of the locomotives, metalworking was key to the production of moving parts such as axles, journals, center plates, and driver hubs. Presumably, since there was no iron foundry in the complex, cast-iron parts were made by one of the numerous job shops that existed in New Haven at that time. The other major production processes could be performed on site, with those requiring precision metalworking carried out in this building. Although no inventory of machinery exists, presumably the shop contained a variety of lathes, milling machines, and drill presses needed to produce the high-precision components of steam engines, as well as performing more mundane tasks such as turning axles and drilling bolt holes in corner braces. In 1872, when the two predecessor companies were consolidated into the New York, New Haven and Hartford Railroad, the roster included among the fifty engines six locomotives built in the New Haven shops. Although the railroad also purchased locomotives from other builders, engines continued to be built in its own shops through 1904, including forty-four medium 4-4-0s built in the period 1897-1904 using parts from older engines.

The machine shop has great historical interest for the history of building technology because of its composite cast and wrought-iron roof trusses, a once-common but now rarely found element. Roof-truss development generally paralleled the evolution of bridge trusses, and in fact many iron and steel fabricating companies pursued both markets for their products. The use of trusses to create clear space goes back to the 18th century, when meetinghouses, markets, and other large public buildings were commonly built with wooden trusses, many of which incorporated iron rods as tension members. All-iron trusses were developed around the middle of the 19th century. Cast-iron is a poor material for members that act, or might act, in tension, so with a few notable exceptions bridge designs used cast-iron only for compression members, such as columns, and used wrought-iron for tension members. Even so, cast iron components had a disadvantage in that special connectors were usually needed to join the cast columns to other parts of the truss. All wrought-iron trusses, using standard shapes either pinned or riveted together, eclipsed earlier techniques by the mid-1880s, and in the 1890s steel replaced wrought-iron as the material of choice.

The Fink truss was devised by Albert Fink (1827-1897), a German immigrant engineer who worked for the Baltimore and Ohio and other American railroads. Known examples of Fink-type bridges date from the 1850s and 1860s and, like this roof truss, incorporate both cast and wrought-iron members; it is believed that only one Fink-truss bridge, the Zoarville Station Bridge in Ohio, survives. The Fink roof truss is an inversion of the bridge truss; unlike the bridge truss, the roof version has always been in wide use and remains so today.

Bibliography

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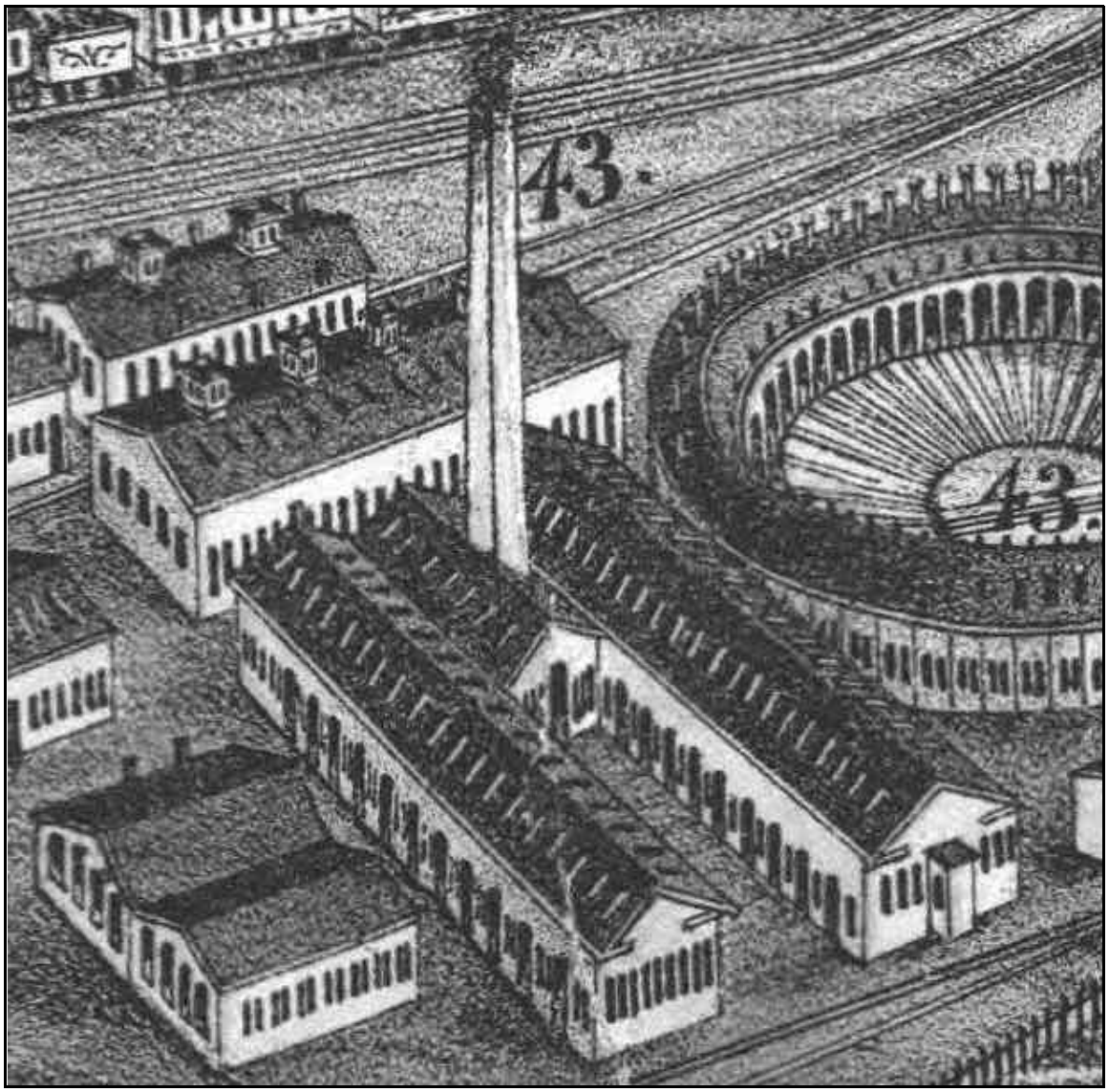
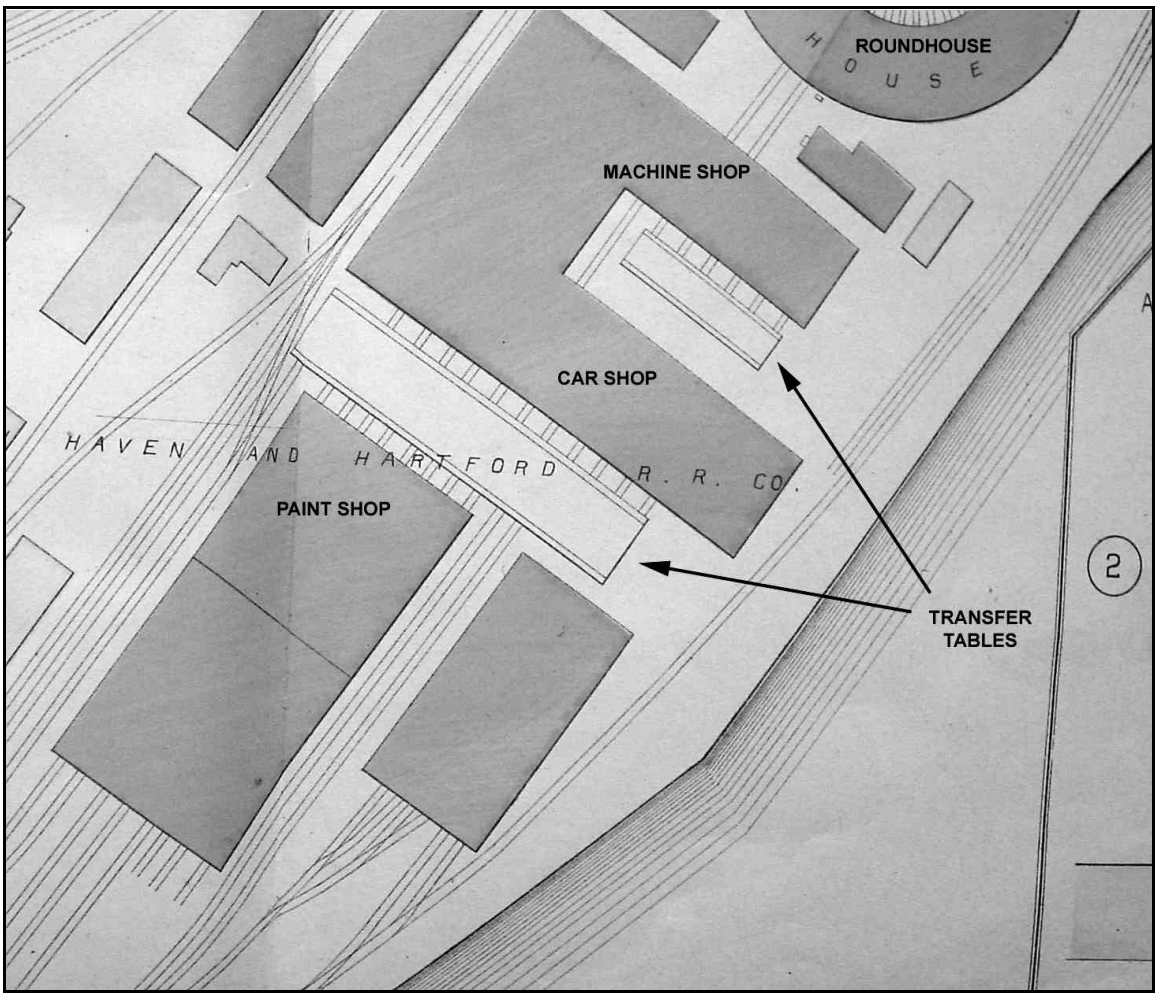
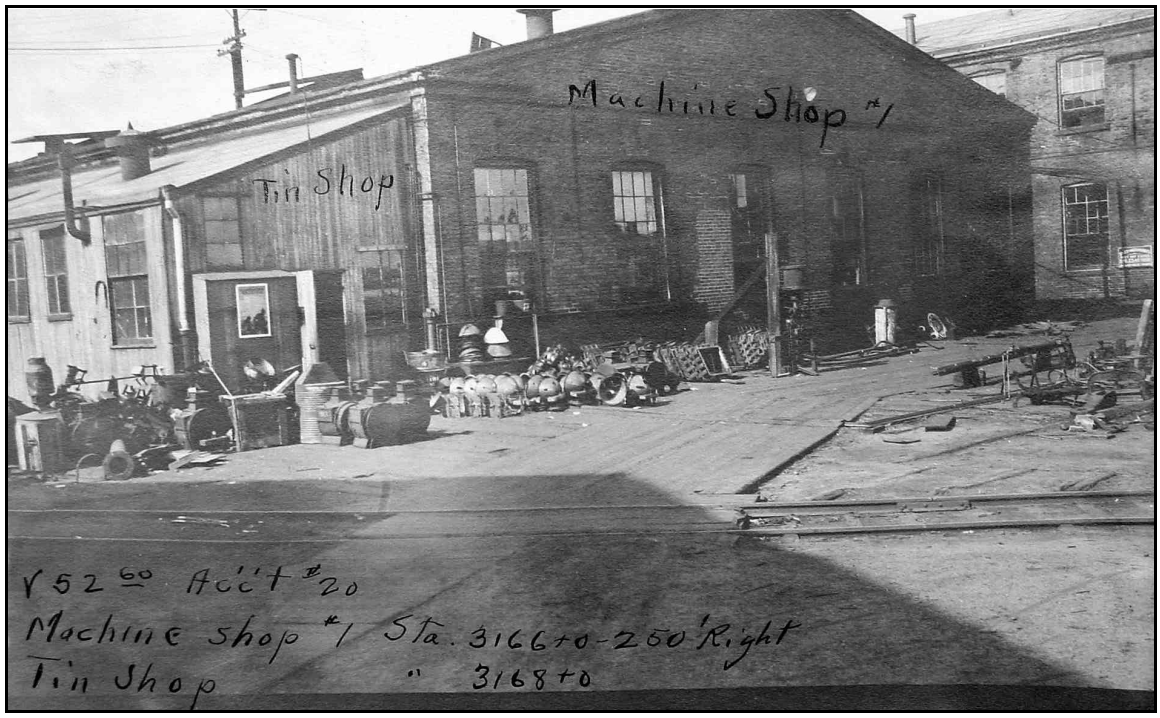
The machine shop as depicted in the 1879 Bailey and Hazen bird's-eye view. The engraving also shows the parallel car shop and the boiler and engine house that stood between the machine shop and car shop.



Detail of 1888 Hopkins atlas map, showing two tracks between the machine shop and the roundhouse to the north, a transfer table that allowed movement between the bays of the machine shop, and a second transfer table for the car shop and paint shop to the south (building labels added).



The machine shop as photographed in 1918 as part of the Interstate Commerce Commission valuation (National Archives).



Composite cast and wrought-iron roof truss as recorded by the Interstate Commerce Commission valuation, 1918.