Society for Industrial Archeology · New England Chapters

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CONTENTS

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NNEC-SIA Spring 2003 Meeting and Field Tour

The spring meeting and field tour of the Northern New England Chapter, Society for Industrial Archeology, will be held on Saturday, May 10, beginning at 9:30 a.m. (if heavy rain on Saturday, then Sunday, May 11). The sites visited will be six in number: three railroad bridges, the remnants of a turntable and locomotive house, a woolen mill, and a granite quarry. Attendees should arrive at the north end of the Sarah Mildred Long or By-Pass U.S. 1 bridge spanning the Piscataqua River between Portsmouth, NH, and Kittery, ME, no later than 9:40 a.m. on May 10. Directions sent by email and post will be sufficiently detailed to permit late arrivals to catch the convoy already heading northwest to the other sites. The registration fee for this tour is $5 per person.

Directions from the south: Proceed on I-95 North (New Hampshire Tpke) to Exit 5, leading to the Portsmouth Traffic Circle. Leave the circle on By-Pass U.S. 1 North (Bickfords Restaurant and the Wynwood, Best Western, and Holiday Inn motels are immediately to the right of this route). Proceed over the Sarah Mildred Long bridge to the Maine side and just at the far end of the bridge, exit RIGHT onto Bridge Street (and continue below).

Directions from the west: Proceed southeast on State Route 16 (Spaulding Tpke) past the Pease Tradeport, at the split bearing LEFT to the Portsmouth Traffic Circle, then follow the directions specified both above and below.

Directions from the north: Proceed on I-95 South or Rte 236 southeast to Kittery, ME, and follow the directions to By-Pass U.S. 1 South. When the green Sarah Mildred Long bridge looms closer, take the last exit on the RIGHT just before the bridge, going under and around. Do NOT get onto By-Pass U.S. 1 North, but rather turn RIGHT from the up-ramp directly onto Bridge Street (and continue below).

Continuing directions for all drivers: Upon entering Bridge Street, take a quick LEFT onto Old Post Road and park on the right sufficiently distant from the intersection for safety. If there is no space remaining on Old Post Road, return to Bridge Street and opposite Old Post Road, enter the Health Club lot overlooking the river and park at the far end.

There will be no public lavatories at the rendezvous site, so the attendee's departure from home should take into account seeking out a friendly service station or McDonald's along the way, in order to arrive by the start time.

From the Sarah Mildred Long bridge site (the lower deck of this over/under vertical lift bridge is for rail transit), the group will convoy to the five sites described below, drivers resetting their trip odometer to Zero at specified places in the detailed directions, to permit a more accurate readout in the event of separation from the convoy.

• On Maine Route 236 North survive the turntable pit and foundation of the three-bay locomotive house for the Portsmouth, Great Falls & Conway RR. This interchange was known as Conway Jct, and later Jewett.

• Just off Maine Route 236 North and across the bridge spanning the Great Works (Asbenbedic) River stands the former Burleigh Woolen Mill at Rocky Gorge. Permission has been granted to enter the clapboard-over-brick main mill building, and while there will be off-limits sections for safety reasons, there remain several vantage points to see and photograph the surviving buildings, the falls, and the river gorge.

• At South Berwick, not far from Maine Route 236 North, stands the iron and steel trestle spanning the Salmon Falls (Newichawannock) River between Maine and New Hampshire. Food can be purchased and lavatories will be available here.

• Attendees will consolidate into three or four vehicles and drive a few miles to the timber boxed pony truss overhead bridge at Rollins Farm in Rollinsford, NH. Only these convoy vehicles will be permitted to enter the private land where the boxed pony stands, one of only six remaining in North America. The mini-convoy will return to the Salmon Falls trestle for lunch and the spring business meeting. Attendees who wish to dine al fresco in the Salmon Falls village park should bring a bagged lunch. The meeting will be held after lunch at a specified time.

• North of North Berwick on Maine Route 4, and three miles west on Quarry Road, lies the former Swenson pink granite quarry at Bald Hill, boasting an impressive number of surviving structures, including its derrick, engine house, boiler, etc. Vigilant safety officers of the chapter will be on duty at this potentially risky site.

• The spring tour ends at the granite quarry, with directions available for the most direct route to the Wells Exit of Maine I-95, five or six miles distant.

IMPORTANT: Those who intend to participate in this meeting and tour should contact field tours committee chair Nelson Lawry at lawrynh@aol.com or (603) 742-0543 as soon as possible to better estimate the number of hand-outs needed. He should also be contacted if there is rain (not simply overcast) and any question if the tour will proceed that day.

So there is no confusion, the official start time is 9:30 a.m. on Bridge Street, at the north end of the Sarah Mildred Long bridge (By-Pass U.S. 1 North), with a no-exceptions slip-slide of 9:40 a.m. The starting gun sounds at that time.

Nelson Lawry
Rollinsford, NH

Southern New England Chapter President's Comments

The Southern New England Chapter will be sponsoring the Society for Industrial Archeology's 33rd Annual Conference centered in Providence, Rhode Island. The conference will run from Thursday, June 10 to Sunday, June 13, 2004. Conference Hotel is the meticulously restored Providence Biltmore with paper sessions, business meeting and luncheon at the nearby Rhode Island Convention Center.

The Blackstone and Quinnebaug Valleys were the site of the Society's first Fall Tour in 1972. Rhode Island hosted another fall tour in 1978. Since that time the area has undergone significant change. Major industries have closed down and moved their operations to areas featuring low cost labor and overhead. Providence suffered a period of decline and mills were abandoned and demolished. In recent years Providence had a renaissance. Investors restored architecturally significant and civic buildings. A new convention center and hotels brightened the center of the city. New and refurbished restaurants have made the city a destination for connoisseurs.

The surrounding area features a diverse array of medium-sized industry. The Southern New England Chapter has toured many of these and we expect some of them to be on the Annual Meeting tours. The area is home to many museums and restorations that highlight the industrial revolution, maritime subjects and an outstanding example of a site that features preservation, restoration and operation, The New England Museum of Wireless and Steam. The area presents a unique opportunity for SIA members to visit significant historical sites, museums and surviving industrial operations.

The "Call for Papers" will probably go out in November. If you have material on early industrialization of Southern New England or maritime activities in the area please consider developing a presentation for the conference. We also intend to have a lively "Show and Tell" session. If you have an interesting brief presentation on any IA subject please consider sharing it with the attendees.

A number of members of the Southern New England Chapter are familiar with the area and have volunteered to help organize and conduct the 2004 SIA Annual Conference. As the time for the meeting approaches we will need more volunteers. Individuals who have research and writing skills are encouraged to help with preparation of the tour guidebook. We will need tour guides to direct the tours, talk about the area and arrange photo stops. If you want to volunteer you may contact me or Greg Galer at robert.stewart13@att.net or ggaler@stonehill.edu.

Bob Stewart
West Suffield, CT

Northern New England Chapter President's Comments

The Northern New England Chapter created a "Field Site Committee" at its Fall 2002 meeting at the Daloz Mill in Hancock, New Hampshire, and the committee will be actively working with our membership to pick sites for future NNEC meetings. The committee is composed of Nelson Lawry, Gerry DeMuro and Dennis Howe, and they have made plans for our Spring 2003 meeting (Please see the announcement on page 1). We anticipate that our chapter will have lots of exciting sites to visit in the near future! (Chairman Nelson's committee report is below.)

Speaking now as editor of the New England Chapters Newsletter, it is becoming clear that NNEC members really haven't been submitting very many articles to the newsletter in recent years. Most of the newsletter contains reports from southern New England, and this doesn't make us look good! After all, we have a lot of great industrial sites in northern New England and some very enthusiastic members! So I want to encourage everyone in Maine, New Hampshire, Vermont and eastern New York to consider writing about their favorite site, a recent project, an upcoming conference that features industrial sites, or whatever you feel would be of general interest to our membership. We really need your help!

David Starbuck
Plymouth State College

Field Site Committee Formed for the Northern New England Chapter

At the fall 2002 field trip to the Daloz sawmill in Hancock, NH, a three-man committee chaired by NNEC member Nelson Lawry, Rollinsford, NH, was formed to investigate, make the initial inquiries of (in order to ensure that the welcome mat is out at the sites suggested), and recommend the next few field sites scheduled as educational adjuncts to the spring and fall chapter meetings. This approach should reduce the head-scratching and lengthy discussion that have occurred in the past to select the next field trip/chapter meeting site, but rather will suggest (as much as possible) a rotational-by-state sequence of sites to be visited in the near future. The other two members of the committee are Gerry DeMuro, South Acworth, NH, and Dennis Howe, Concord, NH.

It has been pointed out by more than one member that three of the past four field visits have been to New Hampshire mills, so a strenuous effort will be made in the immediate future to downplay both mills and the Granite State, at least for the primary site on the itinerary. The committee will be looking largely at sites in Maine, Vermont, and the upper Hudson River valley (i.e., north of the imaginary line generated as a westward extension of the northern border of Massachusetts) as places due for a look-see by the northern chapter in its next few meetings.

The committee will earnestly strive to schedule the field visits in the spring before the foliage is fully developed, and in the autumn after leaf fall but before the end of daylight saving time, in order to avoid leafy green barriers but still provide adequate light for photographing the assets at hand.

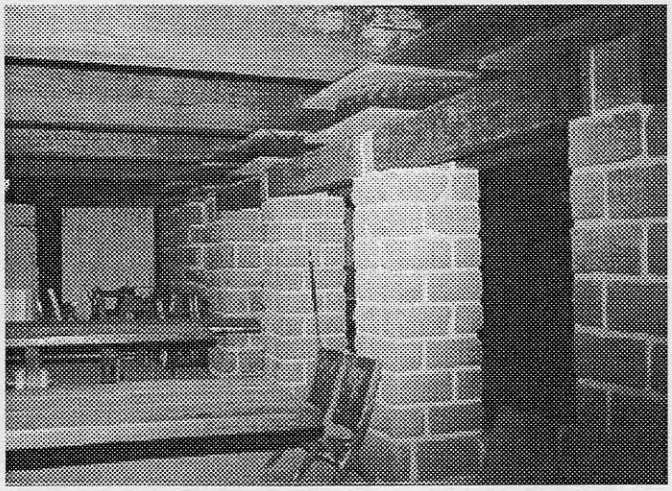
NNEC members who have suggestions for field visits are urged to contact the committee chair at lawrynh@aol.com. Because of the amount of spam incoming, please use the subject line "NNEC field visit". Suggestions from SNEC members will also receive consideration, as long as they pertain to northern turf. Any site of merit will be added to the roster, although its visitation will await the turn of its state, in order to maintain a fair and equitable rotation in the three and a fraction states that legitimately fall within the Northern New England Chapter's territory. With four states and two visits each year, no suggested site, if it passes committee muster, will have to wait too long. Of course, if a particularly excellent asset is to be demolished or the temporal window to visit a site is a narrow one, soon to be closed forever or for a long spell, that site will be jumped up the schedule.

Please, send member suggestions to the committee. Traditionally, each meeting includes both morning and afternoon field sites that lie reasonably closeby.

Nelson Lawry
Rollinsford, NH

From Square Dancing to Folk Engineering: A Visit to Thrall Hall

In 1968, an East Windsor, Connecticut farmer named Ed Thrall combined a passion for square dancing, a desire to provide a wholesome gathering place for teenagers, and a self-taught talent for construction into a decades-long project that became Thrall Hall. Through the remainder of the 1960's and into the 1970's, he piled his low-bed trailer with the remains of buildings torn down in waves of urban renewal in Hartford, New Britain and Rockville; brought them to his farm; and re-assembled the pieces into what some

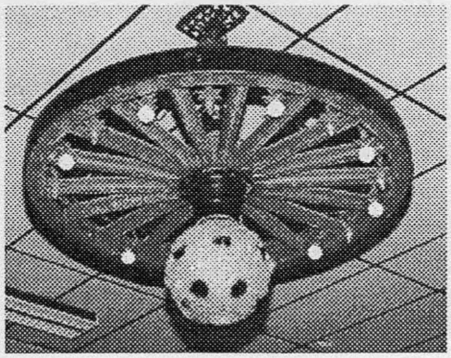


observers have described as the Yankee equivalent of Los Angeles' famed Watt's Towers.

Janett and Doug Moore, Ed Thrall's daughter and son-in-law (and the current owners of the property) sponsored a SNEC SIA tour of Thrall Hall on February 22. The centerpiece: a 100' by 70' dance floor, decorated by 7240 vinyl tiles arranged in 38 square patterns appropriate for dancing, suspended ingeniously on truck tires that can be pneumatically adjusted to manipulate the degree of "bounce." Above, carriage wheel lamps illuminated the floor; below, Ed Thrall had constructed a number of rooms for dining, meetings and even for auctions.

But perhaps the most spectacular aspect of this home-grown hall is its amazing assortment of artifacts from significant Connecticut buildings: 24 72' steel trusses from Billings & Spencer; a counter-top from Spinelli's spaghetti factory in Hartford; cast-iron stairways from the Underwood factory; spiral staircases from the Garde Hotel; plus hundreds of architectural elements from the Corbin Factory, the Westinghouse Building, the Heublein Hotel and many other structures.

Today, this must-be-seen-to-be-believed building is in a state of limbo as Janett and Doug do what they can to protect it from the elements (and vandals) while contemplating its future potential. For more information, and pictures, you can visit a website created by Ed's granddaughter, Natalie: www.geocities.com/thrallhall.



Jonathan Kranz

Adapting to a Changing Steel Economy: A Visit to Berlin Steel

After visiting Thrall Hall on February 22, members of SNEC SIA were welcomed at The Berlin Steel Construction Co. in Kensington, Connecticut. There, hosts Mark LaJoie and Mike Belcher led the group on a brief tour of the facilities and a thorough presentation on the evolution of a New England steel fabricator and erector.

As the Berlin Iron Bridge Company, the company was so successful that, by the end of the 19th century, it was responsible for approximately 90% of the highway bridges in New York and New England. In subsequent years, the company's changing focus reflected changing needs, becoming a major supplier of industrial structures (such as coal conveyors and log stackers) in the 1920's, to its gradual transition, by the 1980's, as a constructor of high rises and sophisticated steel architecture.

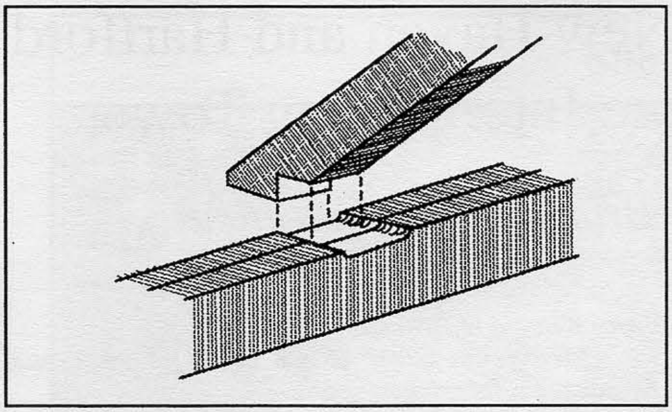
In 1995-96, Berlin Steel moved its fabrication capabilities to Virginia to take advantage of lower labor and insurance costs, plus greater ease of access to the Mid-Atlantic market. In its latest incarnation, Berlin Steel has become a specialist in complex fast-track projects that require special finesse and/or sophistication. Among their more impressive recent projects are the Yale Music Library (which required the installation of vast steel arches between existing buildings) and the Indian Museum at Foxwoods, a complex spiral of exposed steel and glass.

Jonathan Kranz

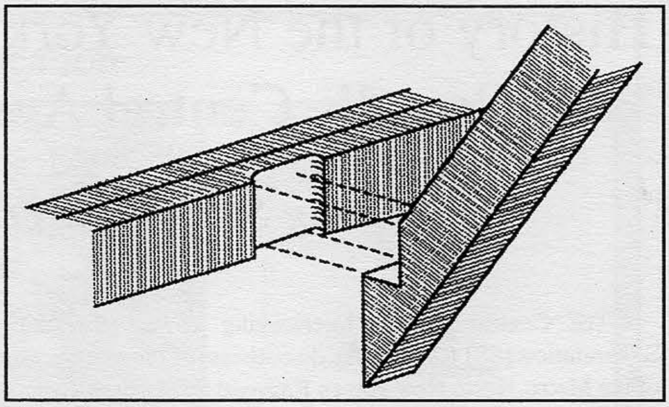
Discoveries at the Haverhill-Bath Covered Bridge

Recent discoveries have confirmed that the Haverhill-Bath Covered Bridge has spanned the Ammonoosuc River in New Hampshire since 1829, making it the oldest surviving example of the Town lattice truss in the United States. The structure retains an astonishing amount of original material and exhibits early framing techniques not previously identified in a covered bridge.

Long recognized as one of the oldest wooden spans in the United States, the Haverhill-Bath Bridge was included in a group of thirty covered bridges to be researched by the Historic American Engineering Record (HAER) during the summer of 2002. HAER undertook its covered bridge documentary project under the sponsorship of the Federal Highway Administration, using funds for covered bridge preservation provided under legislation introduced by



Intersection of rafter and upper chord, Haverhill-Bath Covered Bridge, showing recessed seat used in "square rule" framing.



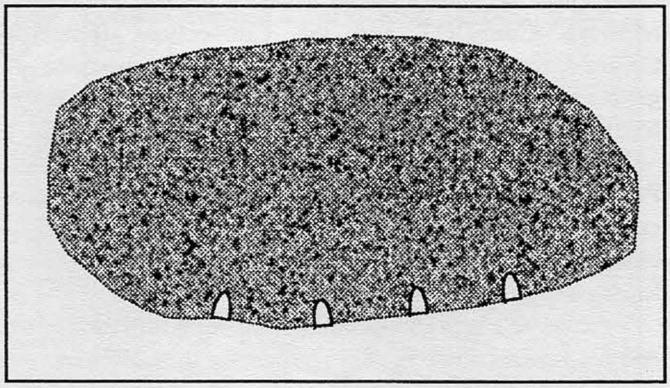
Intersection of chord and wind brace, Haverhill-Bath Covered Bridge, showing recessed seat used in "square rule" framing.

Senator James M. Jeffords of Vermont. Joseph D. Conwill, editor of Covered Bridge Topics, the journal of the National Society for the Preservation of Covered Bridges, carried out the research.

Conwill established that the bridge was constructed in 1829, nine years after Ithiel Town patented the lattice truss system. Conwill also learned that town records reveal that Bath (and probably Haverhill as well) paid a claim of $84 in 1832, presumably as a penalty for utilizing the truss without securing a license from its patentee, a noted Connecticut architect. Conwill noted that, "as the oldest existing example of a Town lattice truss, Bath-Haverhill Bridge is a treasure of national significance."

During his inspection from ledges twenty feet below the bridge, Conwill noted an appearance of unusual age among the floor beams. Knowing that the entire floor system was slated for replacement in a proposed rehabilitation of the span, architectural historian James L. Garvin of the New Hampshire Division of Historical Resources carried out his own inspection of the bridge in August, 2002. He was accompanied by David W. Wright, president of the National Society for the Preservation of Covered Bridges.

Garvin and Wright discovered that an unanticipated amount of original or very early material had survived in the ancient bridge. Despite the fact that the span stands over a dam and has been subjected to spray, high water, ice floes, and even the impact of a large tree carried downstream in the legendary flood of 1927, most of its trusses, roof system, and even its roof sheathing appear to be original. All these elements, as well as the floor timbers that Conwill had noticed, bear the parallel marks of an "up-and-down" sawmill—probably Alcott's sawmill, which stood nearby in 1829. Moreover, many of the intersecting members of the bridge reveal hewn seats that are characteristic of the "square rule" method of framing, which was becoming commonplace in the 1820s. Evidence of "square rule" framing has never before been noted in a covered bridge.



Evidence of flat-wedge splitting, pre-1830, as seen in stones in the north abutment and the central pier of the Haverhill-Bath Covered Bridge.

The bridge's granite abutments and central pier similarly reveal the marks of a method of stone splitting that is characteristic of the 1820s. Together, both superstructure and substructure are a time capsule from the earliest years of covered bridge construction for which we have any physical evidence.

The New Hampshire Division of Historical Resources is now working closely with the towns of Haverhill and Bath, the New Hampshire Department of Transportation, the Federal Highway Administration, and the consulting engineers for the bridge rehabilitation. Together, they are developing plans to ensure that proposed repairs preserve the rich evidence and early materials that the span has miraculously retained for almost 175 years.

James L. Garvin

History of the New York, New Haven and Hartford Railroad's Central Avenue Interlocking Tower

Switching Station [SS] 62, Bridgeport, Connecticut

The Central Avenue Interlocking Tower (Switching S*Shore*tation [SS] 62) is located southeast of the intersection of the Metro-North New Haven Railroad and Central Avenue in the City of Bridgeport, Connecticut (Figure 1). It was constructed by the New York, New Haven and Hartford Railroad (commonly known as the New Haven Railroad) in 1911. In 2002, the Connecticut Department of Transportation (ConnDOT) Office of Rail Operations removed the deteriorated tower because it posed a safety hazard. Prior to its removal, ConnDOT and the Connecticut Historical Commission (CHC) concurred that the building may be eligible for listing in the National Register of Historic Places for its historic and engineering importance.

In compliance with Section 106 of the National Historic Preservation Act (NHPA), ConnDOT and the CHC concurred that removal of the tower would constitute an adverse effect, and as a result, ConnDOT agreed to undertake the following actions:

• Prepare a historic documentation report on the Central Avenue tower, including photographs, for the CHC archives;

• Donate tower artifacts to the Western Connecticut Chapter of the National Railway Historical Society for use in their restoration of the SS 44, an interlocking tower in South Norwalk constructed along the New Haven Line by the New Haven Railroad in 1896; and

• Prepare this article on the history of the Central Avenue tower for this publication.

All these items have been completed. For those wishing to review the historic documentation report, please contact the CHC in Hartford, Connecticut at (860) 566-3005. In addition, for those wishing to visit restored SS 44 tower in South Norwalk on Saturdays and Sundays, 12:00 PM to 4:00 PM, beginning the first weekend in May 2003, please contact Dana Hunt of the Western Connecticut Chapter of the National Railway Historical Society at dhunt@daymon.com or 203-352-7953.

PHYSICAL DESCRIPTION

General Setting

The Central Avenue Interlocking Tower (SS 62) is a two-story, rectangular-plan, Mission Style building located in Bridgeport, Connecticut (Photo 1). The tower is bounded to the north by an access road, the south by railroad tracks, the east by the Central Avenue bridge over the railroad and the west by a mid-20th century metal blacksmith shop, two modern aluminum block houses with modern switching facilities and a modern concrete shed. The blacksmith shop

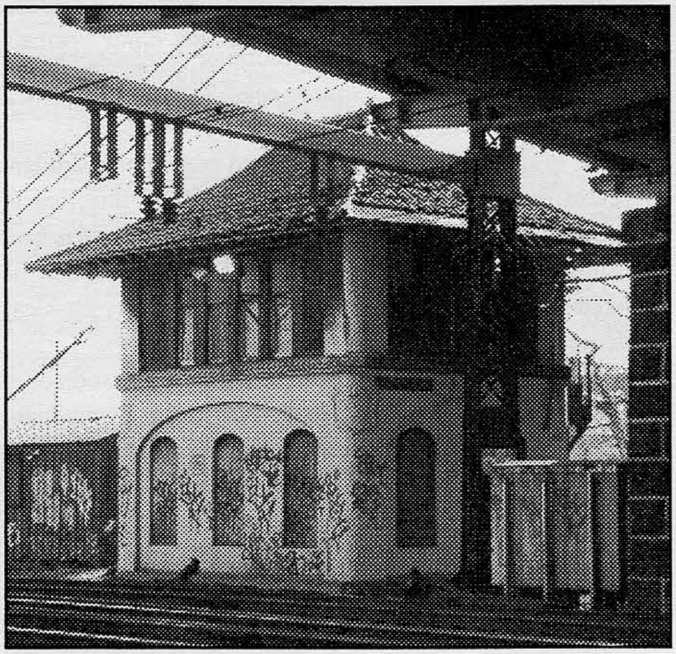


Photo 1. *Looking southeast toward north and west facades. Note corner shields that may have originally contained tower number.*

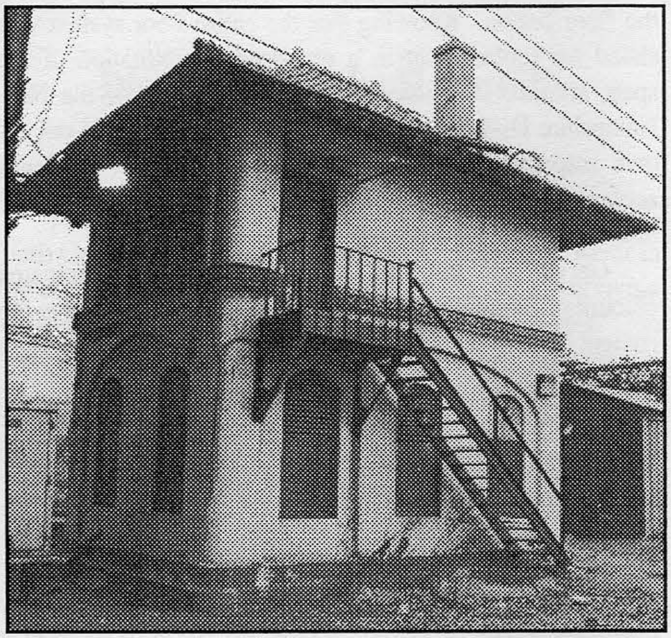
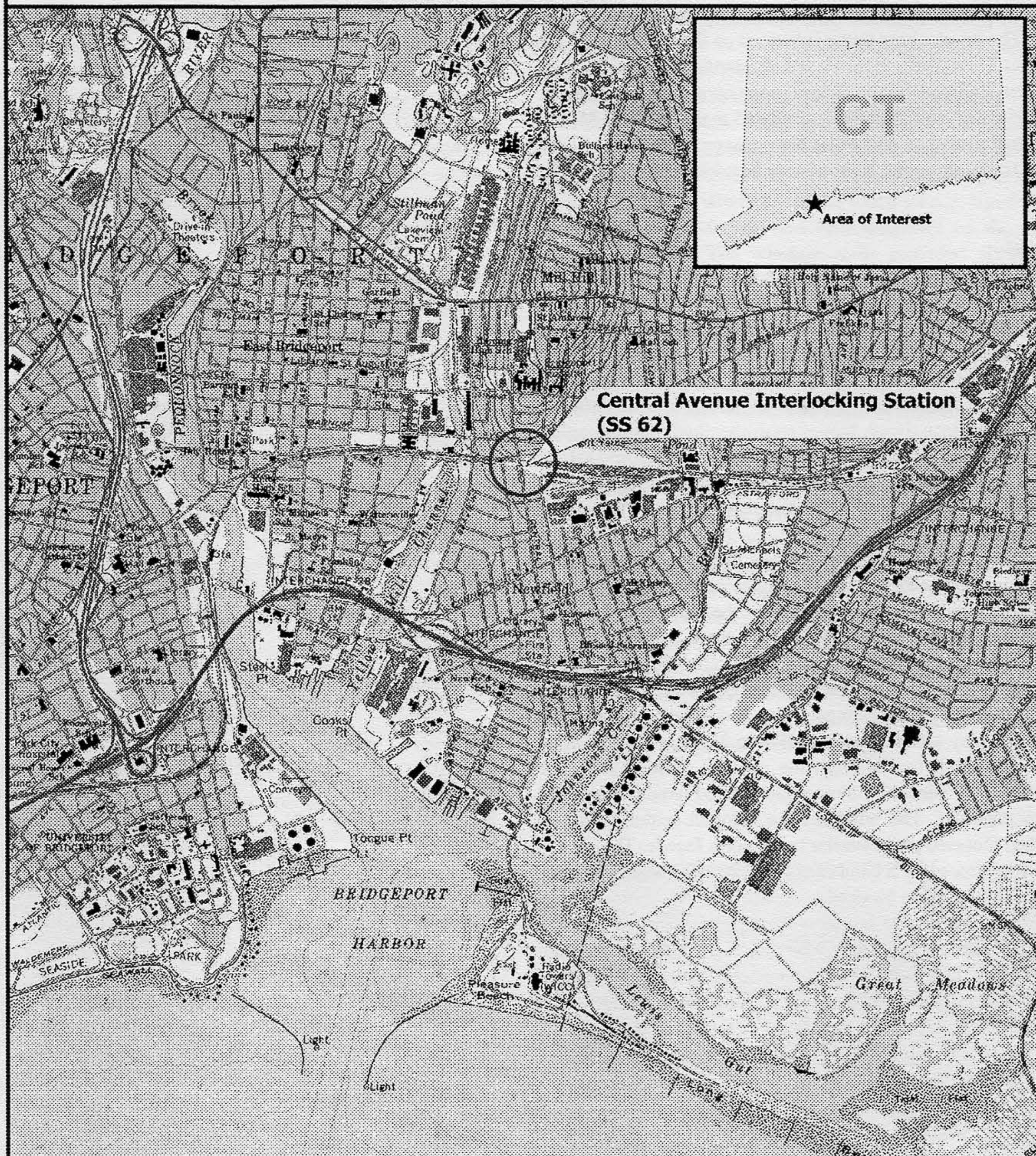


Photo 2. *Looking northeast toward south and west facades. Note round-arched windows on first floor, set within arched, recessed surface.*

Site Location



Site Location

5000 0 5000 10000 Feet

1000 0 1000 2000 Meters

N

Source: USGS 24K Quadrangle, Bridgeport, CT, 1984.

Figure 1

is sheathed in standing seam metal and pierced by industrial casement windows on the north, south and west facades. A metal door, illuminated by a gooseneck lamp, is located on the east façade. The roof is sheathed in standing seam metal.

The interlocking tower is located on the north side of the former New York, New Haven & Hartford Railroad (New Haven Railroad) right-of-way now owned by ConnDOT. The right-of-way is actively used and maintained by Metro-North Railroad as part of its New Haven Line. Amtrak also runs trains along the right-of-way but does not maintain the tracks.

Exterior

The tower is three bays long, two bays wide and rests atop a concrete foundation. The tower is distinguished by rounded corners and a decorative belt course embellished with a wave pattern. All corners except the northwest corner are embellished with molded concrete seals that most likely bore the interlocking tower number when it was constructed. It is capped by a flared, hipped roof, sheathed in tile shingles. The roof has broad, overhanging eaves with exposed rafters and is also pierced by a buff-colored, brick chimney. The north, south, east and west facades of the building are described below.

The north facade of the tower has three round-arched openings on the first story. The openings are blocked with plywood while the upper portion of the central and eastern openings are louvered. Together, the three windows are set within a broad-arched, recessed panel. The second story has a door opening at the eastern corner. The modern door is sheltered by a deteriorating awning and is accessed from the first story by a metal staircase (Photo 2).

The south facade faces the railroad right-of-way. The first story is pierced by three round-arched windows blocked with plywood. The windows are also set within a broad-arched recessed panel similar to the north facade. The second story is pierced by a band of six double-hung sash windows, some of which are blocked.

The east facade is pierced by a round-arched window and door on the first story. The door is modern and the window is blocked. Both openings are set within a broad-arched recessed panel similar to the north and south facades. The second story is pierced by a band of four double-hung sash windows. The west facade is pierced by two round-arched windows on the first story, set within a broad arched surround. The second story is pierced by a band of four double-hung sash windows.

Other features located on the tower exterior include lighting and communications fixtures. A gooseneck lamp is located on the north side of the tower, second floor center, facing the railroad tracks. A communications bell and horn is located on the eastbound side of the tower, second floor, adjacent to the air conditioner that pierces the upper portion of the central window.

Interior

The first floor of the building consists of four rooms including a foyer, furnace room, relay area and locker room. The walls and ceiling are constructed of concrete/plaster material. Entry is gained via the west façade. The foyer area includes a white porcelain janitor sink on the south side of the foyer. The north side of the foyer includes the furnace room, equipped with a Crane Sunnyday-brand furnace. Access to the furnace room is gained via an entrance with no door. A four-panel wood door provides access to the relay area from the east side of the foyer. Relay switches are located in a board-and-batten, double-door closet located south of the four-panel door. Modern metal shelving units are located east of the board-and-batten shelving unit. The north- facing portion of the shelving unit has relay switches on the upper shelves and PVC pipe, toilet paper and discarded relay equipment on the lower shelves. The south-facing portion of the shelving unit contains wiring and remnants of the historic relay system (Photo 3). A four-panel wood door on the north side of the room provides access to the locker room. A rectangular, Square D-brand switch box is affixed to the north wall. A discarded Westinghouse Air Brake Company (WABCO) Entrance/Exit interlocking machine (circa 1980)

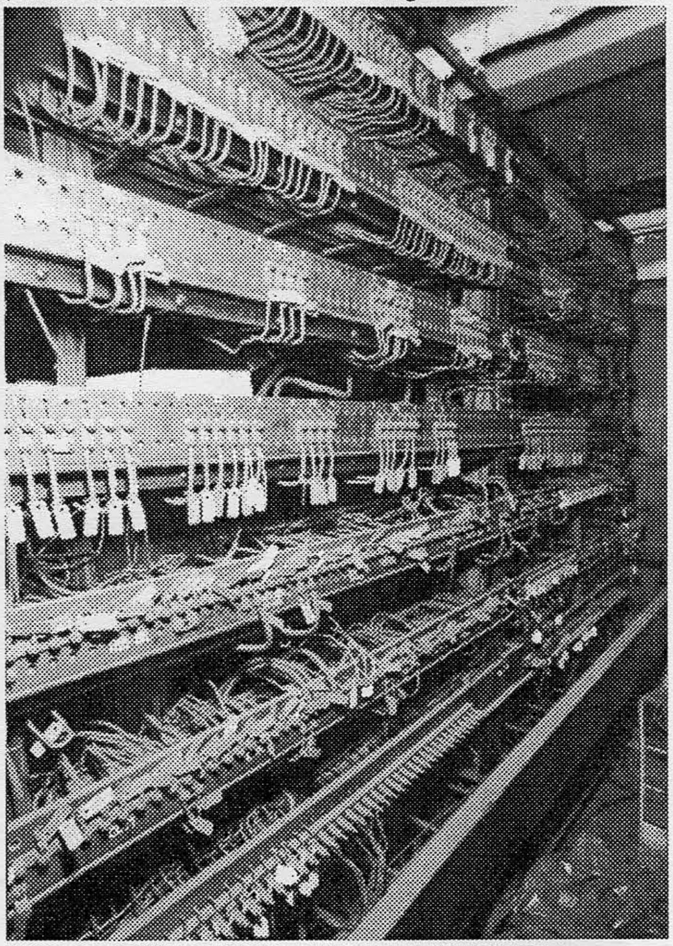


Photo 3. *Looking west toward switching mechanism mounted on modern metal shelving unit on first floor of Central Avenue tower.*

is located on the floor of the locker room. The machine is marked "Burr" and was originally associated with the non-extant Burr Road Interlocking Tower (SS 55) located two miles west of Bridgeport Station.

Decorative metal radiators, circa 1911, are located on the first floor on the northeast wall of the foyer and on the ceiling in the relay area. The heating elements consist of square units with four corner blocks, embellished with vegetative ornament. A triple criss-cross pattern is located in the center of the square, accented with diamond-shaped vegetative ornament in the center. The radiators generally occur in units of four squares (Photo 4).

Entry is gained to the second floor of the building via an exterior metal staircase accessible at the northeast corner of the north facade. The main door is a four-panel wood door. The room is characterized as a large, rectangular open space illuminated by six windows on the south facade, three windows on the east facade and four windows on the west facade (Photo 5). The window walls provided necessary lines-of-sight for railroad employees charged with monitoring interlocking operations. The historic interlocking machine and model board have been removed from the building. Modern metal cabinets and lockers are located against the walls, adjacent to 1930s and 1940s-era bureaus, modern cabinets and desks. The room is illuminated by fluorescent light tubes, while empty historic incandescent fixtures hang from the ceiling. The walls are sheathed in plaster and the ceiling has a wood board surface. A bathroom and closet are located at the northwest corner of the room. The bathroom is equipped with a modern toilet and sink. The two-story closet, affixed to the east side of the bathroom wall, is equipped with a two-story beaded board closet. The remains of the communications box are affixed to the ceiling east of the closet and wires protrude from the trapezoidal-shaped box. A cast iron fuse box is affixed to the north wall, west of the main entry. The non-functioning electric switch box is marked "R&B No. 22". A modern, metal radiator is located along the east wall of the room.

Photo 4 (above). *Looking west from vestibule on first floor. Note decorative design of wall-mounted radiator.*

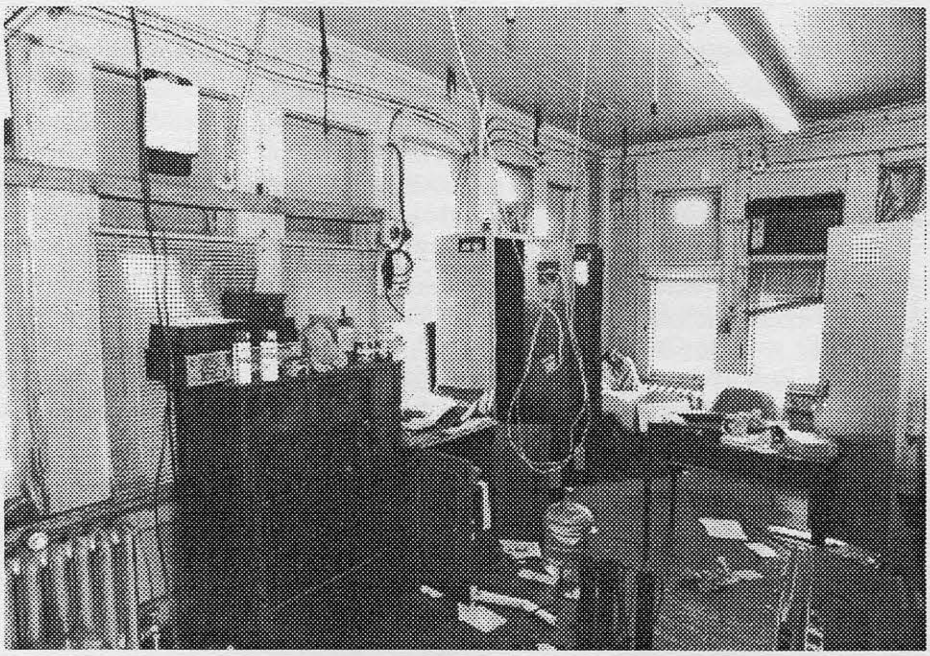


Photo 5 (right). Looking northeast on second floor office. Note wood floor and original empty light fixtures on ceiling.

HISTORICAL INFORMATION

Introduction

Central Avenue Interlocking Tower (SS 62) was designed by the New Haven Railroad in 1911. The New Haven Railroad was formed in 1872 when the New York & New Haven Railroad, which passed through Bridgeport, and the Hartford & New Haven Railroad, merged to form the new railroad company. The New Haven Railroad operated freight and passenger trains in New York, Connecticut, Massachusetts, and Rhode Island, including its well-used main line between New York City and Boston, via Bridgeport. Around 1890, the New Haven Railroad commenced a $4 million project to four-track the railroad right-of-way (ROW) between South Norwalk and Bridgeport. Dangerous grade crossings would also be eliminated in Bridgeport through construction of a four-track, masonry viaduct. By 1904, the four-tracking project was complete through Bridgeport and beyond, thereby improving the safety of train operations in the city (Zdravesky, 2000).

The New Haven Railroad's management focused on expansion and initiated multiple mergers and acquisitions during its early years. By the turn of the century, the railroad acquired over 2,000 miles of trackage and over 25 railroad companies. In the 1900s, the financier J. Pierpont Morgan acquired the New Haven Railroad and set out to amass a transportation monopoly in New England, built around the New Haven line. During this period, the New Haven Railroad purchased railroads, steamship lines, and trolley companies throughout the northeast, and eventually became the subject of a criminal investigation for violating federal and state anti-trust laws (www.nhrhta.com accessed August 27, 2002). However, during the early 1900s when the Central Avenue Interlocking Tower (SS 62) was constructed, the New Haven Railroad was at the forefront of technological innovation when it embarked upon electrification of its main line between New York City and New Haven, Connecticut, requiring the construction of electrically-equipped interlocking facilities.

Bridgeport and New Haven Railroad Electrification

The origins of the electrification project were rooted in a July 1, 1903 New York state law that forbid the operation of steam locomotives south of Harlem in New York City by 1908. Prior to the passage of this law in 1902, the New York Central and Hudson River railroads announced plans to replace the existing Grand Central Terminal at East 42nd Street and Park Avenue in New York City with a new double-level terminal for electric trains. Since the New Haven Railroad operated trains into Grand Central Terminal, it was compelled to comply with the law. In response to the regulation, the New York Central Railroad began electrifying its tracks. Between Woodlawn, New York and the new Grand Central Terminal, the New York Central chose to power trains via a low voltage (600-700 volts) Direct Current (DC) third rail *(Shoreliner*, 1975).

In order to provide direct service into New York City, the New Haven Railroad had a long-standing agreement with the New York Central to lease trackage between Woodlawn, New York and Grand Central Terminal for the operation of its trains (New York, New Haven & Hartford Railroad, 1914). However, instead of opting to install a third rail electrification system, the New Haven Railroad chose to design and construct an overhead catenary electrification system in 1903. The overhead catenary, designed under the auspices of William S. Murray, Chief Electrical Engineer for the New Haven Railroad, would provide 11,000 volts of Alternating Current (AC) electricity. To travel along the New York Central DC-powered trackage, New Haven Railroad engineers worked alongside Westinghouse engineers to design cars and engines that could operate on DC or AC power (Stewart, 2001).

Work on the electrification project progressed throughout the 1900s, and by 1907, the New Haven Railroad main line was electrified between New York City and Stamford, Connecticut. Electric power was generated at the railroad's newly constructed generating plant in Cos Cob, Connecticut. (*Shoreliner*, 1975). In 1913, the new Grand Central Terminal in New York City was completed (www.historychannel.com, accessed October 14, 2002).

In addition, during this period, railroad operations were also expanding in Bridgeport because of improvements made along the main line of the New Haven Railroad and increased usage of the railroad by passengers and freight services. In 1902, the New Haven Railroad augmented freight facilities in the city through the completion of East Bridgeport Yard, located east of the Yellow Mill Pond crossing. The yard was equipped with a station and 20-stall engine house, and was considered a state-of-the-art facility when it opened. In addition, the Civil War-era passenger station in central Bridgeport was replaced with a new station designed by Warren Briggs in 1905 (Zdravesky, 2000).

Interlocking Towers in Bridgeport

Between 1907-1914, electrification of the New Haven Railroad main line east of Stamford continued (*Shoreliner*, 1975). To facilitate this new system, a series of interlocking towers were constructed along the main line, seven of which were located in Bridgeport. Designed and constructed by the New Haven Railroad, the Bridgeport interlocking towers, like other interlocking towers along the New Haven Railroad, varied in materials and design details but shared similar layouts. The buildings were characterized as two story structures with the first floor dedicated to housing interlocking machinery and the second floor dedicated to manned interlocking operation. Table 1, New Haven Railroad Interlocking Towers, Bridgeport, Connecticut, on the following page provides a list of the seven New Haven Railroad interlocking towers constructed in Bridgeport during the main line electrification era.

Based on available data presented in Table 1, it appears that

Table 1. New Haven Railroad Interlocking Towers, Bridgeport, Connecticut

Tower Number	Tower Name	Year Constructed	Building Materials	Status
SS 55	Burr Road	1913	Wood	Out of service, 1990; Non-extant
SS 57	South Avenue Yard	1907 (?)	Unknown; May have been stand-alone switch machine	Non-extant
SS 58	State Street	1904	Unknown	Out of service, 1937; Non-extant
SS 60	Pequonnock West	1914	Wood	Out of service, 1937; Non-extant
SS 61	Pequonnock East	1914	Wood	Out of service, 1937; Non-extant
SS 62	Central	1911	Reinforced Concrete	Out of service ca. 1991; To be demolished November 2002
SS 63	Bishop	1909	Wood	Out of service 1969; Non-extant

Sources:

Carpenter, Richard, personal communication, September 4, 2002.
Hunt, Dana, personal communication, October 11, 2002.
Jacobs, Warren. "The Bridgeport Terminals." Along the Line, August 1926.
Lawrence, A.A. 1976 in *Shoreline*r. Volume 24, Issue 1, 1993;
Lawrence. A.A. 1978 in *Shoreliner*. Volume 28, Issue 3. 2000.
Lynch, Peter E. e-mail to John A. Donovan, CTDOT, October 18, 2002.
Zdravesky, Charles. "Bridgeport: 1840-1990 – 150 Years of Railroading." *Shoreliner*. Volume 28, Issue 3. 2000.

the Central Avenue tower may have been the only or one of a few reinforced concrete interlocking towers in Bridgeport (the building materials of the non-extant State Street tower is unknown). The New Haven Railroad was at the forefront of constructing reinforced concrete structures, a relatively new building technique developed around the turn of the century, because the firm recognized the durable properties of this material. Research indicates that Central Avenue was not the only reinforced concrete tower along the main New Haven line. For example, reinforced concrete towers that may have shared similar details to the Central Avenue tower were constructed by the New Haven Railroad during the 1900s in the South Bronx (Oak Point) and New Rochelle, New York and Devon, Connecticut, all of which survive today. New Haven West tower was also constructed of reinforced concrete and put in service ca. 1954 (Carpenter, pers. comm., September 4, 2002; Hunt, pers. comm., October 11, 2002; Lynch, October 18, 2002).

Central Avenue Interlocking Tower and Typical Interlocking Operation, 1914 - 1945

The Central Avenue tower was put into service on March 26, 1911 (Lawrence, 1978). The SS 62 designation number indicated the approximate miles that the tower was situated from New York City. By 1914, the New Haven Railroad main line was electrified between Stamford and New Haven, including Bridgeport (*Shoreliner*, 1975). Along with the six other Bridgeport interlocking towers constructed between 1907-1914 on the New Haven main line, the Central Avenue tower assisted passenger and freight trains to move rapidly through the city without much delay.

In general, the Central Avenue tower was a typical early 20th century interlocking tower. Interlockings are defined as the arrangement of signals, switches and connecting machinery that facilitates safe passage of trains. The technology of the original interlocking system at Central Avenue originated in England in the 1850s when John Saxby designed a machine to simultaneously operate several railroad turnouts. The machine was viewed as a cost-cutting device with the added benefit of interlocking controls that prevented train accidents because controls for turnouts on conflicting routes were locked. To house the machinery, interlocking towers were constructed along the railroad ROW, and by the late 19th century, interlocking towers were common sites along railroad lines throughout the industrialized world (www.railroadinfo.com/prodnews/prod_98/tower.html, accessed January 21, 2002).

The towers were often manned by hard-working crews who cared for the building and tracks surrounding it. A poem by George M. Hill of Denver, Colorado, "The Old Switch Shanty," appeared in the August 1925 issue of *Along the Line*, a monthly newsletter published by New Haven Railroad employees, and conveyed the warm feelings of a tower's devoted crew toward an unidentified tower, presumably in the west:

When I turn back memory's pages
  With mingled smiles and tears,
As I review the scenes and incidents
  Of many bygone years,
I see far in the distance
  A little wooden shack;
A dingy, narrow structure
  That stood beside the track.
The wind blew thru its numerous cracks
  And whistled 'neath the door,
The juice of many tobacco brands
  Had stained the creaking floor.
I see it 'neath the summer sun,
  Thru winter's drifting snow,
As it stood there by the freight house
  In the days of long ago...

'Twas a jolly bunch that gathered there,
  None happier in the land,
When the signals worked by cord or wire;
  All switches thrown by hand...(Hill, 1925).

Early 20th century interlocking towers, like Central Avenue, were often two story buildings situated along the railroad tracks. The first story commonly housed the lead-out for the interlocking machine, and, in the modern electric era, electrical equipment for housing relays, storage batteries, recharge equipment, terminals and electric distribution boards. Space was often set aside on the first floor for the signal maintainer's work area, a furnace and electric generator if necessary (www.railroadinfo.com/prodnews/prod_98/tower.html, accessed January 21, 2002).

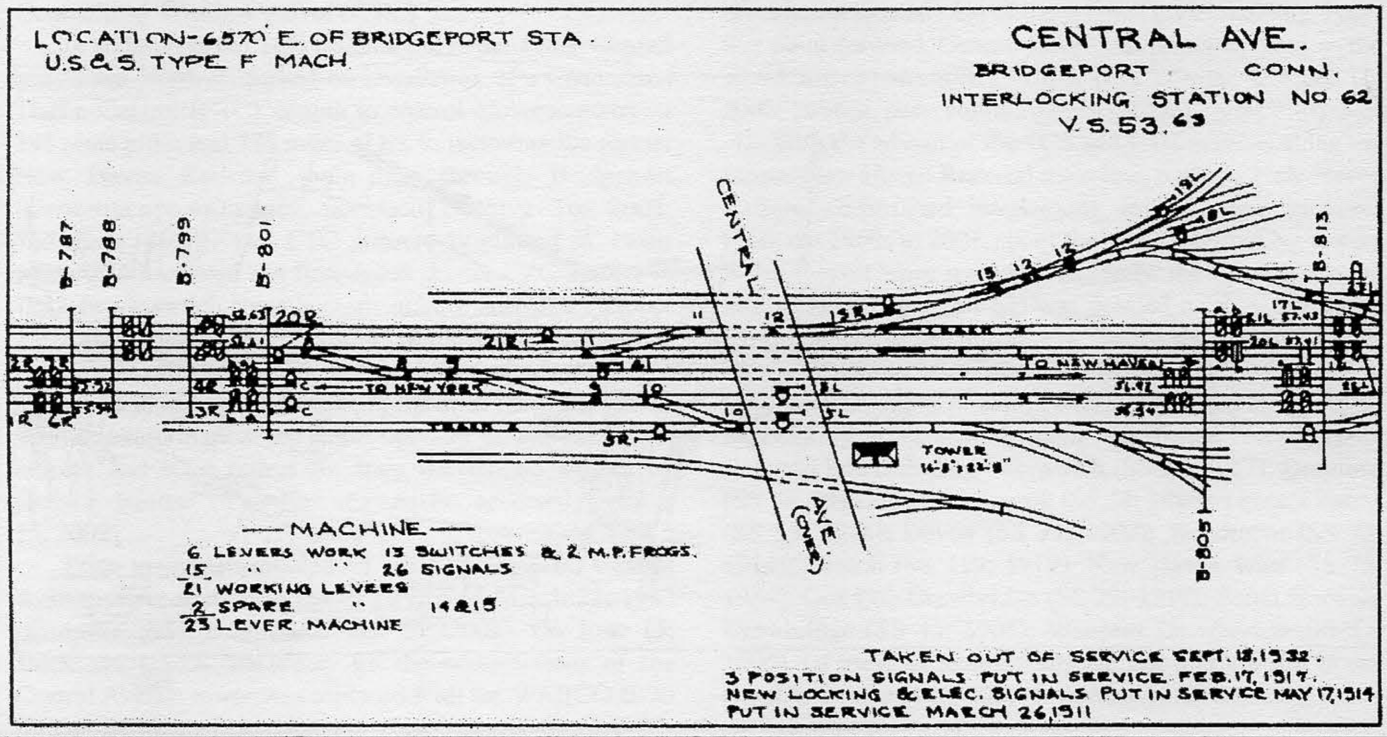
The second story provided work space for the interlocking operator or tower man. The space was characterized by windows on multiple facades to provide a clear view of turnouts, signals and passing trains. From this space, the operator could view the interlocking system in the tower's area of control or block (www.railroadinfo.com/prodnews/prod_98/tower.html, accessed January 21, 2002). Throughout the early to mid-20th century, levers to operate the interlockings were situated behind the windows. In general, numbered levers controlling the switches and signals were arranged in a row. Corresponding numbers were assigned to the actual signal or switch to assist in identifying it when discussing the interlocking. Model boards were situated above the machines and showed the track layout, with red lamps at various points in the tracks to indicate track occupancy. The levers may also have been equipped with lights indicating when they were they were not locked (www.nycsubway.org/tech/signals/interlocking.html, accessed January 21, 2002). On the lever machine, each switch or pair of switches (crossover) was controlled by a lever that could move a switch. A switch lever could be in the normal (straight track) or reverse (switch track) position that, in turn, moved the switch, respectively. The switch lever was mechanically interlocked with other levers to prevent operation under unsafe conditions. Each signal that was part of the interlocking was also assigned a lever that would permit the signal to clear when and if track conditions permitted it. In addition, the presence of trains on any switch and train stops would lock levers, thereby regulating the flow of rail traffic (www.nycsubway.org/tech/signals/interlocking.html, accessed January 21, 2002).

In addition to the interlocking towers, outbuildings were often found at interlocking sites. These sheds were used by signal maintainers and building crews to store maintenance equipment because exposed railroad linkages required constant upkeep (www.railroadinfo.com/prodnews/prod_98/tower.html, accessed January 21, 2002).

The Central Avenue Interlocking Tower (SS 62) conformed to the general arrangement of early 20th century interlocking towers. The first floor of the tower housed the electro-mechanical relay levers associated with the interlocking machine on the second floor. When the machine was removed from the second floor during the 1980s, the disconnected relays remained on the first floor. The first floor also has a furnace room and work area equipped with a janitor's sink. The second floor is illuminated by window bands on three facades, providing a clear view of tracks. Initially, a model board and levers were located below the south-facing windows but have been removed over time. An outbuilding, the blacksmith shop, is also located west of the tower and provides storage space for the tower work force.

Research indicates that in May 1914, new locking and electrical signals were put in service at the tower in conjunction with the overall Stamford to New Haven electrification initiative. The electric signals were most likely closed-track circuits. These operate when an electric current traveling through the rails in a block of track is shorted by the presence of a train or interrupted by a rail break, resulting in a red signal. The closed circuit activates a green signal when the track is clear, enabling approaching trains to enter the block. By 1917, a three-position signal was put in service, and during the same period, the tower was equipped with a Union Switch & Signal (US&S) Type F interlocking machine. The

Central Avenue Interlocking Tower (SS62) Track Diagram



Source: Traced by A.A. Lawrence, 5/28/76.
Reprinted in "Bridgeport" by Charles Zdravesky, Shoreliner, Volume 28, Issue 3, Page 33, 2000.

Figure 2

machine operated six levers that worked 13 switches and two MP frogs and 15 switches that worked 26 signals. It also had 21 working levers and two spare levers resulting in a 23 lever machine overall (Lawrence, 1978). On the second floor, electo-mechanical relays were installed that routed the switching and signal commands as indicated by the electrical impulses triggered by the track switches (Figure 2).

Throughout the 20th century, US&S manufactured the rail industry standard for interlocking machines. George Westinghouse formed the Pittsburgh-based company in 1881 when he consolidated the Union Electric Signal Company (1878), holder of the closed track circuit patent, with the Interlocking Switch & Signal Company, holder of interlocking patent rights in the United States, into US&S (www.switch.com/about/about.htm, accessed October 15, 2002).

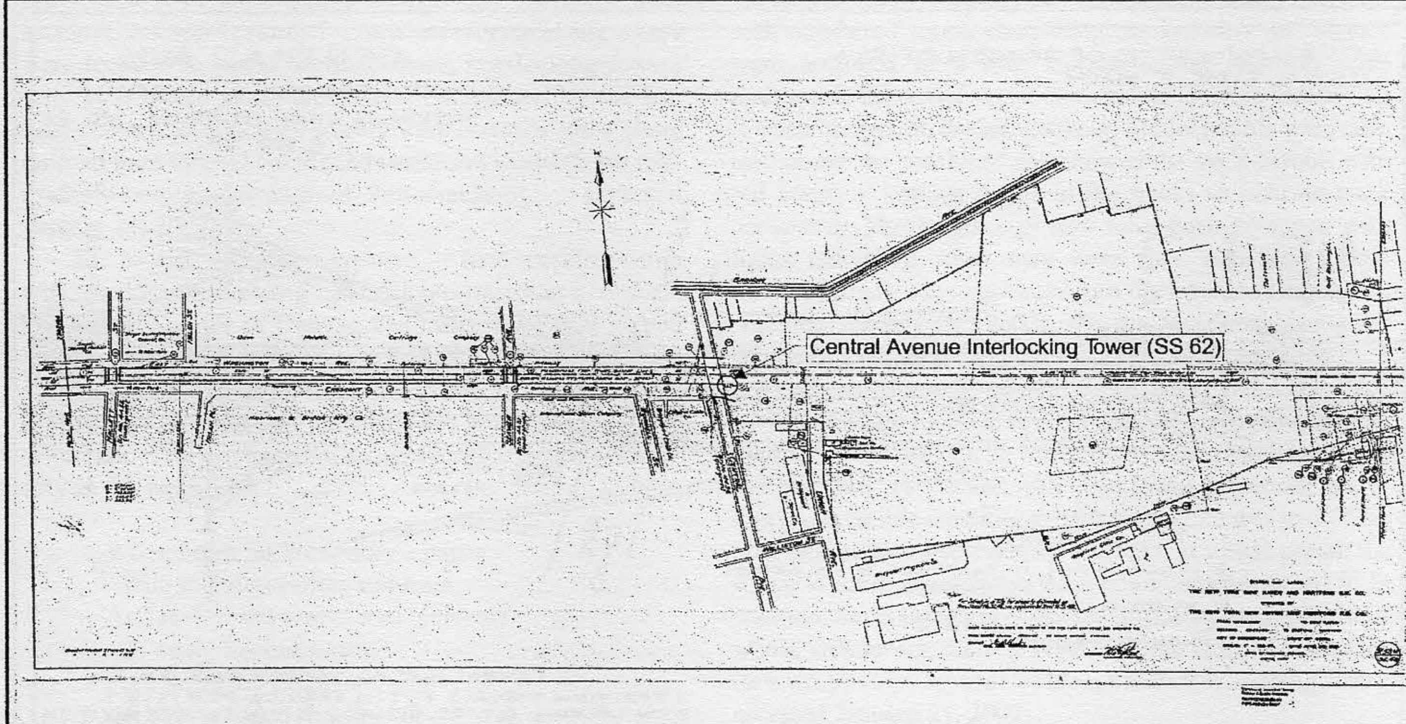
The Central Avenue tower controlled train movements between at the west end of East Bridgeport Yard, some main line train movements and the Seaview Avenue Railroad interchange, located north of the tower (Zdravesky, 2000) (Figure 3). The Seaview Avenue Railroad was a trolley-electric route that served Bridgeport's factory area and waterside terminals during the height of the city's prominence as a manufacturing center (ca. 1870-1930) (http://216.239.37.100/searc.../mfgrail.doc accessed October 10, 2002). Bishop Avenue tower (SS 63) was located east of Central Avenue and controlled train movements at the east end of East Bridgeport Yard (Zdravesky, 2000).

In 1932, the Central Avenue tower was taken out of service. The reason may have been linked to the impact that the Great Depression had on train travel in the United States at that time. The 1932 Annual Report for the New Haven Railroad stated that:

"[C]ontinuation throughout the year 1932 is the severest decline in business ever experienced by your company and resulted in a volume of traffic less than half of the capacity of your company's plant and equipment. Revenue ton miles for 1932 were the lowest of all years since 1909. Passengers carried one mile were the lowest since 1902...The physical property of your company has been maintained consistent with the low volume of traffic handled during the past year, with appreciable return of traffic, it will be necessary to increase maintenance costs" (New York, New Haven and Hartford Railroad, 1932).

However, with the advent of World War II and the increase in demand for transporting manufactured goods via rail, service at the Central Avenue tower was reinstated around 1940 (Carpenter, pers. comm., September 30, 2002).

New Haven Railroad in Vicinity of Central Avenue Interlocking Tower (SS 62), 1915



Source: New York, New Haven and Hartford Railroad Archives,
Thomas J. Dodd Research Center, University of Connecticut, Storrs, CT.

Figure 3

Central Avenue Interlocking Tower, 1945 - Present

During the post-World War II era, railroad systems, including the New Haven Railroad, began to decline as schedules were trimmed, equipment disintegrated and personnel cutbacks were made. During the mid-1950s, construction of the Connecticut Turnpike (Interstate [I]-95) paralleling the main line of the New Haven Railroad through Bridgeport, foreshadowed the demise of the New Haven Railroad. During construction of I-95 from 1955-58, the New Haven Railroad was used to transport steel and concrete to the work site. However, with completion of the highway in the late 1950s, individuals and businesses alike realized that the new highway provided a swift, direct route for trucks and cars, and thus diverted both freight and passengers away from the railroad (Zdravesky, 2000).

In the 1960s, the New Haven Railroad went bankrupt as competition from government-subsidized highways, airlines, high rates of taxation and diminishing passenger and freight service demands brought financial ruin to the once powerful company. By 1969, the New Haven Railroad was purchased by Penn-Central Corporation and under Penn-Central, the railroad infrastructure continued to deteriorate until the corporation declared bankruptcy in 1970 (Adams, 1996). Bankrupt passenger lines were incorporated into the federally-subsidized National Railroad Passenger Corporation, or Amtrak, in 1971, and bankrupt freight lines were incorporated into Conrail in 1976 (Adams, 1996). In 1983, Metro-North Railroad assumed control of Conrail commuter operations in New York and Connecticut, including operations along the former New Haven Railroad right-of-way in Bridgeport. ConnDOT assumed ownership of the railroad ROW in Connecticut (www.mta.nyc.ny.us/mnr accessed October 16, 2002).

Traffic Control System (TCS) Installation

During the 1970s and 1980s, Conrail and Metro-North began to modernize the signal and interlocking system between New York City and New Haven, including Bridgeport (Hunt, pers. comm., October 16, 2002). In 1983, Metro-North began to install a Traffic Control System (TCS) along the main line of the former New Haven Railroad. This necessitated removal of the early 20th century wayside semaphore signals and mid-20th century two-light signals, and replacement with a three-head searchlight style wayside signal system. For safety purposes, the wayside signals were repeated in the cab before the eyes of the locomotive engineer, and were known as cab signals. In the city of Bridgeport, the semaphore signals were removed and replaced with three-head searchlight signals during the 1990s (Hunt, pers. comm., October 16, 2002).

Centralized Traffic Control (CTC)

In addition to the TCS installation, in the 1980s Conrail and Metro-North embarked on installation of a Centralized Traffic Control (CTC) system to control movements on its 384 route miles and 775 miles of track, including the former New Haven Railroad main line through Bridgeport (www.mta.nyc.ny.us/mnr, accessed October 16, 2002; *Shoreliner*, 1984). The CTC concept originated in 1940s when US&S created the first coded carrier CTC system in 1942 (www.switch.com/about/about.htm, accessed October 15, 2002). Under CTC, each train automatically reports its position and movements by means of lights that appear on a track map in front of the tower operator or train dispatcher. With this information, the tower operator or dispatcher can arrange and issue orders for train movements simply by pushing buttons (www.fem.unicamp.br, accessed October 15, 2002).

Prior to implementation of the CTC system, Central Avenue tower was taken out of service on March 22, 1980 (Donovan, pers. comm., October 22, 2002). On June 15, 1985, the US&S machinery on the second floor of the Central Avenue tower was replaced with the WABCO B-30 Entrance-Exit system (Nichols, pers. comm., October 21, 2002). The electric relays associated with the US&S machine remained on the first floor of the tower.

Historical research indicates that WABCO was founded in 1869 by George Westinghouse after he successfully demonstrated the first straight air brake system for locomotives. WABCO went on to develop automatic air brake systems whereby brakes on the entire train would apply automatically if malfunctions occurred (www.wabtec.com, accessed October 15, 2002). WABCO also fabricated Entrance-Exit systems such as the machine found at the Central Avenue tower. The WABCO system consisted of pushbuttons at locations on an enlarged model board corresponding to signals on the tracks. To enable a train to pass from point A to point B, tower operators pressed a button at the entrance and then a button at the exit, and the interlocking automatically configured itself to enable the train to pass.

Initially, the WABCO machine was locally operated to control interlockings within the Central Avenue tower control zone. However, on September 25, 1990, the Metro-North CTC system was implemented in the Bridgeport area, and from that point forward, interlocking functions were remotely controlled from the rail traffic control center in Grand Central Terminal. However, the WABCO machine remained intact at the Central tower, and fulfilled its function as a redundant system that could be locally operated in case of a system-wide power failure at the Grand Central Terminal CTC (Hunt, pers. comm., October 16, 2002). In addition, the WABCO machine was retained to enable railroad staff in the Bridgeport area to conduct locally-controlled testing exercises (Nichols, pers. comm., October 21, 2002).

Around 2000, the WABCO Central machine was removed from the Central tower and placed in the metal shed blockhouse located west of the original tower building. From that point forward, Central tower was primarily used as the signal maintainers office (Hunt, pers. comm., October 16, 2002; Estrom, pers. comm., January 2002).

With the advent of the TCS and CTC systems along the former New Haven Railroad main line, multiple New Haven Railroad-constructed interlocking towers were removed. From the 1960s to 2001, six of the seven interlocking towers in Bridgeport were removed. Recently, the Central Avenue Interlocking Tower (SS 62) was deemed a safety hazard by the ConnDOT Office of Rail. As a result, the damaged building was shut and demolished in November 2002. According to ConnDOT Office of Rail, 11 former New Haven Railroad interlocking towers exist along the former New Haven Railroad line including Greenwich (SS 28; 1917); Stamford (SS 38; 1917); South Norwalk (SS 44; 1896); Green's Farms (SS 53; 1916); Devon (SS 71; 1907); Woodmont (SS 73; 1914); Groton (SS 119; 1919); New Haven West (SS 75; 1954); Cos Cob Drawbridge (SS 29; 1917); South Norwalk Drawbridge (SS 45; 1905); Westport Drawbridge (SS 52; 1905). Of these 11 towers, only the last four are still in use (Lynch, October 18, 2002; November 12, 2002).

Historic Significance Assessment

The Central Avenue Interlocking Tower (SS 62) (1911) is National Register-eligible under Criteria A and C for its local and statewide historic and architectural significance. The tower is eligible under Criterion A because it represented the improvements that were made by the New Haven Railroad in conjunction with the New York City to New Haven main line electrification project prior to World War I. The New Haven Railroad Company is considered a railroad technology pioneer because of the great contributions the firm made to railroading in the United States through their application of overhead catenary AC electrification, widespread use of relatively new building materials for railroad structures, including reinforced concrete, and other innovations. The tower is also eligible under Criterion C because it survived as a good example of a reinforced concrete, Mission Style switching station. Although multiple switching stations were constructed along the main line during the early 1900s, the towers had design characteristics that differentiated them from other functionally similar structures, and provided visual variation for passengers as they traveled along the New Haven Railroad line.

BIBLIOGRAPHY

Books

Adams, Arthur G. *The Hudson River Through the Years.* New York: Fordham University Press. 1996.

Articles

Hill, George M. "The Old Switch Shanty." *Along the Line.*

August 1925. On file at the University of Connecticut, Christopher J. Dodd Research Center, New Haven Railroad Archives.

Jacobs, Warren. "The Bridgeport Terminals." *Along the Line.* August 1926. On file at the University of Connecticut, Christopher J. Dodd Research Center, New Haven Railroad Archives.

Shoreliner. "Our Main Line Electrification Set Pattern for the Country. Reprint of a May 1945 *Along the Line* article. Volume 6, Issue 4. 1975.

Shoreliner. "Metro-Update." Volume 15, Issue 4. Page 26. 1984.

Stewart, Robert. "The Catenary System of the New York, New Haven & Hartford." *Society for Industrial Archeology New England Chapters Newsletter*. Pp. 13-18. Volume 21, Number 1. 2001.

Zdravesky, Charles. "Bridgeport: 1840-1990 – 150 Years of Railroading." *Shoreliner.* Volume 28, Issue 3. Pp. 6-37. 2000.

Maps and Site Plans

Lawrence, A.A. Track Diagrams of New Haven Railroad Interlocking Towers SS 55, SS 60, SS 62 and SS 63. 1976-1978 in "Bridgeport: 1840-1990 – 150 Years of Railroading" by Charles Zdravesky. *Shoreliner.* Volume 28, Issue 3. Pp. 32-33. 2000.

Lawrence, A.A. Track Diagrams of New Haven Railroad Interlocking Towers SS 57 and SS 58, 1976 in "Bridgeport Puzzle Switches" by C.A. Brown. *Shoreliner*. Volume 24, Issue 1. Pp. 34-35. 1993.

New York, New Haven & Hartford Railroad Company. "Station Map Lands of the New York, New Haven & Hartford Railroad Company from Woodlawn to New Haven. City of Bridgeport, Connecticut. June 30, 1915. On file at the University of Connecticut, Christopher J. Dodd Research Center, New Haven Railroad Archives.

United States Geological Survey (USGS). Bridgeport, CT Quadrangle. 7.5 Minute Series. 1984.

Reports

New York, New Haven & Hartford Railroad. Annual Report of 1914; Annual Report of 1932. On file at the University of Connecticut, Christopher J. Dodd Research Center, New Haven Railroad Archives.

Interviews

Carpenter, Richard. Railroad Historian. Telephone conversation, September 4; 30, 2002.

Donovan, John. ConnDOT Office of Rail Operations. Telephone conversation, October 22, 2002.

Estrom, Robert, Metro-North Railroad Signal Maintainer. On-site interview, January 22, 2002.

Hunt, Dana, Western Connecticut Chapter of National Railway Historical Society. On-site interview, January 22, 2002; Telephone conversation, October 11; 16, 2002.

Lynch, Peter. ConnDOT Office of Rail Operations. Telephone conversation, November 12, 2002.

Nichols, David. Metro-North Railroad Employee, Signal Department. Telephone conversation, October 21, 2002.

Correspondence

Lynch, Peter, ConnDOT Office of Rail Operations, e-mail to John A. Donovan, ConnDOT Office of Rail Operations, October 18, 2002.

Web Sites

Greenberg, Bernard S. "New York City Subway Signals: Interlockings" at www.nycsubway.org/tech/signals/interlocking.html accessed January 21, 2002.

"Walthers to Release O/O-27 Cornerstone Series Wooden Interlocking Tower in September 1998" at www.railroadinfor.com/prodnews/prod_98/tower.html accessed January 21, 2002.

"Trolley Freight in New Haven" at http://216.239.100/sear…/MFGRAIL.doc accessed October 10, 2002.

Bennof, Anne O. "Railroad" at http://www.fem.unicamp.br accessed October 15, 2002.

Wabtec Corporation History at www.wabco-rail.com/corp/history.asp accessed October 15, 2002.

"About Union Switch & Signal Inc." at www.switch.com/about/about.htm accessed October 15, 2002.

"Grand Central Terminal is Born" at www.historychannel.com/exhibits/grand/born.html accessed October 14, 2002.

History of the New Haven Railroad at www.nhrhta.org accessed August 27, 2002.

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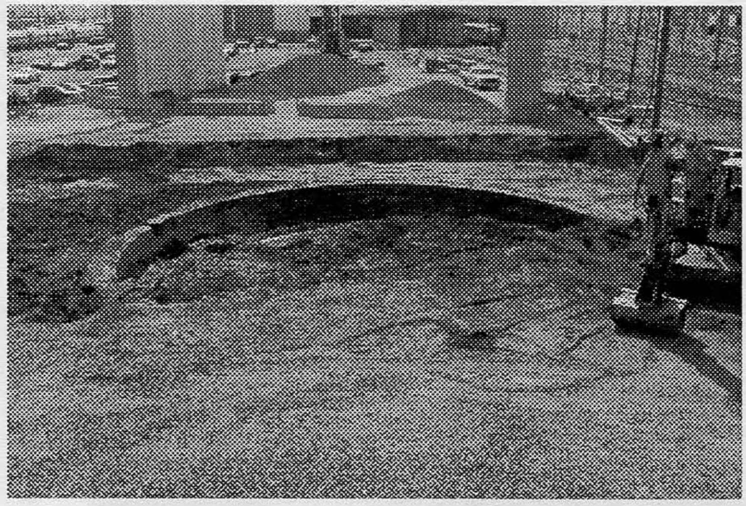
Railroad Roundhouse Archaeology in New Haven, Connecticut



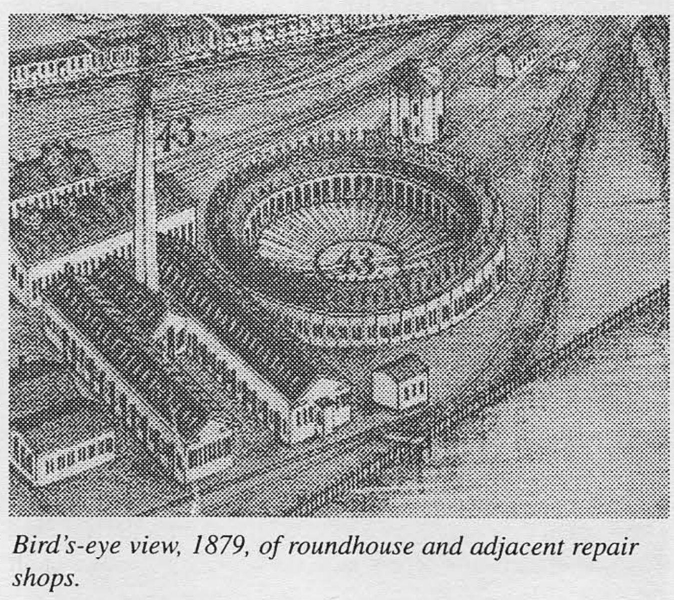
Portion of retaining wall for turntable pit, New Haven rail yard roundhouse, 1870. Piers in background are for the Church Street overpass.

In the last three years the Connecticut Department of Transportation has undertaken a series of improvements to the rail yard that lies southeast of the New Haven, Connecticut, passenger station, including the construction of a new storage yard for electrified multiple-unit (MU) commuter equipment and an overpass that will allow Church Street to cross over the rail yard to the Long Wharf section of New Haven. In commenting on the project, the Connecticut State Historic Preservation Officer asked that historic buildings impacted by the project be recorded to HAER standards and that archaeological monitoring accompany the construction activities.

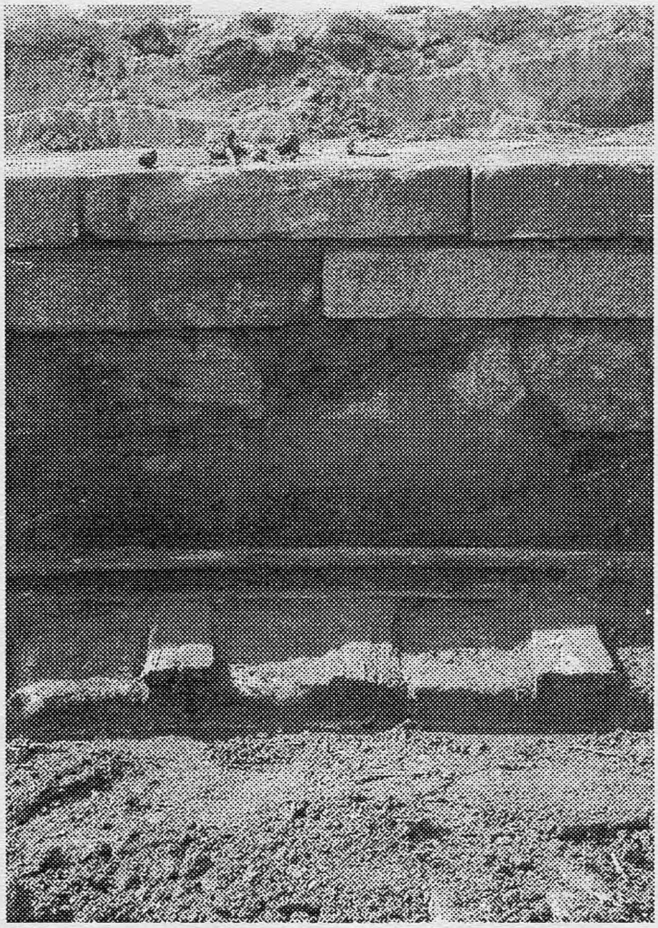
The New Haven rail yard dates from 1868, when the New York and New Haven Railroad acquired 20 acres of marshy land that lay between its tracks and New Haven harbor in order to build a massive new shop facility. Completed in 1870, the complex consumed an estimated 1.5 million bricks and 110,000 sq. ft. of roofing. It included a 260-long machine shop, a blacksmith shop with 22 forges, a shop for building rolling stock, and a 360-degree roundhouse for engine storage and repair. A short time after its completion, the railroad merged with a adjacent line to become the New York, New Haven, and Hartford Railroad, popularly known as the New Haven, the railroad that dominated rail transportation in southern New England for nearly a century thereafter.

When built, the New Haven complex was the railroad's most important shop facility, and many of its early locomotives and much of its rolling stock were built there. Additional facilities, including two more roundhouses, were added in the 1890s at the south end of the yard, giving the name Lamberton Street Shops to the entire facility. In the 20th century, the yard was eclipsed by larger facilities at Van Nest, New York, Cedar Hill in New Haven, and Readville, just outside Boston. Nevertheless, the yard continued to be of importance to the railroad: the New Haven's entire wooden boxcar fleet was rebuilt in these shops in the 1920s, along with hundreds of gondolas and flatcars. The yard also served as the maintenance facility for the railroad's 39 gas-mechanical rail cars, an appropriate duty for the 52-foot-diameter turntable dating from 1870. In the early 1960s, the New Haven shops were again called upon for an important contribution: the shops overhauled 11 second-hand EF-4 electric freight engines (known affectionately as "bricks"), thereby addressing a serious shortage in motive power.

The Church Street overpass required several piers within the footprint of the original 1870 roundhouse, which had been reduced in half around 1900 and demolished in the late 1930s; moreover, the foundation for the huge crane that will erect the truss over the tracks required excavation in additional parts of the roundhouse site. Public Archaeology Survey Team, Inc. (PAST) was called upon to monitor these activities and devised a preemptive pre-construction strategy to reveal any roundhouse remains. Paving and hard-packed fill were removed in the impact areas. Some had been completely disturbed by later construction, including an early



Bird's-eye view, 1879, of roundhouse and adjacent repair shops.



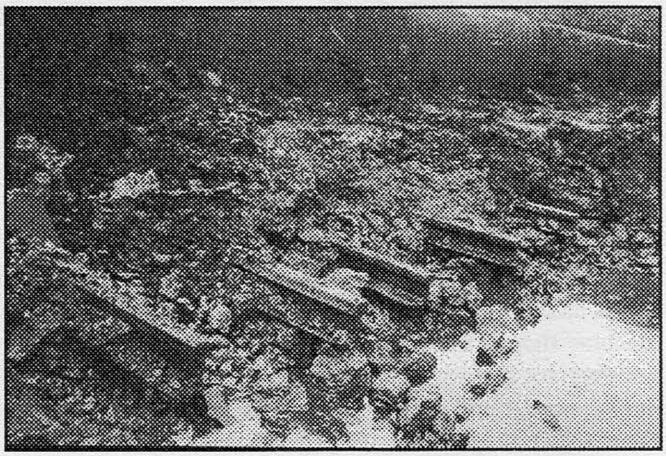
Detail of turntable circumferential bearing rail at base of retaining wall

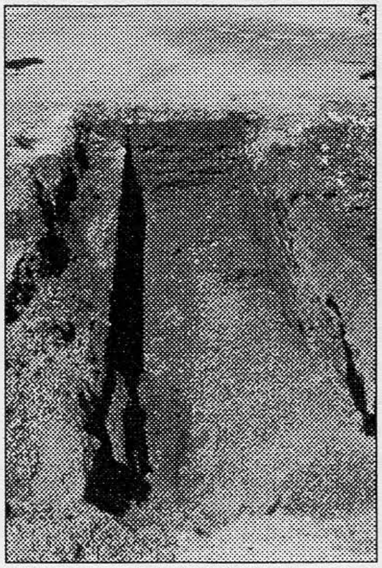
20th-century storm drain system, but a number of repair pits and the central turntable pit were encountered by the targeted excavation. These features were then exposed by additional machine-aided stripping and hand-cleaning so that they could be photographed, measured, and drawn. During the process, the removal of fill was examined for related cultural material.

As a result, three periods of repair pits were identified. The first generation were shallow pits of stone masonry; a somewhat larger type employed brick walls, while the latest type was built of concrete, with re-used T-rail providing the reinforcement. The turntable itself rotated on a single-rail circular track laid along the base of a granite retaining wall.

Material recovered in the fill included the usual railroad debris of ties and spikes, but also other items that were clearly architectural and reflected the use of demolition debris, probably from the roundhouse itself, as fill: brick, window glass, skylight glass, granite pintle blocks from the original arched openings, steam piping, and timber framing connections. Some of the track spikes were only 4 inches long, suggesting that they may have been associated with the light rail that was spiked to sleepers atop the repair pit walls. Shaft bearings and a heavy-duty machine base suggested the use of the building for repairs. A small amount of food-related material was encountered, including clam shells and ceramic fragments. More intriguing was a ca.1880 patent-medicine bottle for "Mrs. Winslow's Soothing Syrup," an opiate advertised for teething babies but apparently one that found some use in the rail yard as well.

At the opposite end of the yard, the construction of the MU storage yard impacted the site of two later roundhouses, one built for engine storage and repair and the other for repairing rolling stock. These had also been demolished in the early 20th century when Cedar Hill absorbed their duties, though one 70-foot turntable remained in use until a loop track was built around 1970. Here, the entire site was to be affected by the drilling of foundations for the electric catenary poles and by the installation of an elaborate drainage system and other utilities. The research design therefore turned to sampling, in which a large pie-shaped section of each of the two roundhouses was exposed from the perimeter wall past the center point of the turntable. These roundhouses, both dating from the 1890s, utilized repair pits with brick walls and floors. Architectural debris in the fill included brick, glass, slate,

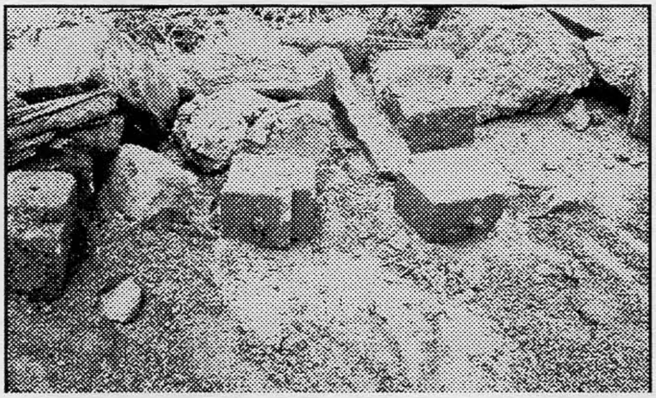




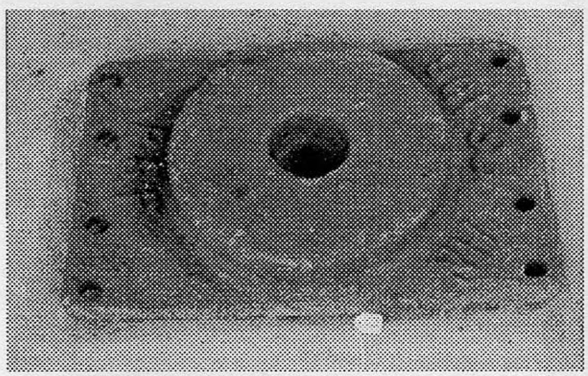
Above: *T-rail used as concrete reinforcement in floor of ca. 1905 repair pit.*

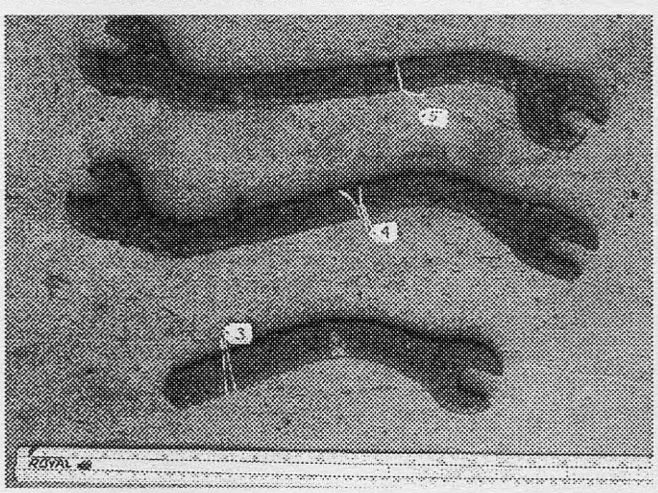
Left: *Repair pit from 1870 roundhouse, 2-feet deep, stone side walls, brick floor.*

and timber-framing fittings. There also was the usual railroad debris of spikes, tie-plates, and ties. What was most interesting, however, was that the repair pits in the west roundhouse, the one used for the repair and re-building of rolling stock, were filled with iron objects related to wooden railroad cars and their repair: tools such as wrenches, reamers, and a paint bucket; car parts such as truck journals, grab irons, stirrup steps, center plates, and king pins; fasteners, including rivets, bolts, and cotter pins; and a sign advising workers not use welding gases for any purpose other than cutting or welding (?!?).



Above: *Pintle blocks recovered from fill; these supported large arched wooden doors on the interior of the roundhouse.*
Below: *Freight-car center plate, marked "NH," recovered from fill in roundhouse at Lamberton Street end of yard.*





Wrenches recovered from fill in roundhouse at Lamberton Street end of yard

The archaeological investigations at the New Haven rail yard shed a great deal of light on this particular facility, for which there is limited graphic evidence. For example, it is evident from the exposed features and the material recovered in the fill that the ca.1900 reduction of the 1870 roundhouse did not entirely replace the original structure but rather was a combination of rebuilding and re-use. It also apparent that at least in these three cases, the architectural items recovered from the fill exactly match what is known from other sources as the buildings' materials, and perhaps a similar correspondence could be assumed in cases where there is no graphic or documentary evidence. Finally, a typology of repair-pit construction emerges from these investigations, in which the pits become deeper and longer with time and the material progresses from stone to brick to concrete.

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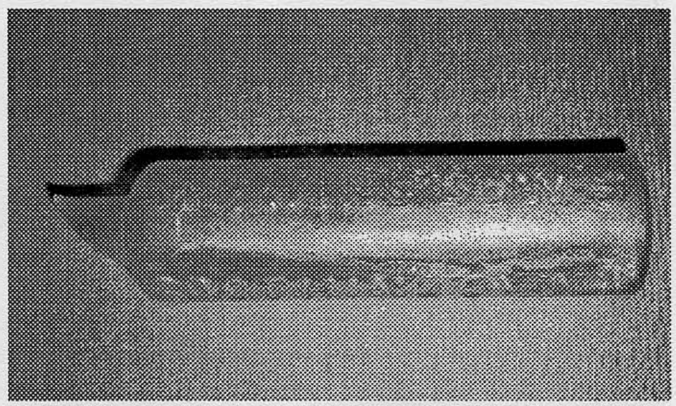
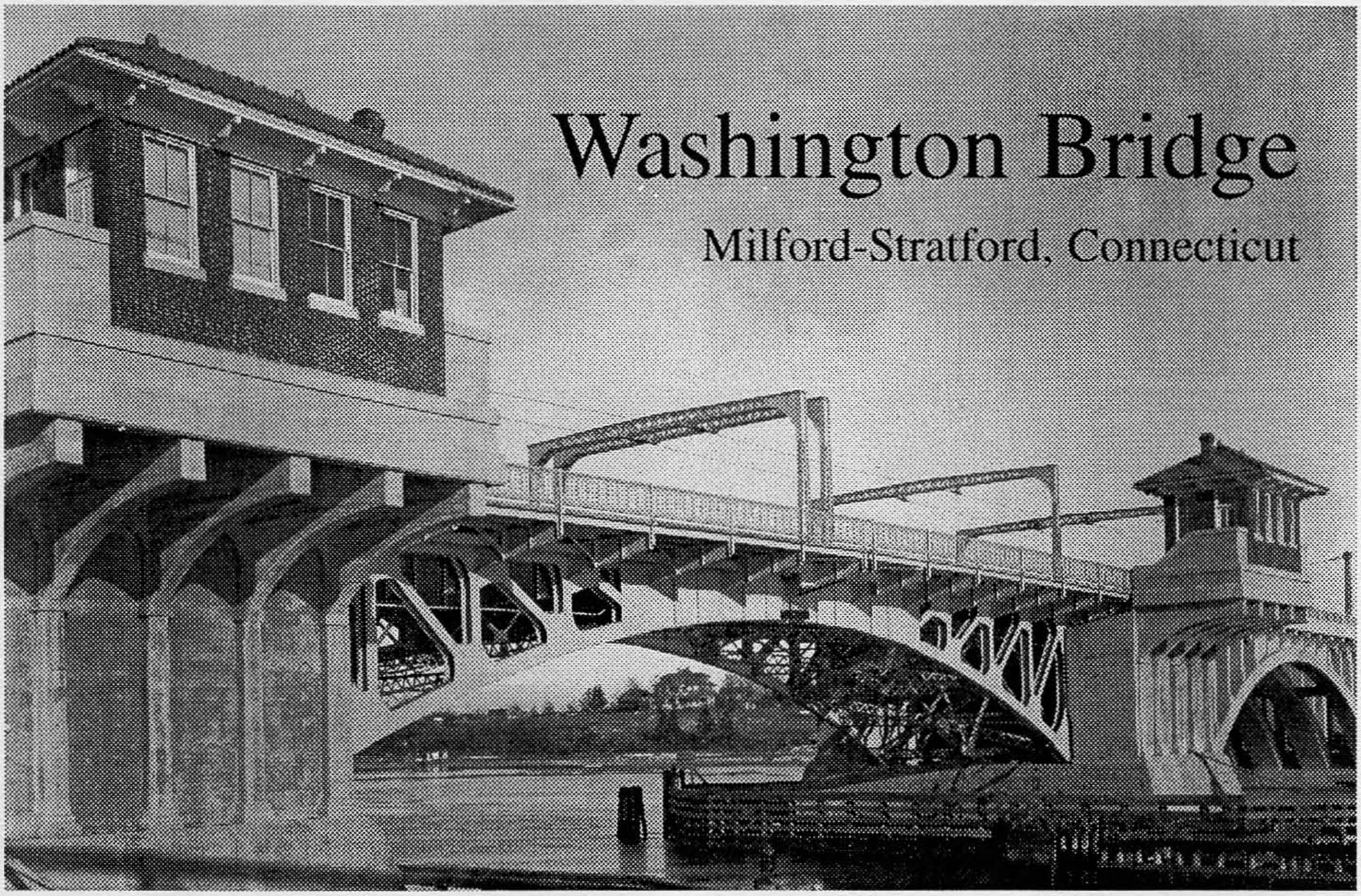


Above: *Patent-medicine bottle (Mrs. Winslow's Soothing Syrup) recovered from fill.*

Below: *Advertisement, 1887, for Mrs. Winslow's Soothing Syrup.*

Washington Bridge

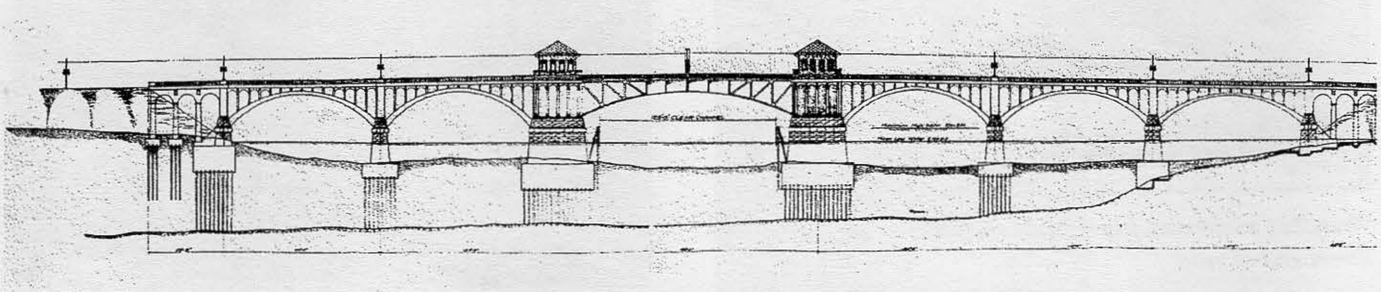
Milford-Stratford, Connecticut



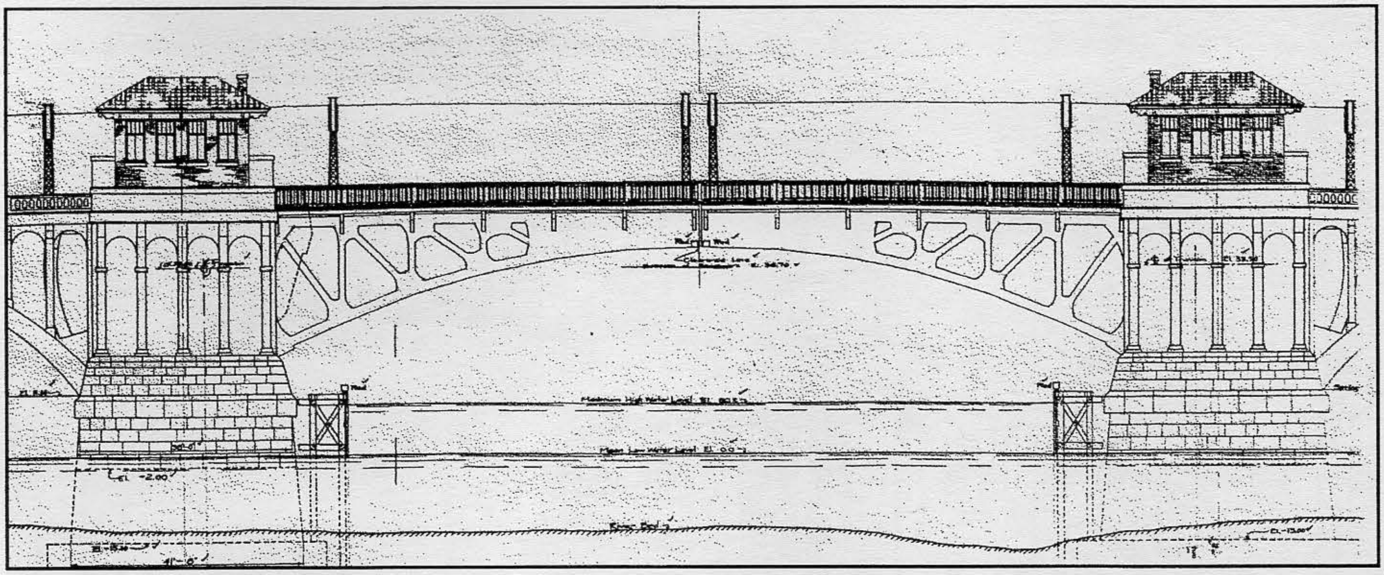
Washington Bridge, south side, looking northeast; not visible are five smaller approach spans.

The Connecticut Department of Transportation is planning a program of rehabilitation for the historic Washington Bridge that carries U. S. Route 1 across the Housatonic River between Milford and Stratford, Connecticut. Although designed in 1915 as one of the State Highway Department's first bridge projects, shortages of steel associated with World War I delayed completion until 1921. At the time, it was the department's most expensive bridge project ($1.5 million) and it was considered a showcase of the state engineers' talents. The road it carries, U.S. Route 1, was the state's busiest "trunk line," serving as the principal east-west shoreline route leading to New York City. The bridge also carried two streetcar tracks and pedestrian sidewalks. Two tile-roofed houses are cantilevered from the south side of the bridge; one is the operator's house, the other originally housed public restrooms. Today Washington Bridge remains an impressive work of engineering: 859 feet long overall, with five large open-spandrel concrete arches and a double-leaf deck-truss bascule across the navigation channel. The only major change from its original appearance is the modern tubular guardrail that supplements the original concrete parapet and replaces the bascule's original ornamental iron railing.

The consultant for the bascule span was none other than John Alexander Low Waddell, the author of *Bridge Engineering* (1916) and *Economics of Bridgework* (1921), two works that certainly have been of utmost importance to engineering historians and undoubtedly were equally useful to the engineers and students of the period. For the movable portion of the bridge, Waddell selected an undergrade counterweight design developed by Thomas E. Brown. Brown was a mechanical engineer with long experience in the ele-



Original drawing showing overall elevation of bridge.



Original drawing of bascule portion.

vator industry; he designed the original inclined elevators that rise inside the legs of the Eiffel Tower in Paris. Toward the end of his career Brown turned his attention to improving the operating mechanisms of movable bridges, and he had several patents to his credit by the time this bridge was built. Waddell was a great proponent of Brown's designs and gave them considerable attention in *Economics of Bridgework.* The bascule leaves are arched so as to be aesthetically compatible with the open-spandrel fixed spans.

As part of the rehabilitation project, Public Archaeology Survey Team, Inc. has compiled additional research on the bridge and photographed it as a record of its current condition. The rehabilitation will include replacement of the bascule's trunnion supports and selective reinforcement or replacement of some of the truss members.

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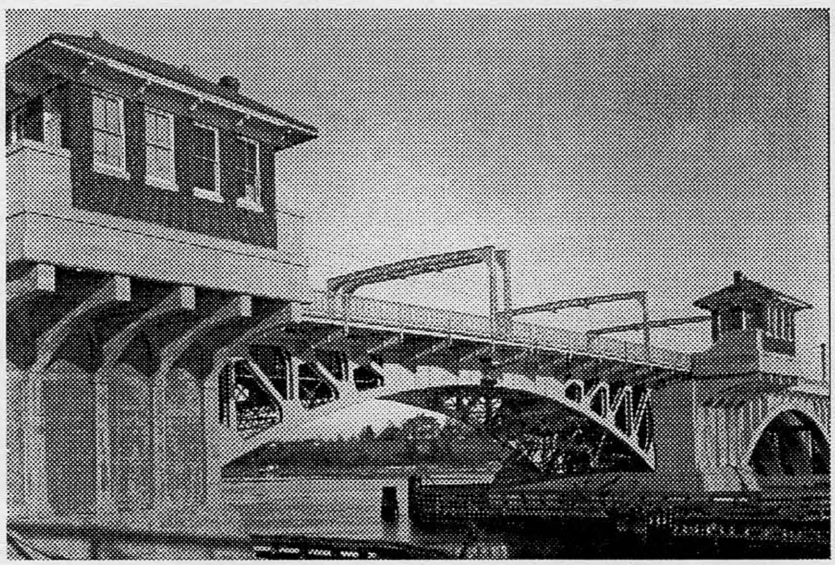
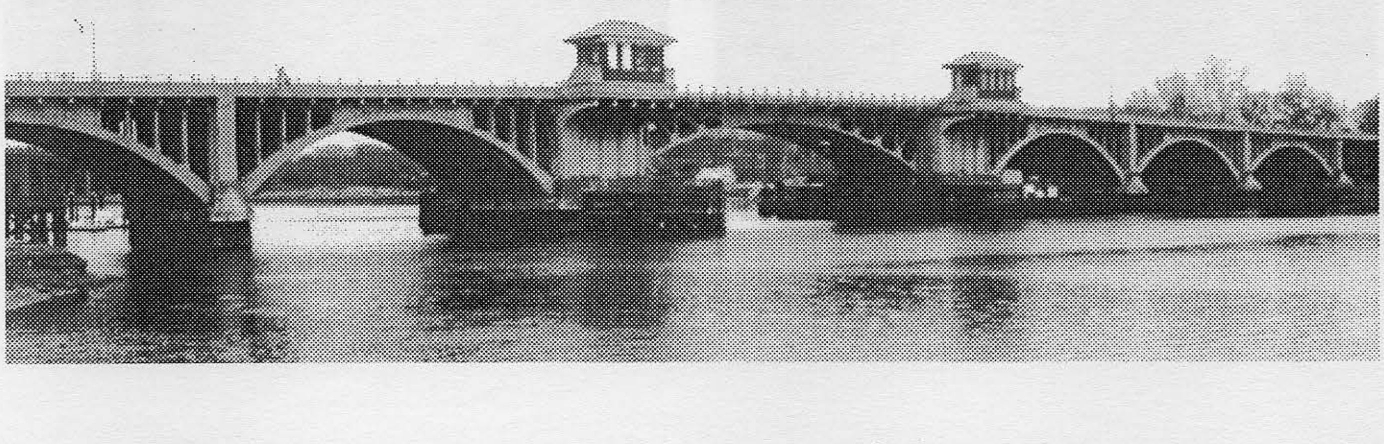
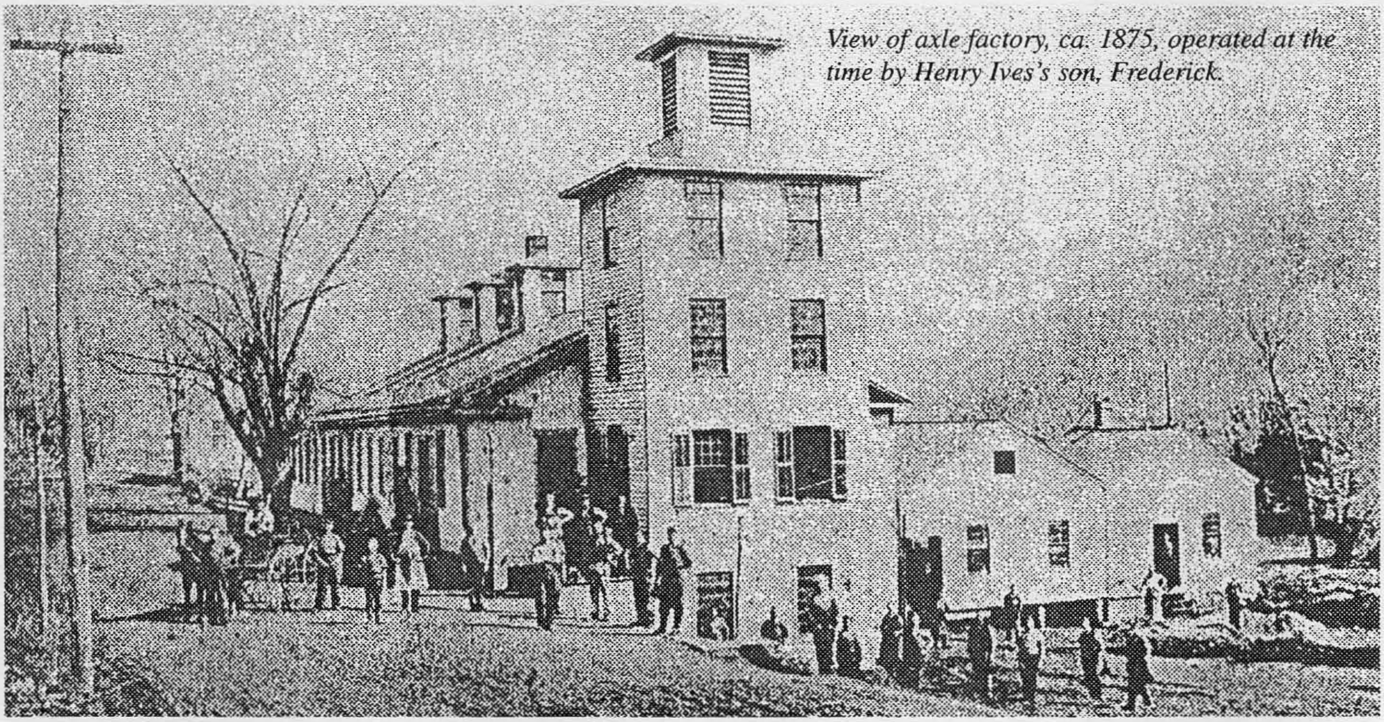


Above: *Close-up of open-spandrel concrete arches. Near cantilevere structure is the operator's house, far one originally housed public restrooms.*

Below: *View of bascule span shortly after completion (Connecticut Department of Transportation Photo).*





View of axle factory, ca. 1875, operated at the time by Henry Ives's son, Frederick.

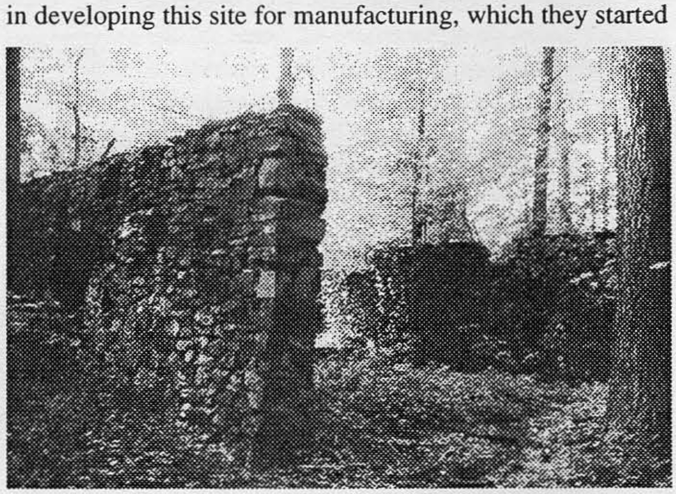
Carriage-Parts Factory Sites

in Hamden, Connecticut

Proposed widening of Connecticut Route 10, a busy road through the towns just north of New Haven, poses potential impacts to a series of industrial remains that lie just east of the highway right-of-way in the Mount Carmel section of Hamden. Stone-lined water channels, a breached concrete and rubble dam, a small stone-arch bridge, and several rubble walls are found in the woods just down the slope from the highway embankment in an area administered by the state's Department of Environmental Protection. Some of the standing stone walls are more than eight feet high. As part of a Phase I archaeological reconnaissance survey, Public Archaeology Survey Team, Inc. (PAST) investigated the remains and made recommendations for their protection during construction.

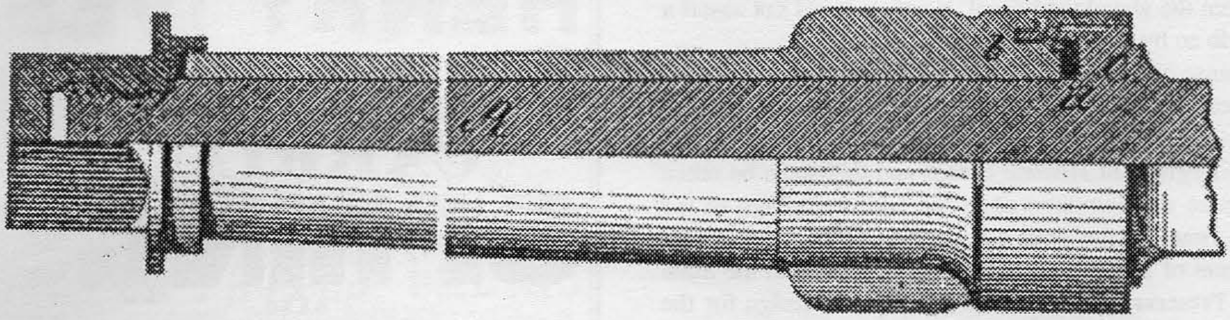
Mid 19th-century maps and other documentary sources indicate that the remains mark the location of two adjacent factories involved in carriage-parts manufacture, a local specialty tied to New Haven's large carriage-making industry. At the north end of the site was the Charles Brockett carriage-spring shop, with the Mount Carmel Axle Works located at the south end. The present roadway runs along the west foundation walls of former buildings associated with the two enterprises. Construction documents from the 1930s reveal that additional remains, including a brick arch over a channel and rubble foundation walls, were buried in the embankment for the present roadway.

Charles Brockett (1803-1884) is sometimes credited with being the first to manufacture steel carriage springs in America, although another Hamden resident, Jonathan Mix, also contributed substantially to the innovation. The Mount Carmel Axle Works, a partnership of Henry Ives and his three brothers started in 1833, made machined iron axles using lathes and boring machines at a time when most carriage axles were hand-made of wood with iron fittings. The Ives brothers and Brockett worked closely together, not only in developing this site for manufacturing, which they started



Remains of stone walls associated with the 1853 Mount Carmel Axle Works factory.

200,214. Carriage-Axles. Willis E. Miller, New Haven, Conn. Filed Nov. 30, 1877.



Claim.—The combination of an axle-arm the collar of which is constructed with a flange projecting forward parallel with the axis, and a box constructed with a groove corresponding to said flange, and so as to extend over the said collar, with an annular recess between the said collar and the box, substantially as described.

Patent illustration for a carriage axle invented by Willis Miller, 1877. Miller had been a worker in the Mount Carmel Axle Works and later became partners with Frederick Ives.

on in 1853, but also in marketing their goods to carriage manufacturers. Together the spring and axle shops at this location, along with another Brockett-Ives axle factory just downstream, had 33 employees in 1860 and produced 125 tons of carriage springs and 250 tons of axles. Motive power listed in 1870 included a 20hp steam engine and 18'-diameter water wheel for the spring shop and a 25hp turbine for the axle shop. That year, machinery in the axle shop included 16 lathes for turning, 8 for polishing, 4 boring machines, 4 trip hammers, and assorted saws, shears, and presses, and employment had reached 50 workers. The New Haven Water Company bought the properties in 1907 as part of its reservoir watershed. The spring factory disappeared before 1910 and the axle factory, then in use by the Liberty Cartridge Company, burned in 1916.

Perhaps the most interesting aspect of the site is the strong evidence that the waterpower for the two shops originally came not from the nearby Mill River but rather from the abandoned New Haven and Northampton Canal just on the other side of the road. Two large stone channels running underneath the road lead from the canal to the mill sites, and there is an earthen ditch leading away from the mill sites that probably represents an early tail race. It is not known if the proprietors paid the canal company for the privilege or simply regarded the water as theirs for the taking. Apparently the opportunistic use of the canal's water was not uncommon. The company, which had transformed itself into the New Haven and Northampton Railroad and built a parallel rail line beside the canal, was probably the instigator of a law passed by the Connecticut General Assembly in 1841 that

Stone-arched bridge, approximately six feet in span, across a former head race leading to the 1853 Charles Brockett carriage-spring factory site.

Remains of dam that formerly impounded "Axle Shop Pond."

exempted canal companies from adverse-possession actions; in other words, local farmers and manufacturers might take water from the abandoned canal, but they could not assert a right to do so by virtue of custom.

Because of the importance of the carriage-parts industry to the economic history of Hamden, PAST recommended that the site be considered as eligible for listing in the National Register of Historic Places and that steps be taken to minimize any intrusion upon the site or damage to the standing ruins during road construction. The Connecticut Department of Transportation, in consultation with the State Historic Preservation Office, has agreed to a design for the road that will confine the improvements to the existing highway right-of-way. Furthermore, vibrational studies will precede the actual construction, currently scheduled for 2003, so the work can be done in such a way as to avoid harm to the site's stone walls and other features. The documentation for the site produced by PAST formed the basis for designating it as one of Connecticut's first State Archaeological Preserves.

Bruce Clouette, Historian
Public Archaeology Survey Team, Inc.

Henry Ives advertisement for carriage components, Connecticut Business Directory, 1851.

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The Society for Industrial Archeology promotes the identification, interpretation, preservation, and modern utilization of historic industrial and engineering sites, structures and equipment.

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