Society for Industrial Archeology · New England Chapters

VOLUME 35 NUMBER 1 2014

CONTENTS

Concord's Sewall's Falls Bridge 1
NNEC President's Report 2
NNEC Fall Tour 2013 2
SNEC President's Report 4
SNEC Treasurer's Report 5
Proposal to Amend Article X(c) of SIA Bylaws 5
SNEC Fall River Tour 6
Joseph Abboud Manufacturing Company 9
Stamford's Stone-Faced Concrete Bridges 12
Stamford's 1896 Atlantic Street Railroad Bridge 19
Nationally Significant New Hampshire Highway Overpass Imperiled 22

CONTRIBUTORS

Marc N. Belanger, Bruce Clouette, David Dunning, James L. Garvin, Michael S. Raber, Sara Wermiel

EDITOR

David Starbuck
PO Box 492
Chestertown, NY 12817-0492
dstarbuck@Frontiernet.net

CONCORD'S SEWALL'S FALLS BRIDGE TO BE MOVED OR DEMOLISHED

The Sewall's Falls Bridge of 1915 in Concord, N. H., one of the last surviving metal truss bridges designed by prominent New Hampshire bridge engineer John Williams Storrs, is destined for demolition unless a way can be found to relocate it. The bridge was formerly slated for rehabilitation as a one-way span, with a second, modern bridge to be placed next to it to carry traffic in the opposite direction.

The New Hampshire Department of Transportation turned the rehabilitation project over to the City of Concord in 2011. Citing the costs of repair and future maintenance of the truss bridge and improved roadway geometry that would be provided by a new two-lane bridge on the same alignment, the city has declared its preference for a modern, two-lane bridge. As required by federal law under these circumstances, the city has issued a request for proposals for the re-use of the National Register-eligible bridge at another site.

Under federal provisions, the cost of demolishing the historic bridge, estimated at $550,000, would be available to a party that offered a viable plan to reuse one or both spans of the two-span bridge for transportation or experimental study or testing.

The deadline for submission of proposals for relocation is September 30, 2014. If the City of Concord receives no acceptable proposal for relocation and re-use by that date, the city will issue bid documents by October 1, 2014, requiring demolition and disposal of the bridge in its entirety.

John Williams Storrs (1858-1942) was the only New Hampshire engineer who specialized in bridge design in the early twentieth century. Remarkably, Storrs also served five terms as mayor of Concord between 1933 and his death. When he died in his eighty-fourth year, Storrs was regarded as the oldest serving mayor in the United States.

The Sewalls Falls Bridge (1915), designed by New Hampshire engineer John William Storrs crossing the Merrimack River in Concord, NH.

The state once boasted about 100 Storrs bridges, half of them being metal truss bridges similar to the Sewall's Falls span. Many other Storrs bridges once stood throughout New England. Over the past century, Storrs bridges have become exceedingly rare. The towns of Canterbury and Boscawen, N. H., recently voted to demolish the long-disused 1907 Storrs bridge that connected the two towns across the Merrimack River. That loss will reduce the list of surviving Storrs truss bridges in New Hampshire to seven, including the Sewall's Falls Bridge. One of the seven, a single-span, 340-foot bridge over the Connecticut River at Hinsdale-Brattleboro, is now being studied for replacement. Loss of Sewall's Falls Bridge and the Hinsdale-Brattleboro Bridge would reduce the number of surviving Storrs truss bridges to five. Only one of the five, the Patterson Hill Road Bridge in Henniker, N. H., is currently open to highway traffic. Lack of a statewide bridge preservation plan places the remaining four Storrs bridges in jeopardy.

James L. Garvin
Retired New Hampshire State Architectural Historian

NNEC President's Report
Spring 2014

Don't miss our joint spring tour with SNEC on Saturday May 3rd. Thanks to them for offering this as we've been too busy planning the national tour in Maine to arrange one of our own. The tour is of the Middlesex Canal in Massachusetts. See details at our new combined NNEC/SNEC website at www.nec-sia.org . Thanks to Marc Belanger too for combining these two. Check it out. Next fall's tour will be in southern New Hampshire.

What industrial history lies beneath the ground or in print somewhere in your local area? Share it with us. Did you know, for instance, that in 1816 a canal was proposed to link the Merrimack and Connecticut rivers? Its central point would have been Lake Sunapee, in the middle and the highest elevation. The planners had seen or heard of locks in Europe and already some in this country that could be used on either side. You do the math: the elevation in Concord is 288 feet, Lake Sunapee is 1020 feet and Claremont is 581 feet. Start laying this out on paper and planning the locks and decide if you would vote to fund it.

David Dunning
NNEC President
dunmark@tds.net
603-526-6939

NNEC Fall Tour 2013

On a nice autumn day last August we visited these two sites in northern New Hampshire. The old sleigh mill is in Eaton and the Redstone Granite Quarries are in Conway.

Sleigh Mill

Some historic sites, like this one, have been kept up or redone on the outside so you have to go in and explore to realize what a gem it is. The following is from Dave Coughlin's presentation at the Plymouth conference. The Sleigh Mill was started in the 1880's by Will Snow who took apart buildings from a nearby farm to build the mill. Although next to a stream, it did not have water rights and had to use various small engines over the years to run the mill. He designed most of the equipment used to make the sleighs himself and all the equipment ran on belts and pulleys. Originally he made both carriages and sleighs but as time passed and horseless carriages became more common he primarily made sleighs, which were used in winter when automobiles were put up on blocks.

In addition to sleighs, he also made sleds and sledges for hauling a variety of objects around the farm and yard. At


Will Snow's Sleigh Mill *in Eaton, NH.*


The belt and pulley system for the Sleigh Mill's sanding drum.

the peak around 1910, he had 20-25 workers and they made about 100 sleighs per year. Sleighs that could not be sold locally were most likely brought to the train station and shipped to Portland to be sold there. He also sold sleighs in Boston.

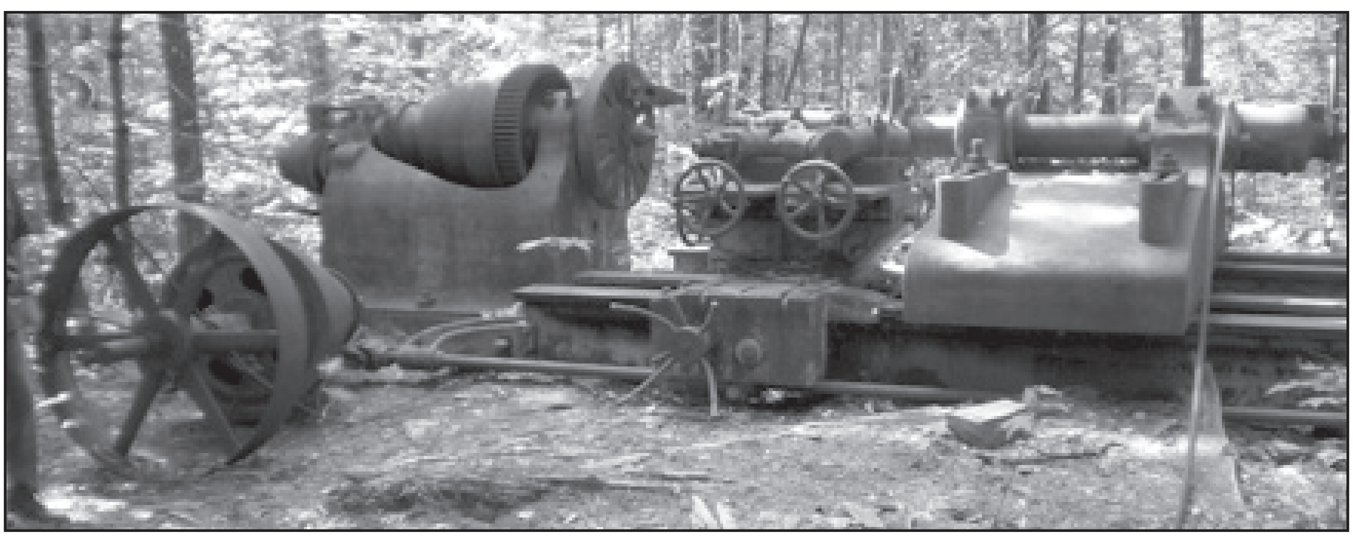
The primary feature of his sleighs was his patented leveling spring system which kept the sleigh from tipping over when making turns and hitting uneven levels of snow and ice. The most common style of sleigh made was the Portland cutter, a one seat sleigh for one or two persons, and "Old Comforts" which were similar in design but with a higher seat and sides than the Portland style. Other styles were pongs and jumpers, based on sleighs that he repainted and repaired.

The painting of his sleighs was done by a Mr. E. J. White and after a few years of use, sleighs were often brought back to Will Snow for refurbishing, repainting, and coats of varnish. This helped keep the business going, as the sale of sleighs declined over the years. In time, he turned to making wooden toys for children and it was said that he sold these through Sears Roebuck. Another item he likely made was crutches and one is still at the mill. Will Snow died in 1932 and many aspects of the sleigh mill were left intact. His desk in the office is still there, as are many of the small parts used in sleigh making and upholstering, still on the shelves.

Redstone Granite Quarries

Steve Swenson, great grandson of the founder, gave us a great walking tour of these old quarries. They are abandoned now and all grown up, so it was strange to see trees growing beside and through gigantic equipment. It was like exploring through an old mill building but inside out. The following is from his presentation.

In 1883, John Swenson started the John Swenson Granite Company in Concord, NH. It continues to supply gray granite curbing for many of our local roads.
The Redstone Granite Company began in 1884 in Redstone, NH (Conway), by the same owner. Redstone was a


Granite turning lathe remains at the Redstone Quarry in Conway, NH.

renowned granite facility, offering three colors of granite: red, green and gray. In its heyday, over 300 men worked in the sheds – drilling, sawing and polishing as well as operating huge lathes and running inclined railroads. They also operated derricks, drills and air compressors, and stoked the boilers. Steam was the main source of power for the equipment then and it had to be piped all over the hillside.

Millions of paving stones were shipped by rail to cities in the Northeast. They also shipped dimension stone and columns for bridges in Boston, New York, Washington, and as far away as Denver, CO, and Havana, Cuba. The largest structure ever built of Redstone Granite is the 7-story George Washington Masonic Temple in Alexandria, VA. This job took 10 years (1923-1933), included over two dozen columns and close to one mile of steps.

Redstone, NH, was a company village with its own railroad station, store, post office, school, church and bowling alley. The depression and WW II saw the end of granite production while some facilities were still used for the war effort. In 1948, all structures, materials, homes and land were sold at auction. Much of the equipment still rusts in the woods. Thanks to Rick Russack for sharing this information from his 2012 conference presentation.

Timeline

1871 Portland & Ogdensburg RR tracks laid at the base of Rattlesnake Mt.
1886 Cutting yard built and first granite shipped from Redstone
1887 Maine-New Hampshire Granite Company was formed
1900 Maine Central RR lays new spur from the north
1903-1905 Two air compressors installed to support pneumatic tools
1923 Redstone Granite supplied to build Masonic Temple
1929 Original stone shed burns, replaced by metal frame building
1942 Company joins war effort; women join workforce assembling iron castings in the company boarding house
1943 For war work, stone shed disassembled and moved to General Electric plant in Lynn, MA
1947 Conway Green quarried by Swenson and Fletcher Granite Company for NYC Criminal Courts building
1948 Quarry shut down

David Dunning
NNEC President
dunmark@tds.net
603-526-6939

SNEC President's Report
Spring 2014

It looks like 2014 is shaping up to be a busy year for IA in New England. In January 2014, the new combined New England Chapters' website went "live". We now have our own domain name: www.nec-sia.org. The new website is largely an expansion of the former Northern New England Chapter site that I created in early 2012, and eliminates the need for duplication of efforts on my part. It also provides a common platform for posting the back issues of the New England Chapters' Newsletter, which I scanned last year. The newsletters are now searchable PDFs, although I eventually hope to have the articles indexed to make it easier to find information on a certain locale or topic, etc. Another feature I would like to add is a listing of all of the past Winter Conference topics and speakers. To date, I have been able to pull most of the conference paper listings from either flyers or from the newsletters, except for the following years: 1988, 1989, 1992, 1994, 1997 and 2002. If anyone happens to have an old flyer from one of these years, please let me know. Also, if anyone would like to have an article posted on the website, please send it to me and I'd be glad to post it.

In February, several SNEC-SIA members, including myself, attended a two-day conference hosted by the Whaling Museum in New Bedford, Massachusetts, entitled *"The River and the Rail, A Symposium on Enterprise & Industry in New Bedford."* The event offered a variety of papers on topics related to the city's transition from its well-documented early whaling days to its rapid rise and fall as a dominant textile center, to its current status as the leading scallop-fishing seaport in the nation. Among the speakers were Pat Malone, who presented *"Steam Mills in a Seaport: The Textile Industry in New Bedford"* and Chuck Parrott with *"The Textile Factory in New Bedford as Architecture"*, which focused on the development of the two-story weave shed of which there were once many in New Bedford. Whaling-city native Kingston Heath delivered the keynote address, which included excerpts from his book *The Patina of Place: The Cultural Weathering of a New England Industrial Landscape*, with a particular focus on the development of worker housing within the city, from the first tenement blocks of the Wamsutta Mills to the boom years around 1910 when the triple-decker "flat" came to dominate much of the city's landscape. The symposium also included talks on the workings of local whale-oil refineries, the decorative glass industry, and the development of the city's excellent water supply system. The Sunday session also included more contemporary topics such as the on-going cleanup of New Bedford Harbor and the creation of a new shipping terminal for handling large objects such as components for offshore wind turbines.

On March 1st, several SNEC members headed north to *Plymouth, NH, for the 27th Annual New England IA Confer-*

ence. We also have three tours planned for the first half of this year, including a visit to Joseph Abboud Manufacturing in New Bedford on April 11 (see accompanying tour report in this issue of the Newsletter), a joint tour of the Middlesex Canal and Museum held in conjunction with the NNEC and the Middlesex Canal Association on May 3rd, and a visit to the Deer Island Sewage Treatment Plant in Boston / Winthrop, MA on June 27th. Of course, in between these regional events, is the 43rd SIA National Conference, held this year in Portland, Maine.

Marc N. Belanger
Taunton, Mass.
mnbelanger@comcast.net

SNEC Treasurer's Report for 2013

Membership and dues levels
In 2013, SNEC had 131 members, a net gain of 3 members over 2012. SNEC welcomes 15 new members who joined in 2013, two of whom joined as life members. Overall, SNEC's membership has grown a bit since 2011, but the total continues to be fairly steady. There are 41 life members.

Since 2011, the cost for individuals to renew their memberships in SNEC has dropped from previous levels to $10 for those who renew in January, and $15 thereafter. Dues for new members and students are $8 throughout the year. This bargain cost for dues and quality benefits – in the form of newsletters, announcements, tours, and scrupulous financial management – are possible only because of the service of volunteers, who devote their time to SNEC. SNEC members should not take the service of the officers and others for granted, and should step up to contribute their time and take their turns holding office.

Activities and costs during 2013
The main expense during the year was hosting the annual conference. SNEC essentially broke even on this and was able to host a day-long conference, including lunch, for $15/person, if paid in advance.

During Craig Austin's terms as SNEC's Secretary, SNEC made no payments for mailing, as Craig mailed the newsletters at his own expense, for postage and packaging. On behalf of the members, I thank Craig for his efforts and generosity. SNEC is now paying for mailings, beginning with the fall newsletter. Nevertheless, even with mailing costs going up, dues are sufficient to cover this cost.

SNEC income and expenses in 2013
SNEC began 2013 with a balance of $9,881.56 and at year's end had $10,675.58 in its accounts, made up of $6,675.58 in a checking account and $4,000.00 in a CD. Thus, SNEC ended the year with $794.02 more in the bank than it did at the start.

Starting balance, Jan 1. 2013		9,881.56
Income		
Member dues and contributions, 2013		1,312.00
Member dues paid in 2013 for 2014		415.00
SNEC-NNEC annual conference registrations		700.00
Bank interest - checking & CD		41.38
	Total	2,468.38
Expenses		
Publishing the newsletter, shipping		533.15
2013 New England conference, not including a deposit (206.50) paid in 2012, Clark University and Sodexo catering		518.10
May and October tours organized by Marc Belanger, reimbursement for expenses		271.06
Mailing fall newsletter: postage (including unused postage), envelopes, labels, return address stamp		319.34
Treasurers expenses 2012 & 2013 (deposit stamp, postage)		32.71
	Total	1,674.36
Ending balance, Dec. 31, 2013		10,675.58
Assets		
Postage purchased but not yet used, held by Secretary		80.64

Sara Wermiel, SNEC Treasurer
March 2014

Proposal to amend Article X (c) of the SIA bylaws

The executive board of the SNEC would like to propose a change to the bylaws of the Society for Industrial Archeology (SIA) with regard to who can serve as, and vote for, officers of SIA chapters. SNEC is a chapter of the SIA and as such, must comply with SIA's bylaws regarding local chapters. The section we propose to amend is titled "membership relationships." Currently, it requires that any chapter member who wishes to hold a chapter office, or to vote in an election for chapter officers, also be a member of the national SIA.

We propose to amend this section to allow any SNEC member to hold office in the chapter and to vote for officers.

In order to change an SIA bylaw, 25 or more members of the SIA must sign a petition, which then is sent to the SIA board. The board can approve a change by a ¾ vote. All SIA members would be notified of the proposed amendment, and two-thirds must approve the vote for it to take effect. The vote of the membership would take place either at an annual meeting or by mail ballot.

Rationale for the change
SNEC membership is open to anyone who is interested in encouraging the study of industrial archeology and, as

written in the SNEC bylaws, who supports the "documentation, preservation, and interpretation of industrial artifacts, structures, sites, and their contexts in the region." The work of the officers in a large chapter, such as SNEC, is very time consuming, and in the SNEC, is performed without any compensation or reward. It has been difficult to recruit chapter members to serve as officers. For many years, SNEC has not had a vice-president because no member has been willing to serve in the office.

Given this reality, we do not want to exclude any qualified member from running for office, whether she or he is a member of the national SIA or not. Moreover, we do not know whether SNEC members are also members of SIA, and do not exclude any SNEC member from voting for SNEC officers. Allowing all chapter members to contribute is important to having an ongoing chapter and moreover, a successful chapter will become a gateway for members to join the SIA.

The section we propose to change, Article X (c), now states,

> Membership in the Society [i.e., the national SIA] is requisite to holding any chapter office, balloting for such offices, or voting on issues in which the name of the Society shall be used or having impact beyond the local area.

We propose that the sentence be revised as follows,

> Membership in the Society is requisite for voting on issues in which the name of the Society shall be used or having impact beyond the local area.

In other words, we propose simply to eliminate the words dealing with holding chapter office and balloting for offices.

We will be circulating a petition for signatures. If you have any thoughts about this that you would like to communicate to President Marc Belanger, you can email him at mb_cyc1@yahoo.com.

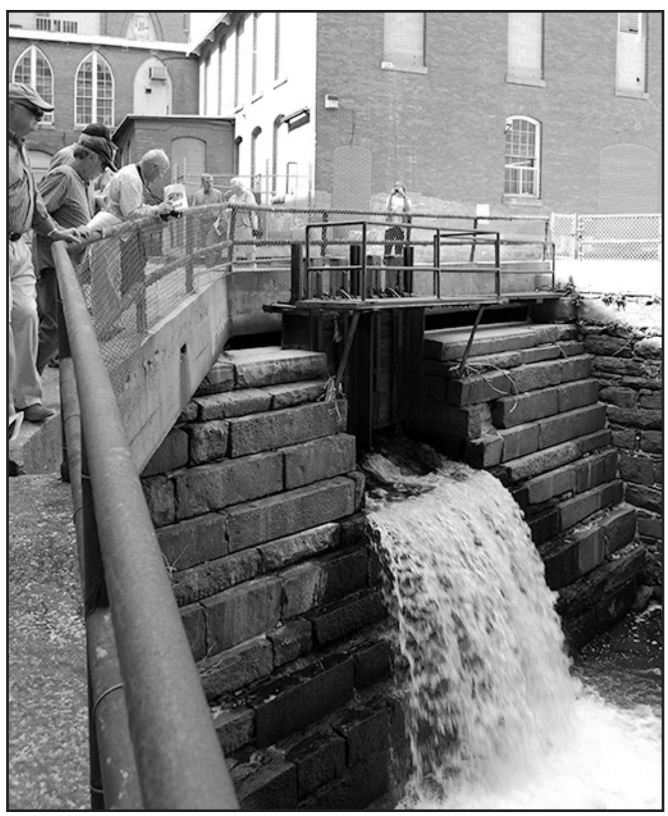
Sara Wermiel, SNEC Treasurer

View of Mill Street, Fall River, MA.

SNEC Fall River Tour
Spring 2013

[*Please Note: This report was inadvertently left out of the last newsletter.*]

The SNEC-SIA Spring Tour was held in Fall River, Massachusetts on May 18, 2013. The event coincided with the 200th anniversary of the first two textile mills to be established along the Quequechan River. For the morning session, chapter members and invited guests met at Gromada Plaza, across from city hall, built over Interstate-195 along the former path of the river, which drops about 130 feet in roughly one-quarter of a mile on its way to Mount Hope Bay. Now mostly located in underground culverts, the river originally contained a series of eight waterfalls, ranging in height from about 10 to 21 feet. The Quequechan River was adapted for industrial purposes as early as 1703, when Benjamin Church established a saw, grist and fulling mill along the river. In 1803, the town of Fallriver (one word) was split off from Freetown. The following year, the town's name was changed to Troy, and remained so until 1834, when it was changed back to Fall River for good. In 1811, the first cotton mill in the area was established by Joseph Durfee, a few miles to the south in what was still then part of Tiverton, Rhode Island. (The border was moved to its present location in 1862). In March 1813, the Fall River Manufactory and the Troy Cotton & Woolen Manufactory were established by two separate groups of local investors, on the 3rd and 8th falls from tide-



Quequechen River falls at the Metacomet Mill.

water, respectively. The "Fall River Mill" was in operation by October 1813, and the Troy opened in March 1814.

The tour began near the site of the Pocasset Mills, established in 1821 by a group of New Bedford investors. The Pocasset Manufacturing Company once owned three mills just west of what is now South Main Street, including the "Bridge Mill" which began in 1822, as well as the Quequechan and Watuppa Mills further downstream. The Pocasset was destroyed twice by two of Fall River's "great fires", first in 1843, and again in 1928 when it was in the process of being dismantled after it had closed for good in 1926. Further down along Pocasset Street, tour participants passed the site of the Robeson Print Works, established in 1826 by Andrew Robeson, the father of Fall River's famed cloth printing industry. Later known as the Fall River Print Works, the Quequechan Manufacturing Company and the Massasoit Manufacturing Company, the Robeson complex consisted of three small mills located at the 4th falls from tidewater. They were demolished in the early 1960s for the construction of the Milliken Boulevard viaduct. Next along Pocasset Street the tour passed the site of the Fall River Manufacturing Company. Originally a small wooden mill containing 1,500 spindles, the Fall River (aka "White Mill") was rebuilt in 1839 and again in 1869 when it contained about 27,000 spindles and 640 looms. After 1905, it was part of the Pocasset

Inside the stair tower of Durfee Mill No. 1 (1866).

Manufacturing Company, as its Mill #5. The "White Mill" was demolished in 1961 for the construction of I-195.

Continuing downhill along Pocasset Street, tour participants got their first glimpse of the Quequechan River, as it emerges from its culvert and flows under Mill #7 of the American Printing Company. Built 1905-06 at the site of the 1825 Anawan Mill, the red brick mill is irregular in plan, in order to conform to the adjacent hillside. Mill #7 features a unique Gothic-styled engine house and is currently occupied by a variety of businesses. Adjacent to Mill #7 is the 1846 Metacomet Mill – the oldest extant mill in Fall River. The Metacomet was originally built by the Fall River Iron Works Company, with plans brought from Bolton, England, at the lowest of the eight falls, on the site of the company's first nail mill. The Metacomet was enlarged to its current form around 1905. Tour participants got another view of the Quequechan as it emerges from under Mill #7 and drops about 13 feet before it flows under the Metacomet. This is perhaps a good time to explain the importance of the Fall River Iron Works Company to those who are not familiar. Established in 1822 by Richard Borden, Bradford Durfee and several others, the Iron Works was enormously successful in its early years. Profits from the Iron Works were used to build textile mills (such as the Anawan and Metacomet), steamship lines, railroads, the gas works, banks and most notably the American Print Works in 1834. The company even purchased its own coal mine in Maryland. It also controlled valuable water rights along the Quequechan River. By the 1850s, the Fall River Iron Works was one of the largest in New England, employing over 600 workers. However, by the late 1870s, with the advent of cheaper steel from other parts of the country, the Iron Works closed. Several businesses were spun off from its wreckage, including the renamed American Printing Company, the Fall River Gas Company, and the Fall River Machine Company. Under the direction of Richard Borden's son M.C.D. Borden, the reorganized American Printing Company embarked on a major expansion between 1889 and 1905, building five huge new cotton

Joseph Sarlo of GS Rubber Industries explains his business to tour participants, May 18, 2013.

cloth mills along the waterfront, known as the "Iron Works Division", even though they no longer produced any iron. By 1910, the majority of the cotton mills in Fall River were producing but one product – print cloth – mainly to feed the hungry printing machines of the American Printing Company, which had the capacity to print 6,000,000 yards per week!

The tour continued under the soon-to-be-demolished double-deck Route 79 viaduct, toward the lower part of Anawan Street to the circa-1895 Borden & Remington building. Now known as Boremco and located on nearby Water Street, the company traces its origins to 1834, as a dealer of dyes, paints, starches and chemicals. On the north side of Anawan Street are the three large brick storehouses built by the American Printing Company between 1880 and 1903. Tour participants also got a glimpse of the former Fall River Gas Works complex, including the 1907-08 conical reinforced concrete oil tank containment building, currently scheduled for demolition by MassDOT as part of the project to remove the aforementioned Route 79 viaduct. (See article in the Fall 2012 New England Chapters Newsletter for more information on this unique structure).

Next, tour participants got to see inside two buildings owned by Patricia Tod of the Fall River Mill Owners Association; the former stables for the American Printing Company, located near the end of Pond Street; and the former upper APC storehouse (now commonly referred to as the "Anawan Mill"). Constructed about the same time as the adjacent 1902-1905 New Haven Railroad grade crossing elimination project, the east end of the upper storehouse contains an indoor rail siding with a reinforced concrete ceiling. The track has been mostly covered over with a plywood floor but is still visible at one end. The first floor of the mill is also occupied by GS Rubber Industries. Owner Joseph Sarlo, who also operates a police dog training business in the adjacent space, gave an excellent impromptu discussion of his business to the group. The tour continued past the middle and lower storehouses, along the cobblestoned Mill Street, toward the former main site of the American Printing Company. While the sprawling waterfront property has suffered from major fires and demolitions, it still contains a variety of industrial structures, including the 1922 oil-fired electric power plant, and subsequent mid-century constructions by Firestone Rubber Company, Tillotson Rubber and the current owner, Borden & Remington (Boremco).

The final stop during the morning session was at the Fall River Marine Museum, which occupies the former (circa 1900) machine and carpentry shop of the American Printing Company. An overview of the building was given by museum vice president Andy Lizak, who explained the tunnel system that used to connect the numerous buildings in the APC complex. Tour participants got to see remnants of the tunnel in the basement of the museum, as well as the old boiler that used to provide heat to the storehouses along Anawan Street.

The afternoon session focused on a portion of the upper Quequechan River valley, an area that developed rapidly in the years following the 1862 annexation of Fall River, Rhode Island during the post-Civil War economic boom. The tour reconvened at the corner of Troy and Pleasant Street, near the former site of the 1813 Troy Cotton & Woolen Manufactory, at the uppermost of the eight falls. Despite its name, the company never got around to manufacturing woolens. The Troy Mills closed in 1929 and were occupied by various small business and garment shops until the 1960s, when like many other buildings in the area, they were demolished for I-195. Next, the group headed across the street to the modern gate house of the Quequechan River, which is still used by the city to control the flow of water into the downstream culvert. After a brief stop on Hartwell Street to view the former Fall River Electric Light / Edison Electric plant, and adjacent historic commercial buildings, the group then headed east along Pleasant Street toward the Union and Durfee Mills. The Union Mills were established in 1859, and served as the "model" for the dozens of new mills that were built in the years that followed. It was the first corporation in the city to be established by general stock subscription, with many owners of modest means, rather than just a handful of individuals. It was also the first mill in the city to be powered by a Corliss engine. Union Mill #2 was added in 1865. The two remaining Union mills have more recently been converted into medical offices.

Continuing east along Pleasant Street is the Durfee Mills complex, the largest and most intact group of mills in the city. The Durfee Mills were established in 1866 by the heirs of Major Bradford Durfee, one of the founders of the Fall River Iron Works, who died in 1843. His estate passed to his only son, Bradford Matthew Chaloner, "BMC" after his eighteenth birthday, but was largely controlled by his mother and his uncles. The Durfee Mills are laid out in a generally symmetrical plan, with Mills No. 1 (1866) and No. 2 (1871) flanking a central office building (1872). Other buildings and additions are as follows: Mill No. 3 (1880), cotton storehouse (1887), weave shed (1893), cloth room and repair shop (1895). Mill No. 2 also includes a large ell containing the boiler, engine and picker houses, while Mills No. 1 and 3 share a similar combination. The Durfee Mill complex is currently occupied by a variety of businesses, although some of the buildings (particularly the upper floors) appear to be vacant.

The Union, Durfee and Metacomet Mills were recorded in 1968 as part of the New England Textile Mill Survey II, led by Robert M. Vogel. Photos, drawings and narratives are available online at the Library of Congress website. I'd also like to extend special thanks to Tom Paterson of the Fall River Mill Owner's Association (and also an SIA member), who assisted with tour details.

Marc N. Belanger
Taunton, Mass.

Joseph Abboud Manufacturing Company, New Bedford, Massachusetts

Tour Summary, April 11, 2014

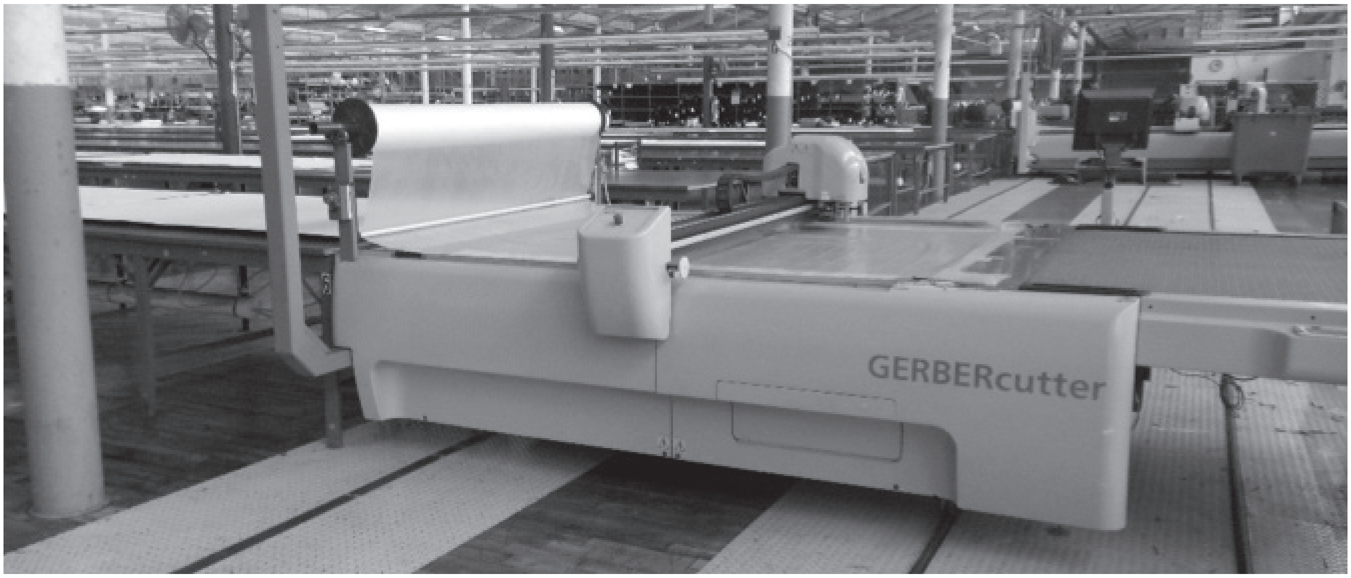
On Friday April 11, about a dozen SNEC/NNEC members met at the Nashawena Mills in New Bedford, Massachusetts, for a tour of Joseph Abboud Manufacturing Corporation. We were welcomed by company president Anthony Sapienza in their conference room, where he gave us a brief overview of the company, which was originally established in 1975 as Riverside Manufacturing. At that time, there were dozens of apparel manufacturers throughout New Bedford, most located in the city's many former cotton textile mills. In 1987, Riverside was acquired by GFT USA, a subsidiary of the largest suit-maker in the world, Gruppo Finazario Tessile, based in Torino, Italy. Sapienza explained how this was a way for the Italian company to avoid paying high duties on its products made overseas and imported to the United States. GFT also found in New Bedford a large pool of talented garment workers. The New Bedford factory was set up as an exact replica of the GFT plant in Italy. In 1988, the company partnered with up-and-coming Boston designer Joseph Abboud to manufacture high-quality men's suits under his label.

The company eventually purchased their building, the former Nashawena weave shed, along with the nearby power plant and office building, which are connected to the main mill by a tunnel under Belleville Avenue. The sale did not include the adjacent former spinning mill, located immediately west of the weave shed. In 2000, Joseph Abboud sold his brand and the company to a group of investors. Sapienza, however, continued to grow the business. By 2004, they were making about 1,200 suits per day in New Bedford, and selling to various retailers around the country, including their largest account, Nordstrom. JA Manufacturing managed to survive the recession of 2009, and in July 2013, they were purchased by Men's Warehouse for $97.5 million. The transaction also marked the return of Joseph Abboud to the company which bears his name. Their suits are now exclusively sold at Men's Warehouse. The transaction also enabled the company to "cut out the middleman," allowing the same $700 suit that was sold at Nordstrom to be $500 today. The company is nearly back to its pre-recession production of 1,200 suits per day, and has added to its workforce which is currently around 600 and growing. Their suits are made exclusively from high-quality Italian-made fabrics, mostly worsted wool, utilizing the latest technology in order to stay competitive.

The Nashawena Mills were built in 1910, by William Whitman (1842-1928), a Nova Scotia native who began his career in 1867 at the Arlington Mills in Lawrence. In partnership with Edgar Harding, the Whitman Mills were established in 1895 in the north end of New Bedford. This was followed by the Manomet Mills in 1903, and the Nonquit Spinning

Inside the upper floor of the Nashawena Mills north-lit weave shed, now part of Joseph Abboud Manufacturing Company, New Bedford, Massachusetts.

Joseph Abboud Manufacturing Company President Anthony Sapienza explains the layout and cutting process. There are about one hundred separate pieces that go into a men's suit, each is given a number to ensure it is routed to the correct sewing station for assembly, in the correct order – a challenging task with almost 1,200 suits per day of various sizes, colors and designs.



One of three automated Gerber Cutters in the cutting room of Joseph Abboud Manufacturing Company. These fully automated machines can accurately cut through a stack of fabric to produce the various pieces that go into making a high quality tailored men's suit.

Company in 1906. Each of these mills was among the largest in the city. In 1909, Harding and Whitman split. Harding maintained the Whitman Mills, while Whitman got the Manomet and Nonquit. The Nashawena Mills were considered to be the most up-to-date textile mills in the world when built, and information on their construction is well documented. Unlike the first three complexes, which were steam powered, the Nashawena built a central electric power plant on the east side of Belleville Avenue, connected to the spinning and weaving mills by a tunnel. Whitman also built a large, well-appointed two-story office building, adjacent to the power plant. All of the Harding-Whitman mills in New Bedford were designed by C. R. Makepeace & Company, of Providence. At the time of their construction, the Nashawena Mills were claimed to be the largest spinning and weaving complex ever constructed at one time. The four story spinning mill was 800 feet long by 136 feet wide, and contained 145,000 spindles. In 1916, it was extended north by 255 feet. The two story north-lit weave shed is 278 feet wide. Also originally 800 feet long, with 3,324 looms, it was extend by 255 feet in 1922 on its north end, creating an impressive uninterrupted 1,055-foot-long wall of brick along the west side of Belleville Avenue. Power was transmitted to the looms from the lower level, eliminating the clutter of overhead shafting and belting within the weaving area. As is common in most two story weave sheds, most of the lower level of the Nashawena is only 8 feet tall, providing just enough room to enable access to the power transmission system for maintenance. However, the eastern 76 feet (and the entire 155-foot-wide addition) of the Nashawena lower level is full height (13 feet), to serve as a cloth room for storage of finished goods awaiting shipment.

The north end of the lower level of the Nashawena weave shed now contains the pants department. The factory also contains a spacious cafeteria within the narrower portion of the lower level. The remainder of the lower level is currently leased to various other businesses. JA Manufacturing occupies the entire upper level of the weave shed, which has mostly retained its north-facing sawtooth windows, now supplemented by artificial lighting. All access to the attached spinning mill, under different ownership, has been blocked off.

The automated Eton System at Joseph Abboud Manufacturing Company. Used to deliver suit coats in various stages of production to the correct terminal for assembly. Each sewing station in the factory is tied into a real-time shop-floor control software system that tracks the production of each worker.

Following a tour of the pants department, we passed through the cafeteria and outside along Belleville Avenue to the impressive Nashawena Mills office building. Now vacant,

View of the four remaining 300-hp Bigelow-Manning upright boilers. One of the two newer Babcock & Wilcox boilers is visible in the distance. The plant also contains two Cleaver-Brooks oil-fired units that are still in use by JA Manufacturing to provide heat and steam to its plant across the street.

the building was most recently occupied by the Buzzards Bay Coalition. It still contains much of its original millwork, including wood floors, wainscoting, stairwells and coffered ceilings. We were led into the front lobby by JA Manufacturing facilities manager Rick Caesar, in front of a large original framed well-detailed lithograph of the Nashawena Mills. To our amazement, he explained how the remarkable condition of the century-old print is due to the fact that its glass had been covered for many years in grey paint, and was only recently uncovered during the process of restoration of the building several years ago. The building also still contains the original tile-lined vault with "Nashawena Mills" over the doorway.

The tour continued to the adjacent former engine room, which contained two 3,000 kW Allis-Chalmers turbo-generator sets, and a 500 kW system for lighting and auxiliary motors, all which have since been removed. The cavernous hall still contains its original green and white tiled walls, and tall Romanesque arched windows, with a roof supported by steel trusses. The Fairbanks scale used to weight coal deliveries still exists, along with large concrete foundations for the generating equipment in the basement, which is currently used by JA Manufacturing as a maintenance shop.

Adjacent to the turbine hall is the large boiler room, which still contains four of its original sixteen 300-hp upright coal-fired Manning boilers, built by the Bigelow Company of New Haven. Over the years, new boilers have been added by various owners, including a pair by Babcock & Wilcox, and two Cleaver-Brooks oil-fired units that are still in use by JA Manufacturing to provide heat and steam to its plant across the street.

The tour then proceeded back to the main plant, and through the distribution center (DC), located at the north end of the upper level. The DC contains an elaborate overhead track system used to efficiently move bundles of finished suits directly into trucks for delivery. Continuing north we then passed through the large cutting department, which contains several rows of long tables with three Gerber Cutters mounted on tracks at one end. The company utilizes the latest computer technology to efficiently lay out and cut the various parts for its suits, with minimal waste. Mr. Sapienza explained how the average suit contains one hundred separate pieces of cloth, and the pieces for one suit must be cut from a limited length of fabric, less than seven yards long, to avoid having subtle color variations that would create a lower quality item. After cutting, each piece is given a specific number so that it can be properly routed to the correct sewing station, in the correct order – a challenging task when dealing with thousands of suits of varying size, color, design. All this technology is controlled by real-time shop-floor control software, which monitors each operation as the garment moves through the factory. The company also employs an Eton System, an array of overhead tracks and belts designed to automatically deliver the suit coats to ergonomically positioned work stations for final assembly. Each operation in the factory is also directly tied to the payroll system. On average, it takes about 200 minutes of raw labor content to produce one suit. On behalf of the SNEC, I'd like to thank Anthony Sapienza and Rick Caesar for taking time out of their day to provide an excellent tour of the JA Manufacturing facility.

Marc N. Belanger
Taunton, MA

References

Goodell, John M., ed. "The Nashawena Mills, New Bedford, Massachusetts.".*The Engineering Record*. December 4, 1909. Pages 631-633 (Google eBook).

Metcalf, M.A. "The Nashawena Mills, New Bedford, Mass.," *The Textile American,* Volumes 13-14, 1910. Pages 15-16. (Google eBook).

Perdue, Beth. "In SouthCoast, passion for making clothing outweighs perils of U.S. production." southcoasttoday.com, January 26, 2014.

Smith, John H., ed. "Recent Progress in Textile Mill Design and Operation – Electrification of the Industry." *Electrical Age,* May 1910. Pages 150-151 (Google eBook).

Whitman, Malcolm D. "A Brief Outline of the Business of William Whitman & Co." The University Press, 1910. (Google eBook)

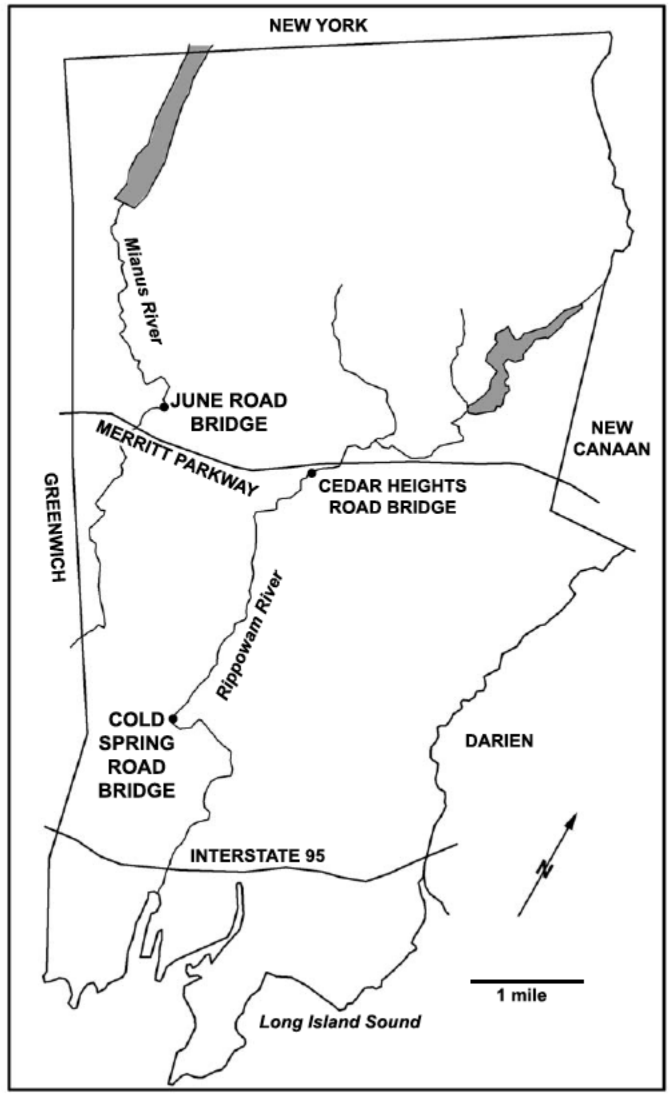
Stamford's Stone-Faced Concrete Bridges

Introduction

The City of Stamford, Connecticut, has recently rehabilitated one, and is in the process of rehabilitating or replacing two more, of its Depression-era bridges. All three structures, at Cold Spring Road, June Road, and Cedar Heights Road, are excellent examples of rusticated stone facades on reinforced concrete structures designed by the same engineer. These crossings are listed, or eligible for listing, on the State Register of Historic Places, and are being documented at the request of the Connecticut State Historic Preservation Office to mitigate removal of some significant decorative features.

Founded in 1641, Stamford had a relatively complex political history. Although the most densely-settled part of town along Long Island Sound and the mouth of the Rippowam River became a borough in 1830, Stamford remained a largely agrarian community until railroad construction in 1848 stimulated significant industrial and population growth. A tripling of population c1850-1890 led to the 1893 chartering of a City of Stamford, encompassing about a fifth of the territory of the town. Continued industrial expansion, and migration from Europe and the American South, tripled the population again between 1900 and 1930, with approximately 80% of the people living in the city, although considered residents of the town and subject to taxation by both governments. This political division persisted until the merger of both governments into the present city in 1949.

It appears the town built and repaired bridges for the town, borough, and city, usually contracting for design and construction of all but perhaps the very smallest projects. By the mid-1880s, town selectmen came under increasing pressure to improve the community's roads and bridges, and began rebuilding river crossings in the congested town center with a variety of designs, including several wrought-iron trusses and a large but relatively late example of masonry arch construction at North Street over the Rippowam River (1899). The town rebuilt a small number of crossings between c1900 and World War I, but by the end of the war increasing population and automobile traffic required far more attention to roadway planning in Stamford and the surrounding region. In the early 1920s, work by the Regional Plan Association of New York stimulated construction of parkways in Westchester County, as well as the creation of the Fairfield County Planning Association which became involved in lobbying for the Merritt Parkway built 1934-1940. Stamford commissioned its own plan of development in 1926, which noted the lack of major through streets and the narrow widths of virtually all roads. Despite such concerns, the town evidently built or rebuilt only three new bridges between the war and the start of the Great Depression in 1929, two of which were less than 20 feet long. Prior to the beginning of increased state support for roadways in 1931 through the Town



Locations of Stamford's stone-faced concrete bridges discussed in this article.

Aid Program, Stamford evidently rebuilt four more bridges, including the 32-foot-long crossing of the Rippowam at Cedar Heights Road in 1930, and several shorter crossings using Town Aid funds c1931-32. Although town officials considered most of the town's larger bridges too narrow, deteriorated, and in some cases dangerous for automobile-era traffic, only the establishment of enhanced federal public works programs by the Roosevelt administration in 1933 allowed Stamford to replace many of these crossings. Federal support, primarily from the Public Works Administration, led to construction of five 25-to-60-foot-long bridges between 1933 and 1936, including the bridges completed in 1935 at Cold Spring Road over the Rippowam and at June Road over the Mianus River.

Almost all of Stamford's bridges built c1917-1936 were variants of concrete design, with at least five of them designed by Llewellyn Bromfield, Jr. (1889-1963), principal of the

L. Bromfield Jr. Company c1915-1962. The town retained Bromfield for most or all of the Depression-era bridges. As discussed below, his designs for the larger Stamford bridges at Cedar Heights, Cold Spring, and June roads had a narrow range of common structural types, and stone-faced elevations which appear to reflect labor-intensive New Deal methods, widespread preferences for rusticated surfaces, and increasingly elaborate components likely influenced by bridges on the Bronx River Parkway in New York and the carriage road system at Acadia National Park in Maine. The use of large boulders as border stones at the Cold Spring Road and June Road bridges, and along other contemporary Stamford roadways, appears highly unusual but also probably derives from extensive use of similar roadside treatment along the same carriage roads.

The three bridges discussed here were at crossings whose histories are not well documented, but originated in the 18th or early 19th centuries. The bridges reconstructed by Bromfield had substantial masonry abutments which he re-used, as discussed below. At Cold Spring Road, the previous crossing appears to have had two timber-deck spans, each about 26 long, with wooden side rails and a total width of just over 20 feet. June Road crossed the Mianus River on a lightweight Parker pony truss with a roadway perhaps 20 feet wide and a single 30-foot-long span, with a timber deck, wooden side rails, and substantial abutments extending well into the river. The bridge replaced on Cedar Heights Road remains the least known at present, but may have had a timber deck approximately 30 feet wide with a 24-foot span.

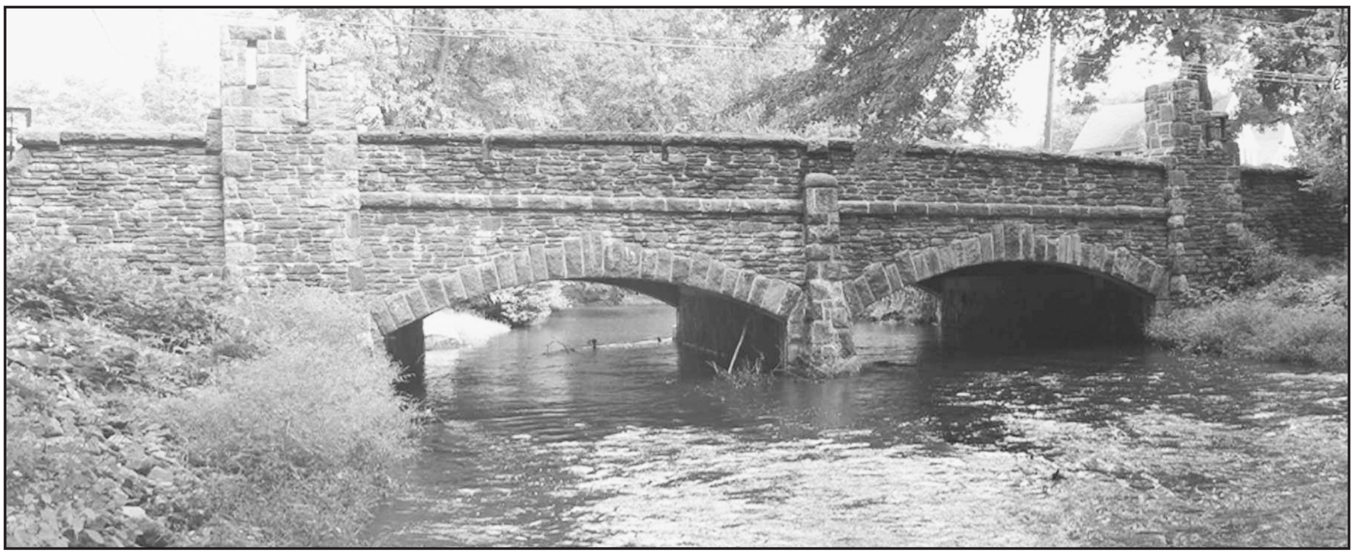
Structural Context of Stamford's Depression-Era Reinforced Concrete Bridges

After fairly rapid evolution of reinforcing systems in the late 19th century towards the standard use of twisted or textured steel bars, reinforced concrete bridges became common in the United States in the first decade of the 20th century. Spans of approximately 70 feet or more were usually built with steel trusses prior to World War II, but for shorter spans a variety of concrete types evolved through the 1920s, including arches, slabs, concrete-encased steel stringers under concrete decks, cast-in-place reinforced-concrete T beams (multiple stringers cast integral with the slab deck), thru girders, box culverts, and rigid frames. Factors including span length, roadway width, costs of reinforcing steel or formwork, and sometimes the aesthetics of bridge location influenced design choices. State highway departments began encouraging or standardizing bridge designs by 1910, supported in this effort during World War I by the 1916 Federal Aid Road Act. In Connecticut, the State Highway Department established in 1897 began promoting reinforced concrete designs as cheaper than stone masonry arches or shorter steel trusses by 1907, but use of the newer material on town bridges grew slowly prior to c1920. Greater postwar availability of steel for reinforcing bar and for rolled I-beams accelerated the use of reinforced concrete throughout the state, and in 1927 the highway department issued the first standard specifications for concrete and truss designs.

Until the Great Depression, the most common concrete bridge designs in Connecticut and other states appear to have been concrete slabs for short spans under approximately 20 feet, concrete decks supported by steel stringers or integral with concrete beams for spans of up to approximately 30 feet long, and closed-spandrel concrete arches (often called deck arches) for spans typically up to approximately 40 feet but sometimes up to 70 feet or more. Even longer open-spandrel concrete arches were sometimes built, but in Connecticut such structures were rarely built by towns. Most of Stamford's shortest bridges built c1917-32 appear to have been concrete slabs or culverts including Old Long Ridge Road, Farms Road, and Hunting Ridge Road, though later reconstructions leave original designs unclear in some cases. The longer-span designs with variants of stringer or girder supports had cost advantages including potential re-use of older masonry abutments, as seen in the Rippowam River crossings at Cedar Heights and Cold Spring roads, and at the undecorated 1936 Lakeside Avenue Bridge over the North Stamford Reservoir. Deck arches were less expensive to maintain than metal trusses, and sometimes provided more vertical clearance over roadways than horizontal stringers or beams, but this latter advantage was probably not a factor in design of the June Road Bridge over the upper Mianus River. Deck arches offered opportunities to replicate older masonry arch elevations, which as discussed below was a widespread decorative choice through the 1920s, but higher material and construction costs relative to steel structures or most other concrete bridge designs made deck arches less common after c1930 except where more park-like effects were desired. At June Road, the availability and intent of federal support programs were probably a factor in design and decoration choices, which required much traditional masonry labor. The longer span of this structure relative to Stamford's other contemporary bridges, and the presence of earlier abutments which could be modified to provide resistance to horizontal arch thrust, may also have made the design here stronger and more cost-effective.

Llewellyn Bromfield, Jr.'s structural designs for the Cold Spring Road and June Road bridges contrast markedly with contemporary choices made for bridges on the nearby Merritt Parkway by Connecticut Highway Department engineers. Most of the parkway bridges are reinforced-concrete rigid-frame structures, with integral horizontal and vertical members. Developed in Europe in the late 19th century, rigid frame structures were first deployed in the United States c1923 for parkways in Westchester County, New York. The basic design allowed for structures with arched elevations which could be faced with stone, and while requiring expensive form work had lower costs than arch or stringer/

Cedar Heights Road Bridge



Cold Spring Road Bridge

June Road Bridge

beam bridges because of smaller abutment sizes and the use of relatively less concrete or steel. Rigid frames were also stronger than the older concrete design types. Unlike the 1920s parkways built in Westchester County and on Long Island, most of the Merritt Parkway bridges were built entirely of concrete, with no stone facing, to lower costs. Envisioned as a planned landscape, the Merritt Parkway was especially significant as an early large-scale example of architectural design applied to concrete-faced bridges, to retain a park-like setting without actual or simulated traditional stone bridge designs. A variety of picturesque, Neo-Classical, and Modernistic surface treatments characterize most of the bridges, which typically have pylons and in-line wingwalls flanking the central rigid frames. A small number of arch or stringer/beam bridges were also built on the Merritt Parkway, including several concrete arch structures faced with stone, cast stone (sometimes known as architectural concrete slabs), or a combination of the two facing materials. Not far from Bromfield's bridges, the bridge carrying the parkway over the Rippowam River is a 52-foot-span stone-faced reinforced-concrete arch with in-line wing walls. Masonry costs generally avoided on the parkway bridges contributed to the approximately $58,600 price of the Rippowam River Bridge. Bromfield's contemporary Cold Spring Road Bridge -- a two-span 56-foot-long stone-faced structure with simulated arches, in-line wingwalls, and elaborate masonry details -- cost $27,855. It appears that by taking advantage of the crossing's earlier abutments and mid-river stone pier to retain two spans, Bromfield was able to retain a traditional preference for stonework in a manner not only cost effective but highly unusual among Connecticut's early 20th-century bridges. As discussed below, Bromfield's sequence of concrete bridges in Stamford reflects familiarity with similar treatments elsewhere, as well as preferences for masonry labor in many federally-assisted/funded programs.

Architecture and Decoration of Stamford's Depression-Era Road and Bridge Projects

Masonry arch bridge construction is an ancient design, but was not very widespread in Connecticut until the mid-19th century due to the prevailing preference for cheaper timber crossings. The growth of urban centers and some severe weather events increased preferences for the more flood-resistant stone arches throughout the state c1865-1880, after which metal truss structures became competitive with masonry construction. By the early 20th century, few new stone arch bridges were built, and the form became more valued for its picturesque quality and, in less urbanized locations, its closer resemblance to a natural feature than an unfinished concrete structure. With some notable exceptions of true stone arch construction, including the nine-span Bulkeley Bridge completed across the Connecticut River at Hartford in 1908, the form was usually maintained by facing closed-spandrel concrete arches or arched concrete girders. Techniques used to bond or connect masonry components to concrete are not always well documented, but the voussoirs acted as true arches and provided some support for spandrel stones. Whether attached to the concrete with metal pins, hooks, or dowels as seen at the Merritt Parkway Rippowam River Bridge, or simply set on the arched wood forms or falsework on which adjacent concrete beams or arches were poured as was the case at the June Road and Cold Spring Road bridges, voussoirs were finished rectilinear blocks made to abut concrete surfaces. In true stone arch construction, voussoirs could be less carefully finished; a wide variety of voussoir and intrados treatments in Connecticut examples suggests the basic strength of these structures accommodated almost any well-fitting stone masonry, including unmortared, largely uncut flat stones, carefully-cut blocks, and irregular rubble.

There were two general approaches to replicating masonry arch bridges in Connecticut bridges before World War II:

- large granite ashlar blocks of approximately equal size used for voussoir, spandrel, and pier stones on a small number of large, often multi-span crossings built c1910-1930, often reflecting the Progressive-era City Beautiful movement to enhance urban environments and express progress and prosperity

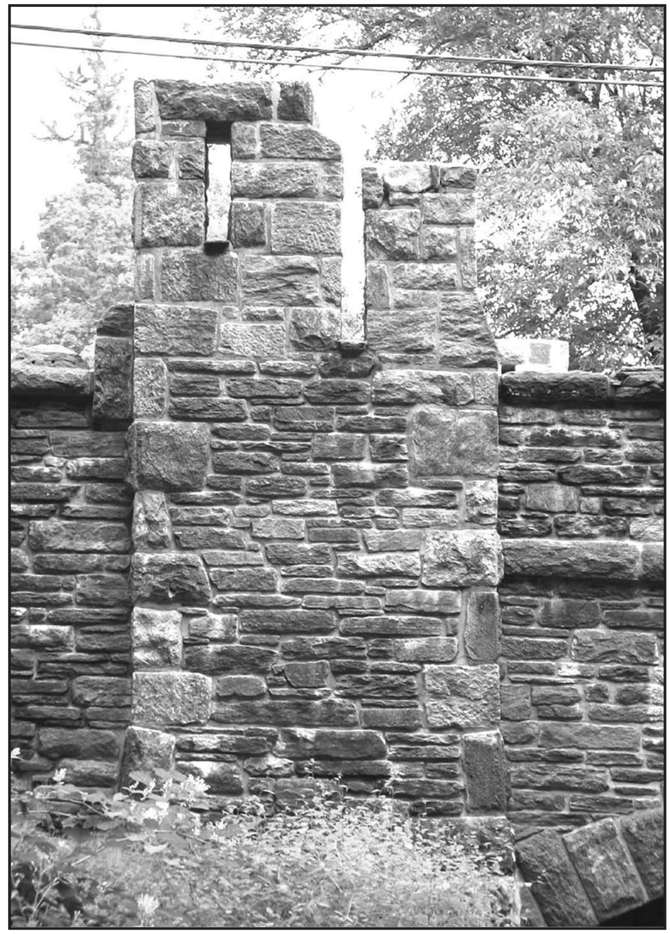
- smaller rectilinear voussoirs, and a variety of coursed or semi-coursed rubble or ashlar spandrels resting on the voussoirs, to retain the appearance of older masonry arches found in many towns, with widespread examples between the two World Wars.

Stamford had no examples of the former class of more classically-finished stone-faced bridges, but retains several large 19th-century true masonry arch structures with traditional materials, notably the three-span crossings over the Rippowam River at North State Street (1847) and North Street (1899). By World War I, the wide distribution of such structures in Connecticut and other states, and the appeal of stone facades vs. the stark appearance of many all-concrete bridges before the mid-1930s, fed a preference for rusticated arched surfaces which was reinforced near Stamford by the parkways built in nearby New York State during the 1920s. In many areas, stone facing was also applied to some concrete slab and steel girder spans, continues today on some projects with special historic preservation values, and since the 1990s has been replicated with the use of concrete forms mimicking ashlar and rubble masonry.

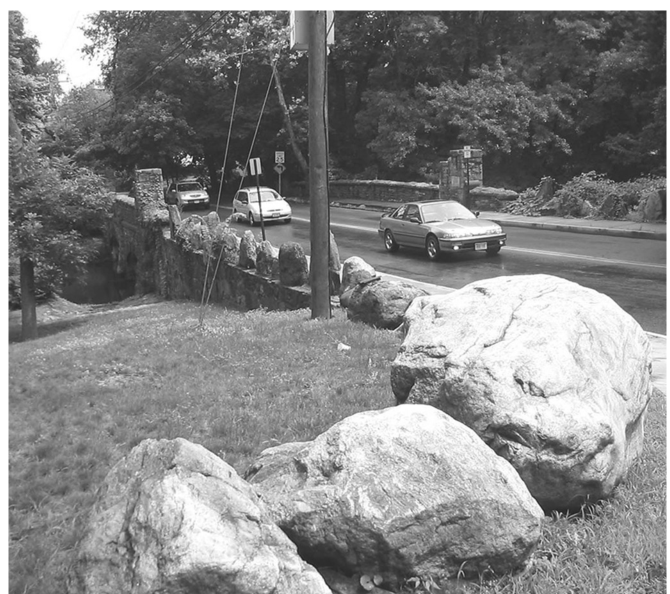
Whether true stone arch construction or stone facing, vertical planes on stone arch facades were typically rather uniform other than at buttressed piers for some multi-span structures. Small pillars were sometimes built at the ends of masonry parapets. Llewellyn Bromfield, Jr.'s stone-faced bridges in Stamford were notable for their increasingly elaborate pylons, buttresses or pylon-like components at junctions of wingwalls and arches, and for the large border stones set atop the in-line wingwalls at Cold Spring Road and extending along the approach roadways of the June and Cold Spring road bridges. Similar roadside stone placement was done in Stamford at the approaches to the short 1932 steel-girder Wildwood Road bridge designed by Bromfield for the town, along the c1937 reconstruction of Haviland Road paid for by the federal Works Progress Administration, and on the approaches to the Wire Mill Road Bridge built over the Merritt Parkway in 1937-38. The original border stones were generally several feet high, and consist primarily of narrower slabs split from larger rocks; many have been removed or replaced with large boulders in recent decades. Beyond Stamford, the use of such stones appears extremely rare on American road and bridge projects, especially as wingwall treatments.

The most likely design source of these unusual roadside stones is the 58-mile-long carriage road system built by John D. Rockefeller, Jr. c1917-1935 on Mt. Desert Island in Maine, most of it within the area designated a national monument in 1916 and re-named Acadia National Park in 1929. Designed for horse-drawn carriages, the Rockefeller project is probably the largest extant American system of carefully-landscaped roads built for such a purpose. It included many miles of large border stones sometimes referred to as "Rockefeller's teeth." The stones appear to have been intended as a megalithic railing system, more permanent than wood, to keep carriages from running off steep slopes or into level roadside areas. Much of the Rockefeller carriage road system was complete before Bromfield began his stone-faced bridge designs in Stamford, and before the town's projects included the border stones. While it is not known if Bromfield visited the national park, it seems likely that he or someone else from Stamford was familiar with these features.

The carriage road system was also one of several possible sources of inspiration for much of Bromfield's masonry embellishments at the Cedar Heights, Cold Spring, and June road bridges. By the early 1920s, architects such as Gilmore D. Clarke advocating for stone-faced concrete designs on New York State parkway projects suggested adding surface detailing to long wingwalls, to cast shadows and break up monotonous facades. Several concrete arch and rigid frame bridges built c1922-1925 on the Bronx River Parkway, including the unusual brick-and-stone-faced Valhalla Bridge, had dramatic examples of buttresses or pylons, some extending well above parapet tops. This and other contemporary New York State parkway projects were well-publicized and almost certainly familiar to Bromfield. The Rockefeller carriage road project included eighteen large bridges, most of them stone-faced concrete arches executed in highly picturesque designs. Several of the bridges, including the



Detail view north of Cold Spring Road Bridge Southwest Pylon.



View southeast of Cold Spring Road Bridge border stones at northwest approach corner, with wingwall in background; larger boulders in foreground replaced original smaller upright stones similar to those on wingwall.

Detail view north of June Road Bridge southeast wingwall.

Waterfall Bridge built in 1925 and the Cliffside Bridge built in 1932, have broad but more restrained pylons – at least one with a crenellated top – flanking the arches where in-line wingwalls begin, but not projecting much if at all above the tops of the parapets. The Maine and New York projects were complete or largely complete before Bromfield began his Stamford stone-faced bridge work with the Cedar Heights Road Bridge.

Bromfield's Cedar Heights Road Bridge was built without state or federal assistance early in the Great Depression and has limited decorative features. The abutments of an earlier bridge, built of large uncoursed rubble with flared wingwalls, were largely retained to support the concrete-encased girders and concrete deck. Rubble masonry parapets, running the approximate length of the bridge span and wingwalls, were slightly inset at street level from the tops of the stone-faced arched outer concrete girders. Above the ends of these girders, small square stone pillars break the faces of the parapets and extend several feet above them, with large square rounded-top stone caps. The inside and outside upper pillar faces have small rectangular recesses. On the outside parapet facades, the lower third of the four pillars have small non-structural buttresses. Aside from the horizontal break in the façade created by the inset parapets, the small pillars are the only significant architectural features, and may be a greatly down-sized version of elements on some Bronx River Parkway or similar bridges.

The federally-supported Cold Spring Road and June Road bridges reflected more ambitious national efforts to maximize local employment, which created a highpoint for rusticated stone-faced treatments on concrete crossings. Bromfield added far more ambitious façades to these two structures than at Cedar Heights Road. Historical views and observed conditions indicate he not only re-used or modified earlier masonry abutments to support new decks, but encased the upstream and downstream abutment faces with uncoursed rubble to create in-line wingwalls. Both sets of original abutments were rectangular in plan and projected into the river channels. At Cold Spring Road, the wingwalls align with concrete fascia beams under the deck which also project outboard of the abutments, which were evidently widened in the 1935 construction. The wingwalls at June Road were offset out from the bridge span, which appears to be a relatively rare façade treatment among contemporary stone-faced concrete bridges and may reflect a difference between re-built crossings and completely new construction on projects such as the Rockefeller carriage roads and the Bronx River Parkway. The dramatic vertical breaks in the 1935 June Road elevation were perhaps a source for a similar treatment on new construction at the nearby 1936 Rippowam River Bridge on the Merritt Parkway – the only stone-faced bridge on this system with offset wingwalls, in this case with battered edges resembling those at June Road.

At Cold Spring Road, the facades are dominated by very large stone pylons of uncoursed mixed-sized rubble, flanking the outer abutment corners and notable for the picturesque asymmetrical tops suggesting medieval European battlements. The pylon bases are accentuated with the waterside ends wider than the ends abutting the wingwalls. Interior wingwall facades are in the same vertical planes as the solid masonry parapets built above the curved concrete fascia beams. Four narrow vertical slits in each parapet top continue the theme seen at the pylons. Unlike the Cedar Heights Road Bridge, the exterior parapet faces align with the masonry arch spandrels, but a belt course just below road level extends across the facades except at the central rubble masonry pier. As with the abutments, Bromfield retained and widened the original pier, and added narrow buttresses with angled bases to the vertical pier centerlines, adjacent to the arch voussoirs. As noted above, large border stones were placed atop the wingwalls, and continued more than 70 feet along the bridge approaches. The Cold Spring Road Bridge is probably one of the most elaborately detailed stone-faced bridges in Connecticut built during the Great Depression.

The 33-foot single span at June Road is 10 feet longer than either of the Cold Spring Road spans, likely a factor in Bromfield's choice of a concrete arch design as discussed above. His decorative treatments at June Road were simpler, with wide low pillars at the battered ends of the wingwalls. There was no other masonry decoration, but to highlight the wingwall pillars Bromfield used a concrete railing system rather than a parapet over the arch spandrels. West of the bridge, the border stones extend 180 feet in what is probably the longest such roadside treatment in Stamford; shorter runs of similar stones east of the bridge meet the intersection with Riverbank Road. Current guardrail standards preclude use of border stones on or close to bridges, but at June Road one can still see an increasingly rare survival of these unusual "teeth."

Acknowledgements
The author thanks J. Patrick Harshbarger (SIA), a senior historian for bridge surveys or management plans in ten states, for noting the rarity of large border stones on bridge approaches and suggesting Acadia National Park's carriage roads as a possible model for this motif in Stamford. Paul Ginotti, P.E., City Of Stamford Engineering Bureau, and Ronald Marcus, Curator at the Stamford Historical Society, provided considerable assistance during the documentation work.

Principal References

Clarke, Gilmore D.
1922 Designing Small Stone Bridges. *American Architect* 121: 249-52.

Clouette, Bruce, and Matthew Roth
1991 *Connecticut's Historic Highway Bridges*. Connecticut Department of Transportation.

Esperdy, Gabrielle, Corinne Smith, and Todd Thibodeau
1992 Connecticut's Merritt Parkway: History and Design. Historic American Engineering Record documentation, HAER CT-63. Library of Congress. Available on World Wide Web at http://lcweb2.loc.gov/pnp/habshaer/ct/ct0400/ct0484/data/ct0484data.pdf

Harshbarger, J. Patrick, ed.
2000 *Delaware's Historic Bridges. Survey and Evaluation of Historic Bridges with Historic Contexts for Highways and Railroads*. Dover, DE: Delaware Department of Transportation. 2nd edition. Prepared by Lichtenstein Consulting Engineers, Inc.

Historic American Engineering Record
1994-1995 Acadia National Park Roads & Bridges. HAER ME-12. Library of Congress. Available on World Wide Web at http://www.loc.gov/pictures/collection/hh/item/me0236/

2001 Bronx River Parkway Reservation. HAER NY-327. Library of Congress. Available on World Wide Web at http://www.westchesterarchives.com/BRPR/Report_fr.html

McCahon, Mary, and Gerry Kuncio
1997 Historic Context for Transportation Networks in Pennsylvania. Prepared for Pennsylvania Department of Transportation. Lichtenstein Consulting Engineers, Inc., Paramus, NJ.

Miller, Ann B., Kenneth M. Clark, and Matthew C. Grimes
2000 Final Report: A Survey of Masonry and Concrete Arch Bridges in Virginia. Prepared for Virginia Transportation Research Council. Available on World Wide Web at http://vtrc. virginiadot.org/PubDetails.aspx?id=296623

Parsons Brinckerhoff and Engineering
and Industrial Heritage
2005 A Context for Common Historic Bridge Types. Prepared for The National Cooperative Highway Research Program, Transportation Research Council, National Research Council. National Cooperative Highway Research Program Project 25-25, Task 15.

Quin, Richard H.
1994-1997 Rockefeller Carriage Roads. Historic American Engineering Record documentation, HAER ME-13. Library of Congress. Available on World Wide Web at http://www.loc.gov/pictures/ collection/hh/item/ me0237/

Raber, Michael S.
2009 Documentation of the Whittemore Memorial Bridge over the Naugatuck River, Bridge No. 04214, Borough Of Naugatuck, Connecticut. Report prepared for Clough Harbor & Associates, LLP. Raber Associates, South Glastonbury, CT.

2013a Documentation of June Road Bridge over Mianus River (Bridge No. 02212)/ Stamford, Connecticut. Report prepared for Alfred Benesch & Company. Raber Associates, South Glastonbury, CT.

2013b Documentation of Cold Spring Road Bridge over Mianus River (Bridge No. 02212)/ Stamford, Connecticut. Report prepared for Stantec Consulting Services Inc.. Raber Associates, South Glastonbury, CT.

2013c Archaeological and Historical Documentation for Replacement of Old Town Hall Bridge, Main Street over Shunock River, Federal Emergency Management Agency Disaster Number DR-1904-CT, North Stonington Village, Town of North Stonington, Connecticut. Report prepared for Town of North Stonington. Raber Associates, South Glastonbury, CT.

Town of Stamford, Connecticut
1930-1939 A*nnual Report of Selectmen ….for the Fiscal Year October 1…to September 30*.

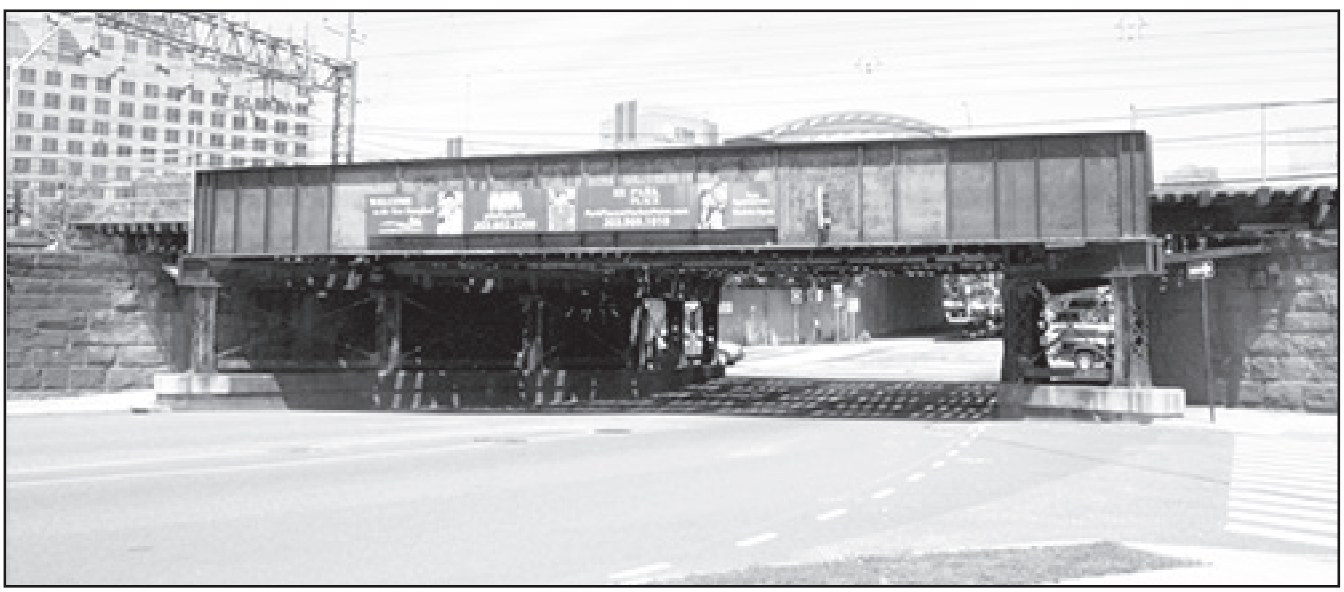
Michael S. Raber
Raber Associates

Stamford's 1896 Atlantic Street Railroad Bridge

Bridge historians, and I include myself, often give short shrift to plate-girder bridges, regarding them as a humdrum form with little engineering interest. Occasionally, however, this bias might lead one to under-appreciate the effort and expertise that went into designing a plate-girder span for special circumstances. Such is the case with the Atlantic Street Railroad Bridge in Stamford, Connecticut. Built in 1896 as part of the New York, New Haven & Hartford Railroad's monumental four-tracking project, the bridge carries the tracks of the Metro-North Railroad over a busy downtown street. The railroad called this the "columns on sidewalk" form, in which trestle structures between the roadway and the sidewalks divide the overall span into three segments. This arrangement, with short girders over the sidewalks and larger girders over the roadway, undoubtedly saved the railroad money compared with a single-span bridge, even though it involved a somewhat greater effort for design and fabrication.

There are six main girders for five tracks (Stamford is the junction point for the New Canaan branch). Three of the main girders are 43' long; the other three range from 49' to 77' in length. The sidewalk girders are also of different lengths, ranging from 12' to 18'. The difference in length arises from the fact that Atlantic Street widens out as it passes under the bridge so as to curve to the west and intersect with Manhattan Street to the east. At the time the bridge was built, there were streetcar lines on both streets, requiring a generous turning radius for the trolleys. (The Stamford Street Railroad had been purchased the previous year by the New York, New Haven & Hartford, its first streetcar-company acquisition.) In addition to differing in length, the main girders also are of three different heights; as a result, the engineer designed a step in the beams that form the tops of the trestles. The center-to-center spacing of the five tracks is not the same; together with the differing girder sizes, this circumstance meant that the floor beams for each girder pair had to be somewhat different. The final complicating factor is that with six main girders for five tracks, the four inner girders each function as part of the load-bearing structure for two tracks. Consequently, even the three 43' girders are slightly different, with progressively more top and bottom plates required toward the center of the bridge. About the only consistent elements in the bridge are the plate-girder stringers that run directly under the rails of each track. Because there are so few identical parts, the original drawings are filled with the notations, "One Required" and "Make One."

In addition to serving as a representative example, albeit a fairly complex one, of the standard railroad engineering practice of the period, the bridge has historical interest as an artifact of one of the most important episodes in Connecticut's transportation history, the four-tracking of the New York to New Haven railroad line. In the late 19th century, the New York, New Haven & Hartford Railroad was intent upon eliminating all competition that threatened its goal of monopolizing freight and passenger service between New York and Boston. With only a few exceptions, all rail service in Connecticut, Rhode Island, and southeastern Massachusetts had been integrated into the New Haven system, and the company was well on its way to controlling all the region's steamship lines and streetcar systems as well. The railroad's



South elevation of the bridge, where Atlantic Street widens out to curve to the west and intersect with Manhattan Street to the east.

policy of acquisitions was accompanied by massive investment in freight, passenger, and service facilities, all of it paid for by increasing the company's authorized limits on the issuance of stock.

The key to making the system work was doubling the capacity of the New York to New Haven shore line from two tracks to four; otherwise, all the rail traffic that had been funneled into the system would hit a bottleneck. While some of the railroad's line in New York had already been four-tracked, the Connecticut portion was built beginning in 1890, under the leadership of Charles P. Clark (1823-1901), who was president of the railroad from 1887 to 1899. Clark was an unrepentant monopolist who campaigned tirelessly against any threat of competition. But he was also a visionary, realizing that the railroad's monopoly would require investment in stations, locomotives, rolling stock, and infrastructure. Passenger fares were lowered and new services introduced, such as the distribution of newspapers by train and refrigerated cars for hauling fresh produce. Under Clark's presidency, the track mileage of the New Haven system was extended from 450 to 2,047 miles, the number of engines went from 136 to 900, and annual revenues increased from $8 million to $38 million.

Underside, showing main girders, plate-girder floor beams, longitudinal stringers under the rails, and angle cross-bracing.

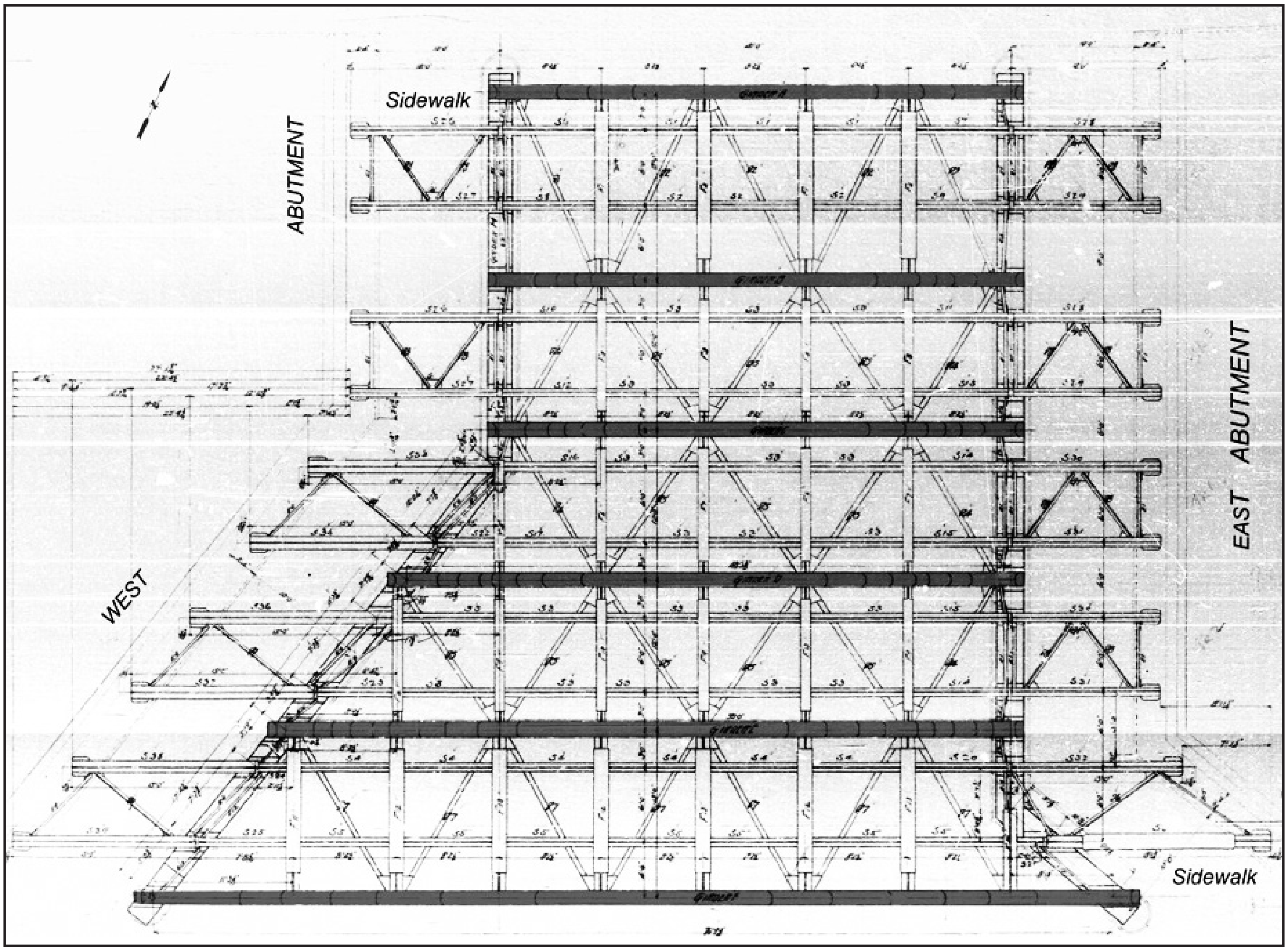
One of two trestle structures between the roadway and the sidewalks that form intermediate supports for the bridge.

The four-tracking project was much more than just buying real estate and adding two more tracks. The line was also intended to eliminate all grade crossings, so that in busy industrial and commercial cities like Stamford, Norwalk, and Bridgeport, long stone viaducts had to be built to raise the tracks above the level of the streets below. Because of the high-level tracks, numerous new bridges were needed in urbanized areas, and most of the stations there had to be relocated or replaced. A block-signaling system was installed to better regulate the increase in the number and speed of trains. The entire roadbed for all four tracks was completely rebuilt to a higher standard, including the use of crushed-stone ballast, an innovation introduced only a few years before.

Charles Clark was interested the possibility of electric traction as motive power for railroad main lines. As early as 1892, he pointed out that one of the advantages of the four-tracking program would be its suitability for electrification. By the time the Stamford bridge was built, Clark had already experimented with electrifying the lines between Hartford and Bristol, Connecticut (live center rail) and East Weymouth and Nantasket Beach, Massachusetts (combination of live center rail and overhead wire). But ill health forced his retirement from the railroad in 1899, and he died not long after, never witnessing the pioneering New York-to-Stamford mainline electrification, which was completed in 1907.

The Stamford section was one of the last portions of the four-tracking project to be completed; the high-level tracks were in place by the summer of 1896 and trains running on them by the end of that year. The Atlantic Street Railroad Bridge was one of three of this type in Stamford fabricated by the Berlin Iron Bridge Company of East Berlin, Connecticut. Berlin Iron Bridge's plant was conveniently located on the railroad's Middletown branch, so it is not surprising that the company, Connecticut's only large-scale steel fabricator, furnished many of the bridges for the four-tracking project.

The Connecticut Department of Transportation plans to



General plan of the bridge, from the original drawings signed by W. H. Moore, Bridge Engineer, New York, New Haven & Hartford Railroad, August 1896, annotated and with the main girders shaded so as to aid in clarity. (The drawings exist as microfilm that is lacking in resolution and has inconsistent brightness and contrast.)

replace the bridge, along with several others along Metro-North, within the next few years. The project will provide greater traffic capacity for Atlantic Street, still a busy artery serving downtown Stamford. The State Historic Preservation Office requested that the bridge be documented to state-level standards in its comments on the project. Archaeological and Historical Services, Inc. completed the written and photographic documentation in June 2013.

References

"Charles P. Clark Resigns Presidency of New Haven Road—Ill Health Given as Reason," *New York Times*, September 17, 1899.

Connecticut Department of Transportation. Engineering drawings, Atlantic Street Railroad Bridge, microfilm, Office of Rail.

Darnell, Victor C. "Lenticular Bridges from East Berlin, Connecticut," *Industrial Archaeology* 5 (1979): 19-32.

New York, New Haven and Hartford Railroad Company. *Bridge List, 1918*. Railroad Collection, Whitney Library, New Haven Museum, New Haven, CT.

________. Office of Valuation Engineer. "Right of Way and Track Map – from Woodland to New Haven." Valuation map V.5360, Sheet 22, June 30, 1915. Dodd Research Center, University of Connecticut, Storrs, CT.

________. *Annual Report of the Board of Directors to the Stockholders, 1886-1900*. Dodd Research Center, University of Connecticut, Storrs, CT.

Bruce Clouette
Historian, Archaeological and Historical Services, Inc.

Nationally Significant New Hampshire Highway Overpass Imperiled by Widening of I-93

The Prowse Memorial Bridge in Londonderry, New Hampshire, one of the most innovative highway bridges on the United States Interstate System, faces an uncertain future. The bridge, which carries Ash Street in Londonderry over I-93, is imperiled by the ongoing project to widen the Interstate in New Hampshire.

Constructed in 1962, the Prowse Memorial Bridge was a groundbreaking structure that spanned both barrels of the highway without a central pier. Robert James Prowse (1906-1969) of the New Hampshire Department of Public Works and Highways first designed the bridge in 1959 for a competition that was intended to foster imaginative and effective uses of steel for interstate highway overpass bridges. Prowse's design was then adapted from an abstract concept to an actual contract design that proved its effectiveness and economy during construction, and was thought to be the only example of a welded steel rigid frame overpass then in use on the American Interstate highway system.

To achieve a 146-foot clear span with the greatest possible economy of labor and materials, Prowse made use of methods of structural analysis that had been developing throughout the first half of the twentieth century, and of steel fabrication technology that had been developing since World War II. Noted both for its engineering and its aesthetics, the bridge received a design award from the American Institute of Steel Construction in 1964.

The bridge is composed of five parallel steel rigid frames or bents. Each frame is sculpted through careful cutting and arc welding to constantly varying cross sections that reflect the internal stresses at each point in the bridge and impart a graceful outline to the structure. The bridge is "statically indeterminate," meaning that it is not susceptible to structural analysis by traditional calculations.

To understand and accommodate the internal stresses in the structure, engineer Prowse employed one of several "indirect" methods of stress analysis that used a model or profile of the frames that make up the bridge. Prowse tested this model with an instrument called a deformeter to measure the deflection of the model under varying conditions of loading and thereby to determine its structural behavior.

By applying sophisticated structural analysis and by employing advanced welding technology with an appropriate steel alloy, Prowse created a bridge that anticipated the statically indeterminate, variable-section welded deck girder bridges that have since become commonplace in interstate highway design. Prowse's use of the steel rigid frame with its integral legs, however, was exceptional at the time and remains a rare structural form. Because of its rarity, the Prowse Memorial Bridge was designated in 2006 as one of two resources on the Interstate System in New Hampshire that require detailed review if affected by highway redesign. The other is the Franconia Notch Parkway.

The current concept for widening I-93 in New Hampshire calls for a much longer overpass at this location. An agreement that was ratified in 2004 requires the New Hampshire Department of Transportation to make a concerted effort to find an adaptive reuse for the bridge and move the structure to a new site, if such a use is found. Thus far, NHDOT has not identified a reuse for the bridge, which faces the prospect of demolition as plans for the next phase of widening I-93 continue to develop.

The Ash Street Bridge was named the Robert J. Prowse Memorial Bridge by legislative act in March, 1973 to honor the recently-deceased New Hampshire engineer. A monograph detailing Robert J. Prowse's innovative engineering work, including the stabilization of the Old Man of the Mountains, can be found at:http://www.nh.gov/nhdhr/publications/prowse.htm.

James L. Garvin
Retired New Hampshire State Architectural Historian

Membership Application to the Northern and Southern New England Chapters of the Society for Industrial Archeology

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

Northern New England Chapter (ME, NH, VT)
Membership and Dues for 2014

Member Renewal: $20.00
Student: $10.00
New Member: $15.00

Send to:
Carolyn Weatherwax, Treasurer – NNEC-SIA, 305 Heritage Way, Gansevoort, NY 12831

Name: ______________________________ Occupation: ____________________
Address: ____
Phone: ________________________________ Email: ______________________

Southern New England Chapter (MA, RI, CT)
Membership and Dues for 2014

Regular: $10.00
Student: $8.00
Lifetime: $150.00
New member: $8.00

Two members at one address pay only one membership fee. As we are communicating increasingly by email, it is vital that we have your current EMAIL address.

SNEC-SIA is your best opportunity to gain a close-up on-site look at extraordinary technologies and exciting engineering history. Join us for another year of newsletters, tours and more. Complete and return this with your check made payable to SNEC-SIA.

Send to:
Sara Wermiel, Treasurer – SNEC-SIA, 70A South St, Jamaica Plain, MA 02130-3143

Name: ______________________________ Occupation: ____________________
Address: ____
Phone: ________________________________ Email: ______________________