Society for Industrial Archeology · New England Chapters

VOLUME 40 NUMBER 2 2019

CONTENTS

CONTRIBUTORS

Rick Ashton, David Dunning, John Mayer,
Michael S. Raber, Sara E. Wermiel

NORTHERN CHAPTER OFFICERS

David Dunning, President
Ray Breslin, First Vice President
David Coughlin, Second Vice President
Dennis Howe, Secretary
Richard Coughlin, Treasurer

SOUTHERN CHAPTER OFFICERS

President (vacant)
Vice President (vacant)
Leonard Henkin, Secretary
Sara E. Wermiel, Treasurer

EDITOR

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

See New England Chapters of the Society for Industrial Archeology on the Web at http://nec-sia.org to obtain more information and membership details.

NNEC-SIA President's Report Fall 2019

Notice to Life Member and others: At the annual meeting on October 18, 2019, the majority voted to ask life members to start contributing $10 per year to allow the New England Chapters Newsletter to continue being delivered in print form. Otherwise, we must go to on-line availability due to the increasing mailing costs. Everyone there agreed that they would rather read theirs in their hands than on their computers. It was also noted that printed newsletters often are placed in archives for future researchers. The $10 would be payable to the treasurer at year's end. Non-life members are encouraged to contribute to this need also. The chapter thanks everyone.

Treasurer's Report: The 2019 Annual NNEC-SIA membership is 35 (last year it was 33). In addition, we have many lifetime members. The current bank balance ending on August 31, 2019 is $4,290.11.

Submit a Site Contest: What old industrial site near you would be interesting but is too remote or too small to incorporate into a tour? Take a few pictures, do a little research and submit it digitally to David Dunning at dunmark@tds.net . We will include the best ones in the Spring Newsletter for all to enjoy. Another way to look at it is, suppose we couldn't go out on a tour next spring or fall for some reason? We would need this good input to fill the newsletter. The person submitting the best virtual tour will get honorable mention.

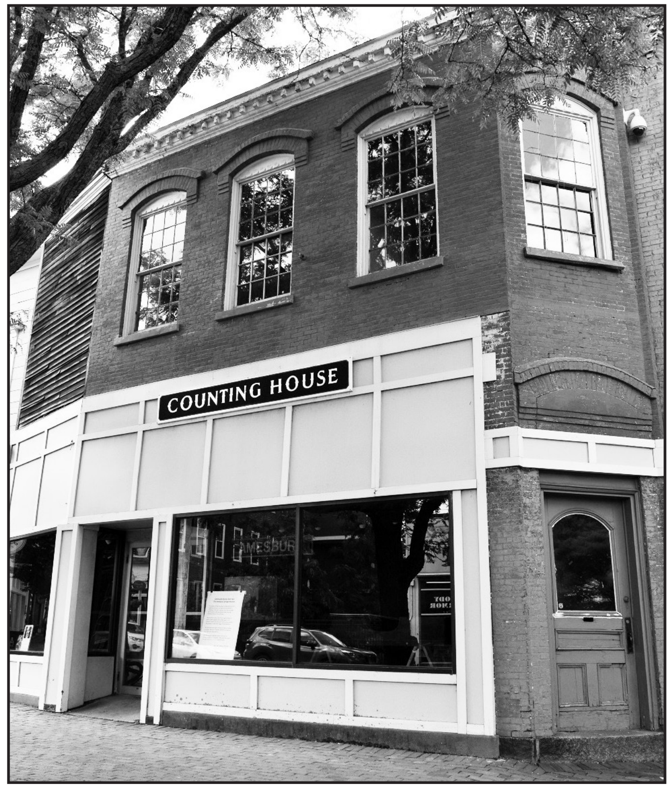
Another Maine Tour? We hosted a national tour in Maine four years ago. For some reason, the national SIA has lined up another one (which we declined to help with). Should the NNEC plan our own fall tour for 2020 or just sit back so that our own members may go to Maine if they want to?

Winter Conference: The 2020 Annual New England Chapters Conference will be at Plymouth State University in Plymouth, NH, on Saturday March 14th.

Bristol, NH Update: At the fall tour of 2017, several of us clamored through the brush down to where the Newfound River joins the Pemigewasset. We saw where the railroad track ended with a freight yard (only remnants now). It is good news that funding has been granted to restore that site for historic purposes. The trees and brush will be cleared, the bridge rebuilt, and the access road restored. Work is beginning now.

This summer, Bristol had a history fair. Since our tour made us the experts on their old mills, they invited us to send a delegate to set up a table with (their) old pictures and discuss Bristol's industrial history with passers-by. The NNEC President was glad to oblige.

David Dunning
NNEC President



Former counting-house of the Salisbury Manufacturing Co. in Amesbury, MA, subject of a historical research and recording project. (Photo: S. Wermiel)

Southern New England Chapter Recent Activities – Upcoming Election – Need for Officers for 2020: A Note from the Treasurer, SNEC/SIA

2019 has been a year of revival for SNEC, with an increase in IA tours and programs for members. Thanks to Rick Ashton and Betsey Dyer, the chapter offered three tours. Rick organized two excellent day-long tours, the first in April, which included the Blackstone Canal in Uxbridge, MA, and sites in Whitinsville, MA, and the second in May, which included sites in Hopedale and Uxbridge, MA (see reports in this newsletter). And Rick is trying to arrange another tour for later this year. Betsey Dyer organized a process tour of the Peggy Lawton Cookie Factory, East Walpole, MA, which took place last November (see report in the spring 2019 newsletter) and has arranged an upcoming tour of a still-operating tower and street-clock factory, Electric Time Co. in Medfield, MA, which will be (was, by the time you read this) Nov. 4, 2019. With John Mayer, I organized a recording project to examine the fabric, history and context of the historic counting-house of the Salisbury Manufacturing Co., a former textile manufacturing company in Amesbury, MA. Another notable IA event in our region was the "Learning from the Industrial Landscape" conference, organized by John Mayer and held at the Amesbury Carriage Museum, Amesbury, MA, in September (see report in this newsletter). And let us not forget the very successful Annual New England Conference on Industrial Archeology last March in Worcester, MA, organized by Peter Stott for the SNEC.

The chapter has added many new members this year as well as new Life Members. Membership now numbers 135. Our treasury is at its usual comfortable level, which allows SNEC to host activities while keeping dues low.

But the chapter needs officers. SNEC does not have a president or vice-president. Leonard Henkin has served faithfully as secretary, handling all the mailings, and I have served for 10 years as treasurer. Members have stepped up to help, for example, by organizing tours and the annual conference; managing the chapters' website and email distribution; and planning (thanks to Ron Klodenski, Peter Stott and Jeff Howry). Very crucially, SNEC's former president Marc Belanger, from far away in Reno, NV, continues to maintain the website for the New England chapters and handle email distributions. These volunteers have allowed the chapter to carry on, and their contributions of time and talent are much appreciated. But the chapter needs to have regular officers who will be responsible for tasks. What are the duties of officers? These are described in the SNEC bylaws, available on the New England chapters' website http://nec-sia.org/pdf/1988%20SNEC%20Bylaws%20typed.pdf.

Anyone who would like to serve in a SNEC office (president, vice-president, treasurer, secretary), please contact SNEC Treasurer Sara Wermiel, swermiel@verizon.net or 617 524-9483. The chapter will hold an election for officers by the end of the year.

If you cannot serve in an office, please consider organizing a tour or program, or helping out in some other way. Please contact Sara Wermiel with your tour, program or other ideas. With your support, we can keep the chapter's positive momentum going and forward the purposes of IA: promoting the understanding, and preservation, of industrial heritage.

Sara E. Wermiel,
Treasurer, SNEC/SIA

NNEC-SIA Spring Tour Report
2019 Brattleboro, VT

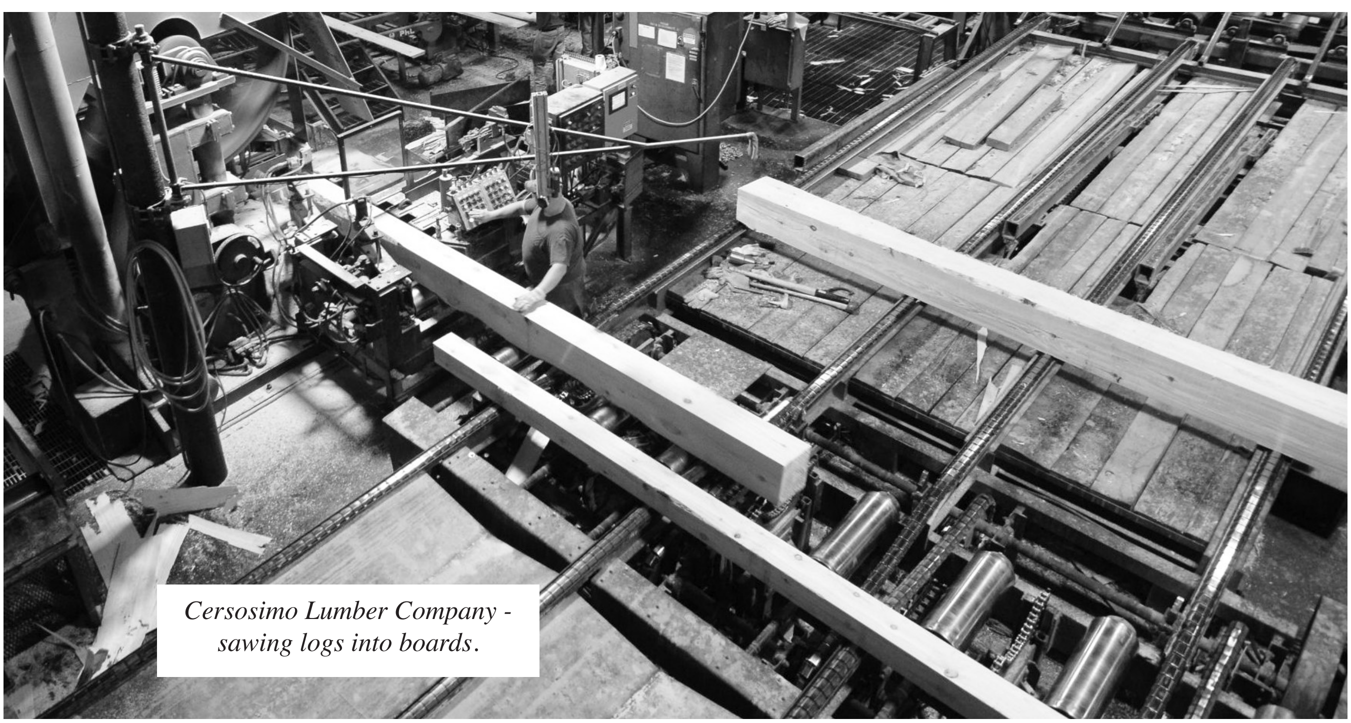
Cersosimo Lumber Company is one of the largest lumber producers in northern New England. We saw the most up-to-date lumber producing machinery and equipment there is. However, it had a modest beginning, in 1947, with a portable sawmill. Now their operations include five sawmills, grading and milling facilities, extensive kiln capacity, a custom kiln drying facility and an extensive network of foresters and log concentration yards, railcar loading facilities, plus transportation and storage. Cersosimo Lumber has over 275 employees and many business partners.

They market over 40 million board feet of lumber per year. Hardwood species produced include Red Oak, White Oak, Hard Maple, Yellow Birch, Northern White Ash, Cherry, and Beach. The softwood is Eastern White Pine. See more at www.cersosimolumber.com

Cersosimo Lumber Co. drying kilns.

Lester Dunklee's Machine Shop is a real gem. It has all very old equipment for making or fixing almost anything. People and companies come from three states for his expertise. His latest machine is c.1950 and most are older. Lester can machine, press (to bend or fit) and weld to make new things or fix old things of any metal. No modern computer-controlled machinery can do what he can from his lifetime of knowledge and experience. Tight tolerances aren't needed for the type of work he does; knowledge, experience and skill are. We marveled at the old equipment that we never thought existed and at Lester's Yankee ingenuity. See a video of Lester's shop here: https://www.brattleborotv.org/it-happens-brattleboro/lester-dunklees-machine-shop

Lester Dunklee's Machine Shop press.



Cersosimo Lumber Company - sawing logs into boards.

From 1880 to 1900 the Estey Company produced an average of 10,000 reed organs per year and employed over 700 men and women.

Estey Organ Company (1852-1953) was the largest manufacturer of musical organs in the world. It consisted of a five-acre 15-building complex. This was believed to be the largest collection of slate-sided buildings in the U.S. With its efficient factory, well-made product, and extensive advertising, in its heyday from 1880 to 1900 the Estey Company produced an average of 10,000 reed organs per year and employed over 700 men and women.

The reed organ was cheaper, lighter, and easier to keep in tune than a piano, so it was the obvious choice for the musically minded middle-class family. Estey's reed organs ranked at the top in both quality and quantity. But reed organs began losing market share to pianos in the 1890s, and to the phonograph and radio later in the 1900s. Of the half a million reed organs made by Estey, many still exist in homes and churches around the world.

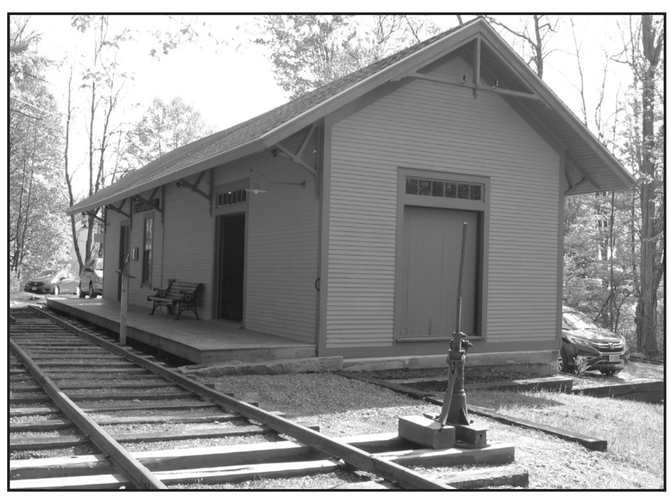
Slate-sided buildings in the Northeast are not common. Jacob Estey's decision to use slate siding on his new factory buildings in 1870 may have been for reasons other than fire protection. Twenty years earlier, Estey had been a marble and slate dealer. Moving stone from western Vermont to Brattleboro was something he had done before. More than 100,000 square feet of walls and roofs had to be covered (overlapping). A lot of wagons must have toiled from the train station through Brattleboro during the three years it took to build the eight 3-story factory buildings. See more at: www.esteyorganmuseum.org

West River Railroad Museum & Newfane Railroad Station: Constructed in the 1880s and used through WWII, this unique station contains an enclosed water tower. When the steam engine was replaced by diesel during the 1950s, water tanks became obsolete and most were torn down. This water tank house, however, has miraculously survived these 135 years.

The Newfane Railroad Station was one of ten stations constructed as part of the Brattleboro and Whitehall Railroad, which was intended to run from Brattleboro, VT, to Whitehall, NY. However, only 36 miles of the Narrow-Gauge railroad were ever constructed. In 1905, the Narrow-Gauge tracks were replaced with Standard-Gauge and the name changed to the West River Railroad (WRRR). The Newfane station was designated as a wood and water station to replenish the steam engines. Of the five water tanks along the WRRR, it is the only one that remains. It is a rare, if not unique, building.

Due to several mishaps, culminating with the flood of 1927, the West River Railroad was nicknamed "The 36 Miles of Trouble." By the mid-1930s, it was out of business. Read more about it on the Historical Society's website: www.historicalsocietyofwindhamcounty.org

David Dunning
NNEC President



West River Railroad Station: this unique station contains an enclosed water tank.

Amesbury Carriage Museum presented Learning from the Industrial Landscape – an introduction to Industrial Archaeology on Saturday, September 7

On a pleasant Saturday in Amesbury, a group of 40 people participated in a special program designed to build interest in both industrial archaeology and the history of Amesbury. Learning from the Industrial Landscape featured two lectures by experts in the field, each followed by a tour to more deeply explore each topic. The program was held in the lower level of an 1826 mill building, currently the home of Amesbury Industrial Supply. This space is being developed as the future home for the Amesbury Carriage Museum and will become the *Industrial History Center at Mill 2*.

Historian Sara Wermiel began the morning with her presentation "Development of Textile Mill Buildings in the Nineteenth Century" tracing the evolution of mill design and highlighting typical features in these buildings. Participants were led in groups through the historic building where they could see original construction elements, changes in roof construction and later fireproofing strategies. Photographer and historian Steve Dunwell made the afternoon presentation, "Hydro to Steam: Who's got the Power?" and traced the evolution of industrial power. The group then walked the Powow River where evidence of different power systems could be seen.

John Mayer, executive director of the ACM, organized the program with support from an active group of local volunteers who have been conducting an industrial survey of Amesbury. The ACM has offered a special program to interest the IA community for the past several years. This has become an ongoing relationship.

The Amesbury Carriage Museum is a non-profit organization with a mission to champion the history of Amesbury's industry and work life. For more information, contact John Mayer, Executive Director, Amesbury Carriage Museum by calling (978) 834-5058 or via email at jmayer@amesburycarriagemuseum.com.

April 20 Tour of Blackstone Canal and Whitinsville

SNEC's April tour took members to the Blackstone River Valley, a region once dense with waterpower-driven industry. The first stop was at the Blackstone River and Canal Heritage State Park to see the remains of the former Blackstone Canal, which connected Providence, RI, to Worcester, MA. Park guide Molly Cardoza told us the history of the Blackstone Canal and its role in the development of the area's cotton mills. It's interesting to note that the canal itself was only used for around 20 years before closing due to financial reasons and winter freezing. The canal's structure had become

A happy group took part in the program "Learning from the Industrial Landscape" in Amesbury, Massachusetts. (Photo courtesy of the Amesbury Carriage Museum, Frank Gurczak image) filled and overgrown during its years of abandonment, but then a hurricane exposed part of it, and that's where the State Park is located today. You can walk about a mile of it, and the little museum at the Visitor Center has an exhibit on the canal and industrial development of the area, and canal-related artifacts.

Then we were off to Whitinsville, a village in the town of Northbridge and home of the former Whitin Machine Works – at one time one of the largest manufacturers of textile machinery in the world. At its peak, the company employed over 5,600 people. We started our tour in the old paymaster's office, a series of rooms with beautiful woodwork untouched since the mid 1800's. We had access to blueprints of some of the buildings, and there were many old photos on the walls of the workers in the plant. Carol Brouwer, a member of the Northbridge Historical Society, guided us on a walk of the village, pointing out some of the significant buildings including houses of the Whitin family and plant executive, and the Social Library, which is on the National Register of Historic Places. In the library, we were able to browse some of the old photo albums and periodicals in their collections.

Then we had a coffee break and snacks while listening to old union workers' songs performed by Luanne Crosby. Our next speaker was Ken Warchol, chairman of the Northbridge Historical Commission and leading town historian, who discussed the history of the town and showed many great old pictures of historic buildings in the town. The afternoon finished up with a tour of an 18th century forge, where the earliest of the Whitins set up the foundations of what later became the Whitin "empire." Dennis Rice, a representative of Open Sky Community Services, which owns the forge and other buildings that had been part of the Whitinsville Spinning Ring Co., showed us the old brick mill to which the forge is attached. The organization rehabilitated the mill, and it is now used as offices. Other buildings at the site are used by the organization, which has the mission to provide necessary skills and supports to individuals with intellectual and developmental disabilities and mental health issues.

It was a busy day and I think everyone had a good time.

Rick Ashton, tour organizer

Flock Process Dam No. 1 on the Norwalk River

Readers of this newsletter may have seen previous articles on removal of several Connecticut dams, part of a widespread effort to remove non-operating, often poorly-maintained dams in New England to restore river environments and fish passage. In many cases, these environmental improvements remove significant historic resources, often when a dam is a potential flood hazard or a poor candidate for fish passage via a ladder. Fish ladders or fishways, in use for over a century, vary greatly in effectiveness depending on design, species, and height of passage. They require maintenance and will provide relatively limited benefits if installed on dams which are failing and unlikely to be repaired. Archaeological monitoring at another recent Connecticut example contributed some new information on the wide variety of designs used by entrepreneurs at relatively small projects, usually without professional engineering assistance. The City of Norwalk, CT, completed the partial removal of the Flock Process Dam with federal and state partners. Based on an assessment study, the Connecticut State Historic Preservation Office concluded the dams appeared eligible for the National Register of Historic Places and initiated steps leading to an archaeological monitoring and documentation study.

Dam Location and Removal Project Objectives

The Norwalk River flows approximately 15 miles into Long Island Sound through the towns of Ridgefield and Wilton and the City of Norwalk, with a drainage basin of about 58 square miles. Approximately half the drainage area is upstream of the Flock Process Dam, the most downstream surviving impoundment on the river, located approximately 4 miles upstream of Long Island Sound and 900 feet south of the Merritt Parkway in a rocky upland section of the basin with gneiss and schist bedrock exposed on both sides of the channel. The river here emerged as a late-glacial channel through meltwater stream deposits of sand, gravel, and silt. Original Holocene terrain at the dam vicinity has been obscured by industrial and post-industrial development, but present topography suggests that the channel above the dam once flowed through a low floodplain 100-350 feet wide between steep bedrock-controlled slopes. The bedrock made the site amenable to ponding by an impoundment built where the slopes are approximately 80 feet apart. Immediately upstream of the dam, the slopes are 90-100 feet apart with a steep slope along the west bank and a narrow floodplain on the east side (Figures 1, 2).

Dam removal objectives included eliminating the risk of dam failure, enabling passage of target anadromous fish species along 3.5 miles of stream, and restoring a free-flowing river habitat with natural sediment transport and more resilience to future flooding. The target species were alewife, blueback herring, sea-run brown trout, American eel, and possibly sea lamprey.

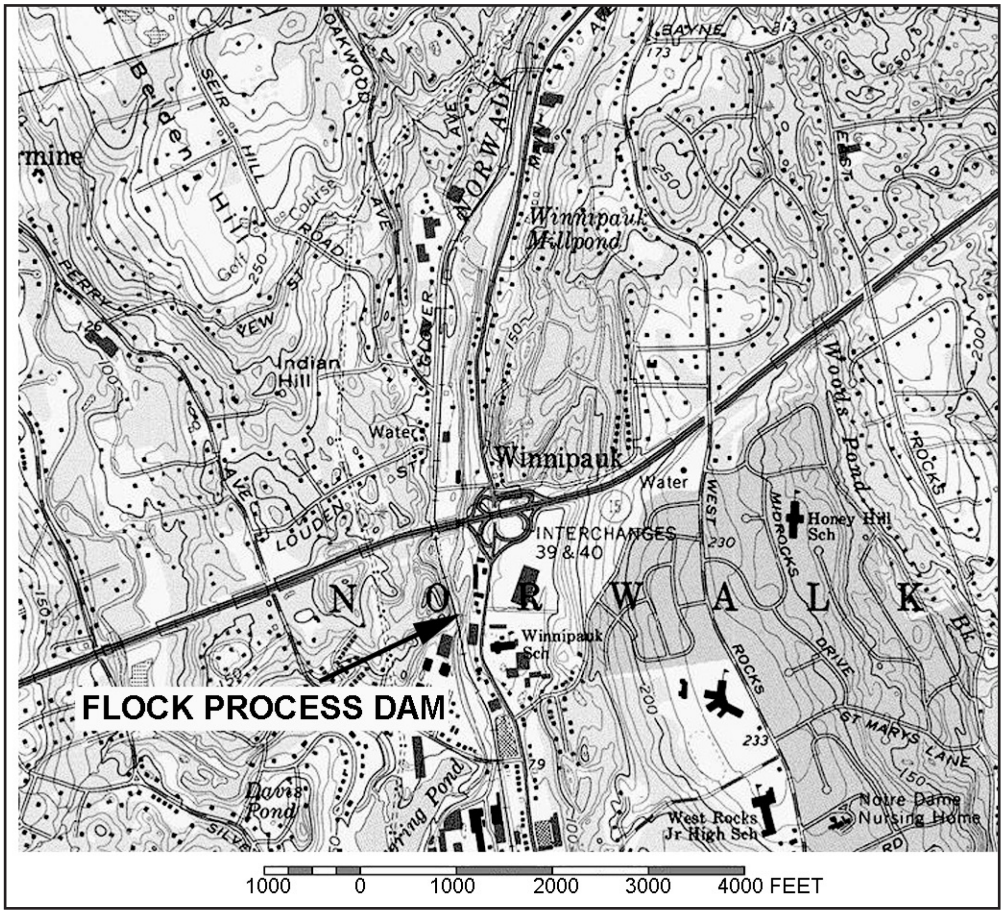
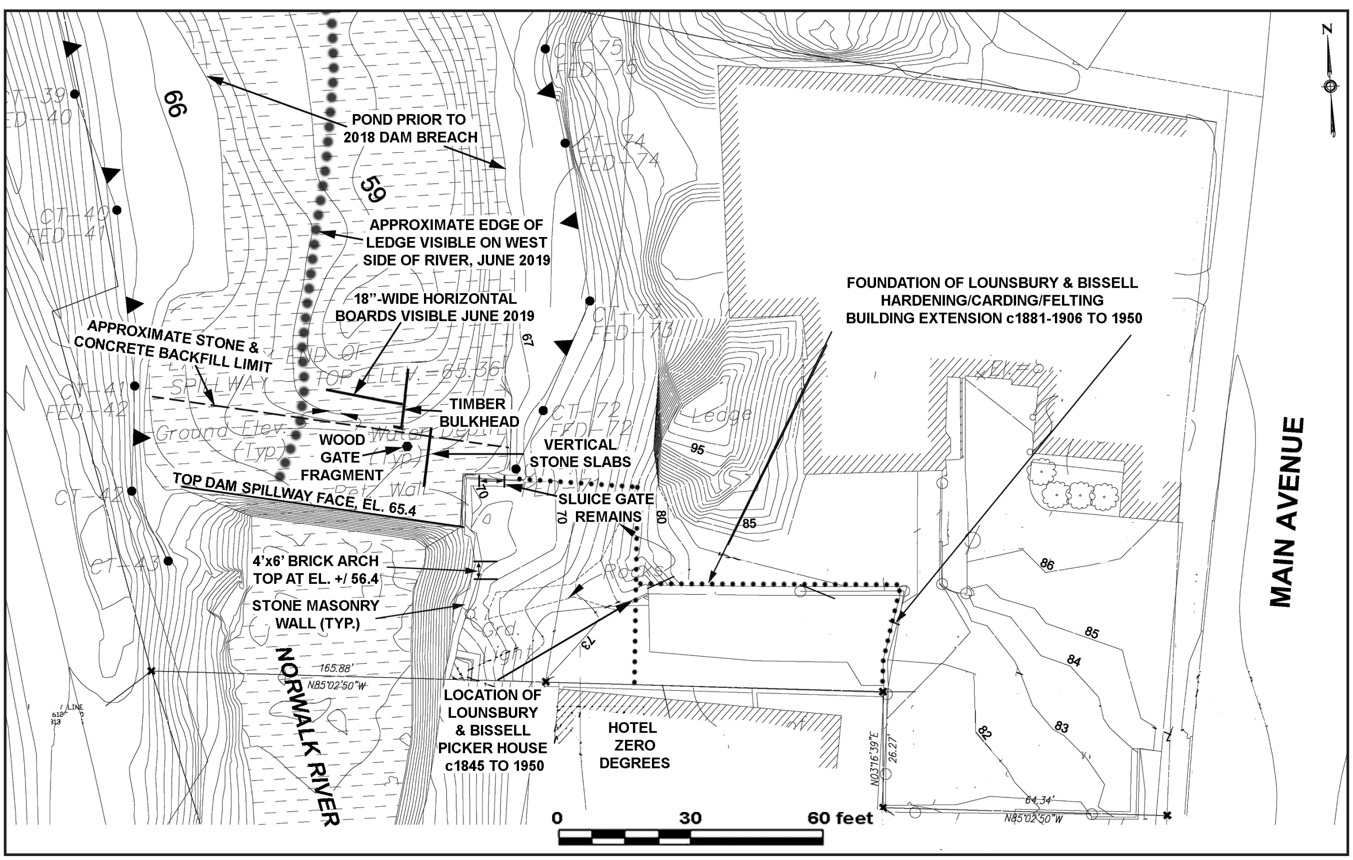


Figure 1 (Left). *Flock Process Dam location on* Norwalk North *7.5-minute U.S.G.S. Quadrangle*.

Figure 2 (Below). *Plan of historic industrial features at and near Flock Process Dam. Vertical datum: NAVD 88, horizontal datum: NAD 83 Connecticut State Plane Coordinate System*.



Dam Design and History as Documented Prior to Removal

Prior to removal in 2018, the Flock Process Dam, formerly known as Winnipauk Dam, was a gravity structure built on bedrock with an approximately 70-foot-long, 15-to-18-foot-high vertical-faced mortared-rubble spillway, capped with concrete and backed by earth and rubble extending approximately 18 feet upstream. The spillway cap had probable wood planking at the upstream and downstream edges (c.1981) and had an upper elevation of approximately 65.4 feet above mean sea level. The width and foundations of the spillway masonry were undocumented. The dam created a head for waterpower of approximately 12 feet. The west side of the spillway was tied to bedrock in an undocumented manner. The east end of the spillway was built against an unmortared masonry foundation for part of a former mill complex noted below, with an unmortared masonry training wall extending approximately 140 feet downstream of the dam below the building foundations. The walls at the east abutment extend 12 feet upstream of the spillway face and surround a deteriorating outlet structure of stone, concrete, and brick with an inoperable 5.5-foot-square wooden sluice gate and bevel-gear steel operator at the inlet and a 4-by-6-foot brick arch at the outlet. There was also a poorly-documented 2-foot-square opening in the spillway face which may have served for limited pond drawdown. Other than the training wall, and the fragmentary building walls at the east abutment, most remains of the mill complex have been removed, with much of the site presently occupied by the Hotel Zero Degrees immediately south of project limits. The Project area extended east of the dam approximately 160 feet to Main Avenue and included part of another mill foundation consisting of an approximately 57-by-17-foot concrete floor bordered to the east and north by 8-foot-high unmortared rubble walls. The latter remains were part of a felting, hardening, and/or carding building noted below. A bituminous parking lot extends between this partial foundation and Main Avenue. On the west bank, the dam site is bordered by the former Danbury and Norwalk Railroad (now part of Metro North), which crosses to the east side of the river approximately 130 feet downstream of the dam, on a 140-foot-long plate-girder bridge with abutments and a central pier of rubble masonry (Figures 2, 3, 9).

Following 1640-1641 land purchases from local Native Americans by Englishmen from Massachusetts, English settlers from Hartford arrived in present Norwalk in 1649. The town was incorporated in 1651, including the area of later Wilton and parts of New Canaan and Westport. Until the early 19th century, Norwalk was one of several agricultural communities in southwest Connecticut with small ports active in the West Indies trade, and in coastal traffic between

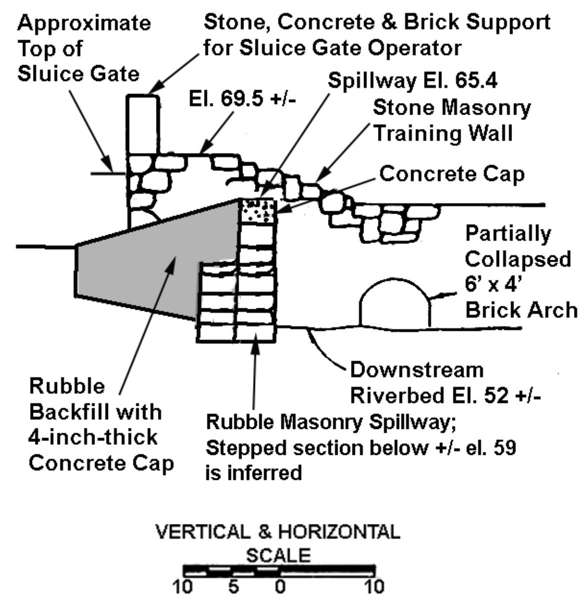


Figure 3. *Schematic dam section to east at east end of dam. Base images: Roald Haestad, Inc. 1981, with elevations NAVD 1988 and details 2018 and 2019.*

Boston and New York, exporting grains, hemp, flax, flax seed, beef, pork, and lumber. The harbor was at the mouth of the Norwalk River, where the estuary powered a tide mill for grain processing and was also an important oyster harvesting area which became the basis for a nationally-significant industry in the 19th century. Above tidewater, the river provided power for approximately eight small waterpower privileges by the late 18th century, most of which were grist mills along with one slitting mill and several fulling mills. By c.1815, Norwalk had three woolen or cotton mills at unidentified locations, and became increasingly important as a hat manufacture center by c.1825. Until the construction of railroads in the mid-19th century, surface transportation remained poor despite the maintenance of the present Boston Post Road beginning in 1673 and short-lived operation of two turnpikes to Newtown and Danbury in the late 18th and early 19th centuries. Norwalk industries near the harbor grew with the increase of coastal steampowered traffic and delivery of coal in the 1820s. Coastal as well as more interior industrial sites grew with the opening of the New York and New Haven Railroad in 1849, and of the Danbury and Norwalk Railroad in 1852 through the Norwalk River Valley; both lines later became parts of the New York, New Haven and Hartford Railroad.

Norwalk's population and industrial growth, concentrated near the coast and to a lesser extent along the Norwalk River and other streams, led to a complex municipal history. An area around the first town center, where the post road crossed the river, became a borough in 1836 and a city in 1893, and South Norwalk was incorporated as a second city in 1871 in the harborside industrial area crossed by the coastal rail line. Both cities remained within the larger Town of Norwalk,

Notes: 1. All elevations are relative to vertical datum NAVD 1988.
2. Felt in the 19th century was a wool textile produced by matting, condensing and pressing fibers together.

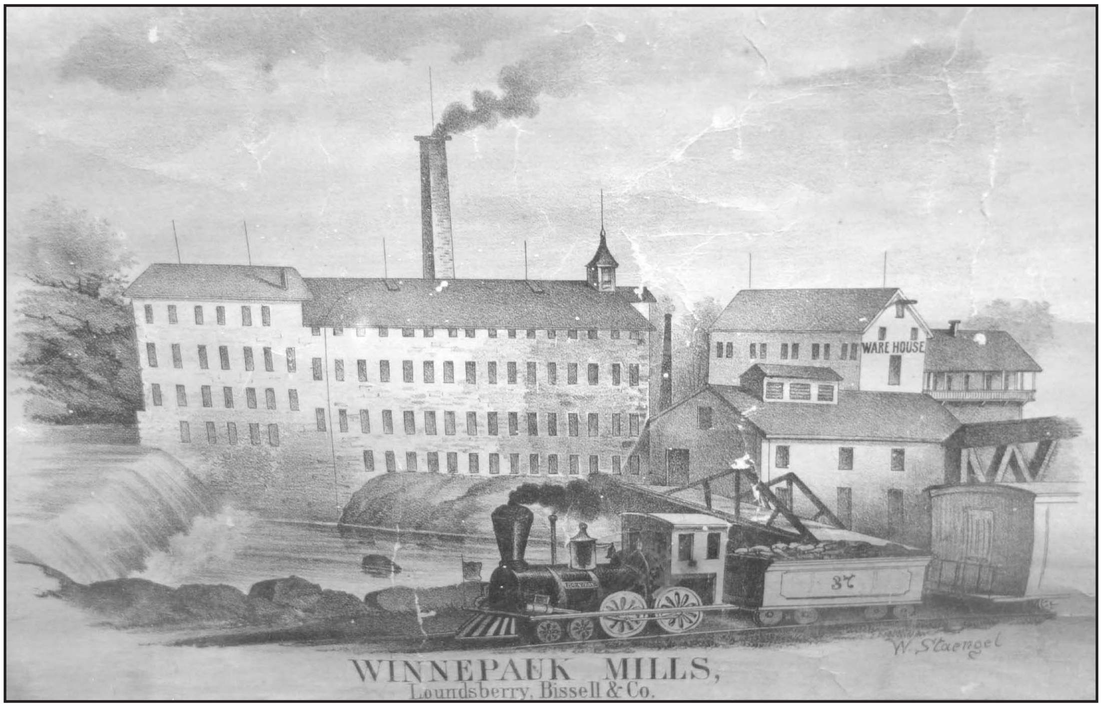


Figure 4. *View east of mill complex c1858. Source: Stevens 1958.*

which was consolidated as the City of Norwalk in 1913 including both earlier cities. The principal social and economic patterns in the city during the last century have involved the disappearance of most remaining agriculture, the decline or disappearance of most traditional industries, and the steady growth of automobile traffic and suburban residential development. Surviving industries rely largely on trucks for shipments and passenger automobiles to transport workers, and most working residents use cars or trains to reach jobs outside the city. Most roads that remain are colonial-period highways with paved surfaces, improved drainage, and newer culverts and bridges. The most important road projects were the Merritt Parkway in the 1930s and Interstate 95 in the 1950s, highways which accelerated the process of suburban expansion and allowed for some retention of industry.

The Flock Process Dam was in a section of Norwalk known as Winnipauk, centered on the Norwalk River upstream of the Silvermine Brook tributary and named after a Contact-era Indian sachem. Most of the former waterpowered mills on the river were in this area, and all larger operations were inhibited by flow and storage limitations summarized in c.1880:

> "The stream itself has a large fall, amounting to 826 feet from the extreme source to the mouth, but being without storage reservoirs it runs very low in the dry season; for eight or nine months in an average year most of the mills have water enough, but for two or three months in the summer season there is a very scanty supply, hardly more than enough some of the time, as stated at one mill, for washing wool. Severe winter weather also brings down the stream, and it is at times low for a month from that cause" (Porter 1885: 155).

Slow declines in grain and lumber exports, and these seasonal power limitations, reduced the number of mills on the river above tidewater by the time the Danbury and Norwalk Railroad was completed, when there were two woolen mills, one gristmill, and possibly one flax-seed oil mill. The larger operations required steampower to supplement, and in some cases replace, waterpowered mill operating systems. Furthest downstream, in the borough, was Union Manufacturing Company, which under several owners and names made felt cloth and carpet c.1836-1912. As summarized below, Winnipauk Mills at the Flock Process Dam site made felt cloth and shot shell wadding c.1840-1930. A third woolen mill, usually known as the Norwalk Mills Company, operated near the Wilton town line c.1865-1900. Within Norwalk, the Flock Process Dam was the only surviving impoundment on the Norwalk River.

Topography suggests all historic industrial development at the Winnipauk Mills site was on the east side of the river. The impoundment dates to an undocumented 18th century fulling mill, an operation rebuilt/re-used for an undocumented lime mill in the early 19th century. Beginning c.1840, the Lounsbury & Bissell Company made wool felt products until the Great Depression, developing a large complex most of which was downstream of the dam. In addition to felt cloth, the firm began making wadding for ammunition during the Civil War, which appears to have remained a principal line of work through the remainder of the firm's history. Part of the mill and perhaps the dam were reconstructed after an 1854 flood. The rubble masonry foundation at the east end of the dam was part of the mill's 2-and-a-half-story stone masonry picker house, in the basement of which the waterpowered prime mover equipment may have been located about where the present outlet structure sits. The equipment may have included an older waterwheel when the felt mill was first built, but by 1870 there was an undocumented 90-horsepower turbine operable for about half of each year on the 12-foot head. The company, which incorporated in 1869, installed one or more steam engines by 1850 to supplement the inadequate waterpower supply. In the late 19th century, the 1-story stone masonry room east of the picker house containing felting, hardening, and/or carding equipment was expanded to the north, with the expansion area supported by extant masonry foundations. At about the same time, a separate 1-story hardener room was added immediately to the northeast.

Lounsbury and Bissell continued to expand and enhance operations into the 1920s, possibly converting to all-electric power in 1920 and introducing a new patented shot shell wadding product c.1922. The dam, which supplied water to at least one pump likely used for fire protection, was repaired and raised 2 feet in 1925 in an undocumented manner discussed below, at the same time that part of the plant was expanded with an additional story. By 1930, however, operations ceased during the Great Depression and the plant was vacant for a decade. From 1940 to 1950, the plant was used to manufacture cabinets for refrigerators and radar equipment by the Kitchen Combination Company and the Merritt Manufacturing Company. The latter firm was, or became, a subsidiary of the Flock Process Company, whose products included rayon fiber cloth made to resemble suede. The Flock Process Company was evidently about to start operations at this site when a fire in January 1950 destroyed most of the north half of the plant. The burned section — including the picker house and the larger building housing hardener equipment within project limits — was razed, and the remaining plant leased by Flock Process to Norwalk Tire & Rubber Company for manufacture of footware. A 1-story machine shop north of project limits was probably added c.1950-58, by the end of which period almost the entire Lounsbury and Bissell complex had been demolished. Flock Process Company dissolved in late 1961, and some or all of the property passed to the Trudy Toy Company, which built a new factory building south of the project area in 1963 and operated here until c.2004. The 1963 plant has been demolished, along with most components of the former Winnipauk Mills complex, leaving the foundations of the expanded felting, hardening, and/or carding building which were left exposed for surface parking prior to the 2013 construction of the Hotel Zero Degrees.

Dam Removal, and Documentation Results During and After Removal

The dam removal project, completed primarily in August 2018, included breaching most of the spillway to approximate elevation 55 feet above mean sea level, leaving intact

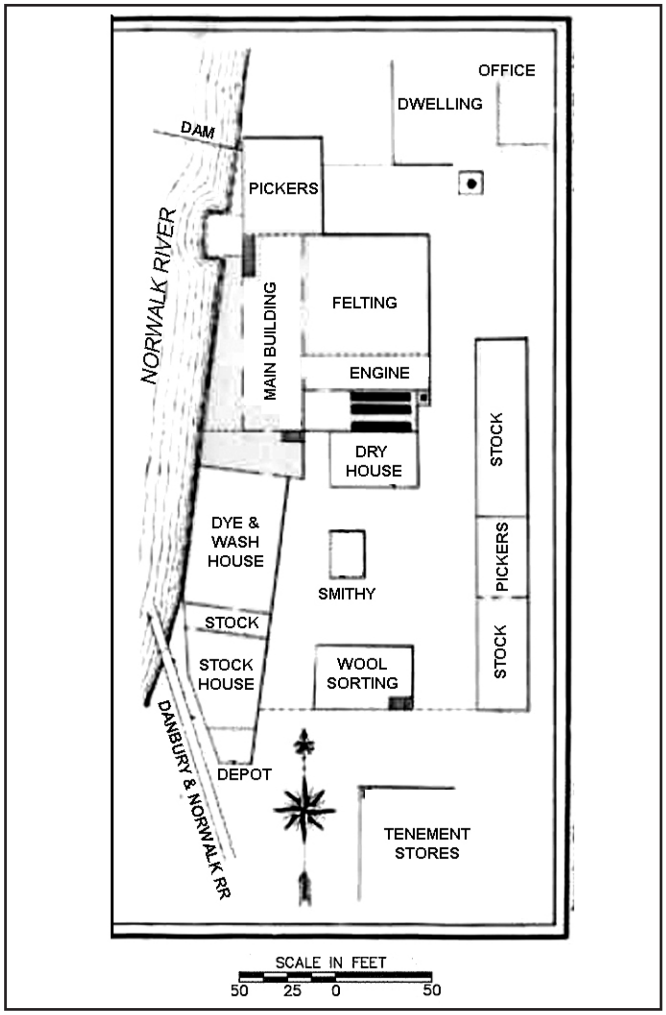


Figure 5. *1881 plan of Lounsbury & Bissell Company. Barlow's Insurance Surveys 1881.*

the lower 4-5 feet of the spillway face, the western and part of the eastern ends of the dam, and the extant mill foundation and channel training walls. To enhance fish passage over a relatively steep bedrock drop through this section of river, a rock ramp, or engineered riffle, was installed between the upstream bedrock elevation and the existing downstream pool. This rock also protected the remnant dam base and western channel wall.

The dam was archaeologically sensitive for possible components from at least three construction episodes in the 18th, 19th, and 20th centuries. Most of the masonry spillway probably dates to Lounsbury and Bissell Company construction or reconstruction, likely in response to the 1854 flood. At least the pre-20th -century components of the spillway were probably designed and built without professional engineering design, like many contemporary mill dams in the northeastern United States. Here, vernacular design included earthen and rubble backing, and the possibility of a sloped or stepped upstream masonry profile. Construction on bedrock may not have required extensive foundation preparation for the masonry. The rubble and earth upstream of the spillway face

Note: All elevations are relative to vertical datum NAVD 1988. Felt in the 19th century was a wool textile produced by matting, condensing and pressing fibers together.

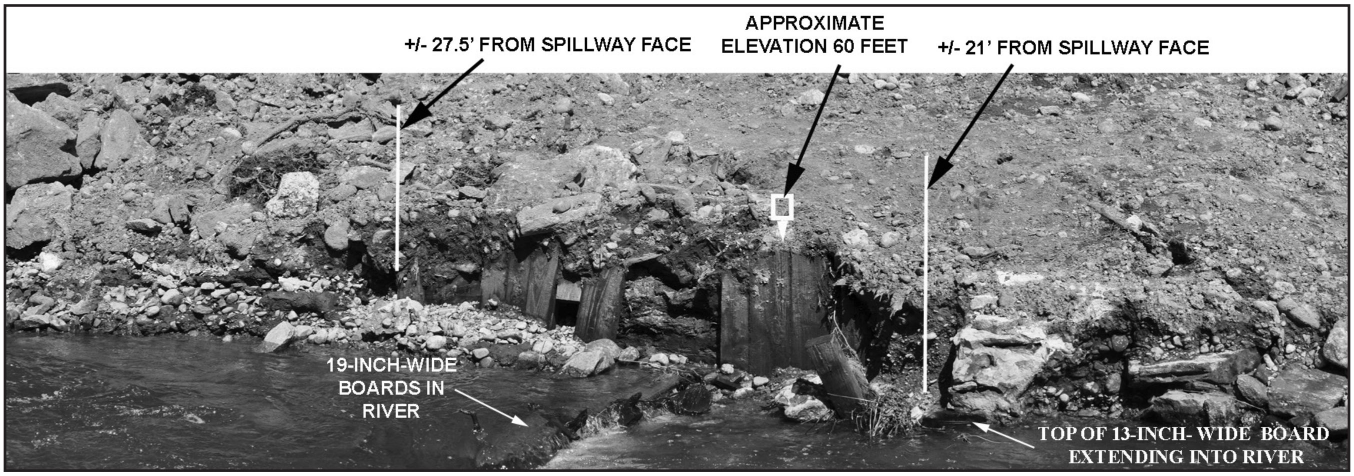


Figure 6. *2018 view east of timber bulkhead exposed after dam demolition. Source: Alexis Cherichetti.*

were sensitive for possible components of several construction episodes, including rubble-filled timber framing seen in similar structures elsewhere in the United States, and/or stone or concrete placed on top of the backfill. Spillway design, and spillway or backfill foundations, were sensitive for significant information about late-18th- to late-19th-century vernacular engineering of earthen and stone mill dams, making it potentially eligible for the National Register of Historic Places under Criterion C. Project actions left spillway and any backfill foundation components in place.

High water conditions in August 2018, and the large mass of spillway backfill, precluded any attempt to de-water the structure during demolition. No detailed information about how the spillway was tied to high bedrock on the west riverbank was revealed, although limited data on spillway backfill was visible as noted below. Virtually all spillway components were removed on the west side. Removal of most dam components above elevation 55 feet, and associated removal of vegetation and grading of the east riverbank, revealed new information on spillway design, backfill extent and composition, and east riverbank bulkhead construction probably related to sluice gate operations. Post-construction high-water erosion events in Spring 2019 removed large amounts of rubble on the east bank and the remaining east end of the spillway, revealing more information on spillway profile and foundations, bulkhead components and related timber and stone features not visible during project monitoring, and the full extent of bedrock on the west side of the pre-impoundment river channel. Information revealed in 2019 was documented by Alexis Cherichetti, Senior Environmental Officer for the City of Norwalk.

Monitoring and site inspection in 2018 and 2019 revealed the following new information:

1. The masonry spillway was approximately 4 feet wide with a nearly vertical upstream face for the approximately 5 feet exposed during demolition, and a 2.5-foot-high concrete cap with medium-sized crushed-stone aggregate above the large boulders which comprise most of the upper spillway. The concrete was reinforced with 1/2-inch-diameter untwisted bars, and had two rows of 7/8-inch-diameter, 1-foot-long bolts set into the upper surface with the bolt heads flush to the cap. The bolts may have once held down wood planking which has not been observed since 1981.

As exposed by 2019 high water, the lower portion of the spillway's east end consisted of large flat stone slabs approximately 8 feet long and indicating at least one step in the upstream face (Figure 2).

2. Spillway backfill consisted primarily of large cobbles, sand, and gravel, with a 4-inch-thick concrete cap reinforced with 1/8-inch-diameter wire. Larger boulders were used at the west side of the backfill against bedrock surfaces. The backfill extended upstream approximately 18 feet from the spillway, sloping gradually to an approximate elevation of 63 or ±2.4 feet below the spillway cap. As discussed below, the configuration of backfill immediately upstream of the sluice gate was not clear and may have been modified to allow for gate operation (Figures 2, 3).

3. Immediately upstream of the backfill, the lower river level shortly after dam removal revealed remains of a low timber bulkhead approximately 24 feet west of the former impoundment's east bank. The bulkhead visible in 2018 was 6.5-7 feet long, built primarily with 3-inch-thick, 6-to-9-inch-wide vertical boards of unknown lengths. The boards, nailed to a horizontal member not well exposed until 2019, appear to have been driven into the riverbank with board tops at approximately elevation 60 – over 5 feet lower than the pre-demolition spillway top elevation, and approximately 3 feet lower than the spillway top elevation prior to addition of the concrete cap. At the approximate longitudinal center of the bulkhead, several 18-inch-wide boards extended at least 5 feet into the river but were submerged during monitoring. A 3-inch-thick, 13-inch-wide board extends a short distance into the river at the downstream edge of the bulkhead, just

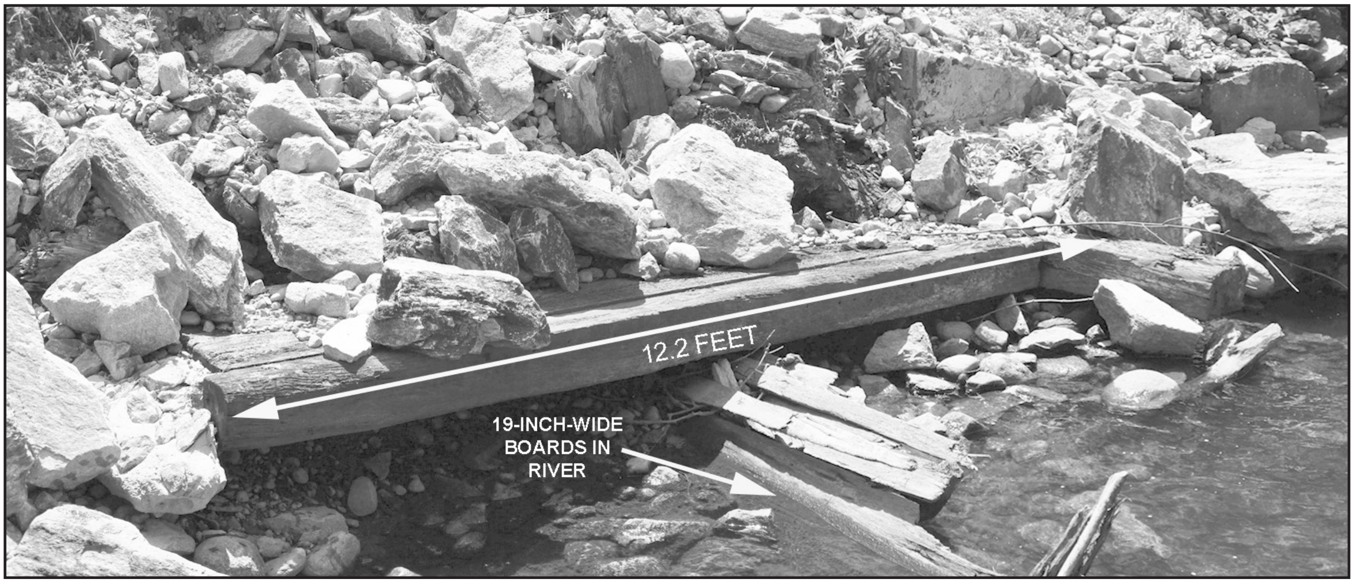


Figure 7. *2019 view southeast of timber bulkhead exposed after high water removal of vertical boards. Source: Alexis Cherichetti.*

upstream and slightly below the edge of spillway backfill (Figures 2, 6). By June 2019, high water had removed or knocked down all the vertical boards and removed rubble on top of the bulkhead to reveal large 9-inch-high horizontal timbers resting on timber bracing and possible rubble supports. The timbers were approximately 12 feet long, with a similar-sized timber extending approximately 3 feet into the river at the downstream end of the bulkhead. Lower water in June 2019 also revealed that the 18-inch-wide boards noted above extended approximately 18.5 feet into the river west of the bulkhead face, and were braced in place with at least three narrower boards driven into the riverbed at a low angle below the downstream edge of the wider boards (Figures 2, 7-8).

4. The low bedrock on the west bank visible in June 2019 was approximately 5 feet west of the 18-inch-wide boards and extended over 100 feet upstream of the dam to create a channel only about 25 feet wide. The bulkhead is at the bottom of the steep east bank of sand, gravel, and cobbles, along which large rubble had been placed upstream of the bulkhead. From the downstream end of the bulkhead to the upstream side of the spillway, a row of flat stones approximately 8 inches thick was set vertically into the riverbank approximately 6 feet east of the bulkhead face, for additional bank stabilization. The top of the stones is approximately 2 feet higher than the bulkhead top, at an estimated elevation of 62 feet. The upstream end of the stone row was covered or reconstructed in concrete (Figure 2).

5. Shortly after dam removal, partial remains of a disarticulated 29-inch-wide wood gate were found approximately 20 feet west of the east bank and immediately upstream of the spillway backfill. The gate fragment consisted of two 2-inch-thick, 16-by-29-inch boards nailed to a 5.5-by-6-inch timber which originally extended at least 3.5 feet beyond the boards.

6. Removal of vegetation during dam removal allowed for better inspection of the sluice gate remains at intake of the outlet structure. Any remains of the 5.5-foot-square wooden gate were buried by debris/re-located spillway backfill, but gate framing and some operating mechanisms remain intact. The gate was lifted vertically on a 3-inch-diameter, over-8-foot-long screw by bevel gearing, for which the original operating mechanism does not survive. The bevel gearing was installed atop a deteriorating 4-foot-high platform of stone and concrete, which may have accommodated a small motor or a hand-powered wheel. The gate rose between brick guides, and against a steel framing attached to the brick and to a 7.5-foot-high concrete surface which includes the platform to which the bevel gearing was attached. The top of the gate was at an approximate elevation of 66.8 feet, 1.4 feet above the spillway cap (Figures 2, 9).

Interpretation and Significance of Documentation Findings

Monitoring and historical data indicated the spillway and backfill removed in 2018 most likely date to the c.1840-55 and 1925 episodes of construction and repair. The observed height of the concrete spillway cap is almost identical to the raised height of the dam reported in 1925. The crushed-stone aggregate in the concrete caps on the spillway and the backfill is also consistent with a date no earlier than the late 19th century. Portland cement concrete intended for submerged conditions was developed in England beginning in the mid-18th century and patented there in 1824 and imported to the United States from England and Germany by the mid-19th century. It was first manufactured in the United States c.1871-75. Examples of concrete used in dam spillways or abutments indicate that until the very late 19th century, ag-

Figure 8. *2019 view northwest of 18-inch-wide boards set in riverbed with bedrock visible at upper left. Source: Alexis Cherichetti.*

gregate usually consisted of coarse materials such as cobbles available near the building site.

Although no foundation components of the spillway or spillway were exposed, the upstream spillway face with a nearly vertical upper cross section and an apparent stepped lower section appears to be an interesting variant in vernacular spillway design of overflow weirs on bedrock. As noted, construction on bedrock may not have required extensive foundation preparation for the masonry, and vertical-faced masonry used less material than stepped faces. Vertical downstream faces were common in masonry dams built on bedrock or softer river bottoms of sand, gravel, or cobbles. Bedrock made spillways less vulnerable to potential undercutting of downstream faces by falling water, or to upward pressure on the upstream face which could lead to sliding in sandy streambeds. Even on bedrock, free-standing spillways without earthen backing were not common prior to widespread availability after c.1880 of practical calculations made to assure the masonry was sufficient to withstand water at the anticipated impoundment height. Upstream masonry faces were typically sloped or stepped even without earthen backing. Backing at the Flock Process Dam spillway, built primarily in the mid-19th century, would also have been typical, but it appears that the builders reduced the amount of stepped cross section on the upstream face to take advantage of the bedrock riverbed and limit the amount of spillway masonry (Figures 2-3).

Construction savings in spillway masonry may have been offset by the need to stabilize the backfill and east river bank against any potential erosion during high water. Even though the bedrock along the west side of the narrow pre-impoundment channel has a low slope, most high water force would hit the erosible east bank and the narrow original channel bottom. The timber bulkhead and upright stone slabs noted above protected the east bank and the east side of the backfill. The concrete backfill capping installed c.1925 was probably designed to further limit backfill erosion, as were the wide boards set across most of the channel at the timber bulkhead. Backfill capping appears unusual among documented contemporary structures in Connecticut but may have been more common than known. In this case, it is possible bedrock in the riverbed inhibited installation of any timber framing to stabilize the coarse backfill (Figures 2, 6-7).

The sluice gate northeast of the spillway, at the corner of the picker house foundations, was the last of what were probably several generations of gate needed to supply the mill's turbines and pumps, and to draw down high water. This appears to have been the only large outlet structure at the dam, and gate operation required a clear channel not obstructed by spillway backfill or debris from high water events. The mid-19th-century spillway had an approximate upper elevation of 62.9 feet, and an upstream backfill elevation perhaps several feet lower. At these elevations, any spillway backfill might not have obstructed a gate with elevations similar to the surviving opening. When the spillway and backfill was raised in 1925, the top of the backfill was probably at about the same elevation as the approximate bottom of the existing 5.5-foot-square gate opening, at estimated elevation 61.3 feet. The undated timber bulkhead, or an earlier version of this feature, may have been installed to inhibit any floodplain erosion in the pre-impoundment channel just upstream of the

Figure 9. *2018 view south of sluice gate exposed after dam demolition.*

gate. The upright stone slabs at about elevation 62 would not have obstructed flow into the gate. Assuming the gate opening was contemporary with the 1925 backfill, this site design probably required some retention at the northeast backfill corner to maintain the channel to the gate. The timber bulkhead may have been rebuilt at this time, perhaps associated with an ell-shaped east-west timber or stone configuration which has not been discovered (Figures 2, 9).

While the sluice gate is undated, it seems likely that the opening and gate were rebuilt in 1925 when the spillway and backfill were raised. The use of a long screw as a gate stem suggests the gate and its operating equipment may have been replaced after 1940, when the Kitchen Combination Company and the Merritt Manufacturing Company ran the factory after a long Depression-era hiatus. Rack-and-pinion gate stems remained common into the 1940s, as reflected in several contemporary engineering texts (Figure 15).

The provenience and function of the small disarticulated wood gate found just upstream of spillway backfill has not been determined. It might have washed downstream from another mill site, though its proximity to Flock Process Dam suggests some association with this structure. As noted above, there was also a poorly-documented 2-foot-square opening in the spillway face, observed in 1981 but not described, which may have served for limited pond drawdown. The opening was approximately the same size as the gate, but there is no evidence as to how such an outlet would have functioned with or without spillway backfill.

Principal References

Barlow's Insurance Surveys
1881 The Lounsbury, Bissell Company, Norwalk, Conn. No. 6668. New York.

Barrows, H. K.
1943 *Water Power Engineering*. 3rd edition. New York: McGraw-Hill Book Company, Inc.

Hall, Edwin
1865 *The Ancient Historical Records of Norwalk, Conn*. Norwalk: Andrew Selleck.

Hurd, D. Hamilton
1881 *History of Fairfield County, Connecticut*. Philadelphia: J.W. Lewis & Co.

Hyde, E.B. & Co.
c.1900 Map of the City of South Norwalk Borough and Town of Norwalk, Conn. New York.

Jackson, Donald C.
1988 *Great American Bridges and Dams*. Washington: The Preservation Trust.

James Leffel & Co.
1881 *Leffel's Construction of Mill Dams*. Springfield, OH.

Leslie, Robert W, comp..
1907 *Concrete Factories*. New York: Bruce & Banning.

Lobozza, Carl
1974 Norwalk,Connecticut: Pictures from the Past. Norwalk: Norwalk Historical Society.

McKee, Harley J.
1973 *Introduction to Early American Masonry: Stone, Brick, Mortar, and Plaster.* National Trust for Historic Preservation and Columbia University.

Norwalk Historical and Memorial Library Association
1901 *Norwalk After Two Hundred & Fifty Years: An Account of the Celebration of the 250th anniversary of the Charter of the Town, 1651-September 11th-1901*. South Norwalk: C.A. Freeman.

Porter, Dwight
1885 The Region Tributary to Long Island Sound, in U.S. Bureau of the Census, *Tenth Census of the United States, Report on the Water Power of the United States, Part 1*. Washington: Government Printing Office.

Raber, Michael S.
2019 Archaeological Monitoring and Documentation for Removal of the Process Dam on the Norwalk River, Norwalk, Connecticut. Report prepared for City of Norwalk Conservation Office. South Glastonbury: Raber Associates.

Ray, Deborah W., and Gloria P. Stewart
1979 *Norwalk/being an historical account of that Connecticut town*. Canaan, NH: Phoenix Publishing.

Roald Haestad, Inc.
1981 Winnipauk Dam. Description and Plans prepared for U.S. Army Corps of Engineers, New England Division, National Program of Inspection of Non-Federal Dams.

Sanborn Map Company
1906,1912,
1922, 1922-
1949, 1958 I*nsurance Maps of Norwalk, Conn*.

The Norwalk Hour
1925 Work Begins Raising Dam at Winnipauk. September 1, 1925.

1933 Lounsbury, Bissell May Be Dissolved. April 5, 1933.

1945 Merritt Co. Plant's History; Once Was Winnipauk Mills. May 29, 1945.

1950 Smouldering Ruins at Rear of Flock Process Plant. January 14, 1950.

1951 Water Power Aided Norwalk. August 7, 1951.

Stevens, George
1858 Map of Norwalk, Fairfield County, Conn. Norwalk: Eneas Smith.

U.S. Department of Commerce, Bureau of the Census
1850, 1860,
1870, 1880 Manuscript returns, Census of Manufactures.

Wegmann, Edward
1918 *The Design and Construction of Dams*. 6th ed. New York: John Wiley and Sons.

Personal Communications

Alexis Cherichetti, Senior Environmental Officer, City of Norwalk

William F. Johnson, Consultant in Geology, Water Power & Industrial Archeology, Becket, MA

Michael S. Raber,
Raber Associates

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 2020

Member Renewal: $20.00
New Member: $15.00

Send to:
Rick Coughlin, Treasurer – NNEC-SIA, 1 May Street, Rochester, NH 03867

Name: ____________________________________ Occupation:______________________
Address:____
Phone: ____ Email: _______________________

Southern New England Chapter (MA, RI, CT)
Membership and Dues for 2019

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(s): __________________________________Occupation:______________________
Address:____
Phone: ____ Email: _______________________

Are you a member of the national Society for Industrial Archeology? [ ] Yes [ ] No