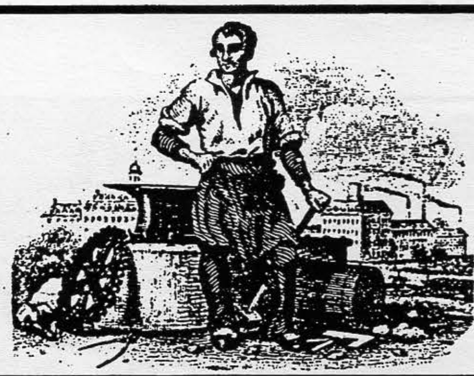


Society for Industrial Archeology · New England Chapters

VOLUME 22 NUMBER 1 2002

CONTENTS

CONTRIBUTORS

Jo Deaton, Gerry DeMuro, Donna-Belle Garvin, Richard Greenwood, Dennis Howe, Matthew Kierstead, Davis Starbuck, Robert Stewart

NORTHERN CHAPTER OFFICERS

David Starbuck, President
Betty Hall, 1st Vice President
Walter Ryan, 2nd Vice President
Herman Brown, Treasurer & Secretary

SOUTHERN CHAPTER OFFICERS

Robert Stewart, President
Jonathan Kranz, Vice President
Charles Schneider, Secretary
Rick Greenwood, Treasurer

EDITOR

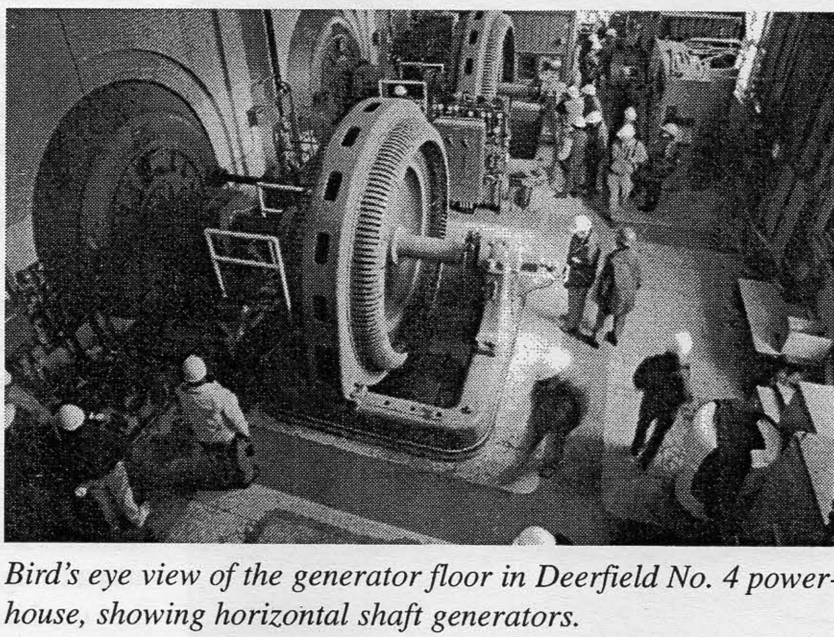
David Starbuck
PO Box 492
Chestertown, NY 12817-0492
starbuck@netheaven.com

NNEC/SNEC Fall Tour:

Deerfield No. 4 and Harriman Hydro Plants

On Saturday, October 20, U.S. Generating New England, Inc., hosted the Northern and Southern New England Chapters on a day-long tour of two of its historic Deerfield River hydroelectric generating facilities, the Deerfield No. 4 and Harriman developments. The tour was led by several knowledgeable USGenNE representatives, whose expertise was complemented by an illustrated description and history of the Deerfield No. 4 and Harriman developments that was provided for each attendee. This information was adapted from a historical documentation of USGenNE's Connecticut and Deerfield River developments conducted in 1998-1999 by PAL of Pawtucket, RI.

At 9:30 a.m. we boarded a palatial tour bus provided by our host at their Buckland, MA, office, and proceeded to the nearby Deerfield No. 4 Development, which includes components in Buckland, Charlemont, and Shelburne, MA. No. 4 was built in



Bird's eye view of the generator floor in Deerfield No. 4 powerhouse, showing horizontal shaft generators.

President's Report
Northern New England Chapter

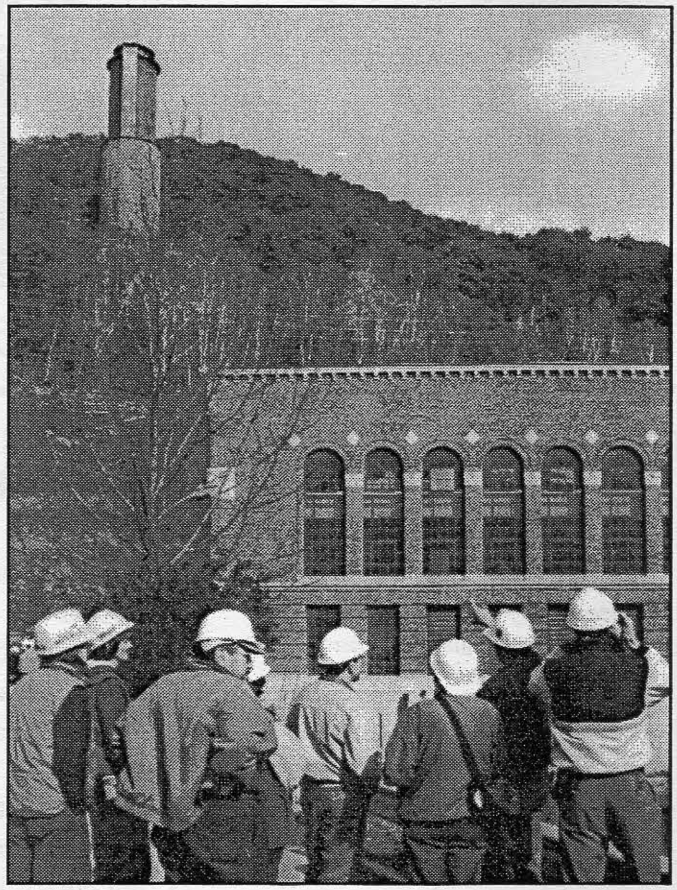
The Northern New England Chapter hosted the Annual Conference on New England Industrial Archeology at Plymouth State College on February 2, and we had a very good turnout and many excellent papers. It will now be the Southern New England Chapter's turn to host the next conference!

As this newsletter goes to press, we will have just held our Spring Meeting in Newport, New Hampshire. Our host was Walter Ryan, 2nd Vice President of the NNEC, and chapter members met at the Newport Historical Society Museum and toured the Newport Historic District and other nearby industrial sites.

It is with regret that I must report the loss of one of our most dedicated chapter members. Philip Whitney of Fitchburg, MA, passed away on April 18 after a short illness. Phil attended many of our meetings, contributed to our newsletter, and gave frequent talks and demonstrations of ice harvesting throughout New England. Phil, we will miss you.

David Starbuck
Chestertown, NY

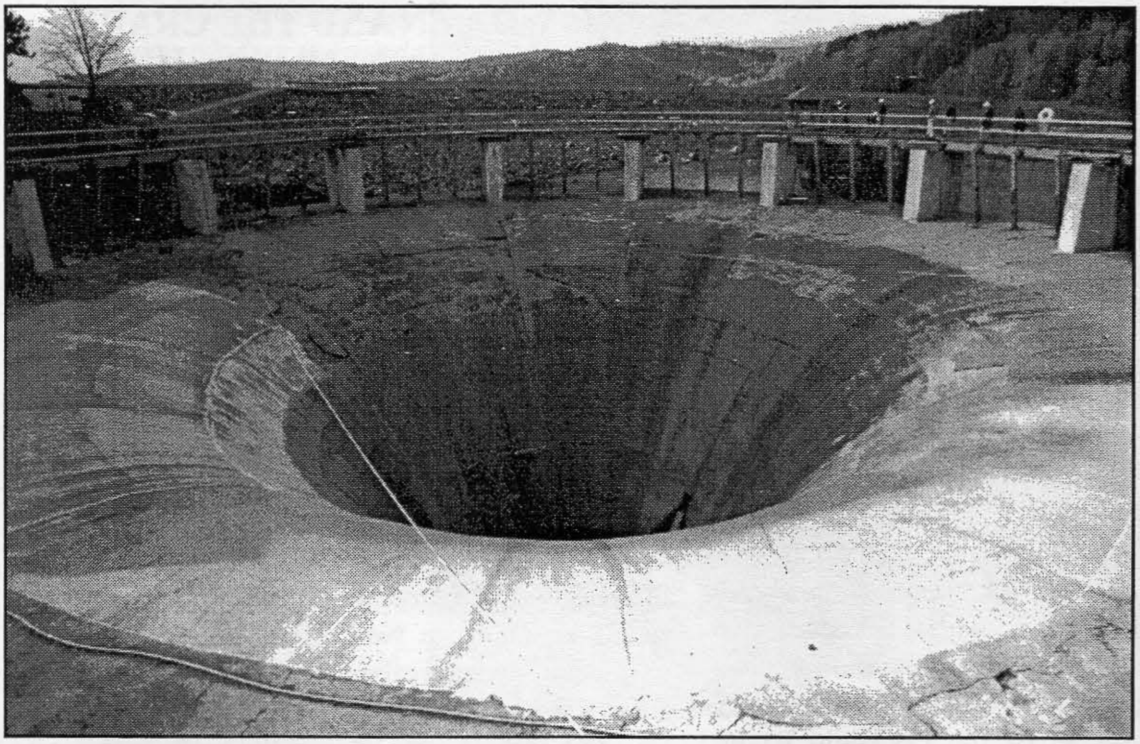
1912 in Chace & Harriman's first phase of hydro development on the Deerfield. It is a divided-fall system, with a 510 ft long concrete dam diverting water to the powerhouse through a 1,425 ft long rock tunnel. The powerhouse is a Renaissance Revival style building housing three horizontal shaft generating units incorporating Wellman Seaver Morgan 3,200 hp Francis turbines and General Electric 1,600 kW AC generators. The horizontal shaft configuration was dictated by early hydroelectric turbine bearing technology. This plant was modified for automatic operation in 1999, which required alteration of its original Lombard speed governors and shaft bearing oil pumps.



Tour group outside Harriman powerhouse, with surge tower on the hillside at upper left.

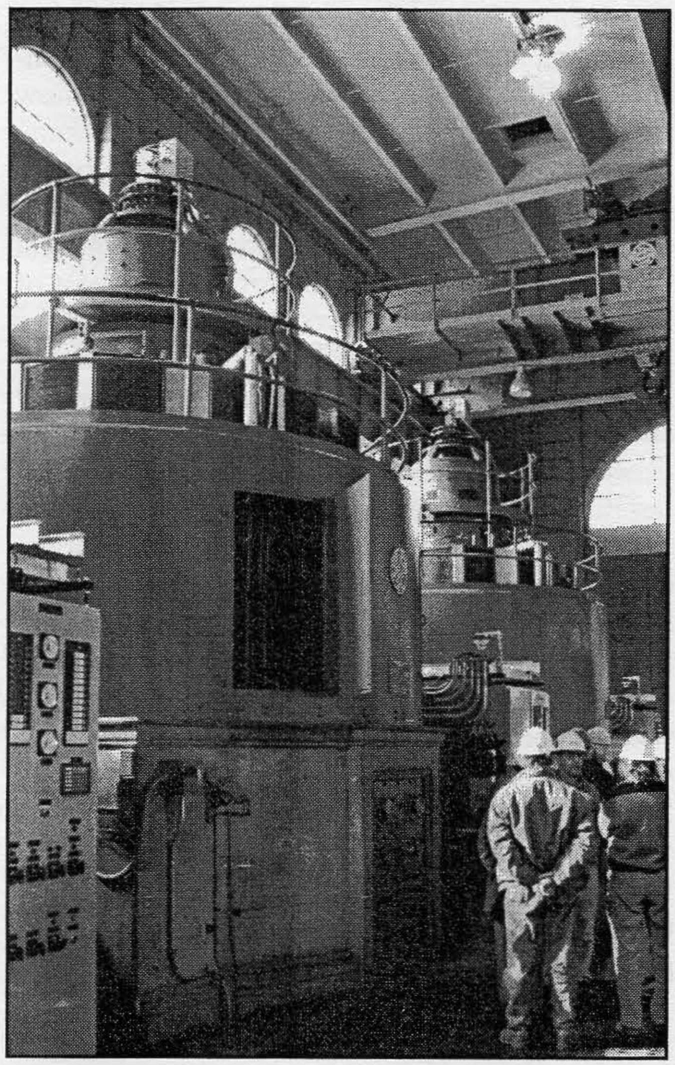
The rest of the day was spent touring the impressive components of the extensive Harriman Development in Whitingham, Vermont, which includes several superlative engineering feats. The tour also included several impressive driving feats executed by our skilled bus driver on the rugged Vermont roads. The Harriman Development was completed in 1924 and was the culmination of the New England Company's hydroelectric development of the Deerfield River. The extensive divided-fall complex is the largest, most powerful, most technologically advanced, and most architecturally elaborate of the Deerfield River developments.

The first stop was a scenic overlook at the Harriman dam, where we stopped for a tasty complimentary box lunch. The dam is a 1,250 ft long, 1,300 ft wide, 217 ft high, semi-hydraulic earth fill structure built up by sluicing impervious materials into a trough between two parallel dikes, a process first used in building the Panama Canal. It was the



Left: *180 ft deep "Glory Hole" spillway at Harriman dam. Note SIAers on catwalk at upper right for scale.*

Below: *General Electric 11,200 kW vertical shaft generators inside Harriman powerhouse.*



largest dam of this construction type when it was built, and holds back the 2,184-acre, 9-mile long Harriman reservoir, the largest man-made body of water in Vermont. After lunch we walked up the face of the dam to investigate the "Glory Hole" vertical shaft spillway, essentially a giant concrete funnel in the water upstream of the dam. This fearsome structure is 160 ft in diameter and 180 ft deep, and was the largest vertical shaft spillway in the world when completed. We walked around the lip of the funnel on a circular catwalk used for servicing the spillway flashboards.

Water from the Harriman dam flows into an outlet control tower on the spillway that is equipped with a specially designed pivot-type disc arm valve, and into a 12,812 ft long, 14 ft diameter diversion tunnel that leads to the powerhouse. Above the powerhouse is a 184 ft tall surge tank. This structure, which looks like a giant rocket on the hill above the powerhouse, is essentially a standpipe that equalizes the pressure in the system and prevents damage from "water hammer" when the turbine gates are shut rapidly. Three steel penstocks descend from the surge tower to the powerhouse below. This system provides 345 ft of head for the three generators.

Our tour ended at the Harriman powerhouse, a large, Renaissance Revival style building with elaborate architectural details including escutcheons and gargoyles bearing the company name and sculptural embodiments of electrical power. The generating equipment in the powerhouse represents a mature expression of early twentieth-century hydropower technology and incorporates three vertical-shaft generating units. The introduction of new types of vertical thrust bearings in the early twentieth century resulted in dramatic changes in hydroelectric unit orientation and plant design. Each of the three Harriman units consists of an Allis Chalmers 19,500 hp, Francis turbine connected vertically to a General Electric 11,200 kW AC generator. Each unit is integrated into the architectural scheme with a massive, rusticated cast stone base and carved stone mantels over the gauge panels. We spent some time in the control room, where all of the Deerfield River developments, the Deerfield No. 2, 3, and 4, Searsburg, and Sherman, are all remotely controlled. There the operator on duty showed us how the stations are controlled to maintain minimum flow and to respond to fluctuating electricity demands and rates.

When completed, the Harriman Development was the largest hydroelectric development east of Niagara Falls and was a corporate showpiece for the New England Company. Its 110 kV line to Millbury, MA, was the first to exceed the industry standard of 66kV. The Harriman Development generated 33,600 kV, 7,840 more than all previous developments on the Deerfield combined.

The day ended with a quick bonus stop at the east portal of the Boston & Maine Railroad's 4.75 mile long Hoosac Tunnel in Florida, MA, completed in 1877. At the end of the tour, USGenNE's representatives, who kindly spent their Saturday with us, provided each attendee with a complimentary copy of "From the Rivers," a corporate history of the New England Power Company, as well as a USGenNE long-sleeve T-shirt. The Northern and Southern New England SIA Chapters thank USGenNE for their generous hospitality!

Matthew Kierstead
Pawtucket, RI

NH WOMEN AND THE CRAFTS FEATURED IN NEW PUBLICATION

CONCORD, NH—In recognition of Women's History Month, the New Hampshire Historical Society announces the release of a special issue of its journal *Historical New Hampshire*. The issue explores the important role of women in New Hampshire's crafts revival, which culminated in the founding of the League of New Hampshire Arts and Crafts in 1932.

The revival of the handcrafts began over a century ago and continues to define New Hampshire's character today. By the turn of the twentieth century, the desire for a simpler way of life was bringing large numbers of city residents to spend summers in New Hampshire. The same period saw a revival of handcrafts, particularly among women.

The earliest advocates of the crafts in the state tended to be women from the city who often brought new social ideas and aesthetic influences to the countryside where they summered. Increasingly concerned about the welfare of the rural women who were their neighbors, city women began to develop home industries that would help families who were struggling to cope with the declining agricultural economy.

The Society's new publication demonstrates for the first time how women working separately in various parts of the state, but responding to similar influences, planted the seeds for a crafts revival. This revival eventually blossomed into a successful statewide phenomenon.

In 1897, Helen Albee, a New York-trained designer, established a hooked rug industry employing local women in the neighborhood of the summer colony at Chocorua. In 1902, Boston and New York artists Frances Houston and Laura Marquand Walker, members of the Cornish colony, joined the village women of Plainfield in establishing the Mothers' and Daughters' Industry, which specialized in hand-woven fabrics. In Peterborough, Mary Morison, a summer resident from Boston, modeled the Handicraft Society she founded there in 1905 on the Society of Arts and Crafts in Boston. Mary Coolidge, also of Boston until she moved permanently to her summer home

Workers in the Mothers' and Daughters Industry of rural Plainfield, finishing handwoven fabrics designed by women artists from New York and Boston who were members of the area's Cornish summer colony; illustrations from a 1904 pamphlet about the industry. Learn more about New Hampshire women in the arts and crafts in the newly released edition of Historical New Hampshire, published by the New Hampshire Historical Society. Copies are available from the Museum of New Hampshire History Store for $9.95 plus postage. Order by calling 603/856-0625.

in Sandwich, not only founded Sandwich Home Industries in 1926 but also co-founded the League of New Hampshire Arts and Crafts.

This special publication is the first in a series of spring programs the Society is sponsoring on women in the crafts. On May 4, an exhibition opens at the Tuck Library in Concord featuring decorated china and book illustrations by Isles of Shoals poet Celia Thaxter.

The New Hampshire Historical Society has published *Historical New Hampshire,* the only statewide history magazine, since 1944. Each issue contains a variety of articles about a past that enriches and informs our lives today, as well as reviews of recent books of state and local interest. *Historical New Hampshire* is a benefit of membership and is sent twice each year to members of the New Hampshire Historical Society.

Thanks to donations from NEA-New Hampshire and from Barbara Larry Pitsch, the New Hampshire Historical Society will send a copy of this special issue to every school library in the state, along with a guide for teachers.

Additional copies are available for purchase at the Museum of New Hampshire History Store for $9.95 (plus $4.20 postage and handling). This richly illustrated publication would make an ideal gift (perhaps for Mother's Day) for anyone interested in handcrafts, in New Hampshire history, or in women's contributions to the arts. To order a copy, call 603/856-0625, e-mail store@nhhistory.org, or visit online at www.nhhistory.org.

The Hartford Clamp Company:

The End of an Era

The Hartford Clamp Company will soon leave the 'endangered list' and become extinct. This small machine shop, owned by Scott and Marie Westbrook, is selling off some of its turn-of-the century machinery as the owners finish production on current orders. A buyer for the building and land is being sought and as the machines are sold off, the original business will cease to be. The Westbrooks have generously allowed me to document this business to HAER standards before it disappears entirely.

Hartford Clamp is a prime example of what might be recognized as a unique method of manufacturing. I have identified this technology as "Yankee Machine Shop Practice", a methodology that combines European and Armory practice with the American System of Manufacturing. Yankee machine shops were a group of intermediate and specialty producers who ran shops that had both dedicated and flexible tools. Their survival depended upon their ability to produce both large batches of commodity clamps and high-end, one-of-a-kind tooling without the expense of special jigs and fixtures.

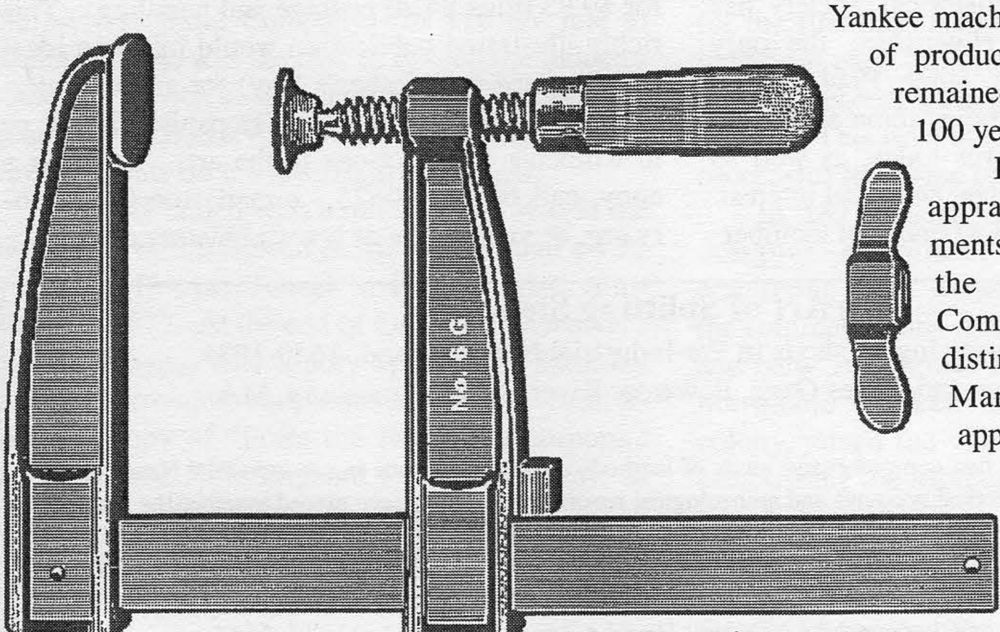
These shops recognized that tooling for fully interchangeable parts was expensive. Yankee machine shops produced parts which were made to interchangeable standards only to the point in the manufacturing process where the cost of additional precision jigs and fixtures became prohibitive. At that point in the process, production continued using skilled machinists to complete the parts. A Yankee Machine Shop could combine partial interchangeability with skilled finishing know-how and demonstrate greater profitability than by making fully interchangeable parts using expensive tooling.

Hartford Clamp is just such a shop. Scott Westbrook still makes miter clamps the way his great grandfather did. This clamp is comprised of two halves of semi-finished malleable iron castings. These halves are not interchangeable; they are drilled in pairs. If the halves become separated after drilling, the assembler must locate and match a pair, or the clamp will not operate. For short runs, this method is more cost effective than producing the tooling required to precisely drill an interchangeable half-clamp.

Hartford Clamp also maintains flexible tooling. This allows Scott to create any part he needs for a variety of projects. He also makes one-of-a-kind, high-end pieces without any plans or special jigs and fixtures. Scott runs one of the last true Yankee machine shops. Using this type of production, Hartford Clamp has remained in business for almost 100 years.

I will keep the SNEC appraised of further developments with Hartford Clamp and the recordation project. Comments on the concept of a distinctive "Yankee System of Manufacturing" would be appreciated. The author may be reached by e-mail jodeaton@cox.net>.

Jo Deaton



HARTFORD CLAMP COMPANY
MODEL # 6G

1930s Reinforced Concrete Open Spandrel Arch Bridges in Rhode Island

The south elevation of the Washington Bridge, with the drawspan towers at center.

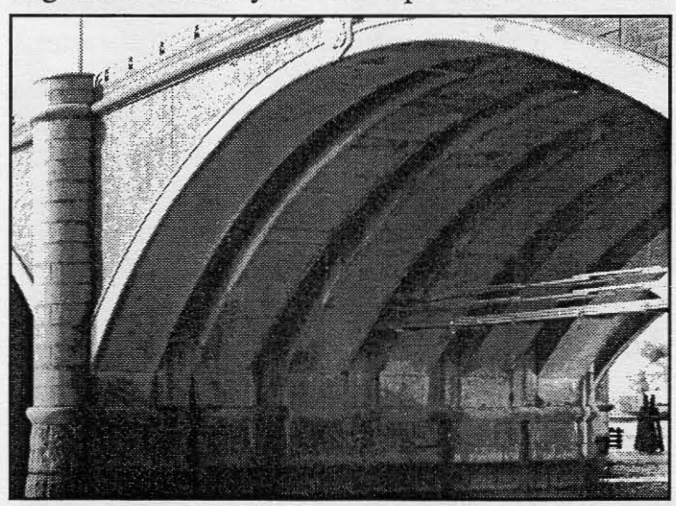
Rhode Island is home to two large, multiple-span, open spandrel reinforced concrete bridges, the Washington Bridge, built between 1928 and 1930, and the Ashton Viaduct, begun in 1933 and not completed until 1945. Although they were planned for at about the same time and employ similar structural engineering, they have markedly different outward appearances. Both have suffered deterioration of their reinforced concrete. The Washington Bridge is slated for demolition and replacement, and the Ashton Viaduct was recently reconstructed.

Washington Bridge

The Washington Bridge (Bridge No. 200) carries the six eastbound lanes of Interstate Highway 195 over the Seekonk River between Providence and East Providence, Rhode Island. It is approximately 2,500' long overall, including a 1,529 ft long span section consisting of a 124 ft fixed central steel deck span flanked on each side by three 105 ft reinforced concrete open spandrel arches and three 89 ft arches. Its most prominent and distinctive features are its decorative stone facing and ornamental granite block towers.

The Washington Bridge is located on what has historically been a remarkably densely bridged 1-mile section of the Seekonk River, where there have been no less than 15 highway or railroad bridges constructed on eight distinct alignments between 1793 and 2002. The bridge is a major Rhode Island engineering work. It was constructed between 1928 and 1930 to replace an outmoded 1885 steel truss swing span bridge. The scope of the project, which was financed through the sale of bonds, required the formation of a special Washington Bridge Commission in 1923 to oversee planning and construction. The bridge was an important component of Rhode Island's early attempts to accommodate the automobile age through highway infrastructure construction.

The Washington Bridge Commission included Clarence L. Hussey, the State Board of Public Roads' first Bridge Engineer. Hussey developed Rhode Island's bridge replacement program and established a national reputation as leading bridge engineer. Hussey's concept for the new



Detail of the Washington Bridge, showing the individual arch ribs behind the stone cladding.

Washington Bridge, as debuted in the early 1920s, was an open spandrel arch design with six exposed parallel reinforced concrete arch ribs carrying vertical deck support columns. The open spandrel reinforced concrete arch bridge became popular in the early twentieth century for moderate to long, multiple span highway bridges, and incorporated thin arch ribs and individual vertical columns supporting the roadway deck, rather than a massive filled structure or solid spandrel walls. This design used much less concrete, and could take advantage of local labor and materials. The new plastic structural medium of reinforced concrete also allowed simple bridge designs that boldly expressed their engineering. Clarence Hussey died in 1925, and Clarence W. Hudson of New York City was retained as consulting engineer for the project. Hudson employed open spandrel arch construction for his bridge design, however, he envisioned a commemorative role for the bridge. Instead of leaving the structure exposed, as Hussey had proposed, Hudson sheathed it in granite, giving it a more conservative, Renaissance Revival-style "London Bridge" architectural scheme. This choice was reflective of the lingering late nineteenth-century "City Beautiful" civic design movement and was in keeping with other urban Rhode Island concrete arch bridge designs of the 1920s.

In the mid-1950s the Washington Bridge alignment was incorporated in planning of the Eisenhower Interstate Highway System and the bridge was conceived as a component of Interstate 195 between Providence and southeastern Massachusetts. In 1968 Bridge 700 was constructed 50 ft north of the Washington Bridge to handle westbound traffic and the Washington Bridge was reconstructed to carry eastbound traffic only. In 2001 the concrete in the bridge was determined to be too deteriorated to simply repair it. The logistics associated with closing the bridge to traffic to rebuild it to new federal standards to withstand earthquakes dictated that the bridge must be demolished and replaced. Current plans call for demolition of all but the two downstream arch ribs and south elevation of the bridge. The replacement highway bridge will be built in the resulting gap, and the downstream arches will be modified to carry a linear park with a pedestrian path and bikeway linking Providence with the East Bay Trail to Bristol, RI. Retention of this part of the 1930 bridge will result in savings of nearly $20 million. The Washington Bridge is eligible for listing in the National Register of Historic Places, and is being documented by PAL of Pawtucket, RI, for inclusion in the Rhode Island Historic Resource Archive.

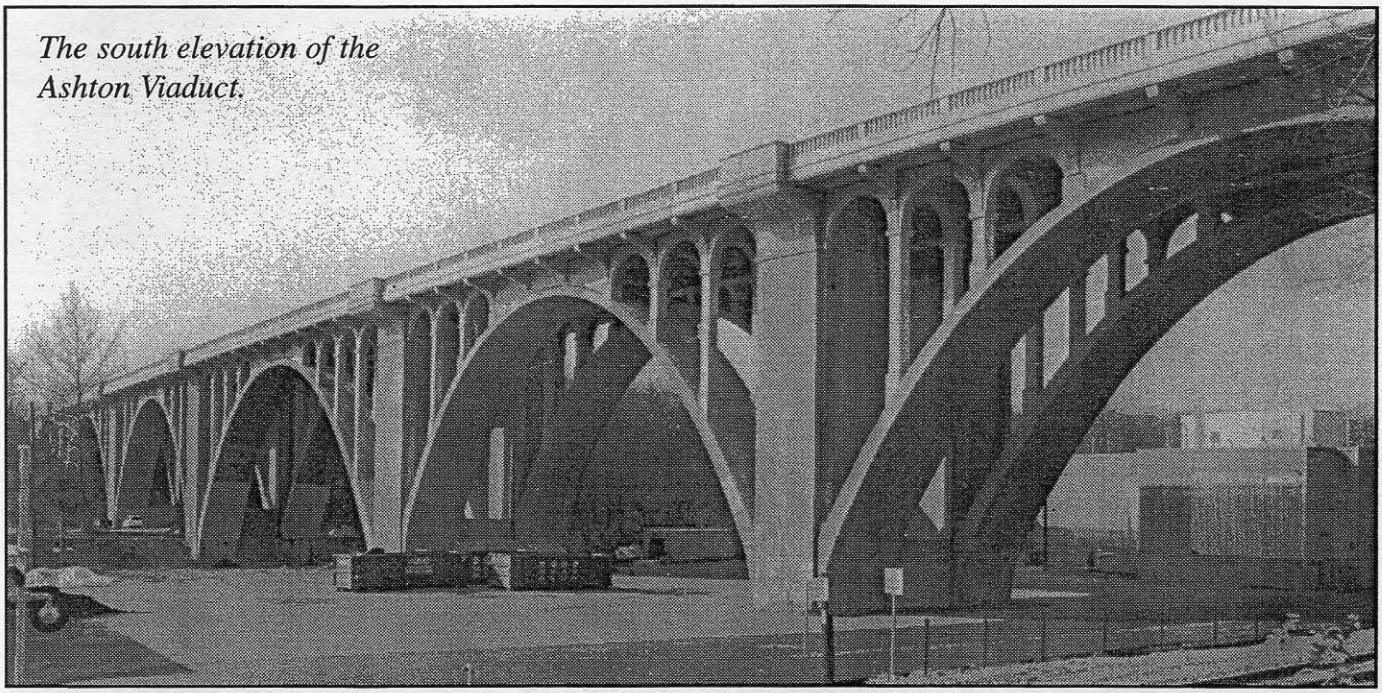
Ashton Viaduct

The Ashton Viaduct (Bridge No. 275) carries the two lanes of the Washington Highway (Route 116) between Cumberland and Lincoln, Rhode Island, crossing over the Providence & Worcester Railroad, the Blackstone River, and the Blackstone Canal. It is 962 ft long overall, and includes five spans: a central 160 ft arch over the Blackstone River, flanked on each side by a 125 ft arch, and terminating with a 120 ft arch on the east end and a 114 ft arch on the west end. Its most prominent and distinctive features are its twin arch ribs and open spandrel design.

The Ashton Viaduct is also one of Rhode Island's largest engineering projects, and is the second longest multiple arch concrete bridge in the state after the Washington Bridge. It was designed as a component of the 25 mile long, Cumberland-to-Coventry, RI, "Washington Highway," a circumferential highway around the Providence metropolitan area conceived in the early 1930s. This highway project included two large reinforced concrete bridges, the single-arch Stillwater Viaduct over the Woonasquatucket River in Smithfield, and the much larger Ashton Viaduct. Involvement in the Washington Bridge project provided the Rhode Island State Board of Public Roads and their Bridge Engineer Samuel L. Engdahl with the experience to design the Ashton Viaduct in-house.

The Ashton Viaduct superseded a low-level steel truss bridge. Work on the substructure began in 1932, but work soon ceased due to lack of funds because of the Great Depression, and was not resumed until 1942. The bridge was completed in

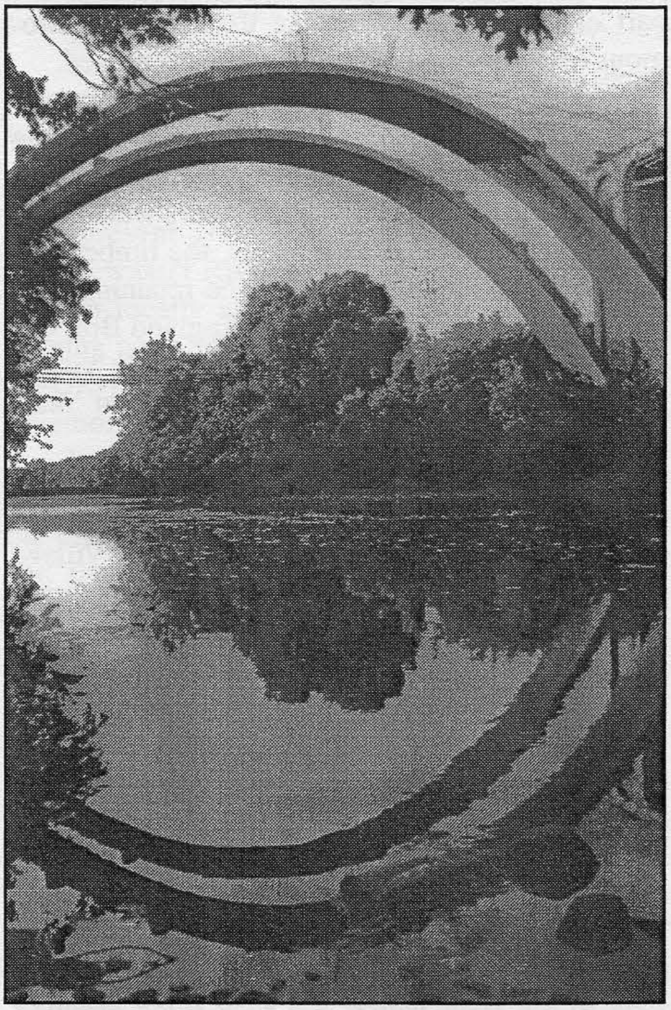
The south elevation of the Ashton Viaduct.



July 1945. The open spandrel construction was left exposed, an accepted aesthetic practice for "country" concrete bridges, and clearly expresses its engineering in its open, light arch ribs and vertical, arcaded columns.

In 1995 the concrete in the Ashton Viaduct was tested and found to be deteriorated. Since the Bridge was on a less vital and busy route, it could be closed for repairs. As the bridge was determined to be eligible for listing in the National Register of Historic Places, it was documented to Historic American Engineering Record standards by Edward Connors and Associates in 1996. The bridge deck and columns were removed and replaced with pre-cast units with special field connections, and isolation bearings and Teflon surfaces were incorporated in the new superstructure to minimize seismic loading. The restoration included replacement of the original concrete baluster railings. The project was undertaken by the Maguire Group of Foxboro, MA, which won a "Best Rehabilitated Bridge Design" award for the project. The bridge recently reopened for traffic in 2000, and the pedestrian bays again offer spectacular views of the Ashton mill and village along the Blackstone River.

Matthew Kierstead
Pawtucket, RIIn the Fall of 2001 researchers for



Twin arch ribs of the Ashton Viaduct's 160 ft span over the Blackstone River during reconstruction.

Winchester, New Hampshire:

Timber Crib Dam Remains are Recorded

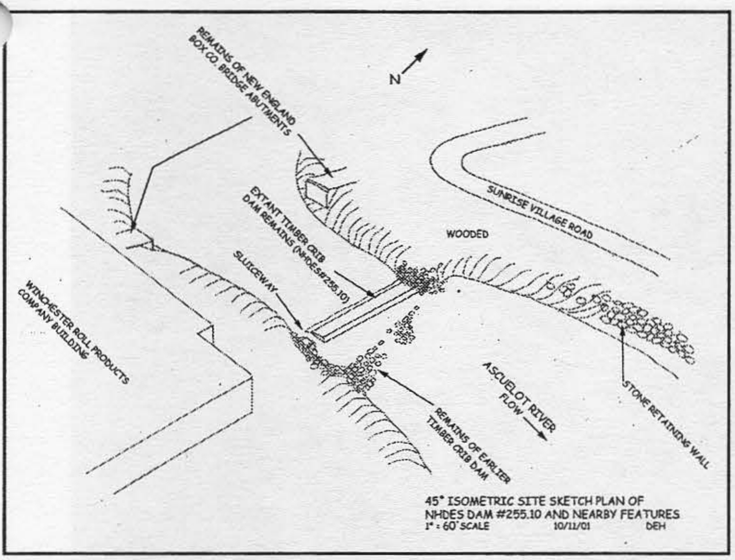
During the Fall of 2001, Victoria Bunker, Inc., a New England archeology and cultural resource management firm, accomplished a recording of timber crib dam remains in Winchester, NH. The Winchester Village dam, NH Dam No. 255.10, was constructed across the Ashuelot River at a bend that was called "the Bow" by the first 18th-century European immigrants. Beyond the Bow the river curls westerly, flowing through Winchester to Hinsdale and into the Connecticut River. The project was undertaken at the request of the New Hampshire Fish and Game Department as part of its program to restore the river's anadromous fish stocks. The dam would be removed.

At the time of its recording, the Winchester Village Timber Crib Dam was deteriorated along its entire crest. No above-water sheathing remained, and all above-water timbers were badly rotted. The original dam remains, the timber crib ruin, the dam abutments, the stone retaining wall on the north bank, and the New England Box Co. Bridge concrete abutments were the only visible components of industrial complexes that once occupied the site.

The extant remains were the last of several dams constructed at Winchester Village for power and other industrial purposes. (Winchester Village should not to be confused with another downstream industrialized part of the Town, call Ashuelot Village, were several more dams were constructed.) The village dams were constructed with a series of connected rock-filled cribs built of thick timbers and sheathed with planks to block the river's flow. The Dam No. 255.10 consisted of 18 cribs, or cells, 9' long by 6' wide to a height 5 feet, spanning about 108 feet from bank to bank. The cells were filled with river cobbles, 1 to 2 feet in diameter to provide weight. To anchor the dam ends to the river banks, the rock-filled cribbing was extended into both river banks, which were excavated to accommodate construction, then covered with soil and rocks. Sheet piling 5" by 2" extended into the river bed and similar boards snugly secured to the spillway made the structure reasonably watertight.

The remains of the Winchester Village timber crib dam in the Fall of 2001.

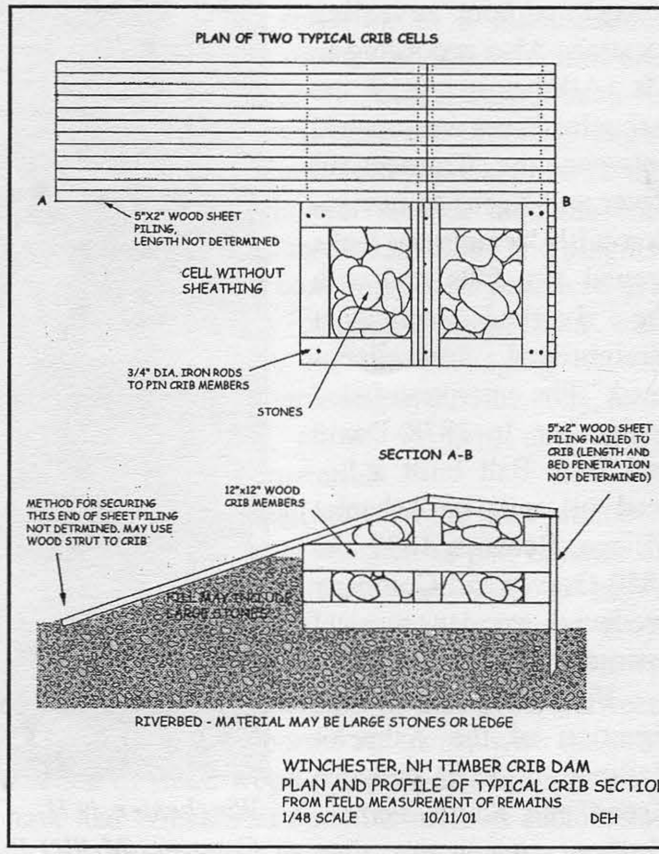
An earlier dam, whose rock remains can be seen about 20 feet downstream from Dam No. 255.10 was likely utilized for industrial hydropower. The extant remains of Dam No. 255.10, constructed about 1910, represent a different application of a water impoundment. The 25-acre pond it created was applied to the storage and movement of timber for the village's wood manufacturing industries that flourished during the late 18th and early 20th centuries. In a New Hampshire Water Resources Board Inventory of Dams and



Water Power Developments compiled in 1937, it was reported that a "chute" or drag way existed under the bridge 100 feet upstream from the dam to aid the moving of logs from the pond to the New England Box Company sawmill on the south bank. At that time, the dam had provisions for two-foot-high flash boards.

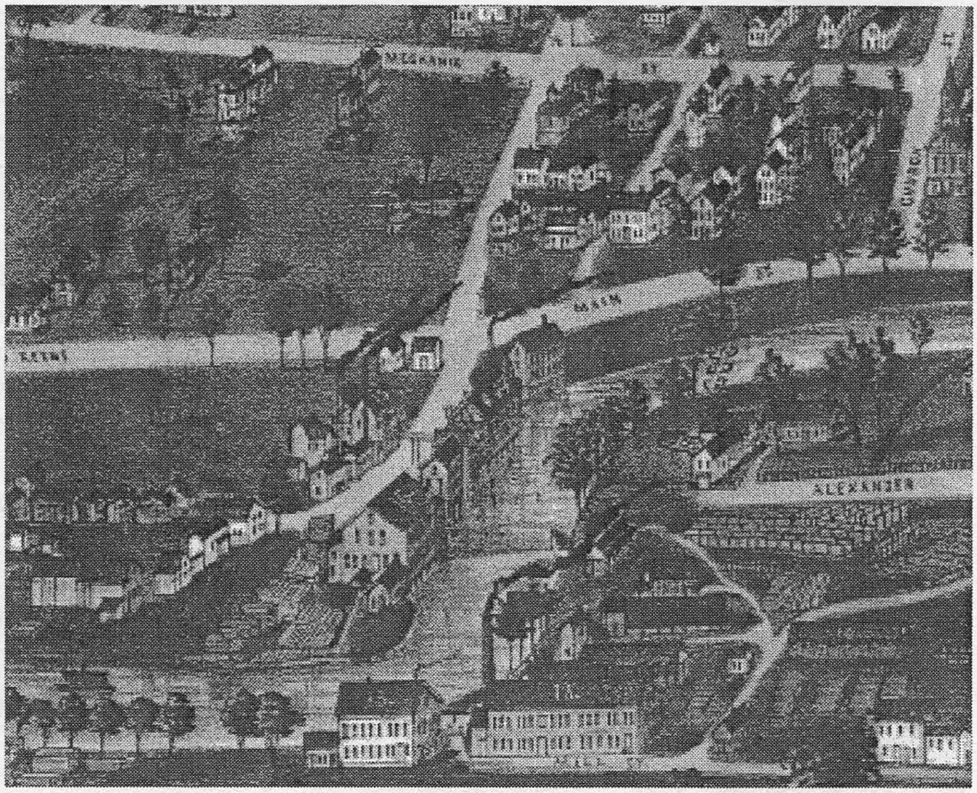
The Winchester Dam had been modified since its original construction. In order to maintain water tightness, timber crib dams such as the one in Winchester Village require the replacement of their sheathing every 7 to 10 years. It is recorded that replacement of planking on Dam No. 255.10 occurred in 1933, and, although no record of previous replanking was found, this was likely the second or third time for such repair since 1910. The dam was breached by natural causes in 1942 and was repaired. These repairs apparently included modification of the dam's cross-section, which had been triangular (as indicated by a 1937 surveyor's sketch), by truncating the downstream leg, eliminating the apron and applying vertical sheet piling on the downstream side (as shown in the right sketch above). Planking that protected the abutments from erosion that were extant in 1937 were removed or washed away. The 1942 repairs likely included the addition of the sluiceway through the second cell on the south side of the dam.

Low-head dams such as the Winchester Village dam were not uncommon in the State, although few examples remain. Remains of a dam



of similar triangular construction and time period are present on the East Branch of the Pemigewasset River in Lincoln, New Hampshire. Known locally as "Diversion Dam," it created a logging pond for a pulp mill and is listed as Site 27-GR-199 in the State's Archaeological Site Inventory.

Is not clear when the first dams were constructed on the river in Winchester, but , early in the town's development, water-powered gristmills and saw mills were operating on Roaring Brook and Broad Brook, which feed into the Ashuelot. According to Edith Atkins in *Walking Back Through Time* (1997, Turley Publications, Palmer, MA.), from 1775 to 1779 iron ore was mined from Gun Mountain and smelted at Ashuelot Village, where a dam had likely been constructed. By the beginning of the 19th century several dams had been built to harness the river to manufacturing. The Eliphate and Phinehas Merrill *1817 Gazetteer of the State of New Hampshire* (1817, C. Norris & Co., Exeter, NH) reported that Winchester had "4 grain mills, 9 sawmills, 3 clothing mills, 1 carding machine, 1 cotton factory, 2 distilleries, and 2

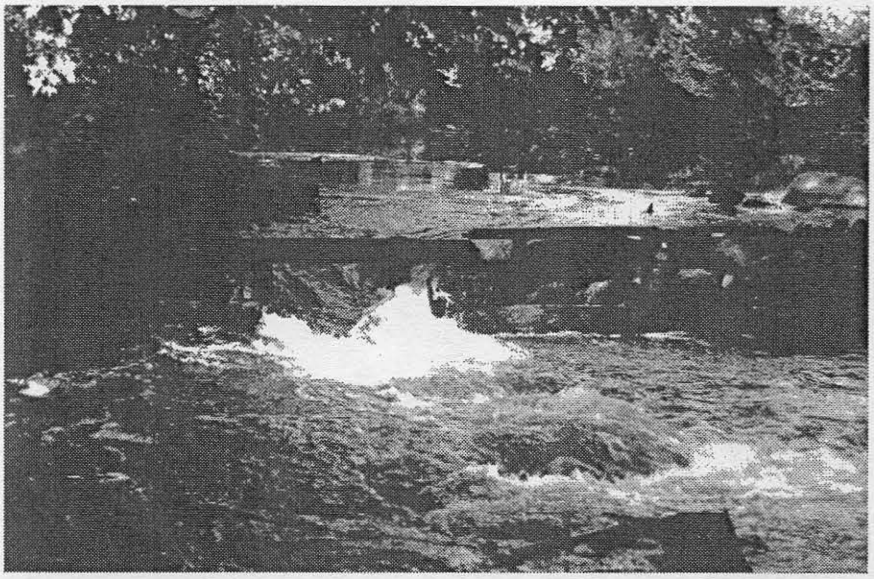


Winchester, N.H., Cheshire County, 1887, Panaramic View. Library of Congress/MrSID Publisher Web Site.

stores" without revealing location. Also according to Ms. Atkins, in 1819 the Ashuelot River was opened between the Connecticut River and Keene to navigation with "temporary locks around two falls and with the riverbed somewhat straightened and deepened." The enterprise failed soon after. In 1838 David and John Ball built a linseed oil mill in Ashuelot Village. Between 1839 and 1850 Graves and Company produced wooden musical instruments.

Following the construction of the Ashuelot Railroad in 1850 between Keene and South Vernon, Vermont, many manufacturing enterprises appeared in Winchester, many of which utilized timber as raw material and represent the forerunners of the many wood-based manufacturing companies that would be located along the river in the vicinity of the Winchester Village timber crib dam. The 1855, George Ticknor's Gazetteer (1855, *A Gazetteer of New Hampshire*, Claremont, NH) reported that there were "two thriving villages in this town," and listed businesses but without indicating in which village they were located: "two woollen factories, in one which are employed 40 hands, in another 15, two pail manufactories, employing 10 hands each, a friction match factory, eight stores, two druggists' shops, two hotels, two sawmills, and one linseed oil manufactory. Considerable expense has recently been made in constructing a canal from the Ashuelot river, to be applied to manufacturing purposes on a large scale."

It is not clear what the dimensions the earlier dam(s) at Winchester Village might have been. A 1980 U.S. Army Corps of Engineers site evaluation report suggests that, based on river bank elevations, a dam up to twelve feet high might be constructed there. The industrial development and the utilization of the river in Winchester Village may be traced with some confidence beginning in 1884 using *Sanborn Fire Insurance Maps* and an 1887 panoramic map (a.k.a. Bird's Eye View). By 1884 steam engines were playing a major role as prime movers in many industries, but the Sanborn 1884 map suggests a sawmill (Dickinson & Baker) and a grist mill (F.P. Willis) were being operated with water power from the impoundment of a dam that preceded Dam No. 255.10. Both mills were located on the north bank. Another manufacturer on the north bank, A.M. Howard Box Co. may also have been at least partially powered by water, although the 1887 panoramic view suggests a rope drive from the steam-powered Winchester Box Co. across the street (running approximately where Sunset Village Road is today). By 1892 only the Howard box mill was running (using water and steam), while the grist mill was vacant and both the Dickinson & Baker and the Winchester Box Co. buildings are gone. By 1902 the dam which appeared on the 1884 and 1892



Winchester Dam remains.

maps has been replaced with a dam of a different configuration, yet, interestingly, labeled as "Old Dam." It can be inferred that the earlier dam had been utilized for water power to north-bank mills for some years before 1884. The reliance on water power at Winchester Village ended by the beginning of the 20th century, and a different dam was constructed to provide an impoundment of water to be utilized for fire protection, industrial processing and log rafting.

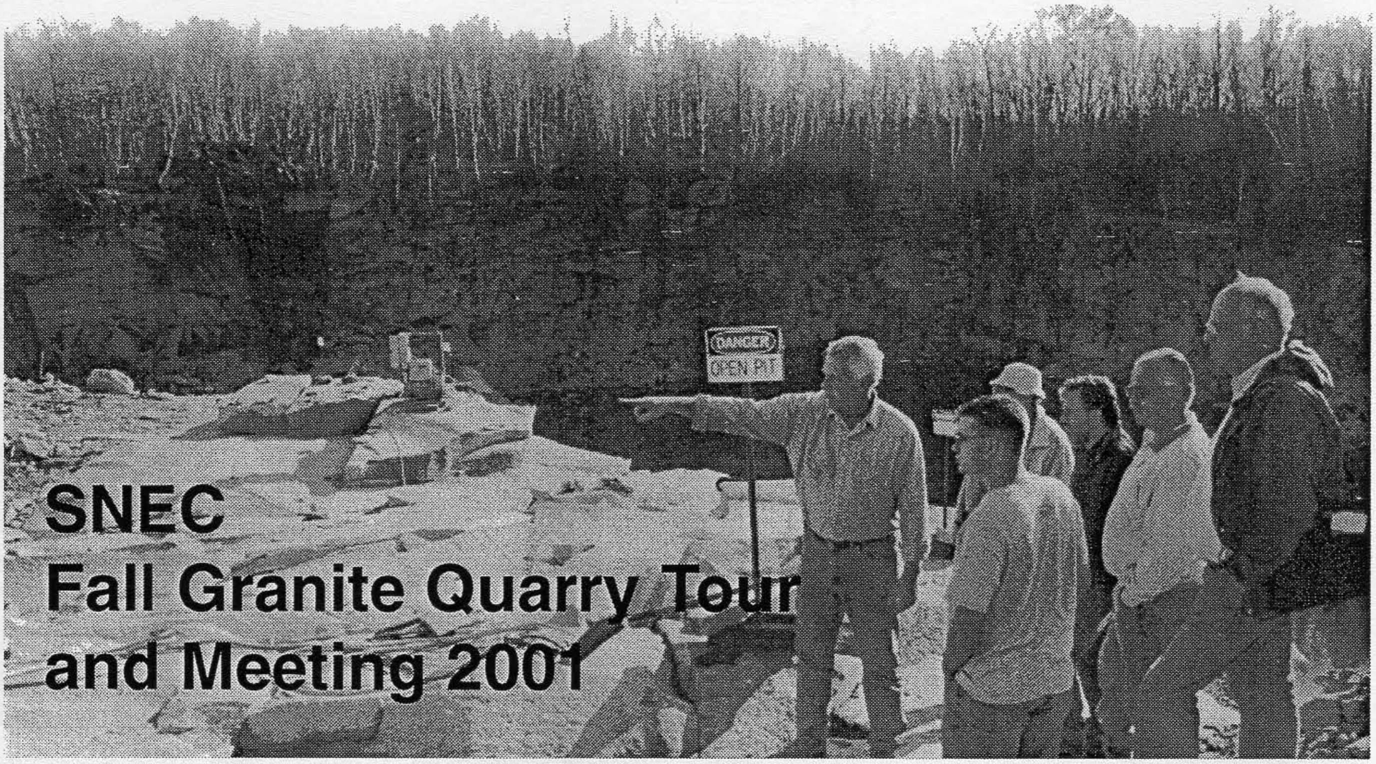
Winchester Village was one of several communities in Cheshire County that saw the growth of pail manufacturing and wood-ware industries following the development and manufacture of the cylinder saw and other specialized machinery by such entrepreneurs as Richard Stuart, Reuben Hyde, Elisha Murdock and Baxter D. Whiney in nearby Winchendon, Massachusetts in the 1830s. According to Richard A. Martin, in his book, *The Only Mill in Town, the Story of the Pail-Making Industry in Richmond, New Hampshire* (1995, Richmond, NH), by 1850, the Manufacturers Index of the United States Census listed 21 pail mills in Cheshire County as follows: Richmond 6, Rindge 3, Swanzy 3, Winchester 3, Marlboro 2, Troy 2, Keene 1 and Dublin 1. Martin also notes that pails were constructed mainly from second-growth native white pine by applying the coopers art; that is, curved staves are cut from pine logs and fitted together to form a cylindrical shape held in place with hoops. The term "pail" is generic when referring to a manufacturer whose production might include one or more of several forms such as pails (with the top diameter larger than the bottom), buckets (with the top diameter smaller than the bottom), cans, tubs, kellers and piggins. These containers were produced in a variety of sizes, often fitted with covers, for the packaging of salt fish, maple sugar, pickles, jelly, lard, butter, paint, varnish, and many other materials.

Small mills in the area produced components such as pail handles or bottoms that were sold to larger manufacturers. Recent research in nearby Troy, NH, by this author, revealed that the small Brown Turning Mill that operated in that town between 1837 and 1880 supported its owner with the production of small wood components, and who may have had Winchester manufacturers as customers.

In an effort to expand to a broader product base that might cope with market fluctuations, smaller pail mills experimented with the production of boxes, bobbins, cloths pins and other wares (see Martin 1995). In the industrial history of Winchester Village we see a production shift from pails to boxes as competitive metal products reduced demand for wooden pails toward the end of the 19th century, followed by a successful growth of a wood box industry until new packaging materials such as corrugated cardboard cause its business to decline. State records suggest that the timber crib dam that created the sawmill pond was maintained into the 1940s and repairs to the dam ceased as the wood box business declined beginning about 1945. In the last half of the 20th century, no longer economically useful, Timber Crib Dam No. 255.10 was allowed to decay. The Town of Winchester became the owner of the dam in 1977. In 1998 State Dam Safety Engineers recommended repair or breaching the dam.

Dennis Howe
Concord, NH

SNEC Fall Granite Quarry Tour and Meeting 2001



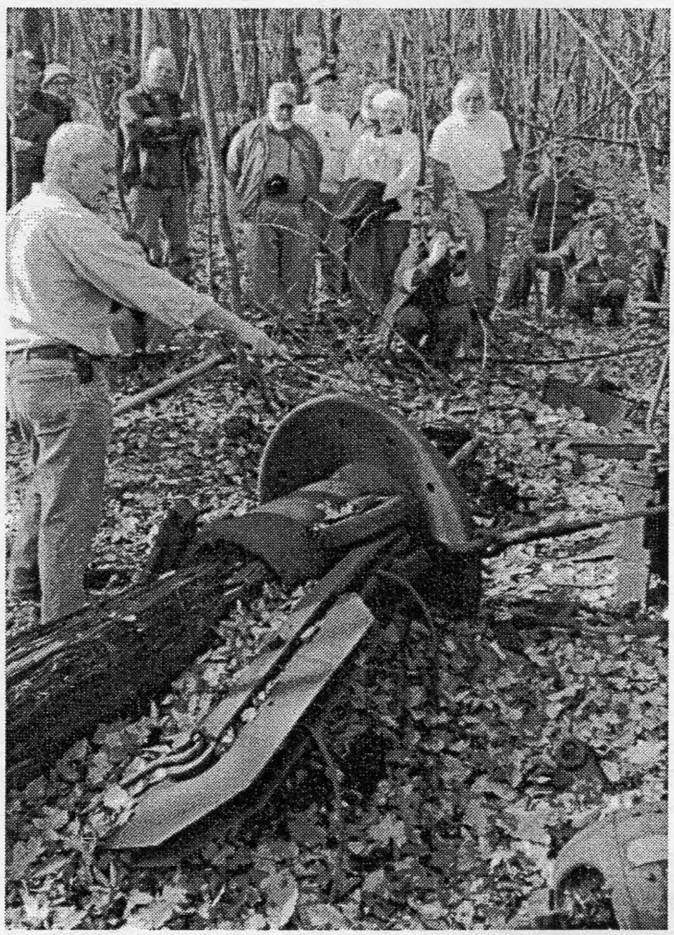
At the Chester Granite Company quarry, owner Allen Williams explains quarrying methods.

On November 3 the Southern New England Chapter clambered up the Jacob's Ladder Trail in western Massachusetts for a fascinating tour of historic and contemporary quarrying techniques. The neighboring towns of Becket, Blandford and Chester are the source of the famous "Chester blue" granite, a hard, fine-grained, stone favored for memorials and monuments since the 1870s.

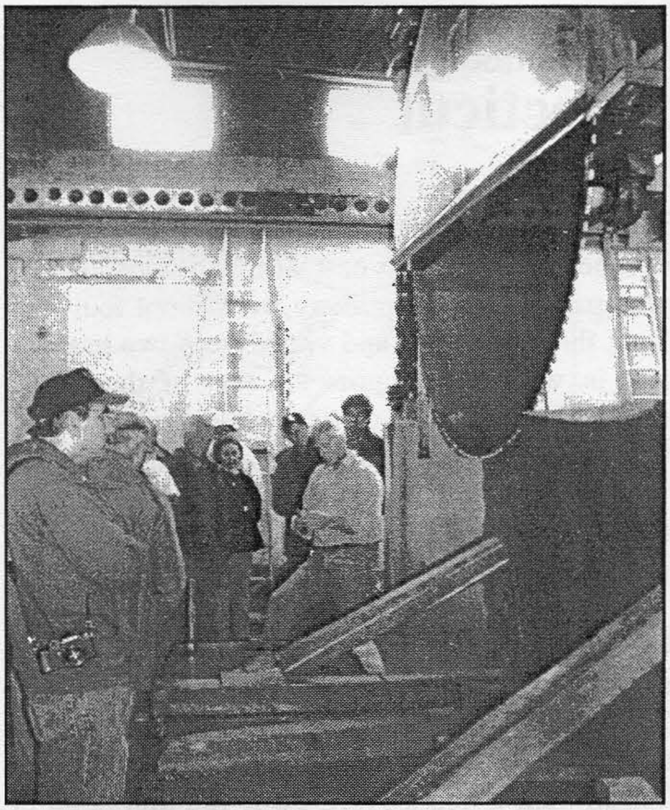
Our guide for most of the day was Allen Williams, owner and operator of the Chester Granite Company. Allen Williams was the perfect interpreter, able to supplement his own practical knowledge of quarrying with historical knowledge gained from his father's experiences working at the Hudson Chester quarry.

The tour began at the Hudson Chester quarry in Becket, which opened in 1870 and closed in 1947. The quarry is a remarkable IA site. By remaining in operation through World War II, the quarry did not lose its equipment to scrap drives like most of the local quarries and its subsequent abandonment has left an extensive collection of historic equipment in situ.

The approach to this hilltop quarry is marked by towering piles of "grout," the scrap rock that must be cleared away from the working face. The quarry proper is a striking sight, with the high



Allen Williams explains the workings of a fallen derrick used for raising quarried blocks from the Hudson-Chester Quarry floor.



Giant water-cooled circular saw for cutting granite blocks at the Chester Granite Company cutting shed.

angular faces of the blue-hued granite forming a bowl around the flooded quarry floor. A single derrick mast with its bull wheel remains upright on the edge of the highest face; another lies toppled nearby. These derricks were capable of hoisting up to forty tons, though the quarrymen would rarely maneuver blocks bigger than eight or nine tons. The winch or draw works that operated the derrick cables are still in place about 30 yards back from the edge. These were originally powered by steam, then compressed air and finally by diesel engines. Compressed air remained a critical component in the drilling and in the maintenance machines found in the extant blacksmith shop. Notable among the surviving equipment are an Ingersoll-Rand air compressor, an Ingersoll-Rand "upsetter" used to sharpen drill bits, a surfacing machine, and a single drill. Fortunately, the rarity and value of this site has been recognized by the Becket Land Trust which has acquired it for preservation.

After an al fresco self-catered lunch, the chapter held the annual business meeting and elected its current officers – Robert Stewart, president; Jonathan Kranz, program chair; Charles Schneider, secretary; and Rick Greenwood, treasurer.

The next stop was Allen Williams' Chester Granite Company in Blandford. Allen has reintroduced active extraction at an old quarry with architectural stone as his primary product. He explained both his contemporary single-handed quarrying techniques, in which he employs a range of tools from the traditional feathers, wedges and gluts to modern jacks - air bags only 12" square that can hold a block weighing up to twelve tons. The company's shop includes a wire saw and a diamond-tipped rotary saw (both state of the art), which Allen had in operation during our visit. A yard full of a variety of stone and a sculpture garden featuring Allen's works in Chester blue capped this superlative excursion with a most knowledgeable and accommodating guide.

The day concluded with a visit to Chester, where we inspected an early 20th century stone cutting shot saw and then moved on to the Chester railroad station. David Pierce of the Chester Foundation opened up the 1840(!) station for us as well as the rolling stock, including a restored 1919 wooden caboose and a box car with an interpretive exhibit that outlined the many highlights of this stretch of the Boston & Albany and the 1000' climb from Chester to the summit of the Berkshire grade at Washington, MA.

Fading daylight put an end to this chapter meeting, however, we had hardly exhausted the opportunities offered by the Chester environs, which include abrasive emery mines and processing plants, a mid-nineteenth century iron blast furnace site, a small chromite mine site, and numerous Boston & Albany Railroad resources, including the massive 1830s Whistler-designed stone arch bridges in the Westfield River gorge, as well as a roundhouse and coaling tower associated with steam pusher locomotive operations on the Washington Summit grade. If you are interested in visiting these railroad resources, join the Chester Foundation at the Chester Depot for their annual history event, "Chester on Track," Saturday, May 18th. Call the foundation for more information at (413) 354-7752.

Richard Greenwood
Barrington, RI

Cook's Dam, Ansonia, Connecticut

Beaver Brook and Cook's Dam

Beaver Brook is a minor tributary of the Naugatuck River. While small, the brook drains a large area and its flow is reliable throughout most of the year. It also had sufficient fall at this location to satisfy the power requirements of a small manufacturing plant. The location is characteristic of the intensively developed water resources found in many 19th century Naugatuck Valley and New England manufacturing sites. In the early-1800s, Beaver Brook provided power for a saw mill and blacksmith shop at a dam site further upstream from the location of Cook's dam. Beginning in 1867, Beaver Brook provided power and process water to a small but significant 19th century industrial site.

After 1920 the Cook's dam was no longer used for industrial purposes. Abutting landowners partially filled the mill pond, expanding their properties. Its mill pond had become a stagnant repository for old tires and shopping carts. The City decided to remove the dam, replace the adjacent Jewett Street bridge and create a landscaped park in the area. Engineering studies revealed that removal of the bridge would dangerously weaken Cook's Dam on Beaver Brook, abutting it on the upstream side. Ansonia removed Cook's dam during the summer of 2001.

The City of Ansonia retained American Cultural Specialists L.L.C. to conduct the Phase I Reconnaissance Survey. AMCS conducted the survey in the spring and summer of 2001. Work included a surficial inspection of the site and associated areas, a documentary study, subsurface archeological investigations, and monitoring/ photo-documentation of the demolition work.

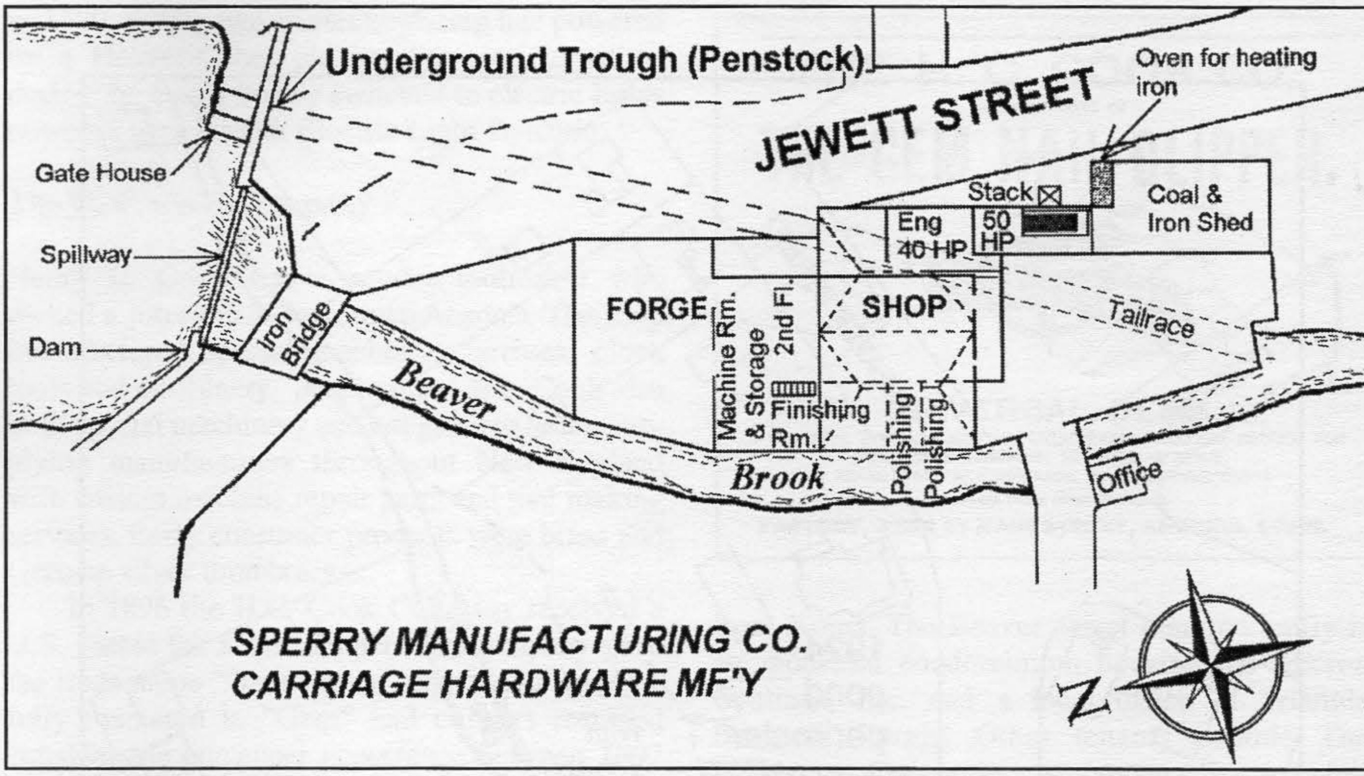
Cook's dam was a 16 foot high, 50 foot wide masonry dam made of roughly squared and rectangular granite blocks of varying sizes, cemented together. The structure dammed Beaver Brook and formed the southern boundary of Cook's mill pond. It had a stone masonry spillway about twenty-nine feet wide on its east side. The stone masonry capstones in the spillway were about four feet long, three feet thick and varied from two to three feet in width. The upper six feet of the dam's downstream face was vertical while the lower portion sloped downstream at an approximate angle of 73o. The upstream face of cemented granite block sloped at an angle of 62o. Stone rubble and packed earth formed the internal structure.

In 1865 Wales Terrell acquired the Beaver Brook water rights and by 1868 had an earth dam, smaller than the masonry dam that existed until 2001, at the site. This dam was associated with a blacksmith and file manufacturing plant at the site. Terrell built a home overlooking the mill pond in 1875. Currently, his house is used as the Spinelli-Malerba Funeral Home.

The industrial development of Beaver Brook was part of the great commercial and industrial expansion of Ansonia. With all the manufacturing activity in the borough, a market for local suppliers of tools, dies, files, drills and a variety of industrial hardware existed. Excepting railroads and water-borne transport, 19th century movement of goods and people required horse drawn carriages and wagons. Wheeled vehicle builders needed a variety of special fasteners, springs, wheels, steps and unique hardware for their products. The Naugatuck Valley, with its skilled workers and experience in the metal trades, was especially able to supply these goods. Manufacture of carriage hardware and specialized tooling did not require the power needed to run massive rolling mills or a large factory. These activities could be powered by a smaller stream having a dependable flow.

The Sperry Manufacturing Company

The end of the 19th century marked a peak of horse-drawn road transportation. Railroads had

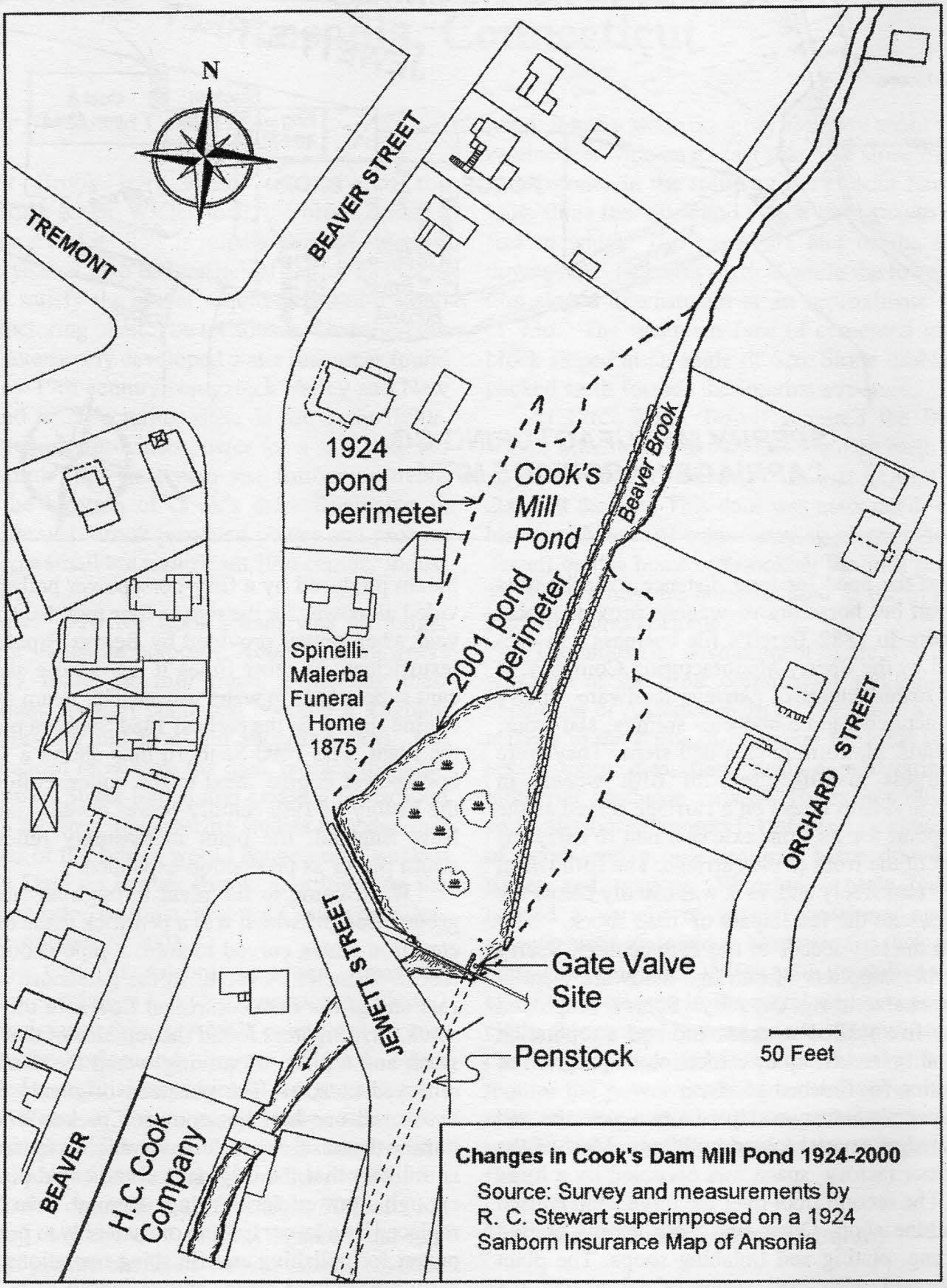


reduced the need for long distance over-the-road transport but horse drawn wagons provided local transport. In 1882 Terrell's file business was succeeded by the Sperry Manufacturing Company, a major manufacturer of carriage hardware. Sperry manufactured saddle and clip springs, slat irons, joint ends, platform circles and steps. They were the largest manufacturers of fifth wheels in America. A fifth wheel on a carriage served as the pivot point for its front axle and had to carry the weight of the front of the carriage. The fifth wheel had to turn freely and, as it was usually below the springs, take the full impact of road shock.

In the last decade of the 19th century, Sperry and other suppliers of carriage hardware were at full manufacturing capacity. Sperry employed twenty-five skilled workers and had a reputation for quality backed up by a meticulous program of inspection for finished goods.

Sperry's factory occupied a two-acre site and consisted of several joined buildings. Most of the first floor factory space was occupied by a forge shop. The second floor over the forge shop housed a machine shop. Other first floor rooms housed polishing, plating and finishing shops. The plant was heated with coal stoves. Coal heated the forges. Kerosene lamps, provided light that was rarely needed as windows supplied ample light. Steam produced by a fifty-horsepower boiler provided all power for the two to four months of each year when power provided by Beaver Brook was insufficient. At other times it provided a significant supplement to water power. The steam ran an engine shown on the earliest 1884 Sanborn plan of the plant. The 1890 Sanborn map shows a forty-horsepower engine next to the boiler. Following the history of 19th century power development in New England, the plant increasingly relied on steam power as production expanded.

Water came to the plant through an "underground trough" which was a penstock made of riveted iron plates curved to form a pipe about two feet in diameter. A valve in the gatehouse at the east end of the dam controlled flow into the penstock. Investigators found the remains of this penstock and a piece of valving when the dam was removed in 2001. The penstock originally fed a seven and one-half horsepower Crocker-Wheeler turbine that discharged downward into a tailrace. It is unlikely that the original turbine could provide enough power for forging. It may have been replaced by a larger turbine or used only to provide power for polishing and finishing operations. The forty-horsepower steam engine would have been ample for the light forging operations. Electricity began to play a role at Sperry's probably as early


N
TREMONT
BEAVER STREET
1924
pond
perimeter
Cook's
Mill
Pond
Beaver Brook
2001 pond
perimeter
Spinelli-
Malerba
Funeral
Home
1875
ORCHARD STREET
JEWETT STREET
Gate Valve
Site
Penstock
50 Feet
BEAVER
H.C Cook
Company
Changes in Cook's Dam Mill Pond 1924-2000
Source: Survey and measurements by
R. C. Stewart superimposed on a 1924
Sanborn Insurance Map of Ansonia

as 1890. Sperry had an electroplating line powered by a Holtzer-Cabot plating dynamo. Sometime during the 1890s Sperry switched to electric lights powered by a Ferreth Electric Light Dynamo.

The H. C. Cook Company

Henry C. Cook was a master toolmaker who owned a job shop in downtown Ansonia. The shop manufactured special machinery, presses, clock tools and machinery, punches and dies. Cook also built special machinery and cut gears to order, supplying manufacturers throughout New England with custom machine repair parts and tool making services. Early consumer products were brass and German silver thumbtacks.

In 1896 the H.C. Cook Company received a U.S. Patent for a nail clipper. The company gave the trade name "Gem" to the clipper and successfully marketed it. "Gem" nail clippers received considerable consumer acceptance between 1897 and 1900. The first illustration of the "Gem" clipper appeared in the 1898 Price-Lee Business Directory. Cook needed more manufacturing space for the new product and bought the Sperry Manufacturing Company in 1901. H.C. Cook discontinued production of carriage hardware to concentrate on consumer products. As additional products were added to the Cook line, new brick buildings were built on the west side of Beaver Brook in 1919. The new plant housed a sheet metal stamping department, electroplating equipment and lines for enameling, baking and assembly.

The company continued to diversify its product line and by 1926 produced paper clips, metal index tabs and file signals. Other consumer items included the "Burro" adjustable pistol grip hacksaw frame, the "OpenrighT" can opener and clips for use on ointment and toothpaste tubes. The "Gem" and "Ansonia" nail clippers continued to sell well. As late as 1967 the product line still included the clippers and stationery hardware. Cook also produced custom sheet metal specialties for other manufacturers.

In 1984 H.C. Cook Company sold out to the W.E. Bassett Company of Shelton, Connecticut. Bassett continued to make the nail clippers until August 2000 when they began importing them

from Korea. The Beaver Street plant currently is an industrial condominium housing the Micron Coatings, Inc. and a local office of Triangle Business Forms. Other tenants include The Handyman Connection, a company that matches contractors with homeowners and social service agency. The following illustration shows some of the changes in Cook's Pond from 1924 to 2000.

Conclusion

Connecticut's Naugatuck River Valley, with its abundance of water power, has been a center of commerce, manufacturing and industrial production from the colonial period to the present. Its water powered saw and grist mills, which served local customers, were replaced by factories that made profitable products to satisfy worldwide demand. Ansonia was a leader in the hardware and metal working industries. The history of Cook's Dam on Beaver Brook summarizes the transition of an early agricultural and forest product processing mill locale to a water powered industrial site. Further development occurred as energy requirements increased and water power was supplanted by steam and electricity. The factories here also responded to market changes and their product output reflected adaptation to production of more profitable, mass-produced consumer goods.

Robert C. Stewart
West Suffield, CT

A Proposed Working Museum

Northern industries and their related mills wove the social and economic life of our towns and villages as they evolved from early small water powered grist milling and saw milling, to the larger steam and electrically powered industrial complexes of the early twentieth century. Most of the early working buildings and their power sources have disappeared from the landscape and the later and larger industrial complexes have made way for newer development or have been converted to other uses as manufacturing is transferred overseas.

A group is forming to redevelop an existing mill complex in New Hampshire to establish a museum that will promote a process-driven learning environment, producing traditional products by original industrial technologies. The manufacturing technologies will use early power sources including water and steam. The financial structure is proposed to be made up of traditional sources, partnerships, associations, etc.

The current group feels that it is the right time to celebrate historic equipment and the uniqueness that make raw materials into useful, everyday products by skilled hands and by the use of early machines and manufacturing processes.

We are a team of resourceful, creative people that want to expedite this emerging plan. We would like to entertain new team members that have access to early working technology/ machines, resources, creative ideas, and/or focused energy. We realize that this is a large undertaking and that it will take expertise from many individuals to complete the project. If you are interested in the development of this project, please write to:

Gerry DeMuro
PO Box 58
South Acworth, NH 03607

Membership Application Form

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
Maine, New Hampshire, Vermont, Northeastern New York.
❒ Regular $10.00
❒ Student $5.00
❒ Lifetime $100.00
Make check payable to NNEC-SIA and mail to:
Herman C. Beown
Traeasurer, NNEC-SIA
250 West Shore Road
Grand Isle, VT 05458-2104

Southern New England Chapter
Massachusetts, Rhode Island, Connecticut
❒ Regular $15.00
❒ Student $10.00
❒ Lifetime $150.00
Make check payable to SNEC-SIA and mail to:
Robert C. Stewart
1230 Copper Hill Road
West Suffield, CT 06093

Chapter members are encouraged to join the national **Society for Industrial Archeology**
❒ Regular $35.00
❒ Student $20.00
Make check payable to SIA and mail to:
SIA-HQ
Dept. Socieal Studies
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Name: ______________________ e-mail: ______________________

Address: ______________________

____

Phone: ______________________

Chapter dues do not include membership to national SIA.