



Society for Industrial Archeology · New England Chapters

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Call for Papers

for the Ninth Annual Conference on
New England Industrial Archeology
to be held on
Saturday, February 10, 1996
at Plymouth State College,
Plymouth, New Hampshire

Papers are invited for presentation to
the Ninth Annual Conference on New
England Industrial Archeology to be
held on February 10, 1996 at Plymouth
State College.

The conference is an annual project
of the Southern and Northern New
England Chapters of the Society for
Industrial Archeology which alternately
sponsor and co-host the meeting with
the host institution. The purpose of the
conference is to encourage the study of
the material culture of our industrial
past, and exchange information on all
aspects of our industrial heritage.

Papers with a strict twenty-minute
time limit may describe field investiga-
tions and other research and findings
concerning structures, machinery, indus-
trial sites, manufacturing processes,
technology, labor, etc. Also, reports on
efforts at conservation, restoration, reha-
bilitation, public education or advocacy
programs are welcome. Topics relating
to typical New England industries are
encouraged but not absolutely necessary
to be included in the program.

Persons who wish to present a paper
are asked to send an abstract and title,
along with a short biographical note

about the author, by January 10, 1996 to:
Dennis Howe, Paper Chair
22 Union Street
Concord, New Hampshire 03301-4250
(603) 224-7563 (home phone)
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President's Report, NNEC

The Northern New England Chapter
has had a very successful year. The
spring meeting was held at hospitable
Washington, New Hampshire, as report-
ed on earlier. Some members also par-
ticipated in archeological survey work at
Fanconia, NH, and Richmond Furnace,
MA, in the late spring and summer.

The fall meeting of the chapter was
held at Portsmouth, NH, on October 21,
1995. Strawberry Banke Museum gra-
ciously offered its Orientation Center as
a meeting room, provided coffee and
opened the seventeenth century
Sherburne House for members to see
(for an introduction to building methods
and a contrast with the afternoon pro-
gram). From there, we went to the
Memorial Bridge, a vertical lift bridge
designed by J.A.L. Waddell and built by
the American Bridge Company; it was
opened in 1923. Members were treated
to a tour of the operator's house (located
over the center span) and rode up on a
full lift (129'+), courtesy of operator
Barry White.

Following that, we went to the tug-
boat wharf (Moran Towing on New

Hampshire), where harbor pilot Capt. Dick Holt, Jr., gave a most informative talk about the towing industry and the handling of ships and tugs in the Piscataqua River. We then toured the largest of the Portsmouth tugs, the *Eugenia Moran*, guided by Dick Holt, Jr., Fred Boyce (Retired as Moran Manager in Portland and Portsmouth) and engineer Tom Worden. In the afternoon, we toured New England Homes in neighboring Greenland, NH, courtesy of Vice-President Bob Killkelley and Doug Hackney, where we saw the various steps in the construction of these fine manufactured homes. Although a dark and damp day, the storm held off until the evening, and the twenty-one who attended enjoyed a real IA tour.

The meeting, incidentally, reelected the 1995 officers for another year. The Annual Conference on New England Industrial Archeology will be held in February 10, at Plymouth State College in Plymouth, NH.

Woodard D. Openo
Somersworth, NH

President's Report, SNEC

Having rescued perhaps a thousand plans and drawings from the Revere Sugar Refinery in Charlestown, Massachusetts, as reported in the last Newsletter and at the Winter Conference, the SNEC still faces the task of sorting through these materials and finding an appropriate archival home for them. Chapter Secretary Tom Vaughan is generously storing this material at his house, but they can't stay there forever. We could really use some volunteer help! Simply undertaking an initial catalog of these materials to use in approaching an archive represents a big project.

These are fascinating documents of many, many aspects of the operations at Revere Sugar. A great student project! Please give me a call if you'd like to work on this effort. 617 727-8470



(work), 617 628-2786 (home).

IA remains an important element of efforts to promote heritage tourism in New England. A good example of this comes from the recently created Essex National Heritage Area, created in Essex County, Massachusetts. The Heritage Area has produced a series of Trail Brochures, one of which, the "Industrial Trail," recognizes some of the significant industrial history of this region.

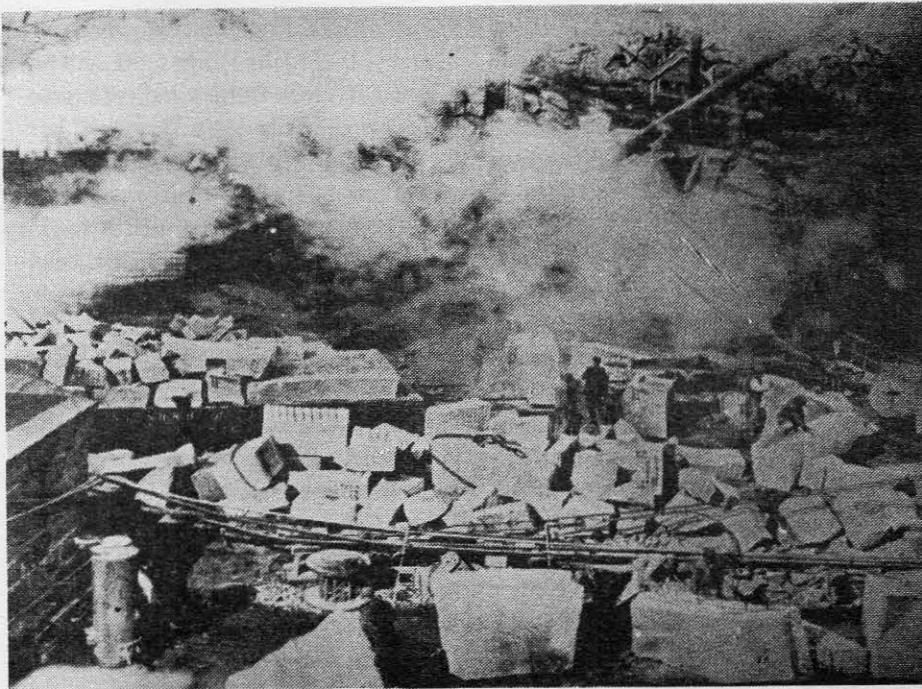
The "Leather Story" explores themes related to shoemaking and tanning, and celebrates sites in Lynn, Haverhill, Peabody, Danvers, Salem, Rowley and Wenham. The "Textile Story" notes the technological, architectural and social history of industrial sites in Lawrence, North Andover, Andover, Methuen, Amesbury and Newburyport. The brochures are available at the National Park Service visitor center in Salem, and at other visitor centers throughout Essex County.

Earlier this year, the Boston Globe reported on efforts of the Saugus Historical Society to save a threatened "ten-footer" shoe shop. If the Blackstone Valley experience over the past few years is any indication, the establishment of the Essex Heritage

Area will give a big boost to positive public awareness of IA resources, and to local efforts to preserve them for future generations.

Speaking of the Blackstone Valley, I'm very pleased to announce that the Blackstone Canal Historic and Archaeological District, comprising the length of the Blackstone Canal in Massachusetts, was recently listed on the National Register of Historic Places. The nomination includes the 27-1/2 mile length of the Canal from the Rhode Island state line to the northern terminus in Worcester. The Rhode Island section of the Canal was previously listed on the

National Register. The Canal, constructed between 1824 and 1828, and operated until 1848, is a significant part of American civil engineering history. The canal trench, towpath and berm remain intact for much of the Massachusetts length of the Canal, as do locks, walls, spillways, basins, bridge footings, and post-canal water power features in many locations. The nomination was prepared by SNEC member Virginia Adams of the Public Archaeology Laboratory, Inc., and supported with funds from the Blackstone River Valley Heritage Corridor



Commission, Preservation Worcester, and the Massachusetts Historical Commission.

Granite: Enduring Legacy of Massachusetts, is an exhibit that recently opened at the Commonwealth Museum at the Massachusetts Archives, 220 Morrissey Boulevard, Boston. The show assembles an impressive array of artifacts, photographs, illustrations and multiple videos that explore the history and ongoing activity of the granite quarrying industry in Massachusetts, particularly in Quincy, Cape Anne and Chelmsford. The show depicts regional geology and the varieties of granite deposits that attracted interest as exploitable resources. The exhibit also focuses on representative businessmen and entrepreneurs in the industry, such as Solomon Willard, designer of the Bunker Hill Monument, Granite Railway engineer Gridley Bryant, and entrepreneur Thomas Perkins. The quarry industry had its share of technological innovations, especially in transportation of the cut stone, and the exhibit includes a full-scale 1926 replica of the Quincy Granite Railway cars first built one hundred years earlier. The show also celebrates the accomplishments of the gran-

ite workers: quarrymen, riggers, cutters, finishers, polishers, carvers/sculptors and dealers. The social history of the granite industry includes the stories of immigrants: English, German, Scots, Welsh, Scandinavian, Irish and Italian. It also found expression in quarry worker communities in places like West and South Quincy. Quarried granite has left its imprint on the New England landscape, where it forms not only landmark buildings and monuments, but is found everywhere as a structural or decorative element in building foundations, bridges, walls, and cemeteries.

The Commonwealth Museum, located near UMass Boston and the Kennedy Library is free and open to the public Mon-Fri, 9-5, and Sat, 9-3. Call 617 727-9268 for information. "The exhibit runs through next summer, and SNEC may try to schedule a quarry program in the spring to coincide with the show!

(PHOTO CREDITS: Thomas Crane Public Library (Quincy), Warren Parker Historical Collection.)

Michael Steinitz
Somerville, MA

Request for Manuscripts

The American Precision Museum invites the submission of manuscripts for publication in its quarterly newsletter *Tools & Technology*. We are particularly interested in the history of precision machine tools, the connection between tool and product, and the specific contributions of tool inventors and innovators. Our purpose is to increase understanding and appreciation of the ingenuity and entrepreneurial spirit which drive the development of technology. Manuscripts should be of between 500 and 2,500 words. Writing should be clear and readable for the aware lay person, with important sources documented by endnotes. All published manuscripts become eligible for receiving the Fairman Prize, awarded on the basis of *Tools & Technology* readers' choice. Send manuscripts to Editor, *Tools & Technology*, American Precision Museum, P.O. Box 679, Windsor, Vermont 05089.

Recent Iron and Glass Investigations in the Berkshires

Two notable industrial archeology events took place in Berkshire County, Massachusetts, in September. On Saturday the 16th a small crew of hardcore ironmasters assembled at Richmond Furnace for the now-biannual weekend recoding mission. Assisted by Allison Edwards and Eleanor Morris, Bill Edwards and Karl Danneil continued their dedicated surveying efforts, this time concentrating on the water-wheel headrace, and a series of discarded furnace hearth components and iron "salamanders" scattered along Furnace Brook. Matt Kierstead continued has ongoing examination of these artifacts and is researching the evolution of iron blast furnace hearth construction in an attempt to make some determination about furnace configuration and operations at Richmond. Vic Rolando exiled

himself to the charcoal kiln site, where he excavated two kiln foundations at several points and searched unsuccessfully for a third kiln noted in Bill Edwards's voluminous furnace archives. Bill, Matt Kierstead, and Ed Kirby walked the less-traveled parts of the site and took field notes for a written description of the furnace site and setting. This description will be a component of the National Register Historic district nomination for the entire Richmond Iron Works. In addition to the furnace plant, the district boundaries include associated waterways and mill sites; the Richmond Iron Works office and Ironmaster's house; the ironworks village, including worker houses, the schoolhouse, and the post office; several iron ore mines, the charcoal kiln site, and even the extensive slag heaps. Much of the research required for the nomination has been completed, and the process of putting the nomination package together has begun in earnest. Assistance with architectural descriptions of the Richmond Furnace village structures is still needed. Recording activities at the furnace were rained out on Sunday... and speaking of the National Register, "Kenmore," the Richmond home owned and operated as a seasonal guest house by the Scaduto family, and place of respite for weary furnace recorders, was nominated for listing to the National Register of Historic Places by the Massachusetts Historical Commission on September 13.

On Saturday, the 23rd, the Lenox, Massachusetts, Historical Society conducted field investigations at the site of the Lenox Glass Works quartzite quarry and wash house site on Washington Mountain, in Washington, Mass. Those attending included Joan Kaiser, Sandwich Glass author and historian; Nan Terry, President, Berkshire County Historical Society; Charles Flint, President, Lenox Historical society, and other society officers; Bill Edwards and Matt Kierstead, SIA, and others. The quarry is located in the Cheshire Quartzite, as the geological formation is known, which is more than 95% pure

silica. This quarry was the source of pure silica glass sand used in the manufacture of glass at the Lenox Glass Works (1845-1878), and also at the better-known Sandwich Glass Manufactory. The quartzite was broken from a series of ledges, and transported by wagon team to the wash house site. The quarry area contains several rough fieldstone foundations of varying sizes, which were tentatively identified as ox barns and housing for quarry workers and teamsters. The wash house, located approximately one-half mile downhill from Roaring Brook, presented some mysteries. At this site, run-of-quarry quartzite was crushed to pea-to-sand consistence, washed of clay and other impurities, and dried in large open-air pans before shipment down the mountain to the glass works in Lenox. A brief site walk-over established the direction of material flow across the property. The wash house foundation straddles Roaring Brook, and several arches, notches and races suggests various possible interior configurations for washing sand, but did not suggest the presence of waterpower of sufficient energy to crush the hard quartzite. The nature of the equipment used to crush the rock, apparently primitive, and possibly even animal-powered, remain elusive after a day that generated more questions than answers. The event was videotaped and will be featured on Pittsfield-area cable television.

Matt Kierstead
Wellesly, MA

SNEC Fall Process Tour Mystic River Foundry, Mystic, Connecticut

The Southern new england Chapter fall process tour was hosted on October 21 by the Mystic River Foundry in Mystic, Connecticut. The Mystic River Foundry is a small, non-ferrous foundry, which makes art and machinery castings in aluminum, brass and bronze. The

Mystic River Foundry is owned and operated by Phyllis Borges, 70, and her all-woman crew. Borges and crew practice what is becoming a "lost art," performing many now-mechanized foundry techniques by hand.

The foundry workers mix their own molding sand. In addition to the hand-ramming of pattern molds, this foundry practices "loose molding," or carving a pattern directly into the molding sand. Metal is melted in graphite crucibles in an oil-fired melter furnace and hand-poured into molds. Much of the final finishing of raw castings is also performed manually. The Mystic River Foundry has made castings both lofty and lowly, from the New Haven City Hall clock, to parts for steam locomotives. The Mystic River Foundry is an example of the one-common "jobber foundry," a type of operation which survives by making one-off or limited-run castings, rather than relying on dedicated customers with large, predictable orders. Environmental pressures and the loss of heavy manufacturing have hit the New England foundry industry particularly hard, forcing the closure of historic foundries such as the H.B. Smith Company boiler works in Westfield, Massachusetts. The Mystic River foundry tour was an unusual opportunity to see manual foundry practices in an industrial environment that is fading from our region.

Matt Kierstead
Wellesly, MA

Grand Opening of Slate Valley Museum

On September 30, 1995, the Slate Valley Museum celebrated its opening at 17 Water Street, Granville, New York. Some of the exhibits in this new museum are:

A Quarry Shanty - A real shanty complete with tools and machinery found in all old-time shanties. Tape recordings of interviews with quarry

workers; outside a video demonstrating the process of slatemaking. Alongside is a geological display done by John Mead of Whitehall, NY.

The Stick - All early quarries used a mast (a stick) with rigging to lift slate from the quarry to the shanty. Adirondack Scenic of Glens Falls, known for their fabrications of major amusement attractions throughout the world, has created a stick with all the riggings.

WPA Mural - In 1939 artist Martha Levy painted a mural, *Men working in a Slate Quarry*, funded by the WPA. It hung in the Granville High School for many years, was restored by Dean Fausett for the Bicentennial, rehung in the town offices. It now holds a place of honor in the museum.

Paintings by Gene Fairbanks - Well-known local artist displays his work, which focuses on his Welsh heritage and quarry operations and scenes.

Early New Hampshire Bridges In Jeopardy

Recent interest in endangered steel bridges in New Hampshire has drawn attention to the fact that the state's bridge preservation plan does not include some highly vulnerable spans. Many of New Hampshire's oldest and rarest bridges are town-owned. Often unprotected by state or federal safeguards, such bridges are subject to deterioration and demolition without review by the State Historic Preservation Office.

The danger that faces some New Hampshire bridges was underscored this past summer when Steve Lindsey, a bridge enthusiast and columnist for the Valley Times-Journal, attempted to stir interest in saving a 1905 Baltimore truss bridge that spans the Sugar River in Claremont. Owned by the city and slated for demolition this winter, the bridge was once used to shuttle materials across the river between a pattern shop and a now demolished foundry built by

the Sullivan Machinery Company. As a non-highway span, the bridge was not included in NHDOT's bridge inventory. Its historical importance had never been evaluated and its demolition is not subject to review by the SHPO.

Evaluation of New Hampshire's highway bridges was attempted between 1985 and 1989 when representatives of NHDOT, the Federal Highway Administration (FHWA), and the State Historic Preservation Office systematically reviewed spans in the NHDOT statewide listing. New Hampshire's Historic Bridge Inventory evaluated some eighty-two metal truss bridges of various designs, ranging in date from 1892 to 1950. Bridges were assigned numerical scores based on their age and rarity, their designers or builders, their settings, and other attributes. Those spans that scored above a certain level were declared eligible for listing in the National Register of Historic Places and for protection under federal law if threatened by federally-funded highway projects. Several high-scoring bridges have since been preserved through rehabilitation or bypassing, while others of lesser distinction have been recorded and removed in various highway projects.

Unfortunately, the inventory did not include bridges that are "off system." Among these are an unknown number of town-owned bridges, many of them very old and some of them closed to traffic and locally regarded as town liabilities.

The vulnerability of such bridges became evident this summer when parties in the adjoining towns of Hancock and Greenfield reopened an old discussion about replacing the Cavender Road Bridge, which spans the Contoocook River between the two communities. Built in 1906 by the Groton Bridge Company, the bridge is one of two pin-connected low Pratt trusses left in New Hampshire. Although the span received a high score in the historic bridge inventory, its removal would not be subject to preservation review if no federal funds were involved.

Town funding sealed the fate of the

1921 Elm Street Bridge in Winchester this past summer. Originally slated for rehabilitation, the Warren truss was demolished by local officials when the cost of removing its old lead paint pushed the price of saving it above that of building a new span.

More recently, Bennington selectman Glenn Loucks proposed to rehabilitate the Thompson's Crossing Bridge over the Contoocook between Bennington and Antrim. Because it had been closed for some years and is "off system," the bridge turned out to have been missed by the historic bridge inventory and was unknown to the SHPO. Research disclosed that it is a rare pin-connected high Pratt truss built in 1893 by the Berlin Iron Bridge Company—one of two in the state, unless others have also been missed. These developments have convinced SHPO officials that New Hampshire is badly in need of a second historic bridge inventory—one that will focus on town-owned or abandoned bridges. The SHPO will raise the issue with NHDOT in the near future. Meanwhile, the office will welcome reports of early New Hampshire metal bridges from interested NNEC-SIA members.

James L. Garvin
N.H. State Architectural Historian

New Hampshire Industrial Heritage Commission Revitalized

The New Hampshire Industrial Heritage Commission has taken on partners to help set goals and to find ways to best utilize the Amoskeag Mill space donated by US First at 255 Commercial Street in Manchester.

A series of meetings this summer has brought together New Hampshire state officials and representatives of private groups and institutions to advise the Commission as to how best to exhibit the state's industrial history to the public. The initial partners in this effort are

Marilyn Hoffman of the Currier Gallery of Art, John Mayer (SIA) of the Manchester Historic Association, Dia Stoinitz of US First, Adele Boufford Baker of the Franco American Center, John Frisbee (SIA) of the New Hampshire Historical Society, Mimi Bergere of NH Partners in Education, and Dennis Howe of the Society for Industrial Archeology, NNEC. Providing leadership for the state are Van McLeod, Commissioner of Cultural Affairs and Jeffrey H. Taylor, Director of the Office of State Planning.

The Commission, which is made up of members appointed by Governor Steve Merrill, was formed several years ago as directed by a legislative act intended to preserve and exhibit the state's industrial history. The act did not include funding. Other than the appointments little was accomplished. The taking on of experienced partners this summer and the recent hiring of Alan Popp of New London to assist with fundraising is encouraging progress.

The Commission wants to compliment the outstanding accomplishments of such groups the Belknap Mill Society and Historic Harrisville.

Members of the SIA who have ideas about how best to teach and exhibit industrial heritage are urged to contact Dennis Howe, (603) 224-7563.

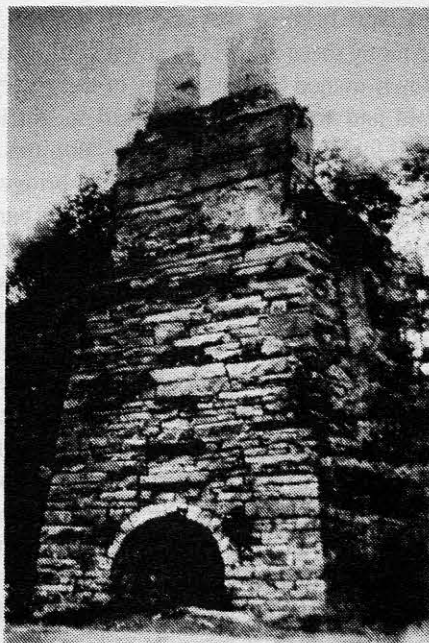
Dennis Howe
Concord, NH

New Publication

Managing Travel in Connecticut: 100 Years of Progress. Connecticut Department of Transportation 100 year history. July 1995. Published by the Connecticut Department of Transportation in cooperation with the Federal Highway Administration.

This book has been written as an historical account of the Connecticut Department of Transportation's first 100 years. What originated 100 years ago as a three-member commission with an ini-

tial budget of \$75,000 has developed into a department with some 4,000 employees and an annual combined operating/capitol projects budget of nearly \$1 billion. In 1895, the \$75,000 was distributed to towns on a matching basis to fund the construction of roads that met state standards. Now, a century later, the Connecticut Department of Transportation (the Department) continues to administer a town aid program for local highway and bridge improvements. While providing assistance to local communities for roadway and bridge improvements. While providing assistance to local communities for roadway improvements was the principal function carried out by the first three highway Commissioners (and later the Highway Department), the current Commissioner, J. William Burns, is responsible for a multitude of transportation programs and projects involving not only highways, but also service, bus systems, airports, ferries, State Pier operations, highway safety, ridesharing and other mobility efforts.



Forest Dale Blast Furnace Ruin is Restored by State of Vermont

The long-awaited restoration of the blast furnace ruin at Forest Dale Furnace State Historic Site in Brandon, Vermont, was accomplished this past summer. The work was done by a crew of stone masons from Middletown, Connecticut (Joseph Mazzotta & Sons), under contract to the State of Vermont. The 10-acre furnace property is owned by the Vermont Division for Historic Preservation (the Division). Three to five masons worked 10-hour shifts at the site from Mondays through Thursdays. I visited Tuesdays, Thursdays, and Saturdays as time permitted, monitored progress, took over 350 slides and B&W photos, and identified, recorded and/or collected various artifacts as they appeared.

The furnace might originally have been built about 1823, although another reliable source gives "perhaps about 1840" as the construction date. The stack was enlarged in 1854 at which time it received its set of two iron blowing pistons. Although the historical record doesn't so indicate, the stack might also have received its blast ovens and fire brick lining at this time. The furnace last operated for two months in 1865. Sometime between 1900 and 1935 the ovens and most accessible binder hardware were removed (see figure 1).

In the early 1950s, the front of the stack was accidentally dynamited by a highway construction crew, who saw it as an excellent source of stone for fill (see figure 2). In 1974, a few years after the stack and 10 acres of surrounding

Figure 1. *The earliest known photograph of the Forest Dale blast furnace, taken about 1900, showing all the binder hardware and the top oven intact. View is of the front, casting arch (Vermont Division for Historic Preservation photo).*



Figure 2. A 1986 photo showing the damage to the casting arch 30+ years after the wall was dynamited (Rolando photo).

property were donated by Mr. and Mrs. Welland Horn to the Historic Sites Division (as it was then called), the site was placed on the National Register of Historic Places. And except for a fence and signs, little else happened here for the next 15 years.

In 1989, volunteers from the Northern and Southern New England Chapters, SIA, along with local resi-

dents' and Vermont Archaeological Society members, participated in a Memorial Day weekend recording project at the site under the direction of Project Leader David Starbuck. But the next spring, a large section of the lining broke off, and enough loose material dropped down into the three tuyere arches that the nozzles were buried from sight. The Division responded by con-

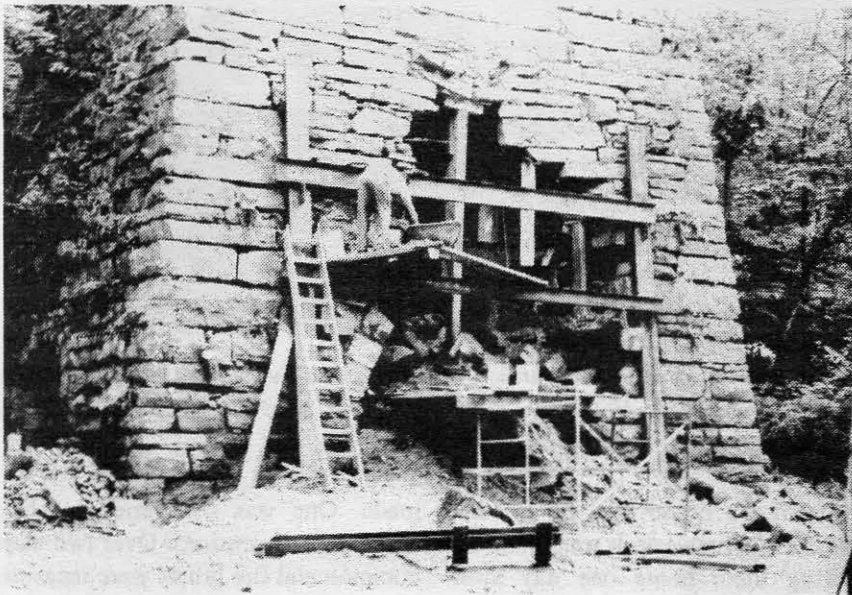


Figure 3. Steel scaffolding against and inside the front wall allowed the temporary wood support beams to be moved so the arch could be cleared of breakdown (Rolando photo).

tracting an engineer to inspect the stack and in the fall of 1991 had all four archways reinforced with heavy timbering and the top of the stack protected with a roof.

Restoration work started on Monday, July 17, 1995, with particular attention paid to rebuilding the severely damaged north wall and its buried casting arch. The first order of work, therefore, was to carefully move the timber supports in the casting arch, which stood on the breakdown, to rest on heavy steel beams set length- and cross-wise inside the archway, above where the top of the rebuilt archway would eventually be (see figure 3). With the supporting beams no longer resting on the breakdown, the archway could be cleared out. On August 3, the floor area of the casting arch was finally cleared. The other three archways, meanwhile, were cleared of breakdown, rebuilt or pointed as needed, and their temporary support timbers removed.

It was very exciting to see inside the casting arch, which had been buried under tons of stone for over 40 years. We now have some idea of what the hearth looked like (see figure 4). There are pairs of rusted iron rods sticking up from the floor that miraculously survived the crush of heavy stones (one is slightly bent over). One pair of 1-square inch-thick rods looks like they might have supported a heavy cross-piece (maybe to control the hearth tap?). Other similar-sized rods of unknown function also stick up from the floor near the side archway walls. A channel-shaped iron casting, about 4- by 4-inches wide by deep, possibly a trough for molten iron or slag, lays in the floor running outward from the hearth. Future archeological work should answer many questions we've had about the furnace. To protect the integrity of features found in the floor from damage, a double carpeting of fiber fabric was laid down on August 8. This was covered with a layer of loose debris, allowing work to progress on the upper portions of the archway without adversely affecting the floor below.

Through the large hole in the bosh

made in 1990 when the piece fell out, workers were able to access the inside of the stack and repair large cracks in the fire brick lining. Material that had fallen from above since 1990 filled the hearth to the top of the bosh, providing a convenient floor for the workers. But someone noticed something hanging out over the edge inside the top of the stack (the top of the furnace is roofed so it's dark up there). A climb to the top up a 40-foot ladder revealed one of the two large, heavy cast iron rings had cracked or separated, and a loose end of this casting plus a huge 4-foot stone were both hanging delicately over the edge, directly over the heads of those who had only moments before been pointing up the lining below. To repair this, a wood scaffold was quickly built up the inside of the stack, resting on the inside breakdown. After the top was repaired, the scaffold was removed, and the bosh debris was shoveled out through the hole. Remarkably, no one was hurt by stones and debris that sporadically fell (or were discarded) from the stack.

One of my best experiences was to crawl into the stack through the hole in the side of the bosh just before it was patched, but after the interior had been cleaned out, carefully slide about eight feet down the narrowing walls, and stand on the floor of the hearth. With the aid of a flashlight, the distance between the inside ends of the east west tuyere nozzles was found to be 29-1/2 inches (all three tuyeres are still in place!). It was hard to believe that this huge stone and brick structure, in the end, resulted in this small, cramped, dark space where four to five tons of molten iron once collected. I wish I had the time and permission to dig a few inches farther down to see if the hearth stone was still intact.

Early in the work, a huge dump truck arrived and was filled with 30+ yards of debris and breakdown that had been cleared from the arches. No one had inspected the debris before it was whisked away and dumped 1,000 feet up the side of a mountain 5 miles away in someone's back yard in another town (Goshen) for fill. (The dump site is 50

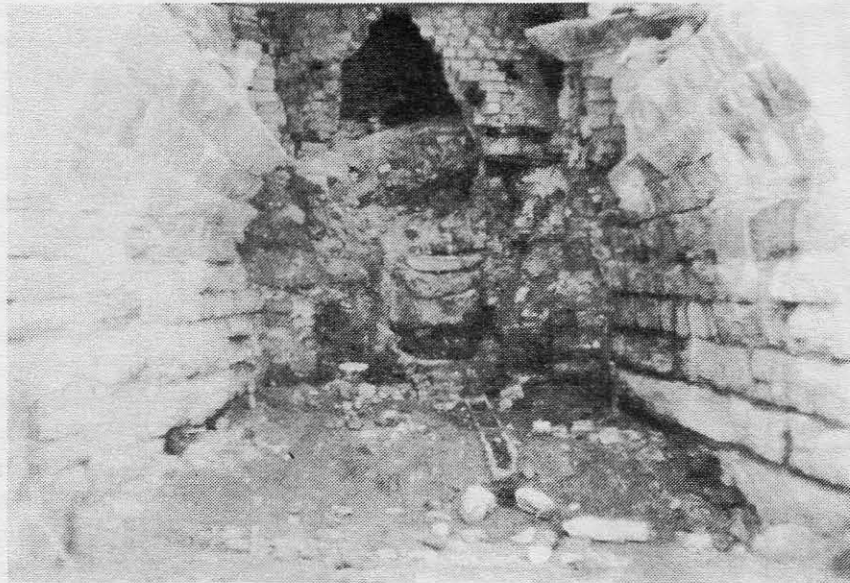


Figure 4. *The cleared casting arch, open again after being buried for over 40 years. Note three courses of archway stonework (left and right) newly mortared in place. Background hole in lining wall was result of continued collapse in spring 1990. What appears to be a trough for molten slag or iron is seen on the floor (Rolando photo).*

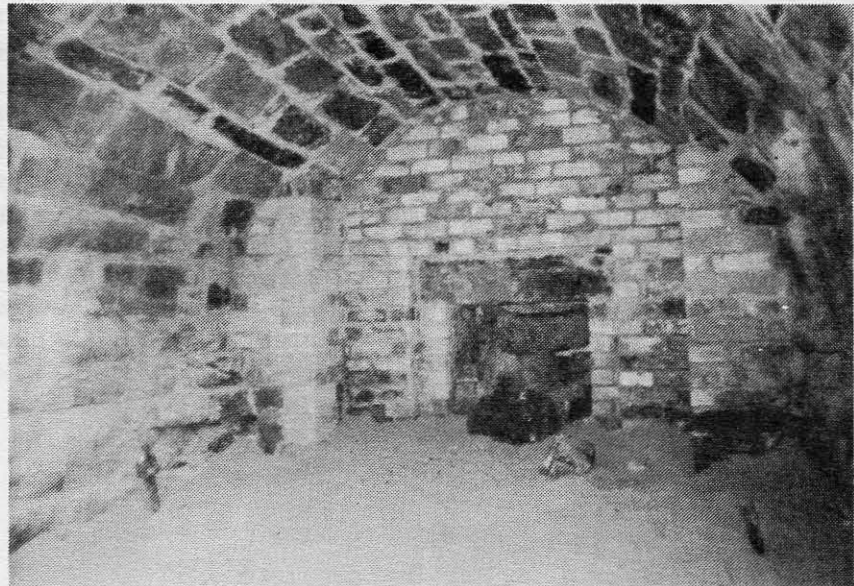


Figure 5. *The restored casting arch. The hearth and the hole in bosh wall above have been rebricked. Note iron rods protruding above ground left and right (Rolando photo).*

feet from the house that the masons rented during the week. It was found by following them home one day after work.) After that, all piles of debris were closely checked for artifacts with a number of interesting findings/discoveries

made. One was the variety of brick marks and dimensions. Over two dozen common and fire bricks were measured and recorded. The following markings were on fire bricks that were found on-site among the furnace debris:

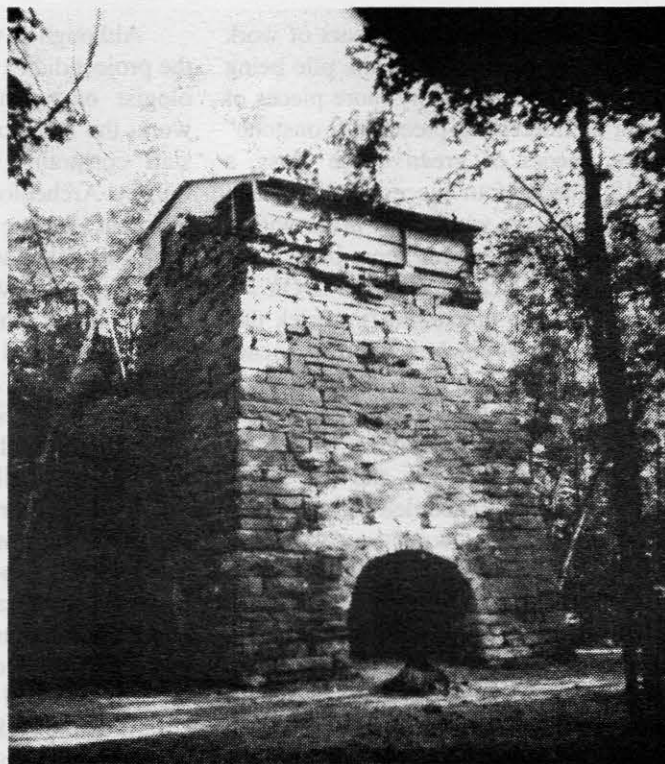
BRANDON VT
OSTRANDER & HEARTT No 1.
TROY, N.Y.
WATSON'S NO 1 P AMBOY NJ
BAYSTATE FIREBRICK BOSTON
EL & EH FARBAR (?)

The last brick was only partially decipherable, and the mark is just a good guess. No information can be found on this brick company. Research into these bricks and their marks may solve the question of whether the fire brick lining was installed during the 1854 enlargement of the furnace or later (fire brick was probably manufactured in the U.S. as early as 1790, in Boston).

Many iron castings of unknown use were also found in the breakdown as it was cleared from the archways. Some were pieces of a large iron pipe (sections of the blast pipe?), pieces of something structural (part of the two iron rings around the bosh?), and pieces of what appeared to be waste iron. There were also two iron wedges, possibly used to shim stones in the furnace walls. More bricks of varying dimensions were also found and measured in these small piles, hinting that much data was probably carried away in that 30-yard load.

During one of the final days of work, while the masons were cleaning up the area of debris, two long rusted iron rods were found in the brush, just a few dozen feet from the stack. One was about 20 feet long and the other about 5 feet; both were about a half inch thick and threaded on each end. On questioning, the work boss said they were found inside the stack when it was cleaned out, just prior to patching up the hole in the lining. Thinking immediately of the furnace-top ovens and inspecting the photo of the stack taken about 1900, what appeared to be ends of binders that went through the length and width of the oven could be seen. By carefully calculating the width of the oven from the photo (19 feet 11 inches) and then measuring the actual length of the rod (20 feet 11 inches) minus the threaded ends (about 1-1/2 inches at each end), the 9-inch differ-

Figure 6. The completed stack as it appeared at the end of work on September 18, 1995 (Rolando photo).



ence between the estimate and actual length of the rod was determined close enough to accept this having been one of the oven binders. That being so, the oven then must have been about 5 feet 7 inches wide (the shorter rod measured 5 feet 11 inches minus 2 inches of thread on each end).

A number of other objects integral to the operation of the furnace were also recorded. The three cast iron tuyeres each measured 12 inches long and have a 7-inch-diameter opening that reduces to 4 inches at the inside end (times 3 = a lot of air being pumped into the furnace). Two 1-inch diameter holes on the outside face of each tuyere mark where pairs of pipes were connected to provide circulating cooling water that kept the nozzles from melting from the heat of smelting. Sections of 4-inch-diameter iron pipe that supplied the cooling water to the tuyeres are visible in walls between the tuyere archways. But the larger pipes that provided the warm-air blast to the tuyeres never appeared; they are most likely still buried in the floors of the tuyere archways. Unfortunately, the two heavy cast iron rings that were seen at various points around the bosh

wall were not measured. They became exposed only a short time and were unexpectedly covered by new brick the day before I planned to measure them, but good photos of them were taken.

As the work drew to a close, I tried to photograph the final stone being mortared into place above the rebuilt casting arch, but an afternoon rain washed out the event, and I couldn't make it up to Forest Dale the next day, September 15. The furnace is now all patched up, the immediate grounds are landscaped and seeded, hay is scattered about to encourage regrowth, and the whole place looks just like a park approaching opening day (see figures 5 and 6). Quiet has returned. The state expects that an interpretation center might be built in 1999 or so. State officials consider the site "mothballed," that is, the site is still accessible to those who wish to walk in (gates prevent vehicular access) but no official tours are planned.

And what about that 30-yard truck load of debris that was dumped 5 miles away? On a warm, sunny October 3rd, I drove to the dump site, and with the owner's permission, dug through the material with my trusty USMC

entrenching shovel. Four hours of work resulted in about 10% of the pile being inspected, finding many more pieces of iron, an interesting piece of "ironstone" ware, pieces of green bottle glass, a 1948 quarter, four pieces of pipe stem, another nearly whole fire brick with a mark not found among those back at the furnace: F. HALL & SO. P AMBOY No 1, and a large unmarked fire brick that measured 7-1/4 inches wide, 9 inches long, and 4 inches thick. Finding those two fire bricks alone made my day in the wilds of Goshen. The pile, about 30 feet long, 10 to 12 feet wide, and four to five feet high, was scheduled to be graded over a steep embankment a day or two after my "dig."

The artifacts recovered at Goshen along with those at the furnace site will eventually be delivered to the custody of the Division where they will be identified, documented, bagged, and stored under the watchful eye of Audrey Porsche, Forest Dale Furnace State Historic Site Administrator. In time, the artifacts will become part of a display at the planned interpretive center in Forest Dale.

Although it was disappointing that the project didn't merit having an archeologist on-site full time to monitor the work, the Division said that budget and staff constraints prohibited this. State Survey Archeologist Scott Dillon and Vermont Historic Sites Operations Chief John Dumville, however, did make periodic inspection visits, sometimes on a weekly basis. John said that a daily photographic record was made by the masons so that everything significant was duly recorded.

The restored furnace stands in the midst of a woodland 100 yards east of the residential area of Forest Dale. To get there, start at Route 7 in Brandon, about 15 miles north of Rutland, follow Route 73 east (watch the signs, there are many intersections along the way) until you reach the Routes 73 and 53 intersection (general store on the right). Continue straight on Route 73 and watch for a sharp downhill left just after the little white church. Follow downhill around to the right. Just as the road curves left toward the houses, turn right and park in the small clearing. The trail from the clearing leads around the gate

and eastward to the furnace (on the right after a one-minute walk). When you return, drive back up the hill to Route 73 and notice the former ironmaster's home (large stone house) across the highway. Turn left to see the state historical marker on the left, and a bit farther, the state highway garages, which may some day be replaced by the visitors' interpretation center.

Victor R. Rolando
Manchester Center, Vermont

Upcoming Lecture

Wadsworth Atheneum, 600 Main Street, Hartford, Connecticut.

November 19 at 2:00 p.m. Bill Keegan, a graduate student from the University of Connecticut, will talk about "Industry and Archeology at the Shaker Village in Enfield." Tickets are \$3 for members and \$8 for nonmembers.

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