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REPORT ON THE FRANCESTOWN ACADEMY BOARDING HOUSE
THE "BEEHIVE"
GREENFIELD ROAD
FRANCESTOWN, NEW HAMPSHIRE

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This report is based on an inspection of the former boarding house of Francestown Academy by James L. Garvin and Peter Bixby on the afternoon of October 11, 2004. The purposes of the inspection were 1. to evaluate the physical condition and architectural integrity of the building, and 2. to consider the social and architectural significance of the building and its potential to serve the needs and responsibilities of the Francestown Improvement and Historical Society.

Summary: The "Beehive," the former boarding house of the Francestown Academy, is a rare building type: a mid-nineteenth-century boarding house or dormitory that served one of New Hampshire's many private academies in the period before public high schools had been authorized by state legislation. The building was constructed in 1846 as a companion to the adjacent Francestown Academy building (now the Town Hall).

While many village academies originally maintained boarding houses or dormitories, almost all such buildings have disappeared over the years or have been remodeled beyond recognition. The Francestown building, by contrast, retains a remarkable degree of integrity for the period of its construction. Although it has suffered from neglect and some alteration over the years, neither the basic structure nor its original detailing has been much altered. Even where it has been altered, the building exhibits clear evidence of its original condition. Because the building is a rare architectural type, and because its original function was closely allied with the cultural and educational life of the village, the "Beehive" possesses architectural and social significance. Because the structure was built with large rooms on two main levels, with additional usable space in its cellar and garret, the "Beehive" offers flexibility and variety of function, and an unusual degree of at-grade access at two and possibly three of its floor levels. The "Beehive" deserves preservation and protection as a rare document of New Hampshire's educational history, and offers the potential of serving many of the needs of the Francestown Improvement

and Historical Society. The building also deserves thoughtful planning, directed toward full understanding and preservation of its unique features and well-preserved materials.

Architectural description: The “Beehive” is a rectangular framed structure that was built into a steep hillside just west of the Francestown Academy building. Because of the declivity of the building site, the structure displays a single, full story above grade on its eastern elevation, facing the former academy building. This story is entered through a central doorway, facing east. The north and south side elevations of the building, however, display two full stories above grade with central entrances, presenting secondary facades that resemble the broad, gable-fronted dwellings that were widely favored in New Hampshire from the 1830s thorough the 1850s. The western elevation, facing Greenfield Road, appears as a tall, two-story house with no entrances in the framed superstructure. At the center of the tall, brick basement wall, however, is a fourth doorway, with sidelights, providing direct access to the cellar. Because of changes in the level of the earth outside the building, the bottom two feet of this basement door are now below grade and filled with concrete blocks. The cellar door leads directly to two basement rooms, with plastered ceilings, at the front of the building. Each front cellar room was originally lighted by two six-over-three window sashes in the brick basement wall. Other cellar rooms, without plastered ceilings or large windows, lie behind the two front rooms.

Construction of a dwelling on such a steeply sloping site called for unusual skill in building the tall stone foundations that are seen in the basement and behind the eastern walls of the first story. These massive walls were constructed of split granite rubble, laid with the split sides facing toward the cellar to create a plumb face. Due to the topography of the building site, the surrounding soil envelops the northeast corner of the building up to the sill level of the second story above the cellar. Because the walls at this corner of the building must resist strong earth pressure, the cellar walls are thickened in the northeast corner by an inner layer or wythe of stone, which acts as a buttress at the base of the foundation wall. While it is not unusual to encounter early nineteenth-century dwellings built into hillsides in central New Hampshire, especially in Hillsborough County, the planning and craftsmanship seen in the foundation walls of the “Beehive” are exceptional. These walls deserve careful study and preservation.

Where it is visible, the frame of the “Beehive” is likewise exceptional. The corner and intermediate posts of the frame are not visible in most rooms, being composed either of four-inch-thick members placed at right angles to one another in the corners of the building or (as is more common) being heavy timbers that had their inner arrises hewn away to allow the wall plaster to be carried into the corners of the rooms with no projecting post being visible. From available vantage points, it can be seen that the frame of the “Beehive” was well braced, with some braces even extending from the front and rear stairhall posts to the stairhall girts within the bearing partitions on each side of the hallway.

As noted in the report of 1991 (Appendix B), the principal framing members, apparently hewn from American chestnut, are spanned by sawn floor joists measuring approximately 2” by 6,” and placed about twenty inches apart. The first floor is supported by joists or sleepers that average about 5” by 5.”

But the most imposing portion of the frame is that of the building's roof. The roof frame is composed of heavy, hewn principal rafters extending from the wall plates to a ridge pole. Spanning the intervals between the rafters, at mid-height, is a wide, sawn purlin. The purlin, in turn, supports the ends of ranges of closely-spaced common rafters, which run from wall plates to purlin, and from purlin to ridgepole. Diagonal wind braces connect the rafters and the purlins at each intersection.

This is a very impressive roof structure, deriving from structural precedents found in Massachusetts Bay during the 1600s. When seen in New Hampshire during the early-to-mid nineteenth century, a roof of combined principal and common rafters is almost always confined to meeting houses or other exceptionally large buildings; the contemporaneous academy building next door may be assumed to have a similar roof frame, built on an even larger scale. Such a frame is highly unusual in a domestic building. The use of such a frame in the "Beehive" suggests that the carpenters who framed the dormitory understood that the building needed to be staunchly framed in order for its broad roof planes to cover a floor area of unusual extent.

Because the "Beehive" retains much original material, the building offers physical evidence of the uses for which certain rooms were originally intended. While interpretation of this evidence must remain tentative at this early stage of investigation, theories may be offered and corrected upon more thorough investigation. Every surviving piece of physical evidence will be crucial to an understanding of the history and uses of the building. If it acquires the building, the Francestown Improvement and Historical Society should investigate each clue carefully before making any changes to the structure, and should carefully safeguard every architectural element that survives in and around the building, including the extensive areas of original lath and plaster that remain throughout the structure.

Because the "Beehive" is a unique structure, it will be important to search through any surviving records of the Francestown Academy to see if there is documentary evidence of the construction of the building or of the purposes to which certain rooms were put. Similarly, diaries, letters, or reminiscences by students at the academy during the pre-Civil War period could provide invaluable clues to life in the boarding house.

In trying to understand the building more fully, it will also be worthwhile to measure and draw floor plans of each story. Such plans would more fully reveal symmetries and asymmetries in the structure, and would make it easier to deduce the uses of certain special rooms and the location of partitions that have been removed over time.[1]

The floor plans of the first story above the basement and of the second story are similar but not identical to one another. Each of these two floors has a central seven-foot-wide corridor and stairhall passing through the building from east to west. On both floors, the central corridors terminated in small chambers at the west end, lighted by windows facing Greenfield Road. On

[1] For example, the conversion of small western chambers to modern bathrooms on the first and second stories above the basement entailed the removal of sections of the bearing partitions that had separated the original chambers from closets in the adjacent southwest rooms. The former closet doors thereupon became second bathroom doors, supplementing the original doors that had connected the small chambers with the stairway corridors.

both stories, these small chambers have been converted to bathrooms in the twentieth century, being enlarged slightly to the south by removing the back walls of former closets.

These central corridors provide access to rooms or chambers arranged symmetrically on each side of the hallways. As noted above, the first floor above the basement can be entered from outside the building by two exterior doorways, one facing north and the other facing south. Both doorways originally opened upon small interior entries that provided access to large rooms placed on the left and right in each of the four corners of the building. The areas between these entries and the central east-west corridor were provided with closets that were accessible from the corner rooms. The closet partitions have been removed inside the southern doorway, but remain largely intact inside the northern doorway.

In keeping with the building's function as a boarding house, the "Beehive" was equipped with ample cooking facilities. The southeast corner room and the northwest corner room were both provided with brick cooking fireplaces that are supported on sturdy brick bases in the basement. Each fireplace has gudgeons or rings for a crane in its right-hand jamb, and a brick oven on one side of the fireplace. While it is not uncommon to find two cooking fireplaces in a building constructed before 1850, it is notable that these two kitchens were built on slightly different plans, with the northwest chimney being somewhat larger and having a more elaborate and substantial brick base in the cellar. The two kitchen fireplaces were provided with wooden casings in characteristic Greek Revival patterns, but the two differ in design, that on the northwest being more elaborate. Finally, the two cast iron oven doors display different designs and bear different wording. The door in the northwest kitchen has the words "Amherst, N. H.," while the somewhat less elaborately designed oven door in the southeast kitchen bears the words "Milford, N. H."

A report (attached as Appendix B) compiled by the New Hampshire Division of Historical Resources in 1991, when a local committee was evaluating the "Beehive" for possible conversion to as town library, noted evidence of more intensive use of the southeast kitchen than of the northwest kitchen. The report stated that, "to judge by wear on the floor boards, the southeast kitchen was by far the more heavily used [of the two]." In 1991, the finish floor boards were nearly worn through to the sub-flooring in some places. They have since been replaced by new boards, but it remains to be explained why the two kitchens were finished in somewhat differing styles and why the southeast kitchen showed so much more wear. Possibly one kitchen was reserved for the private use of a house superintendent, while the other was used to serve all the boarding students in the building.

Based on preliminary inspection, it may be theorized that the room in the northeast corner of the building on the story above the basement served as a dining room. This room is adjacent to the more heavily worn southeastern kitchen, and in fact incorporates the seven-foot-wide area that normally would have been part of the corridor adjacent to this kitchen. Thus, the supposed dining room immediately adjoined the southeastern kitchen and became the largest single finished room in the building. The room was provided with its own closet adjacent to the northern entry, perhaps used for storing dishes and other tablewares. It also retains an original plastered closet in its northeast corner, possibly intended for use as a pantry or for storing items used in a dining room.

Being largely below grade, this room has windows only on the north. A comparison of the muntin profile of these windows with others in the house reveals that these are original sashes (see discussion of finish woodwork, below). Because even the north wall of the room is partly below grade, the windows of this room are horizontal sashes, made to slide sideways in guides or channels in order to ventilate the room.

The second floor above the basement is entered by a central doorway on the east, opening directly into the seven-foot-wide corridor. Like the floor below, the second story offers clues to the uses of various rooms, yet the exact disposition of these spaces awaits further physical and documentary investigation.

Two rooms on the second floor are physically differentiated from the bedchambers on this story by unusual woodwork. The middle room on the north side, above the door and entry on the floor below, was clearly a room with a special purpose. This room has baseboards that are set flush with the plaster, and wall cleats, also flush with the plaster, encircling the room at two different elevations. These elements have never been painted, and their surfaces reveal a few scattered nail holes. It may be theorized that this room served as a library or book closet, and that book cases were attached to these specialized cleats.

Adjacent to this middle room is the relatively large northeastern chamber, located above the supposed dining room on the floor below. Lighted by a window on the north and two on the west, this room is differentiated from others by having flat wainscoting around its lower walls and by a six-panel door connecting it with the central corridor, in contrast to the four-panel doors seen elsewhere in the building. Evidence in the attic above suggests that the room was originally heated by a stove vented through a chimney that rested on the attic floor framing, with its weight supported by iron rods connected with a rafter above. This room shows especially pronounced wear on its floor boards. If the middle room on the north side of this floor was indeed a library or book closet, then it may be theorized that the northeastern corner room functioned as a study, or served some other academic function that resulted in heavy wear to its floors. To judge by paint accumulation on the floor, this room also had some form of bench or enclosure along its northern wall. After the room is cleared of personal possessions, it will be important to examine all its surfaces more carefully for further evidence of its original uses.

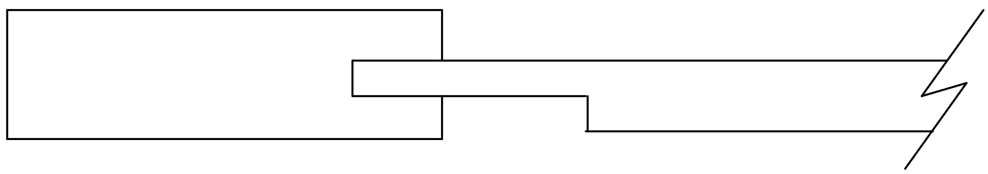
The other rooms on the second floor appear to have served as bedchambers. All were provided with closets in varying arrangements.

Two additional plastered chambers were found in the attic, on the south side of the building. Both of these rooms were apparently heated by stoves connected to the brick chimneys that pass upward, adjacent to their walls.

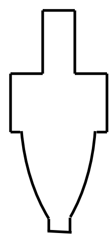
Architectural detailing: As befits a building that served an institutional purpose in the mid-1800s, the “Beehive” had (and retains) simple joinery that evokes the then-current Greek Revival style in a basic fashion. Remarkably, much of this joinery has survived intact over the years, even in vulnerable areas where it might be expected that fragile elements like window sashes or paneled doors would long ago have been replaced.

In general, door and window openings in the "Beehive" are surrounded with plain, flat casings. In a few cases, as around the two kitchen fireplaces, the upper corners of the casings are marked by square corner blocks, but even this degree of elaboration is unusual in the building. The three exterior doors leading to principal floors of the building deserve careful investigation to ascertain their original interior and exterior treatments. The door on the south, for example, has been altered with a new window placed adjacent to the door, and with glass panels replacing two door panels. This much-altered entrance might be examined to learn if it matched the comparable doorway on the north side of the building.

While door thicknesses and other details vary somewhat throughout the building, depending on original uses, the majority of doors appear the be $1^3/_{16}$ or 1¼ inches thick and have the following profile:

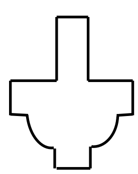


Most window sashes throughout the building, from cellar to attic, display an attractive muntin profile that was commonly used between about 1830 and about 1850. This characteristic profile is as follows:



This profile is consistent throughout most of the house, and the sashes throughout the building remain in remarkably good condition, even those in the front windows of the basement. These sashes are largely glazed with hand-blown cylinder or crown glass.

For reasons that are not yet clear, some of the windows on the south side of the building are filled with sashes of a different profile, as follows:



This muntin pattern is actually an older design than that of the sashes more commonly seen in the building. Its use generally extended from the 1790s to about 1830. The use of these more old-fashioned sashes on the south side of the building may represent a deliberate choice in 1846, or may result from the deterioration of the original sashes and their replacement with second-hand sashes from another building.

Recommendations for treatment: If the Francestown Improvement and Historical Society should choose to acquire the "Beehive," it would be prudent for the Society to secure and stabilize the building immediately, then take time to study and understand the structure before making any appreciable changes to so unusual a property. Because the "Beehive" has received a low level of maintenance and financial investment over the years, the building appears to retain original materials to a remarkable degree, including most of its original clapboards and exterior joinery. Every surface of the building deserves careful evaluation before any building fabric is removed or replaced.

In developing an approach to the building's preservation, future owners would confer great benefit on the building by adopting the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, given as an appendix to this report. These *Standards* have been developed for treatment of historic properties that are federally owned or that receive federal funding, but their general principles are equally applicable to any project that affects a historic building. The *Standards* are especially appropriate for a project undertaken by a responsible preservation organization.

As noted above, the "Beehive" deserves careful study and evaluation before any changes are made to the building. Once the building is cleared of personal possessions, it would be prudent to obtain baseline documentation of the entire structure, in the form of floor plans and thorough photographic recordation, with a careful examination and evaluation of the entire building fabric by experienced architectural historians and building conservators.

In keeping with the *Secretary's Standards*, no ground-disturbing activity, such as the drainage work described below, should be undertaken until after an archaeological evaluation has been carried out. Prudence may require that an archaeologist be present during any excavations under or around the building.

Moisture conditions: The "Beehive" does not have a working central heating system, but has depended on individual stoves for heat. For this reason, the building has been susceptible to ambient moisture conditions, and will be even more so after it is no longer occupied. Moisture is the great enemy of buildings, and the greatest amount of damage the building has suffered thus far has been caused by roof leaks and basement dampness.

Even with occupants, the "Beehive" is suffering from high levels of moisture. Much of the moisture that pervades the interior atmosphere of the building originates in the basement.
In most unheated buildings with exposed soil beneath them, enough moisture will emanate upward from the unfrozen soil under the structure to condense and freeze as hoarfrost on many interior surfaces during cold weather. This is especially common on the points of roofing nails that project through the roof sheathing and conduct cold from outside the building, and also on

the undersides of the roof sheathing boards. Inspection of the attic during cold weather would probably confirm the presence of condensed and frozen water vapor in the upper part of the building.

The “Beehive” has no gutters on front or back. Most of the water that falls from the roof therefore collects at the east and west foundations of the building, and a certain amount of this roof water penetrates the cellar through the foundation stones, which were laid without “dry” and only lightly pointed with lime-sand mortar to exclude vermin. Capillary action in the soil also draws water upward from the soil directly under the building during wet seasons, so that the cellar floor is constantly damp.

An earthen floor beneath a building will remain unfrozen during most parts of the winter when the soil outside the building is frozen. The unfrozen earth under the building thus acts as a source of water vapor during much of the year. During the daytime, the warmer air in the upper building, being heated by the sun or by stoves, is capable of absorbing some of the water vapor generated in the basement. Being a gas, this vapor is capable of migrating into the upper parts of the building, penetrating wooden floors and plaster walls or ceiling with ease. At night, when the building cools, this water vapor condenses on all cold surfaces. It is not uncommon in unheated buildings with dirt cellar floors to find condensation on window glass or to find hoarfrost covering all walls during winter nights or on especially cold days. As noted above, such frost is especially common in attics, which tend to become the warmest areas in any old building during sunny days, but to cool most quickly at night. On warmer days, this frost melts, often inviting mildew or creating damaging condensation.

This cycle of migration and condensation of water vapor slowly saturates all the materials of a building. For this reason, it will be important to control the migration of water from the basement into the upper parts of the building. Experience has shown that this can be done by two means, best used in tandem: excluding roof water from the crawl space, and placing a barrier between the damp soil and the air in the crawl space.

Exclusion of rainwater can be accomplished by intercepting the water either at the eaves, with gutters, or in the soil below the drip line. While gutters often cause problems of ice damming and roof leaks in heated buildings in New Hampshire, gutters can be mounted on unheated buildings with no fear of ice dam formation. Ice dams form only when roofs are artificially warmed, and when the meltwater from snow on the roof freezes as it reaches the colder eaves or drops into a cold gutter. In an unheated building, the only melting of snow that takes place is caused by the sun, and solar melting normally proceeds up the roof from the eaves, leaving the latter clear of ice. Thus, it would be possible to install temporary gutters on the “Beehive” while the building remains unoccupied and unheated and while plans are made for the eventual installation of a heating system in the building.

As an alternative to eaves gutters, an in-ground collection trough could be placed around the entire building, and especially along the east and west drip lines. Perforated PVC (polyvinyl chloride) pipes or pierced flexible drain conduits may be buried in the soil, usually cradled in a trough created by digging a trench, lining the trench with 6 mil black polyethylene, and filling it with crushed stone or gravel. The perforated collection pipes are usually connected to solid

PVC piping that conducts the run-off to a distant point of discharge such as a dry well or an open-ended outfall.

As still another alternative, a trench with a sloping bottom may be dug from the foundation wall forward a few feet, to whatever depth is deemed necessary. The trench may be puddled with packed clay and/or lined with polyethylene, with a perforated drain pipe placed at its lowest extremity, as above. While this method requires more excavation, it shields a greater area of earth from roof water than the simple placement of a collection line directly under the drip line.

As noted above, no excavations should be undertaken near the building without an archaeologist in attendance.

A second means of controlling the migration of moisture from the crawl space is by sealing the earth under the building with a vapor retarder. Sealing the earth can be accomplished by the simple method of covering all exposed soil with sheets of 6 mil black polyethylene, well lapped (and taped if possible) at the edges. Before the earth is covered, it should be cleaned of all sharp debris, organic materials, or anything that may tend to puncture the plastic membrane. A cushioning layer of clean sand might be spread across the dirt for the same reason. After the vapor retarding membrane has been placed, it may be covered with a layer of pea stone ballast.

Again, if soil should be removed from the cellar in preparation for laying the polyethylene, an archaeologist should be in attendance.

Experience has shown that the laying of plastic sheeting on the soil beneath a building reduces the amount of water vapor dramatically in the structure as a whole.

There is another source of moisture that requires different remedies from those described above. This is condensation. Condensation may become a serious problem, and a source of much liquid water, during the humid summer months.[2] Typically, an unventilated basement or crawl space under a building remains cool during the summer. When the outdoor humidity is high, the cool areas under the building are frequently below the dew point. In such a situation, humid air from the outdoors finds its way into the building, and the water vapor in that air condenses as water droplets on all surfaces, including wooden floor joists or sleepers. Even with the earth beneath the building sealed against moisture, the infiltration of outside air can introduce damaging amounts of water that will saturate the first floor frame and eventually cause decay. Water from this saturated wood eventually finds its way into the rooms above as well, causing problems similar to those created by water from an unsealed dirt floor.

If humid air does infiltrate a building, condensation can be prevented by two means: mechanical dehumidification, or by warming the surfaces under the structure above the dew point.

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[2] Condensation is most common in cool areas in or below buildings during humid weather in the summer. Condensation can, however, also occur in the winter on days when sudden warming and rain or fog create moisture that penetrates a cold building and condenses on its frigid surfaces. On such days, drops of liquid water may be seen to run down cold walls and windows. This phenomenon occurs only in unheated buildings.

Mechanical dehumidification is usually achieved by portable dehumidifiers. Dehumidifiers have the advantage of actively removing moisture from the air, lowering the humidity in any space where they are run. The reservoirs of dehumidifiers must be emptied by hand or drained through a hose to some point lower than the machine. The cooling coils of dehumidifiers may also ice up in any space that remains below 55ºF. during the summer.

The second means of preventing condensation is by warming all surfaces of a given space above the dew point—the temperature at which water vapor condenses to liquid water. In humid summer weather, the dew point may sometimes be above 70ºF. Condensation in a basement may be prevented by heating the air to a temperature above the dew point by some kind of heating element, or by drawing warm outside air through the space.

Both dehumidification and artificial warming require some mechanical equipment, surveillance of that equipment, and the consumption of electricity, as well as posing some degree of fire hazard to the building by the use of electrical appliances.

In undertaking a program of moisture control, it is important to establish baseline documentation of conditions in a structure, preferably throughout an entire calendar year or more. With this information in hand, it will then be possible to see what degree of relative humidity occurs throughout the annual cycle and how often temperatures in a building drop below the dew point, inviting condensation.

To gain this baseline documentation, it is necessary to obtain an accurate record of temperature and relative humidity over time. This can be accomplished with some degree of accuracy by taking frequent readings on analog instruments placed in the building. An easier but slightly more costly method is to monitor conditions in the building through the use of digital data loggers. These devices store data on temperature, relative humidity, and dew point over a period of months. These data can be downloaded into computers to provide graphic or tabular records of moisture conditions over time, making it easy to identify areas of the building or seasons of the year when unfavorable conditions occur. The same data allow improvements in internal conditions to be monitored and measured after remedial actions are taken.

If the FIHS wishes to inquire about the cost of obtaining baseline environmental data through the use of data loggers, I suggest that you contact Marc A. Williams, American Conservation Consortium, Ltd., 85 North Road, Fremont, NH 03044; tel.: (603) 679-8307; e-mail: acc@conservator.com.

Thermal insulation: Thermal insulation of a historic building must never be undertaken until moisture conditions in that building have been monitored, understood, and controlled. Just as water vapor will condense and freeze on visible surfaces, as described above, it will condense on hidden surfaces within wall cavities unless excluded from such areas by vapor barriers. Water vapor is a gas, and as such always migrates from areas of higher concentration, such as the interior of a building during the wintertime, to areas of lower concentration, such as the dry outside air. In an uninsulated but heated building, water vapor in the inside air penetrates the wall plaster with ease. If the wall cavity in such a building is warm, the vapor will remain a gas until it leaves the building through cracks in the sheathing, clapboards, and casings. If insulation has been placed in the wall cavities, however, the outer zone of the insulation, together with the wall sheathing and clapboards, will be cold. When the migrating water vapor penetrates the insulation, it will encounter materials that are below the dew point. The water vapor will thereupon turn to liquid water, saturating the insulating material and the sheathing and clapboards.

This condition will initially lead to paint failure on the exterior. Soon, the condensed moisture will cause mildew and decay of the wall sheathing and of the framing members, such as girts and sills, that lie at the bottom of the wall cavity.

This syndrome explains why insulation installed in new buildings has a foil or polyethylene vapor barrier placed on the inside of the walls before wall finishes are installed. Such a vapor barrier prevents most moisture from entering the wall cavity, encountering low temperatures, and condensing.

Installation of a vapor barrier is impossible in an old building, like the "Beehive," where it is essential to preserve the original lath and plaster. For this reason, the placement of wall insulation in a historic wooden building is generally *not recommended*, at least until the humidity levels in such a building can be controlled with certainty. Rather, thermal efficiency in such a building is best gained by installing storm windows, weatherstripping windows and doors, and generally diminishing air infiltration anywhere in the structure.

Most heat loss in any structure occurs through ceilings and attics. For this reason, the best place to concentrate on insulating a building like the "Beehive" is below the attic floor. This can sometimes be accomplished by lifting the floor boards and installing a polyethylene vapor barrier on top of the laths below, with the insulation then placed above the vapor barrier. In cases where it is difficult or impossible to install such a vapor barrier, it is beneficial to insulate the attic floor to the maximum degree possible, and then ventilate the attic through louvers placed in the windows. Air circulation through an attic in this fashion carries off water vapor that penetrates the insulation from the warm rooms below. Such ventilation also helps to keep the roof cool, minimizing or preventing ice dams when snow lies on the roof.

Exterior paint: At some future time, after control of moisture within the building has been gained, the building will need repainting as a means of protecting its exterior materials. The choice of priming and finish paints is especially important during this era when the quality of many paints is declining precipitously. This decline is due in part to the understanding by many American paint manufacturers that Americans move from house to house, on average, every four years. When they move, they generally re-paint their new home. For this reason, manufacturers have designed paints with an expected longevity of only about five years. Traditional exterior house paints, formerly hand-mixed from paste white lead and pure linseed oil, often endured for twenty years.

White lead, the best pigment for exterior painting, has been unavailable in the American market since the 1970s due to its poisonous nature if ingested. The "Clean Air Act," which strives to reduce volatile organic compounds (VOCs) released into the atmosphere during paint production, has also had an ever-more-detrimental effect on the quality of the chemicals available for paint manufacture.

In addition to the American manufacturers whose products are available in most paint stores, there is a company in Woodstock, Vermont, that imports paints of unusually high quality made by the Hermann A. Schroeder Company (HASCO) of The Netherlands. While these Dutch paints are expensive, they are also enduring. Since the cost of materials constitutes only 15% of the expense of a good paint job, a higher materials cost may be more than offset by the longer life obtained by the use of the best quality of materials. For more information about HASCO paints, contact *Fine Paints of Europe*, P.O. Box 419, Woodstock, Vermont, 05091. [Tel: (800-332-1556; FAX: (802) 457-3984; http://www.fine-paints.com]. *Fine Paints of Europe* has at least one New Hampshire distributor: A&M Paint & Wallpaper, 46 Market Street, Portsmouth, NH, 03801 [Tel.: (603) 436-5366].

Traditional painter's practices place great emphasis on preparation for painting. Preparation should account for at least fifty percent of any paint job.

On method of paint preparation to avoid at all costs is the now-popular "pressure washing" or "water-blasting" of the building. Washing a structure with a damaged paint film, even under moderate pressure, drives a great deal of water into the fabric of the building. A washed building requires weeks and often months to dry to a condition fit for painting, yet many of the painters who now employ this method attempt to paint the structure within a short time after washing it.

The easy availability of pressure-washing machinery has tempted many painters to employ this method of preparing buildings for painting, usually with the justification that blasting off the loose paint will save labor. Labor should constitute about 85% of the cost of a paint job, and it is false economy to try to avoid hand work during preparation. Some painters may believe that because latex or acrylic vinyl paints are water-based and water-soluble, they can be applied over damp materials. This is utterly wrong. Once such paints have undergone the chemical reaction of drying, they are as susceptible to failure from underlying moisture as are oil-based paints. Water is the great enemy of a long-lasting paint job. The drying of a damp, washed building invariably causes paint failure in both oil-based and water-based paints.

There is no substitute for the traditional method of dry scraping and sanding of a painted surface. All exterior house paints are perfectly adapted to cover dry surfaces that have been scraped, sanded, and brushed with a dust brush. No paint requires a washed surface for good adhesion. On the contrary, paint adheres best to a slightly roughened surface like that created by traditional scraping, sanding, and dusting.

Future work: If the Francestown Improvement and Historical Society decides to purchase the "Beehive," it will be important to plan carefully for the conservation of the building, carrying out the most essential tasks first and thereby gaining time to plan prudently for less pressing projects. The New Hampshire Division of Historical Resources will be happy to recommend consultants and specialists who may assist the FIHS in planning or carrying out later stages of work.

APPENDIX A

THE SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES

Standards for Preservation

"Preservation" is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

1. A property will be used as it was historically, or given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.
2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials, or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

Standards for Rehabilitation

"Rehabilitation" is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Standards for Restoration

"Restoration" is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

1. A property will be used as it was historically or be given a new use which reflects the property's restoration period.
2. Materials and features from the restoration period will be retained and preserved. The removal of materials or alteration of features, spaces, and spatial relationships that characterize the period will not be undertaken.
3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate and conserve materials and features from the restoration period will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.

4. Materials, features, spaces, and finishes that characterize other historical periods will be documented prior to their alteration or removal.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize the restoration period will be preserved.
6. Deteriorated features from the restoration period will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials.
7. Replacement of missing features from the restoration period will be substantiated by documentary and physical evidence. A false sense of history will not be created by adding conjectural features, features from other properties, or by combining features that never existed together historically.
8. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
9. Archaeological resources affected by a project will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
10. Designs that were never executed historically will not be constructed.

Standards for Reconstruction

"Reconstruction" is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time in its historic location.

1. Reconstruction will be used to depict vanished or non-surviving portions of a property when documentary and physical evidence is available to permit accurate reconstruction with minimal conjecture, and such reconstruction is essential to the public understanding of the property.
2. Reconstruction of a landscape, building, structure, or object in its historic location will be preceded by a thorough archaeological investigation to identify and evaluate those features and artifacts which are essential to an accurate reconstruction. If such resources must be disturbed, mitigation measures will be undertaken.
3. Reconstruction will include measures to preserve any remaining historic materials, features, and spatial relationships.
4. Reconstruction will be based on the accurate duplication of historic features and elements substantiated by documentary or physical evidence rather than on conjectural designs or the availability of different features from other historic properties. A reconstructed property will re-create the appearance of the non-surviving historic property in materials, design, color, and texture.
5. A reconstruction will be clearly identified as a contemporary re-creation.
6. Designs that were never executed historically will not be constructed.

Appendix B
1991 Report on the Academy Boarding House

REPORT ON THE STYLISTIC AND STRUCTURAL INTEGRITY OF THE BOARDING HOUSE OF THE FORMER FRANCESTOWN ACADEMY, AND ON ITS POTENTIAL FOR ADAPTATION TO PRESENT-DAY TOWN NEEDS

This report is based upon a brief inspection of the former academy boarding house (now the Virginia Twombley house) during the early evening of July 16, 1991.

According to information supplied in Cochrane and Wood's and John Schott's histories of Francestown, and in a survey form prepared by Gregory E. Thulander, this building dates from 1846. Built as a dormitory or boarding house for the adjacent academy, the dwelling has been used for a number of purposes over the years. Its predominant use, and the one it still serves, has been that of a private dwelling.

The building is highly unusual in its site and its plan. It is set into a hillside, and therefore originally had entrances at the basement level (somewhat below the present-day road elevation), at a first floor level, and (due to the rise in grade) at a second floor level on the east wall, which faces the former academy building.

The floor plan of the building is highly unusual, and is a rare surviving example of a mid-nineteenth-century academy boarding house. The structure has a central hall on each of its two principal floors, with three rooms arranged on each side of this corridor. The northwest and southeast rooms on the first floor (which is entered by doors on each side of the building) are kitchens, having fireplaces with gudgeons for cranes, and brick ovens. To judge by wear on the floor boards, the southeast kitchen was by far the more heavily used.

The two kitchen chimneys provided thimbles for stoves in the rooms above them. A third chimney, intended only for stove use, provided heat for the southwest rooms on each of the principal floors. A fourth chimney was once suspended from iron rods in the northeast quarter of the house, and may have served only the northeast room on the second floor, which has the most detailed woodwork of any room in the building.

The woodwork of the building is simple, both inside and out. This simplicity is characteristic of the era, which favored plain, flat casings, and simple mouldings based on those used by the ancient Greeks.

All in all, the academy boarding house is an extremely rare building type in New Hampshire. While a number of early academies are known to have had dormitories, these buildings have generally disappeared or have been remodeled beyond recognition. The Francestown boarding house, by contrast, retains a remarkable integrity of plan and detailing, even though it has seen many uses (including that of a harness shop), and has not always had the best of maintenance. While the house may have cosmetic shortcomings, it retains those essential and unique features which make it an important document in the educational and architectural history of New Hampshire.

The purpose of this inspection was to assess the adaptability of the house, primarily for use as a public library. This assessment sought to answer two questions: whether the building *can* be adapted for library use, and whether it *should* be so adapted. The question of whether the house can be adapted is basically a structural one. Library use normally requires an essentially open floor plan, which, in the case of a dwelling, requires the removal of a number of partitions. At the same time, library use imposes very heavy floor loads in those areas where bookstacks are located. The combined removal of partitions and addition of heavy floor loads usually creates problems in buildings which were not designed for such circumstances.

In the case of the boarding house, the essential structural questions focus, first, on the design of the framing system and, second, on the integrity of that system. The framing system of the building, like that of most old houses, is based upon a few major posts placed at intervals around the perimeter walls of the structure, with internal bearing partitions at certain locations within.

The major internal bearing partitions of the boarding house are basically the walls of the central hallway. These walls form two structural planes which can be followed from supports in the cellar all the way up to the principal rafters in the attic. Removal of these walls for library use would be impossible without the substitution of some other means of support—probably columns and/or steel or laminated wood beams below the girders which are now supported by the walls. It would be difficult to add beams in the rooms of the boarding house because of the low ceiling heights. Present ceilings are about seven feet high. The Life Safety Code (NFPA 101), which has been adopted widely, specifies that ceiling heights shall not be less than seven and a half feet, and that any projections from a ceiling (such as a beam) shall be no less than six feet, eight inches from the floor. Thus, in terms of headroom alone, the boarding house poses problems in being adapted for public use.

A second aspect of the building's frame is the method of construction of the floors. To judge from the attic floor framing, the floors are lightly framed by today's standards. Framing beneath the attic floor appears to consist of 2" by 6" joists placed about twenty inches apart. Where observed, these joists run from the outer walls of the house to the hall girders—a span of over thirteen feet. If this kind of framing is typical of all floors in the house, then the floors are too lightly framed for heavy loads, however acceptable they may be for domestic use.

There is also cause to be concerned about the integrity of the frame. There have been leaks around at least two of the four original chimneys: the southwest chimney and the northeast chimney (now removed). While damage from the leak around the southwest chimney may be confined to the upper part of the building, the leak at the northeast chimney appears to have run down the roof and affected the post at the north side of the entrance door on the east. Damage in this location, especially to the sills of the building, has probably been further advanced by the splashback of roof water from the door step.

Due to moisture in the cellar, some of the 4" by 4" sleepers or joists of the first floor have also suffered some damage and a number have been "sistered" with new joists for added support.

In summary, the frame of the boarding house was not designed in a way that invites the conversion of the dwelling to a library, and the slow and natural deterioration of that frame over the years has still further diminished the strength of the building. Thus, in a strictly structural sense, the question of whether the house *can* be adapted for library use must be answered by saying that such conversion would entail a nearly complete redesigning of the frame. For all practical purposes, the answer to this question is "no."

The second basic question, that of whether the house *should* be adapted for library use if it were otherwise feasible to do so, also should be answered with a "no." As stated above, the house is very important in the educational and architectural history of New Hampshire. The features that make it important are those very elements that would have to be removed during a conversion to library use: the partitions, the chimneys, the interior doors, and the floors. Without these, the house would lose that exceptional integrity that it has somehow preserved over the years. Thus, conversion of the boarding house to library use would be very destructive of an important monument of Francestown's history.

For these reasons, I would recommend that the library trustees seek some other solution to the problem of lack of library space.

On the other hand, the building does remain very important to the town's history, and deserves every effort toward its preservation. The factors that work against the conversion of the house to a library do not detract from other potential uses. The most obvious use for the building is its continuance as a dwelling. Because of its special architectural nature, the house does not adapt easily to multi-family use, nor is it even a traditional dwelling for a single family. Therefore, a logical use for the building at some future time might be a return to some sort of institutional function. Because of its easy accessibility at all levels, its multitude of rooms, its easy circulation through the central corridor as well as from room to room, and its relative intactness of original features, the house could make an excellent historical society headquarters and/or museum. It would offer spaces for displays (even period settings), for storage, for offices or workrooms, and, to a limited extent on the first floor, for meetings.

In any case, it is important that the town be aware of this unusual structure in its midst. If circumstances permit, it would be an act of real public benefit if the future of the building could be ensured through repair and restoration, perhaps under public or non-profit ownership.

Respectfully submitted,
James L. Garvin
Architectural Historian