CHRISTOPHER P. WILLIAMS ARCHITECTS, PLLC

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Architectural Analysis

Historic Hebron Academy

Hebron New Hampshire

December 17, 2010

-

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Christopher P. Williams, Architects

The purpose of this document is to assist the Selectmen of the Town of Hebron New Hampshire evaluate the usefulness of their existing Town Hall, built originally as the Hebron Academy, for the purposes of expanding the building to accommodate all of the town's governmental space needs while preserving the remaining historic fabric of the town center. The Greek Revival Structure built in c. 1838 has been substantially renovated at its interior but much of its original trim work at the exterior remains despite two previous window replacement projects.

An investigative visit to the building was conducted by Norman E. Larson, AIA, of CPW Architects in Meredith along with Jason Ross and Salvatore DiSanza of H. E. Bergeron Engineers, Inc. of North Conway New Hampshire. This investigation was made on August 26th of 2010. Representatives of the town who were also present that day included John Matthews, the Chair of the Selectmen; Eleanor Lonske, the Chair of the Planning Board and the Grant Writer for the funding of this study and; and Karen Corliss, Secretary to the Selectmen.

History and Development of the Property

The town of Hebron experienced a period of economic and population growth following the construction of the Mayhew Turnpike linking Plymouth and Rumney with New Chester (now Bristol). Chartered in 1803, the completion of the road simplified access to this community at the north side of Newfound lake and brought heavy traffic and eventually stage coach travel to Hebron. In 1838 a group of citizens in the town committed to the creation of the Hebron Academy. Construction was completed by 1839 and the first classes were held in the building in the fall of that year. Never intended to be a year round school, Hebron Academy planned to offer two terms of Latin, Greek, and French "and all English courses then studied in similar institutions." Students of the Academy came from a geographic area that included Dorchester, Groton, Rumney, Plymouth, Bridgewater, Bristol, and Alexandria. The Academy was served by Leonard Tenney, A.B. as principal; Hiram Orcutt as associate principal; and Jonathan K. Pike, David Hazelton (Hebron postmaster Hebron since 1833), and J.C. Hammond.

Enrollment was stronger than anticipated and a third term was added to accommodate the 89 students who attended in 1840. With no provision of housing for students, board was provided in the homes of local families. This approach to housing for the students appears to have proved too complicated for both the students and for the local families. The difficulties with the arrangement led quickly to the closure of the Hebron Academy; despite it's higher than expected attendance, after the end of the 1842 term. After the Academy closed, the building sat empty for a number of years before it was purchased by the town of Hebron to serve as School Number 5.

Beginning in the 1850's, Hebron's population began a decline that continued for more than a hundred years. In 1885, the school district system previously used in the town was eliminated and Hebron went from having five school districts to just a single district per newly enacted New Hampshire state law. As part of the unification, between 1886 and 1887, all but two of the schools were closed. By this time the old Hebron Academy had come to be called the "Village" school and was the only school house "in town fit for school purposes in cold weather." This school was also the only one in town which had been conducting two terms of classes per year, while the others had only conducted single terms per year varying from 7 to 11 weeks. There were 21 students enrolled in the Village school in 1888 with three terms, and 17 others attending the school at East Hebron. No information was obtained which reveals if any students traveled from Hebron to attend high school after the closure of the Hebron Academy. Hebron's school children would not readily have a chance to obtain education beyond the elementary level until 1901. At that time state law started requiring towns not having a high school to pay the tuition of students attending high schools in other towns. In 1942, the declining population of Hebron allowed for the closing of the East Hebron School and the Village School served as the only elementary school in Hebron until the construction of the current Bridgewater-Hebron Village School.

After the closure of the Village school, the town of Hebron renovated the interior of the building to serve much as the town hall of Hebron, though several town functions such as the Town Clerk's Office and the office of the Tax Collector remain in other buildings nearby. Prior to this renovation, the library (which apparently had occupied the second floor for a period of time) was relocated out of the building. During the renovations, most remaining interior finishes from the historic Hebron Academy were removed and new interior finishes, along with fiberglass batt insulation, were installed along with new vinyl windows. Because of the nature of the renovations, there may be remnants of the original finishes hidden behind the new gypsum board walls. The Selectman's office is located on the first floor of the building and the second floor serves as a public meeting space for the town's boards and committees. The exterior of the building, apart from some relatively modern additions at the rear of the structure, remains fairly well intact and in keeping with the building's original 1838 appearance. The building looks much the same today as it did in its heyday as the Hebron Academy.

The Hebron Academy is a significant structure that has played a key role in the development of the community and its town center. Many of the town's long time resident's spent their elementary school days in the building and on its playground which remains adjacent. The building retains its original exterior character and the town green the building stands adjacent to retains much of the openness it had when the building was first constructed in. The parcel of land the building sits on is not much bigger than the building itself, and it seems likely that neither the playground nor the building's septic system is actually located on the property.

Architectural Description

The front-gabled, four bay structure with its roof-supported bell tower centered at the entry (north) wall is located on a level and very small site adjacent to the Hebron town green, also owned by the town of Hebron. Two stories tall with strong symmetry along the north-south axis, the building has had two one-story additions made at the rear (south) end of the building which house mechanical equipment, restrooms, and storage. The original timber-framed structure sits atop a stone foundation with dressed capstones remaining at the east and north sides. The roof is framed with

common rafters which meet without a ridge board. At the interior, the original front spaces have been modified to provide a vestibule and stairwell which provides access to the Office of the Selectmen at the south end of the main floor and to the large meeting room used by all of the town's boards and committees on the second floor. A limited-use, limited access elevator here serves the main and upper floors, though there is no ramp at the vestibule door. The upper floor is open and clear of any evidence of the building structure. The newer gypsum board walls here are built to conceal any evidence of the timber frame at the building perimeter and the roof at the exterior walls only with no posts. The office space ceiling on the main level is bisected beneath the ridge line with a dropped beam apparently added to support the second floor timber joists at their midspan. This center beam is supported along its length with two wooden posts which bear, in turn, on the primary beams of the main level, each with a makeshift footing in the crawlspace beneath.

Primary character defining features at the exterior include the Bell Tower with its Gothic Revival louvered vent and five pinnacles, one at each corner and one in the center of the tower's almost flat roof. The building itself is more commonly Greek Revival in detailing with its three-part entablature at the front composed of cornice, frieze, and architrave, as well as wide trim at the building corners and the eaves. The seven-panel entry door is original with replacement hardware and the trim around the door provides flat pilasters visually supporting a shallow pediment. The windows of the building have been replaced more than once and the muntin patterns in the current windows are reported to have been coordinated with those from early photographs. The window trims with the heavy sills and the two-piece head casings are original and generally in good condition. Most of the exterior finish within four feet of the grade has been replaced as part of the regular maintenance of the building.

Assessment of Condition

Building Frame

The building is in fair structural condition, especially in terms of its age and ongoing use. The foundation and the tower require the most attention to bring them both up to modern standards for vertical and shear load carrying capacity and safety. It may be appropriate to consider replacing the foundation under the building as to provide better stability to the frame as well as to provide an enhanced thermal envelope and additional usable space within the building for the town's purposes. Framing supporting the tower is undersized and will require some augmentation at the attic level. Leveling the tower (which leans into the building as the beam supporting the south side it has sagged) may not be readily achievable. Future settlement should be prevented by supporting the tower better from below. The existing second floor framing is not adequate. The previous addition of a beam beneath the ceiling in the Selectmen's Office does not provide the stiffness required and the ceiling is cracked in several places because of movement of the frame. The building has undergone some minor shifting east to west due to racking of the exterior walls and attempts have previously been made to tie these walls together at the second floor level.

Foundation

The foundation of the original Hebron Academy is dressed with a low granite capstone, presumably over a fieldstone wall or rubble trench footing. Only the capstone is visible above grade. At the west side of the building this stonework has been replaced and/or covered with concrete as part of a previous repair project. At the interior here, stones visible at the top of the wall above the interior parging indicate that the capstones in this area are missing. Most likely the concrete covers a stone wall from a previous repair. The application of poured concrete to the outside face of stone

foundation walls is typical of attempts to control water infiltration through the foundation walls from roof run-off. There is no direct evidence to suggest why the original capstones were removed from the Hebron Academy. Perhaps a similar water problem caused movement of this side of the foundation. The replacement of wood siding and trims low on the building indicate that the water has previously been an issue with building maintenance

The original sills of the building have been replaced with built-up sills at the building perimeter and the primary cross beams that were once mortised into the sills are now supported just interior to the perimeter wall with stacked or standing concrete blocks without footings. Two of the three crossbeams are supported by ad-hoc structures of piled stones that may be pieces of the original west side capstones. The stone piers were likely added to the crawl space to provide support to new interior posts installed in the Selectmen's Office to carry loads from the second floor. The crawl space varies in height from 12" to 16" at this depth. This poses some risk to the framing due to proximity to the high moisture containing crawlspace soils.

Exterior Shell

Painted very recently, the exterior walls show no sign of water migration to their exterior. The windowsills in the meeting spaces show some staining and water damage, possibly due to condensation on the windows adjacent. Of greater concern is the higher level of damage at the head and sill of the windows in the north (entry side) windows of the stairwell. The staining at these windows is the most extensive of the typical signs of moisture at the larger windows of the Meeting Room and the Selectmen's Office. Moisture damage at the head of these windows may mean water is moving behind the siding. It is unclear whether this damage is ongoing or may have been fixed at its source through the painting of the building or repair of the flashing of the entablature, a likely source for such water penetration. Water in this wall may have been (or continue to be) the source of water problems at the carpeted first floor of the Entry Stair. The three-tab asphaltic roofing on the main block of the building is in fair to poor condition and should be replaced as part of any renovation project disturbing any portion of it. On its own, it may last for several more years, though it should be inspected and repaired at common points of leakage including flashings where the roof meets the tower and the chimney. The chimney within the meeting room shows signs of moisture movement. The tower roof was inaccessible for inspection.

Energy Issues

The building's heating is provided by an oil fired boiler located in the first addition to the original Hebron Academy and installed in 2002. The boiler appears to be in fair to good condition, though is reported to be undersized to meet the building's current heating requirements. Second floor heat is provided through baseboard radiators at the exterior walls of the Meeting Room and the Upstairs Restroom. Downstairs, hot water is piped through uninsulated pipes in the crawlspace to fancoil units which deliver hot air into the Selectmen's office. Most of these pipes travel within the apparent wooden ductwork of a much earlier heating system. A small radiator in the Entry Stairwell provides winter heat and may have been the cause of a leak of semi-toxic materials into the carpet. Baseboard heat is also provided in the restrooms of the first addition. Insulation in the attic is a combination of fiberglass batt and fiberglass blown insulation with good coverage with an estimated Thermal Resistance (R-value) of 35. The interior walls have been built out at some point and are most likely also insulated with Fiberglass Batt Insulation. At 6" thick, the wall would have an R value of 19. Both the foundation and the first floor frame are completely uninsulated, and this is the weakest component of the building's energy envelope.

Integrity of Historic Features

The exterior of the Hebron Academy retains much of its original character defining features. The front-gabled Greek Revival structure retains its original wide trim at the gable-end and eave. The front corners of the building are fitted with wide corner board pilasters visually supporting a three part entablature across the gable end. The entry doorway retains its original decorative enframement including decorative pilasters at each side and a simple entablature above. The entry door appears to be the original seven panel unit hung on strap replacement hinges and the door remains accessed via a set of granite entry steps. At the East and South facades, the original foundation remains visible, At the rear (south) side of the building, this horizontal band at the eave line is discontinuous. The tower with its corner pinnacles and pointed arch shaped louver shows detailing associated with the Gothic Revival style, which was just coming into fashion around the time of the construction of the original Hebron Academy. Few of the interior finishes of the historic Hebron Academy remain visible today. The original finishes can best be seen at the north end of the building in the Electrical and Storage Closet on the first floor. Additionally, some of the early wood wainscoting remains in the second floor of the Entry Stairwell.

Life Safety

The historic Hebron Academy is a two story wooden structure with a meeting room on the second floor. The building was previously used a school but has been used effectively as the Town Hall for Hebron NH for the past ten years or so. No change of use is being considered for the building at this time. The building's second floor Use and Occupancy Classification is A-3 because of the prominent meeting room on the second floor. The first floor office space is Use B, which is the predominant occupancy class in the building. The unprotected wood framed Construction Type is 5B. The building is equipped with an automatic fire detection system but not with an automatic sprinkler system. Adding such an approved system would put the building's height within that allowable in the IBC (as modified) and NFPA 101. Egress from the second floor meeting room could be made more compliant with the addition of panic hardware at the stairwell and attention to fire-rating issues between this stairway and the Selectmen's office below. This would include a substantial reduction in the amount of glass in the door and the wall. The exterior egress stair at the rear of the building is sturdy and usable, but does not meet code requirements for an exterior egress stair because of its construction and materials. The location of the emergency generator beneath the stairs is also a cause for some concern. A future addition should include an interior stair to serve as a second means of egress from the upper floor.

Recommended Rehabilitation Approach

The historic Hebron Academy is in relatively sound condition and would benefit from some maintenance and careful attention. Additionally, there are some functional aspects of the building which could and should undergo more rigorous work to provide for better functionality and safety of the facility and its occupants. Renovation of the building to expand its physical size may provide opportunities to readily address such issues. Without such a renovation or expansion planned within the next five years, the buildings systems should be addressed for their own sake according to the order of priority below.

Short-term Recommendations

Roofing

Keeping water out of a historic wooden framed building is always a high priority for the building's long term health. No access to the roof was achieved during the walk-thru of the building. The main roof and the tower roof should be examined by a qualified roofer and any damaged materials replaced or repaired. The flat roof of the tower is a common area to find leaks, as is the flashing of the connection where a roof meets a wall (such as the tower) or a chimney are common areas to find leaks. There have definitely been water issues in the building at the chimney and staining on the masonry was visible in the meeting room. The building eaves should be carefully examined for the adequacy of the drip edge to shed water. Improper flashing here could be the source of water in the walls that commonly makes an appearance at the head of the windows. It is difficult from the interior to tell if such problems currently continue or if the damage remains though the problem has been fixed. The main roof on the building should be replaced within the next five years. The tower roof was not examined and its condition is unknown. A building of this caliber should be fitted with a high quality roof on such an area where problems might go undetected for a long time. The town is encouraged to install a soldered copper roof at the tower unless such a roof is already in place. Total cost for roofing work will depend on selected work scope: $500 to 14,500

Foundation

The floor framing for the main level of the Hebron Academy is not separated appropriately from the exposed soils of the crawlspace. At a minimum, the crawlspace should be excavated to a minimum of 18" deep and have a reinforced vapor barrier installed over all the exposed soil. Animals that have been allowed to come and go through the unscreened vent holes in the foundation should be prevented from doing so in the future through the installation of screens in these openings. In the summer, these openings should be closed with built-to-fit insulated panels to limit condensation of summer moisture on the top side of the vapor barrier. The same panels can then be used in the winter to keep the building more comfortable and energy efficient. At the same time this work is done, it would be appropriate to install proper footings under at all of the piled stone and concrete block support locations. Estimated Construction Cost $21,500-24,800

Alternatively to making these suggested repairs, the possibility of replacing the entire foundation of the building should be carefully considered. Though more expensive, a new basement would be a better solution to the moisture and pest control problems above while adding the benefits of additional usable space for storage and mechanical services. Moving the mechanical plant to the basement would have the added benefit of opening up the space behind the building for expansion of program space on the main level without changing the building footprint. Similarly, if the building is to be expanded to house all of the town functions, the expansion itself could be smaller in total size. Estimated Construction Cost $87,500-$105,700

Crawlspace Insulation

There is currently no insulation in the crawlspace under the main level of the Hebron Academy. As a temporary measure only, this area could be insulated with inexpensive batt insulation to increase the thermal comfort of this space in the winter. Such insulation should not separate ducts or piping from the space above but instead should wrap

underneath such elements to protect them from freezing. Insulation of the floor frame should be a temporary measure only (though the insulation may be retained after a new foundation is installed). If installation of a new foundation is determined to be more than ten years off, a better insulation approach would be to insulate the interior face of the crawlspace walls with rigid insulation covered with fire protection board per code. Such insulation should extend all the way up to the underside of the floor sheathing and at least two feet into the soil or turned and extend three feet over the crawl space floor. The vapor barrier on the grade should be taped to the foundation wall before placement of the insulation. Estimated Cost $5,000-$8,800

Entry Stair

The carpet in the Entry Vestibule should be replaced. It appears that the liquid saturated in carpet at the base of the stair is not merely water and may be a glycol or alchohol mix leaking from the radiator adjacent. The water poses a hazard to the sheathing and frame, which may be subject to mold or rot. The glycol, if that is what it proves to be, poses perhaps a greater danger to children if ingested. With the carpet removed, a determination should be made as to the exact source of the spill. The apparently recurrent leak may still be leaking from the radiator or may instead be rainwater somehow finding its way in from the north facing exterior wall. This wall has very recently been painted and it is hoped that if this was the source of the leak, that it has already been addressed. After the source of the water at the bottom of the stairs has been identified and the leak confirmed to be repaired, new carpeting should be reinstalled. Estimated Construction Cost $3,400 - $5,400.

<u>Longer Term Recommendations</u>

Building Frame

The existing building has been serving as a town hall for about ten years now and there are no changes of use proposed at this time so no structural improvements are required to bring the building structurally up to code. Nevertheless, structural engineers have looked over the building and have identified several areas where the building underperforms as compared with the standards of a new building. Movement in the second floor frame is also suspected to be the cause of the excessive cracking of the gypsum board finishes of the second floor. The existing beam and posts in the selectmen's office are the result of a previous attempt to shorten the span of the original second floor framing members. In a similar fashion, the engineer's report attached suggests that two beams would have been better than the single one installed, and that these beams (wrapped in wood much as the current beam is) might be sized to clear span the office without the need for posts in the space. This approach will dramatically increase the bearing capacity and stiffness of the second floor platform.

The engineer suggests that limiting the occupancy of the meeting space will also relieve the current problems with ceiling movement. The meeting room is safe and there is no code required need enforce such a limitation because of the building's current use is not changing. Limiting crowds in the upstairs meeting space will help protect the finishes on the underside of the ceiling. The following thoughts are offered for consideration by those deciding to consider such a limitation: The code calculated

occupancy of the space would be calculated as 1 person per 7 sq. ft. or 114 people in the 800+/- sq.ft. space. This loading could go as high as 160 people (standing without chairs) using 5 sq.ft. per person with no change in the 100lb/sq.ft. code required loading so this structural requirement is adequate for the higher occupant loading. The floor joists "as is" support only 44% of the required load. 44% of the allowed occupant load could be argued to be between 50 and 70 people. Once the recommended structural repairs are made to the floor, there would not be a need to limit the occupancy and any postings made now as a result of this recommendation could be removed.

The first floor frame is recommended to be reinforced by adding additional new joist framing between the existing log joists beneath the main level. These log joists span between the original timber beams spanning east to west across the building. If the foundation has not been replaced at this point, it will be necessary to install new footings for both the center supports of the timber beams (where there are currently stone pilings) and at both ends of every beam (where the original tenons have been cut and the beams are currently supported on piled concrete blocks).

The roof frame is constructed of a mixture of hand hewn and sawn common rafters and all of these are undersized for the requirements of the current New Hampshire codes. These bearing requirements are set to establish evidence that the roof will perform satisfactorily through the worst likely weather scenario and do not consider the evidence that the building has been standing for eighty years with no failure of the roof. It is clear from previous repairs visible in the attic that improvements in the original capacity were attempted. The engineer has made specific recommendations in his report for further improving the load carrying capacity of the framing. These include adding additional rafters between those existing and installing ceiling ties to better protect the walls from spreading compared with the current collar ties. A structural ridge beam is suggested but perhaps unnecessary if the ceiling ties are appropriately sized and installed. The hewn timber framed bell tower should be re-supported with the installation of new beams (and perhaps bracing) to prevent further leaning of the tower. The posts used to support new beams at the second floor level might be sized to carry some of the tower loads. Roof framing repair, as well as roofing replacement, could be done integrally with any expansion of the building as this work will require the disturbance of whatever finishes are in place at the time of expansion.

Accessibility

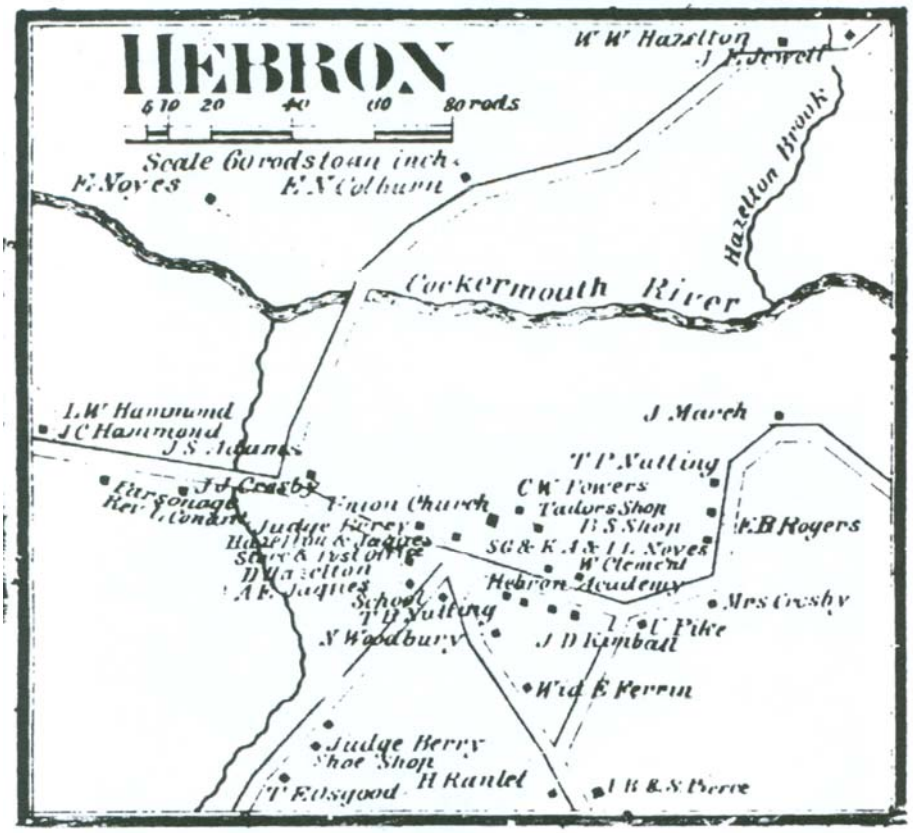
Although the building is equipped with a wheelchair lift, there is no way for an individual in a wheelchair to get themselves into the building. An expansion of the building might allow for the creation of a new entry though which the public might enter the building. Until such an entry is complete, the existing entry could be modified to allow access for the mobility impaired using a wooden ramp and landing. Such a ramp would unfortunately be out of character with the existing entry. An alternative given the low height of the existing threshold might be to place large flat granite slab flush with the threshold and install gently sloped walks symmetrically to the left and right. This more permanent solution will require the cutting of the existing pavement but leave the entry visually more intact.

Conclusion

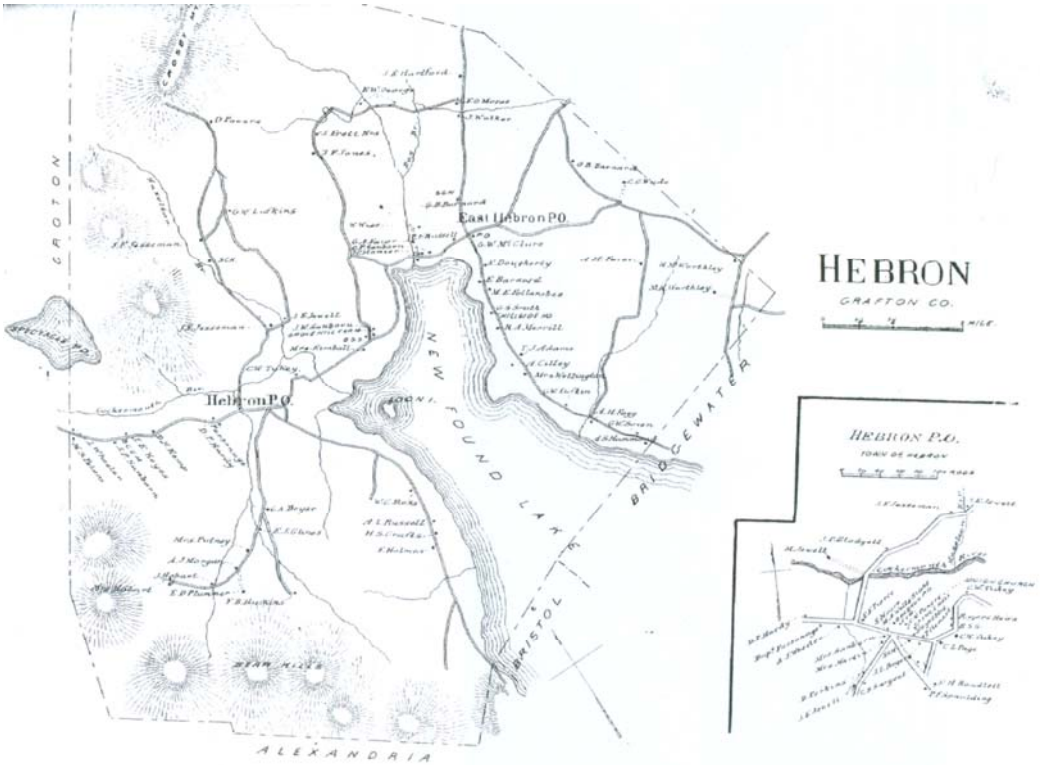
The Hebron Academy building serving as the town hall of Hebron New Hampshire is in good condition for a building of its period. Greek Revival in character with Gothic Revival tower elements, the unique structure once intended to uplift the moral and intellectual powers of its students now serves the purpose of housing the workings of the town government. Several improvements might be made to the structure in order to better facilitate this purpose, some of which may be undertaken immediately. More complicated projects such as foundation replacement and frame modifications may be best timed to coincide with an expansion of the building as is being considered to bring all of the town government functions under one roof. The preservation of the building's exterior form should be maintained by making additions to the back and/or side portions of the building away from the approach side. Boundary line adjustments not made at the time of the playground and septic system installations should be considered at this time to keep all of the work for the project on the Hebron Academy parcel. The Hebron Academy is a good candidate for expansion as such a project offers opportunities to financially capitalize on the lower square foot renovation costs of the usable building and while maintaining the town center's significant historical fabric and character. At more than 170 years old, the Hebron Academy building is a testament to the early civic involvement and pride of the community of Hebron. With proper repairs and ongoing care, the building should stand as both a symbol and useful asset to the community for many, many years into the future.

Photographs and Images:

Map showing route of Mayhew Turnpike chartered 1803

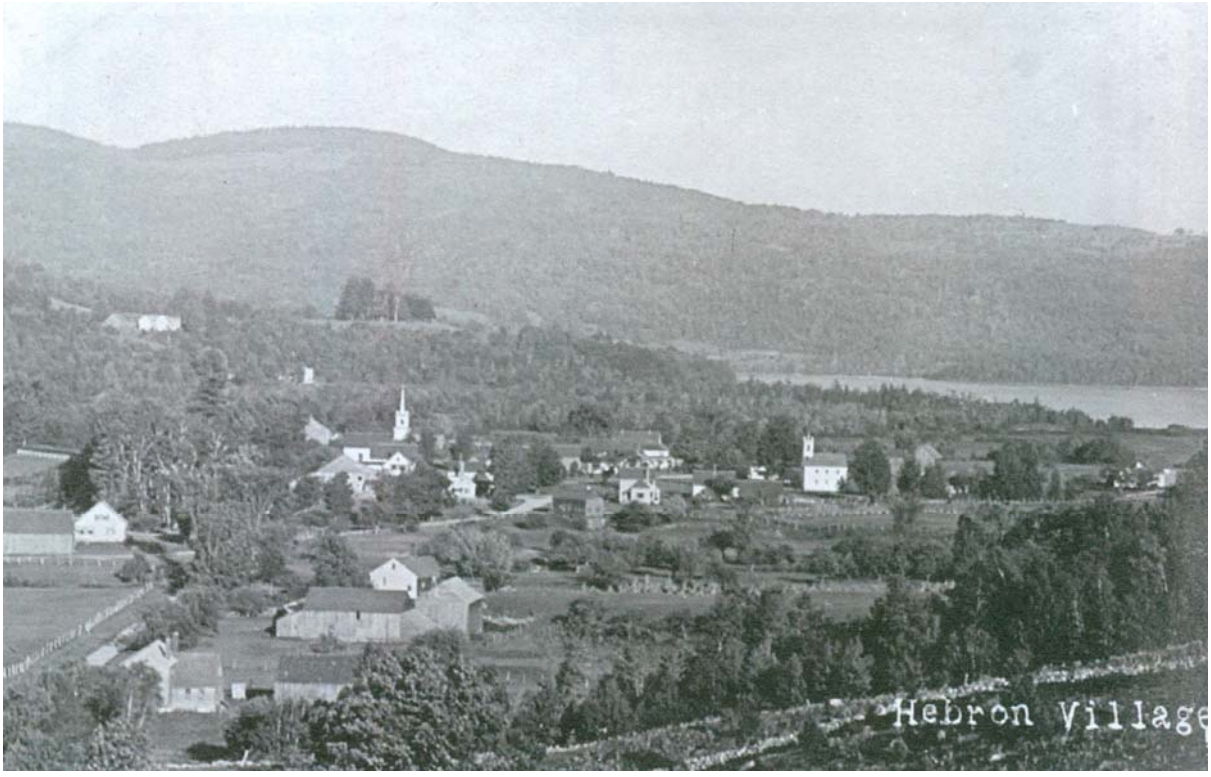


Map showing Hebron Center c. 1861



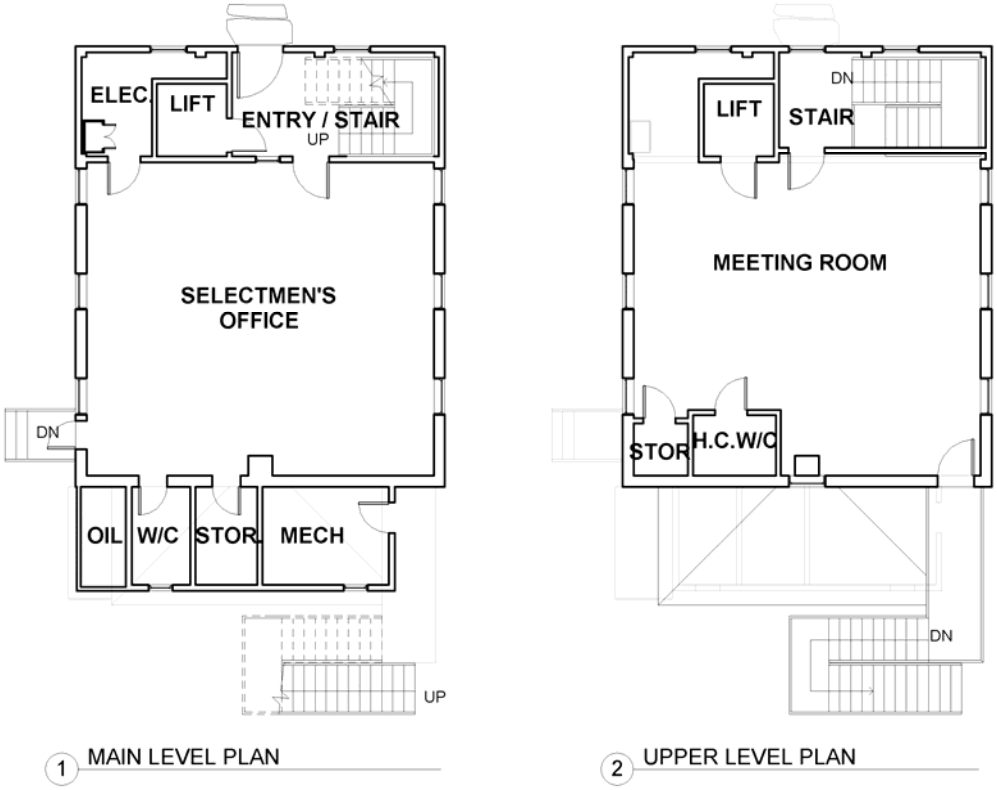
Map showing Hebron Center c. 1892

Hebron Center c. 1890 - note Academy and church visible over roof of ell in foreground.

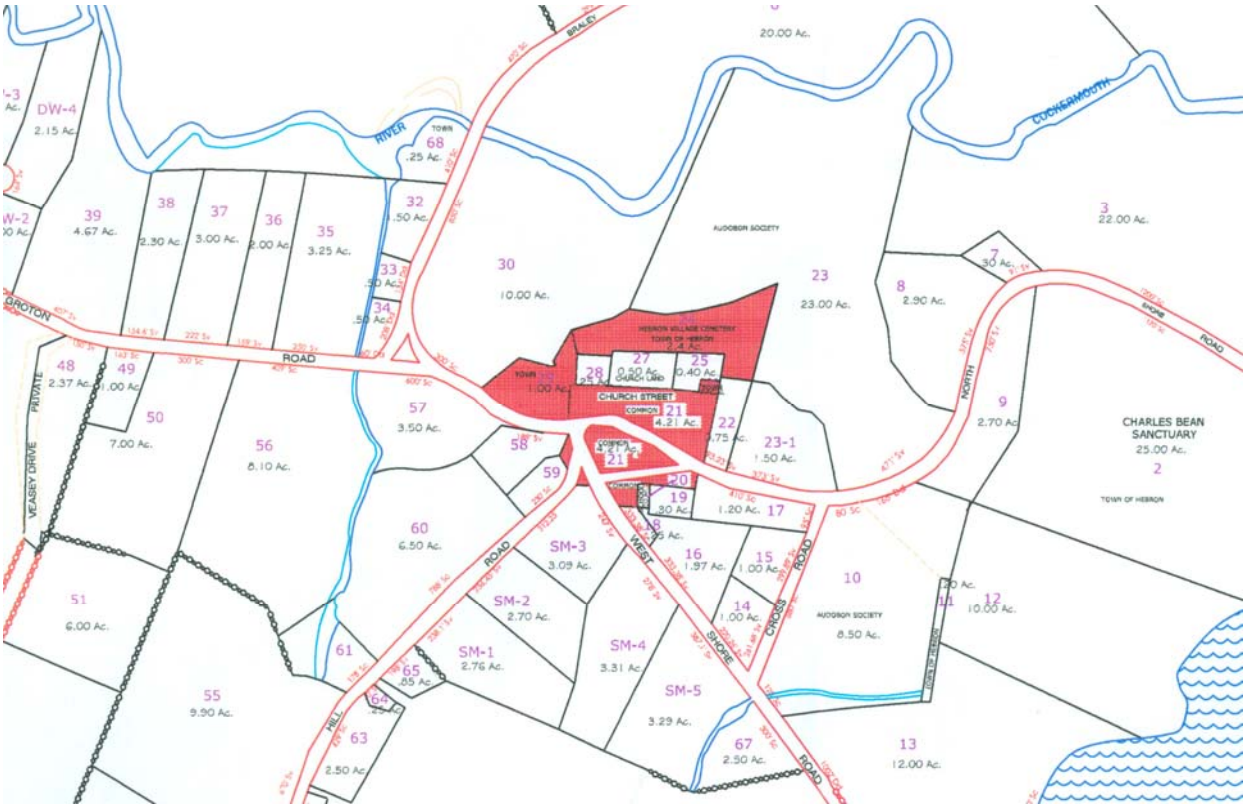


Hebron from Hobart Hill, c. 1910

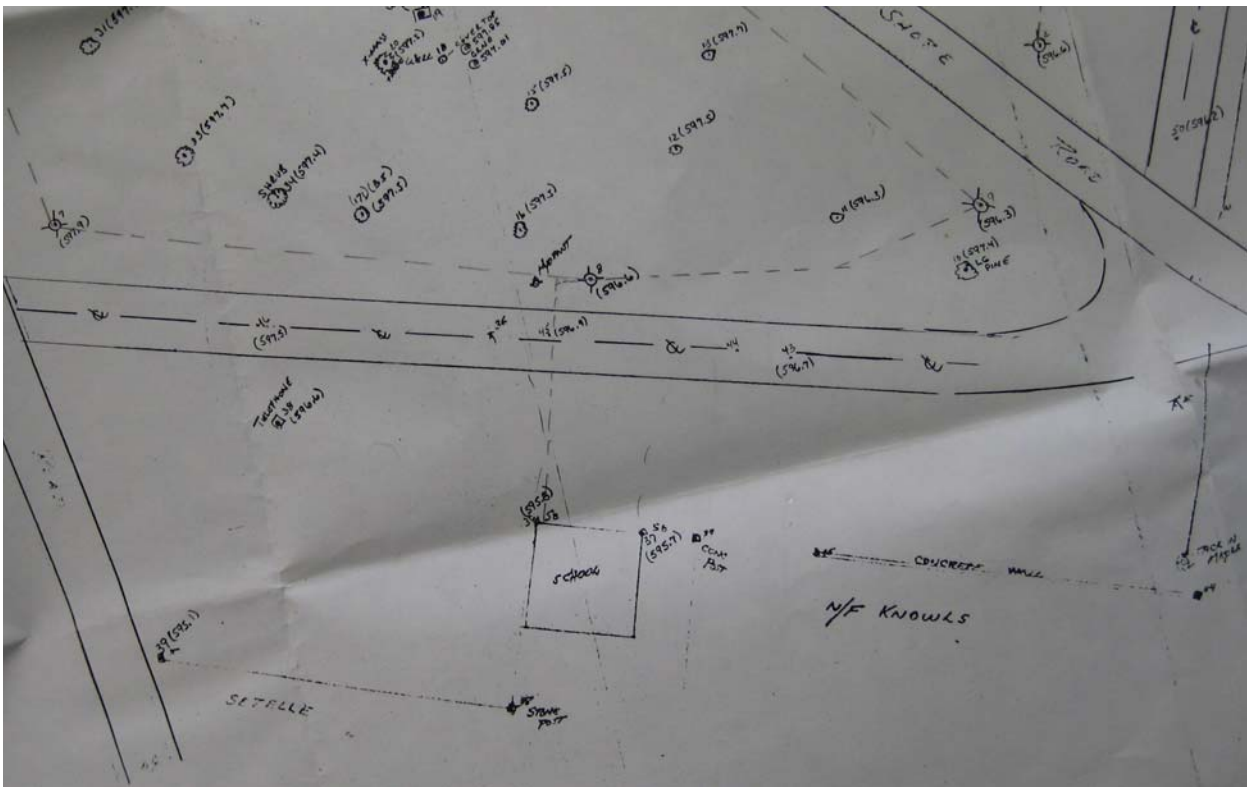
Hebron Academy as it stands today.



Floor Plans of Existing Conditions



Tax Map showing small Hebron Academy lot (#20) adjacent to town common where existing septic system and playground for the school had apparently been installed.



Planting Plan shows several boundaries of Hebron Academy lot.

Original tower leans toward the south (rear) of the building. Stabilize the tower in place and inspect roofing for leaks at joints between main roof and tower walls.

Non-compliant exterior egress stair should be modified or replaced, ideally with an interior stair.

Dressed granite capstone of existing foundation at east facade – note gap caused by stone tipping outward.

Existing crawl space with wooden plumbing chase and stone mid-beam support - note proximity of floor framing to soil and complete lack of insulation in floor system above.

Typical water damage at windows in Entry Stairwell. Similar but less dramatic staining occurs in the Meeting Room windows

Water damage at bottom of stairs is likely caused by past or present leaking plumbing. Replace newel post (drawing dark staining materials up from bottom) if required.

Office of Selectman with dropped beam under original ceiling.

Electrical Closet at northwest corner of building reveals some of original finishes removed or covered over elsewhere in the building.

Water staining at chimney in Meeting Room is likely the result of flashing issues at the roof– note older wooden ceiling not original to building.

Original floor framing below Meeting Room has newer cross framing running perpendicular over the top. Note the split lath and plaster ceiling still attached to the bottom of the old timber joist. This is now hidden above the Selectmen's office by a poorly installed gypsum board ceiling.

Attic with hand hewn and sawn common rafters

Northeast Tower northeast timber post and bell carriage for bell (previously removed to church across the common)

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HEB

STRUCTURAL ASSESSMENT REPORT

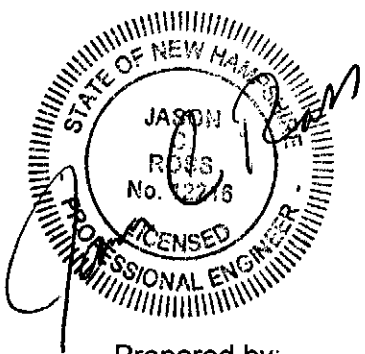
HEBRON TOWN HALL

HEBRON, NEW HAMPSHIRE

Prepared for:
Christopher P. Williams, Architects

September 29, 2010

Revised November 10, 2010



Prepared by:

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HEB Project #2010-076

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HEB

September 29, 2010

Christopher P. Williams, Architects
Attn: Norman Larson
4 Stevens Ave
PO Box 703
Meredith, NH 03253

Re: Hebron Town Hall, Hebron, NH
Structural Assessment Report
HEB Project #2010-076

Dear Norman,

This structural assessment letter has been prepared to report the structural condition of the existing Hebron Town Hall building. The structure is located off North Shore Road in Hebron, NH. Jason Ross, P.E., and Salvatore DiSanza of H.E. Bergeron Engineers (HEB) and Norman Larson of Christopher P. Williams, Architects (CPWA) visited the site on August 26, 2010, to observe the existing building framing and to take field measurements. This work was performed in accordance with our Letter Agreement dated September 16, 2010.

Field Observations:

The existing structure is a two-story, wood-framed building that is rectangular in plan (30'-6" x 36'-5"') with the front of the building facing north (see Photo 1). There is a bell tower on top of the building at the north end. It is approximately 6'-6" square in plan (see Photo 1). The building has a gable roof pitched 8-on-12 with the gable ends at the north and south of the building. There is a one-story mechanical room addition off the south end of the building that is rectangular (22'-3" x 8'-7") in plan (see Photo 2). The building has an emergency staircase located off the south end of the building (Photo 3). The original structure is reported to have been built in 1832 and until recently was used as a school. It is currently being used to house the Town Selectmen's office on the first floor and a meeting room on the second floor.

Basement Area:

The basement area is a 2-foot crawlspace with a dirt floor, making it difficult to fully access for examination. Visual inspection of the basement was possible through a hatch in the northeast corner of the first floor and four exterior basement windows. The foundation was originally constructed of granite stones but was partially replaced with cast-in-place concrete. The original 8"x8" sill plate was replaced with four (4) 2x8 timber planks which appear to be in good condition. There are built-up timber and rock columns resting on the dirt floor (see Photo 5). The basement area also appears to be in fairly good

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condition with no signs of water damage. However, there are signs of uneven settlement in the stones, possibly due to frost in the soil below.

First Floor Framing:
The first floor framing was assessed from the basement. The floor joists are timber logs approximately 6"-10" in diameter (see Photo 4). The joists have been notched at the ends. The maximum joist span is 10 feet with typical spacing of 24" on-center (o.c.). The joists are supported by (3) hand-hewn 8"x10" beams spanning the full length of the building in the east-west direction. There are built-up timber and rock columns supporting the beams at approximately the mid-span (see Photo 5). The log floor joists are notched about 2" to fit into the 8"x10" beams (see Photo 5). There appear to be small holes in several of the log floor joists giving signs of powder post beetle damage. The severity of the damage is unknown at this time.

Second Floor Framing:
The second floor framing is made up of new and original members. There is a built-up floor made of 2x4 joists spaced at 12" o.c. resting on top of the original hand hewn 8"x8" timber beams spaced at 4 feet o.c. The original floor beams span east-west across the building and are supported at the mid span by a timber beam. The beam is supported by two load-bearing walls and two timber columns. The size and material of the beam and column are unknown since they are both encased in wood veneer (see Photo 6). The columns and beams are assumed to be hand-hewn 8"x8" timbers.

Roof Framing:
The roof is a gable style with an 8:12 slope. The original roof rafters are hand-hewn 3"x7" timbers spaced at 36" o.c. The rafters are attached at the ridge by a timber ridge board with no actual ridge beam. There are 2x4 timber rafter ties on every other set of rafters that were added at an unknown date (see Photo 7) to support the ceiling below. There is one steel tie rod across the building, but the exterior wall is still bowing out near the top of the wall due to the outward thrust of the rafters. The bell tower at the front of the building is framed with 8"x8" hand-hewn timbers. The timbers appear to be in good condition, however the entire tower appears to be leaning backwards toward the building.

Emergency Egress Stairway:
The emergency egress stairway off the rear of the building appears to be relatively new compared to the rest of the structure. It is framed with conventional lumber and is supported by concrete sono-tubes. The framing appears to be in good condition. However, the beams and joists are not adequately fastened together. The railing system does not appear to meet current building code requirements.

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Mechanical Room Addition:
The mechanical room appears to have been recently constructed. It has a cast-in-place concrete foundation with a slab on grade. The walls and roof are conventionally framed with dimensional lumber. The framing appears to be in good condition.

Existing Structure Analysis:
It is unknown what codes, if any, were in effect when this building was originally constructed. The current structural analysis of this building is based on the International Building Code (IBC) 2009. A ground snow load of 80 pounds per square foot (psf) for Hebron, NH, was used based on the Cold Regions Research and Engineering Laboratory (CRREL) report Ground Snow Loads for New Hampshire, February 2002. This results in a roof snow load of 60 psf. A basic wind speed of 90 mph was determined based on ASCE 7-05. Floor Live Load Capacities of 50 psf for office areas and 100 psf for auditorium areas are required based on ASCE 7-05.

Timber analysis was based on the AF&PA National Design Specification (NDS) for Wood Construction, 2005 Edition. Lumber grade and species of the existing structure were not tested, but given the age of the structure, the joists and timbers were assumed to be No. 1 Eastern Hemlock.

Conclusions:
The following table is a summary of the required Live Load and Snow Load capacities of the structure and the actual capacity from our analysis:

Member	Required Capacity	Actual Capacity	Status
First Floor Beams	50 psf	25 psf	*Does not meet code*
First Floor Joists	50 psf	30 psf	*Does not meet code*
First Floor Columns	13,500 lbs	40,000 lbs	Adequate
Second Floor Beam	100 psf	25 psf	*Does not meet code*
Original Second Floor Joists	100 psf	44 psf	*Does not meet code*
Roof Rafters	60 psf	20 psf	*Does not meet code*
Emergency Stairs	100 psf	70 psf	*Does not meet code*

Based on our findings, there are many sections of the existing building that do not meet current building code requirements.

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Recommendations:
HEB recommends the following repairs and upgrades to the structural framing:

Foundation:
The existing stone foundation has settled unevenly and is affected by frost in the winter. We recommend jacking up the building and installing a cast-in-place concrete foundation that extends below the frost level. This will prevent movement in the building and will also help to keep moisture away from the first floor framing. We also recommend installing concrete spread footings at all of the interior column locations.

First Floor Framing:
The beams and joists in the first floor are overstressed when the code-required 50 psf live load for office areas is applied. There are also signs of insect damage in some of the floor joists. We recommend bringing the floor system up to code by adding columns under each of the first floor beams and by adding additional floor joists.

Second Floor Framing:
The original beam and hand-hewn joists in the second floor are overstressed when the code-required 100 psf live load for auditorium areas is applied. We recommend adding two additional beams under the original floor framing. This will help to bring the timber floor beams up to the required capacity. If these repairs are not made, we recommend limiting the number of people allowed on the second floor of the building in coordination with the local fire chief.

Roof Framing:
The roof is overstressed when code-required 60 psf snow load is applied. We recommend bringing the roof up to code by installing a ridge beam under the existing rafters, installing additional roof rafters between each existing rafter, and installing ceiling ties to prevent the walls from bowing out. We recommend installing additional support beams under the existing bell tower as well as some additional diagonal braces on the tower itself to prevent it from leaning further.

Emergency Egress Stairway:
The emergency stairway does not meet the code-required 60 psf snow load or 100 psf live load. We recommend bringing the stairway up to code by installing additional floor joists, adding proper hangers and caps, increasing the height of the railing to the required 42 inches, and properly fastening the ledger board to the building using lag bolts.

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Mechanical Room Addition:
Based on our observations, the mechanical room framing likely meets current building codes. No upgrades to this area are necessary at this time.

HEB is available to work with the Town to develop final design drawings for the recommended repairs.

Disclaimer:
The opinions and recommendations contained in this report are based on information provided by the Town, on a "walk-through" field investigation performed as part of this work, and on information provided by other parties. Design checking calculations were performed to determine if certain structural members are in compliance with adopted building codes and no physical testing was performed. This report does not address any other part of the structure other than those mentioned, nor does it provide any warranty, either express or implied.

We hope that this report meets your needs. Please let us know if you have any questions or if you need any assistance in designing any of the repairs discussed in this report.

Sincerely,
H.E. Bergeron Engineers, Inc.

Jason C. Ross, P.E.
Senior Project Engineer

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Photo 1: View of the front of the building and bell tower facing south.

Photo 2: View of the addition off the south end of the building facing east.

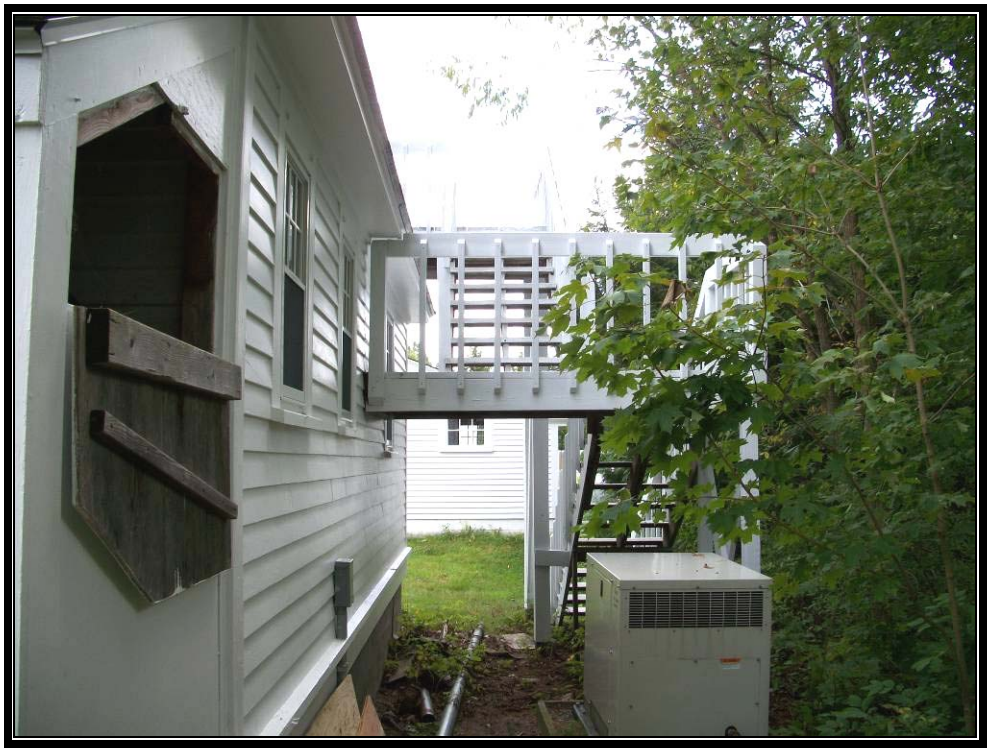

Photo 3: View of the emergency staircase off the south end of the building facing east.

Photo 4: View of first floor timber joists.

Photo 5: View of first floor built-up columns and notched floor joists.

Photo 6: View of first floor columns and second floor beam.

Photo 7: View of roof framing.