Deacon Eldred House

4 Water Street
Sandwich, Massachusetts 02563

Assessment Report
June 25, 2015
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EXECUTIVE SUMMARY

The Deacon Eldred House, at 4 Water Street, Sandwich was built originally in 1756 on the site of an earlier 17th century home. The house was originally built for Cornelius Tobey and its present name is based on the owner from the mid 19th century, Deacon Cornelius Eldred. The Town of Sandwich purchased the building in the 1970’s and leased the building to house the Thornton Burgess Museum. The museum occupied the building until 2013, and the building has since been vacant. The house contributes greatly to the Town Hall Square Historic District, and is located within the Old King’s Highway Regional Historic District. The Massachusetts Historical Commission holds a preservation restriction on the property.

In 2014, the Town of Sandwich commissioned preservation architects and planners McGinley Kalsow and Associates, Inc. to inspect the Deacon Eldred House to provide an assessment report of the building’s condition, to provide existing condition drawings, identify code deficiencies, to prioritize repair recommendations, and establish budget pricing for the repairs. For this assessment, McGinley Kalsow and Associates also engaged structural engineer Arthur MacLeod to provide an assessment of the building’s structural condition.
Historic Background
Deacon Eldred House
Historical Background
March 9, 2015

Introduction

The Deacon Eldred House is a two-story, three-quarter colonial home in the Town Hall Square Historic District of Sandwich. Built in 1756 on the site of a 17th century home, the Deacon Eldred is one of three historic, four-bay colonials in the village, the other two being the Dillingham and Razzinotti Houses. It is likely that the original building was a cape, and was modified later to incorporate more bedrooms. Previous improvements were made under its most memorable owner, Arabella Burgess, included Victorian features such as a bay window and covered porch. These additions were removed after the house was restored.

Not only historic by itself, the Deacon Eldred House stands in the center of the Town Hall Square Historic District, which encompasses a number of public and residential buildings. Included in this list are the Town Hall, Sandwich Glass Museum, First Church of Christ, Dexter Grist Mill, and several historic homes. Town Hall Square has been "virtually unchanged since the 19th century," and contributes greatly to the historic character that welcomes visitors to Sandwich.

The Deacon Eldred House occupies a critical niche in restored historic homes. While plenty of historic homes exist in Massachusetts that were estates or city mansions for wealthy citizens, few
have the colorful "home-to-many" history of the Deacon Eldred House, which provides a picture of life for the average citizen of Sandwich.

**Tobeys, Nyes and Eldreds**

Sandwich was settled in 1637, as an agricultural village. It was the first settlement on Cape Cod, and was incorporated only two years later. Approximately 60 families were among the group that originally arrived. Today, there are seventy-five extant 18th century homes in Sandwich, but only nine from the 17th century. This makes 4 Water Street a unique site, in that it consistently housed at least one family for more than 330 years.

The original home at what is now 4 Water Street was built not long after the settlement of the town, in 1643. Built for the Knott Family when they first arrived in Sandwich, the 17th century home remained in the family until it was razed by Cornelius Tobey in the 1750s. The second house was originally built for Cornelius Tobey and his wife Martha Knott in 1756. James Nye purchased the house from Hannah Tobey Crocker in 1812. A title search on the property shows that James Nye sold the property to Cornelius Eldred and his in-law¹, William Pope, in 1832. The house and land (one acre) sold for a total of $1,000. Pope sold his share to Cornelius Eldred three years later.

While originally a home for a single family, it spent much of its history as a boarding house. Cornelius Eldred, a man with modest income and a small family, made the decision to expand the house to accommodate boarders, adding the two-story ell addition off of the rear, and likely enlarging the second story. The Deacon Eldred House was home to both local celebrities, such as the notorious Arabella Burgess, and everyday individuals throughout the 19th century. Among its residents were cobbiers, journalists, and nurses. Cornelius Eldred, the eponymous owner of the house, was a deacon in his church and a cobbler by profession. He married Mary Anne Pope in 1831. After Mary Anne's death in 1834, Cornelius Eldred married her cousin Salome Pope, who gave birth to five children. The two children who lived to adulthood were Frederick Eldred, who never married, and Arabella Eldred Burgess, who became a memorable social figure in the town of Sandwich.

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¹ The exact connection to Mary Anne Pope, Eldred’s wife at the time, is uncertain. It is possible that William Pope was her older brother.

Figure 2: The deed for 4 Water Street, when Cornelius Eldred bought the house in 1832.
The Burgesses: Local Celebrities and Female Property Owners

Arabella Eldred Burgess was born in 1843, in the house she inherited from her father. She married Frank H. Burgess, a grocer, in 1866, and adopted two daughters, Ambrosetta and May. She was also, as worded by former chair of the Sandwich Woman's Club Shirley Cross, "the first owner whose lifestyle is known to us." This is not partially because Arabella Burgess was a famously eccentric character of Sandwich. She was known for her love of nature, and the way it invaded her home. Pets and plants were reported to run wild in the house. Arabella would feed the carp from the dock, raise canaries, and walk around town with a pet chicken. One visitor commented that she "didn't mind the pets," but was afraid to "step on the snakes."

Much of Arabella's character can be seen in the improvements of the house. Her love of the outdoors manifested itself as a bay window, attached to the front façade of the house. Other Victorian features were also added to the house under her ownership, including a covered porch and extra-wide windows. These additions were removed when the house was restored to its colonial character, at the recommendation of the Advisory Landscape Council.

It is possible that Thornton W. Burgess, one Sandwich's most celebrated residents, may have lived in the Deacon Eldred House for a short time. He was born in Sandwich in 1874, and lived with his mother in Sandwich throughout his childhood. They moved from house to house around the town, living in at least ten different addresses. It is not unreasonable to assume that they may have stayed with his aunt and uncle, Arabella and Frank Burgess, in one of the Deacon Eldred House's many rooms.

Thornton Burgess would later go on to be a celebrated children's author. Much like his Aunt Arabella, his love for nature guided him throughout his life. He began his literary career by writing stories for his son. These stories would become his debut children's book "Old Mother West Wind." He would eventually write 170 books, almost all of them featuring animal characters. His most famous characters include Happy Jack Squirrel, Reddy Fox, Jimmy Skunk, and Peter Rabbit (not to be confused with the Beatrix Potter character of the same name.) The setting of these stories was inspired by the home of an employer, who lived on Discovery Road in Sandwich.

Burgess also became famous for his work in conservation advocacy. Over the course of his lifetime, he helped to pass multiple pieces of legislation protecting migrant wildlife, and established several clubs and organizations devoted to environmental protection. Among these were The Green Meadow Club, which focused on land conservation; The Bedtime Stories Club," for wildlife protection programs; and "The Radio Nature League," which was a regular broadcast on WBZA in Springfield. He received recognition from the Boston
Museum of Science for "leading children down the path to the wide, wonderful outdoors," and was awarded the Distinguished Service Medal of the Permanent Wildlife Protection Fund. Multiple historical records have theorized that Burgess's love of the outdoors was cultivated by his Aunt Arabella.

The Deacon Eldred was inherited by Ambrosetta Franklin Burgess, who married journalist Charles M. Doten. The Dotens left the house to their only child, May Eldred Burgess, who married Lloyd Clifton Gould. The Goulds, who were childless, operated a nursing home on the site of the Deacon Eldred House between 1939 and the 1960s. The house was sold to Mrs. Mary Peebles after Lloyd Clifton Gould’s death in 1966. Mrs. Peebles sold the house to the town in 1974. For at least 90 years, between 1884 and 1974, ownership of the house was passed exclusively through the hands of women.

Married female landowners were nearly nonexistent in the early decades of the republic. Under colonial governments, married women could neither own nor sell real or personal property, nor could they earn a salary or enter into contracts. Beginning in 1839, individual states began signing into law the Married Women's Property Act, which protected the property of married women. Massachusetts signed the legislation in 1855, just eleven years before Arabella would marry Frank Burgess. It is unclear whether Arabella inherited the house after her father's death or if it was given to her when she married; it is her name that appears on historic maps in 1907, while her husband was still alive. The Deacon Eldred's long history of female ownership is a socially and politically distinctive feature of the home.

The Deacon Eldred House - A Community Resource

Figure 5: Deacon Eldred House before restoration, c. 1974. Note Victorian elements are still present.

The Town of Sandwich purchased the Deacon Eldred in 1974. The acknowledgement letter to the Board of Selectmen from 1974 indicates that the town purchased the house with the intent to preserve it. However, there was great concern among the residents of Sandwich that the house was to be razed and replaced with a parking lot. Whether or not these concerns were valid, the Sandwich Woman's Club was inspired to lead the charge to restore the building.

The town held a Board of Selectmen's meeting to determine the exact uses of the building. Four groups were present to show their interest in the space: The Sandwich Woman's Club, the Thornton W. Burgess Society, the Bicentennial Committee, and the Historical Commission. The Thornton W. Burgess Society was created in 1974, in response to the rumored demolition of the Deacon Eldred House. 1974 also marked the 100th birthday of Thornton Burgess, making the purchase of the house an appropriate time to celebrate the author's life with museum exhibits. The Bicentennial

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2 Multiple sources describe the house as being "passed down." Frank Burgess is listed as the head of household in the 1880 Census, even though Cornelius Eldred was still alive.
Committee was also interested in hosting public functions in the house, though their organization would be limited to the celebration of the country's bicentennial in 1976. The Sandwich Woman's Club sought to restore the building and use it for meetings and function space.

After the town had acquired tenants for the Deacon Eldred House, the Sandwich Woman's Club began its restoration project. The work began in 1975, with cleaning of both the interior and exterior, as well as painting and wallpapering the downstairs interior and "patch-painting" the exterior. The following year, the Woman's Club hired a carpenter to re-floor two rooms in pine and expose the beams in the kitchen ceiling. In 1977, which was possibly the final summer of their work on the house, the two fireplace mantels were replaced with "ones of colonial design" and the building was rewired. The women's club also replastered two ceilings, and possibly the walls on the stairway. As of the report written by Shirley Cross in 1977, the Woman's Club was pleased with the progress, but still hoped to restore the large central chimney and reshingle the roof. The subcommittee worked to divide uses and responsibilities relating to the space among the four groups, and invited the representatives to discuss with the architect the restoration of the building.

**Continued Use**

Since procuring the house in 1974, the Town of Sandwich has continued with the Sandwich Woman’s Club’s vision of preservation of the Deacon Eldred House. In 1997, the Thornton W. Burgess Society applied for a grant from Massachusetts Preservation Projects Fund, to facilitate the ongoing preservation concerns for the house. This resulted in a preservation restriction in 1997, ensuring that this historic building would remain a resource for future generations. While the Thornton Burgess Museum has relocated, the building still has much to contribute to Sandwich’s cultural heritage.
1637
First Settlers arrive in Sandwich

1643
The Tobey Family builds the first house at what is now 4 Water Street.

1656
The Deacon Eldred House is constructed for the family of Cornelius Tobey.

1812
Hannah Tobey Crocker sells the house to James Nye.

1832
Cornelius Eldred buys the house from James Nye.

1840s-1870s
The ell is added to the back of the house to accommodate boarders.

1884
Cornelius Eldred dies. His daughter Arabella Eldred Burgess inherits the house.

1913
Ambrosetta Doten dies, leaving the house to her daughter May Doten Gould.

1931
Arabella Burgess dies, leaving the house to the Town of Sandwich. The Sandwich Woman’s Club works to restore the building.

1939
Lloyd Gould dies, and May Gould sells the Deacon Eldred House to Mrs. Mary Peebles.

1939-1966
May and Lloyd Gould operate a nursing home out of the Deacon Eldred House.

1974
Mrs. Mary Peebles sells the house to the Town of Sandwich. The Sandwich Woman's Club works to restore the building.

1974-2011
The Thornton Burgess Society operates the Thornton Burgess Museum on the first floor.

1997
Renovations for Thornton Burgess Museum, using MPPF grant.

1998
MHC Preservation Restriction Agreement.
Architectural Assessment
ARCHITECTURAL ASSESSMENT

SITE

The Deacon Eldred House sits on a mostly open .89 acre site that features approximately 530 feet of shoreline on Shawme Lake. Its location at 4 Water Street places the house centrally within the Town Hall Square Historic District, which includes among its highlights the Town Hall, the Sandwich Glass Museum, the Dexter Grist Mill, and the Hoxie House. The site is zoned R1, medium density residential. (See photos 1 through 3)

ROOFING, FLASHINGS, GUTTERS, AND DOWNSPOUTS

The existing roof is wood shingle, which is new and in good condition. There are wood gutters on the front and rear of the house that look to be in good condition from the ground, but a view of their interior condition was unable to be accessed for this report. Downspouts are round zinc coated steel (see photo 8), and they are in good condition, with some minor fastening issues.

The central red clay brick chimney appears to be in good condition from telephoto view from the ground. The chimney is flashed to the roof with lead flashings that also appeared to be in good condition, though the existing reglet at the chimney appears to need re-caulking. (see photo 9)

WOOD SIDING AND TRIM

The building has wood shingle siding, that is in varying condition, with some recent placements that are in good condition (see photo 10) and some areas that are in poor condition (see photo 11).

The building features painted wood trim boards as cornerboards, rake boards, soffits and fascia, frieze board, water table, and casings at windows and doors. These trim boards also vary
in condition, and some selective replacements should be made in any restoration of the building. (see photos 12 through 14)

WINDOWS

The existing wood windows are 12 over 12, single glazed, double hung, and while old and of an appropriate configuration for the house, they are not original. Currently they are in fair condition, but have structural issues with sash and muntins. There is significant deterioration and loss of the glazing putty, and all of the sash should be re-glazed. The glazing putty should be tested to determine whether or not it is asbestos containing. If asbestos is present, re-glazing will first become an abatement project, with regulations requiring that the sash be abated on site, with the putty then being legally disposed. (see photos 15 and 16)

INTERIOR

The restoration/renovation projects that were completed for the Burgess Museum era of the house of may not have brought an authentic restoration to a particular period, but they were well executed and the overall layout and general sense of the character of the house have been maintained. For example, the rebuilt fireplaces do not feature proportions and construction that are true to the early era of the house, but their locations are correct, and the current mantels give the visitor a sense of how the house was lived in. Lowered drywall ceilings have been added, modern recessed lighting, and display cases allowed the space to function well as a museum wherein the emphasis was on the collection rather than the architecture of the space. The layering of modern finishes such as drywall, and flooring covers over some of the structural features that give the building its interest and importance as an example of early domestic construction. Current paint colors are not selected with a true restoration period in mind, but the paint finishes are generally in good condition and in character with the building.

In assessing what work should be done to the building interiors, many of the scope decisions are contingent on what the proposed use of the building will be. There are many preservation strategies possible with the building, and some of the options may be in conflict with the preservation goals. If the building is to be preserved by assuring that is placed into beneficial use, making the building suitable for use will require a certain level of improvement of the existing structure and systems. For example, any year round full-time use of the building would
require modifications to the heating systems and the thermal performance of the building, such as by adding insulation or storm windows. Any uses of the building that open it to the general public will require modifications to provide universal architectural access. If the building were to again be used as a museum, the choice of the type of museum would effect the preservation strategy. If the building were to become a house museum, wherein its main purpose is to exhibit its structure, use, and cultural significance, the building could be classified as a “house museum”, and would therefore be eligible for a number of exemptions to the building code for existing structures. (The Massachusetts Building Code defines a “house museum” as “the principal use of such must be as an exhibit of the building or structure itself which is open to the public not less than 12 days per year, although additional uses, original and/or ancillary to the principal use shall be permitted within the same building up to a maximum of 40% of the gross floor area.)

The attached structural assessment discusses in detail what changes would be required to reinforce building structure based on proposed use. In sum, the report concludes that the existing floor framing is adequate for a house museum use, but additional reinforcement would be required to make the building code compliant for business or office use. The process of accessing areas to add reinforcement will require disturbance to some of the wall, floor, and ceiling finishes of the building.

The first floor has a small kitchenette that supported Burgess Museum use (see photo 21), and the second floor has a bathroom with tub and shower, water closet and pedestal mounted lavatory (see photo 29)

ATTIC

In 2014 the Town commissioned a structural assessment by Turning Mill Consultants, Inc. This report recommended an number of repairs to roof framing some of which, such as purlin ledgers, were installed (see photos 34 and 35). The attached structural report by MacLeod Consulting contains observations and recommendations that are consistent with the 2014 report. Among these is a concern of inadequate roof structure. It should be noted that while the stair makes access to the attic quite easy (see photo 36), and there is a well-decked attic floor, the temptation to use this space as storage must be avoided as both structural reports indicate a concern for the structural strength of the attic floor support.
BASEMENT

There is a full basement under the west half of the building, while the east half features a partially excavated crawl space. The basement is accessed via a bulkhead and stair to the exterior on the west side of the building (see photo 37). The basement has a dirt floor, and has a sump pit with pump near the west wall. See the attached MacLeod Consulting, Inc. report for recommendations for the basement and crawl space.
Photo 1: Aerial view of the Deacon Eldred House.

Photo 2: View of the Shawme Lake shoreline.
Photo 3: View looking north at the Deacon Eldred House.

Photo 4: South Elevation.
Photo 5: East (Front) Elevation.

Photo 6: North Elevation.
Photo 7: West Elevation.

Photo 8: Detail shows a typical downspout and cornerboard.
Photo 9: Detail shows chimney and flashing in good condition. Flashing reglet should have new caulking.

Photo 10: Detail of new shingles, North Elevation.
Photo 11: Detail of shingles on the South Elevation.

Photo 12: Cornerboard detail with deterioration – Newer rake board and wood gutter are also seen here.
Photo 13: Detail showing cornerboard and water table deterioration.

Photo 14: Deteriorated wood window sill.
Photo 15: Overall window, typical.

Photo 16: Detail of deteriorated muntins and glazing putty.
Figure 1: Keyed Floor Plan - First Floor
Photo 17: First floor.

Photo 18: First floor.
Photo 19: First floor.

Photo 20: First floor.
Photo 21: First floor.

Photo 22: First floor.
Photo 23: First floor.

Photo 24: First floor.
Figure 2: Keyed Floor Plan - Second Floor
Photo 25: Second floor.

Photo 26: Second floor.
Photo 27: Second floor.

Photo 28: Second floor.
Photo 29: Second floor bathroom.

Photo 30: Second floor.
photo 31: Second floor.

Photo 32: Second floor.
Photo 33: Second floor.

Photo 34: Attic.
Photo 35: Attic detail shows new purlin ledgers advised in 2014 Structural Report.

Photo 36: Stair up to the Attic.
Photo 37: Exterior bulkhead and stair to basement.

Photo 38: Basement. Note sump pit on the left.
Photo 39: Basement, looking north.

Photo 40: Basement, looking east.
Photo 41: View inside crawlspace.

Photo 42: View at access to crawlspace.
Structural Assessment
March 5, 2015

Douglas Manley
McGinley Kalsow & Associates, Inc.
324 Broadway
PO Box 45248
Somerville, MA 02145

Re:  Deacon Eldred House
     Structural Condition Assessment

Dear Doug:

At your request, I surveyed the condition of the Deacon Eldred House at 4 Water Street, Sandwich, Massachusetts. The purpose of the survey is to determine the need and recommendation for restoration and repairs to the structure.

BACKGROUND
The Deacon Eldred House was built in 1756 as a residence. The Town took ownership of the property in the 1970’s when the house was leased as a house museum. This two-story timber framed building has two finished levels, a partial unfinished basement, and an unfinished attic. The Town requested this study to propose use options in order to make decisions about the future disposition of the property. Three possible uses considered herein have structural significance. One is as a house museum where the building code permits a structure to remain as is except correcting dangerous conditions. A second use is as an occupied building where the structure needs to meet code loadings. A third use is as an occupied building where floor framing does not meet code loadings and occupancy is limited by number of occupants.

SURVEY
On February 19, 2015, I visited the Deacon Eldred House. This was a clear cold day that followed several recent snow storms. The Town had cleared a path to the first floor and basement entries and a path all around the building. The property is on the shore of Shawme Lake. The front faces east by northeast referenced to true north. For this report, north refers to the right side when facing the front of the building. I was able to access all levels of the structure for a visual survey. Attached to this report are four framing floor plans and two exterior wall details.

Site. The grade slopes several feet from the front to the rear of the house. The slope continues down to the lake. The terrain meets an Exposure B for wind loading.

Basement. The basement is accessed through a bulkhead at the rear of the building. One enters the cellar into an L shape room lined with brick walls. The floor is earth. The first
floor framing is exposed. In a few areas I could see evidence of rot in the perimeter sill (Photo 1). This basement foyer has a sump pit. I saw no water on the basement floor. The south side of this foyer extends past the central fireplace foundation and ends at an opening to the crawl space under the front of the building. At this opening, one can see hewn log joists mortised into the timber sill. The joist tenons are pulling out of the sill (Photo 2). This basement foyer is faced entirely with brick (Photo 3) in contrast to the remaining stone rubble foundations (Photo 4)

**First Floor framing.** Framing over the foyer and boiler room includes mostly reframing with some original timber. Several sets of shores are located in the boiler room. The front north side framing over the crawl space includes original log joists resupported with dimension lumber supported on concrete piers (Photo 5). Portions of the foundation include reused material. I saw what appears to be a former stone column on its side supporting timber sills (Photo 6). On the north face of the building, the wall is pulling away from the floor framing resulting in a bowed wall (Photo 7).

**Second Floor framing.** In the ceiling over the first floor rear room in front of the fireplace, I removed a recessed light can to see the second floor framing (Photo 8). There the joists mortised into the beam are bearing on the lower half of the beam. This aggravates the stresses tending to crack the shrinkage checks. The ceiling over the front north room is flat. This is a gypsum board ceiling dropped below the cased timber beam. The exterior walls of this room are thin as evidenced by the narrow window stools (Photo 9). In contrast, the walls on the south side are wide as evidenced by wider window stools (Photo 10).

**Attic Floor framing.** On the second floor in a closet on the north side, a gunstock post, braces, and beam is readily visible (Photo 11). These represent the typical framing of the house. A hole in the west wall on the second floor shows the makeup of the wall (Photo 12). Plaster lath is fastened to the back side of the exterior sheathing board. This indicates at the thin walls, the exterior wall was comprised of shakes, vertical board sheathing, wood lath, and finish plaster. Interestingly, the plaster runs between the girt and the sheathing. The interior was recovered with modern 2 by furring on the flat supporting a gypsum board. Another hole nearby (Photo 13) shows a similar construction. In the front north room on the second floor, a modern tile ceiling recovered the original plaster finish. It lowered the ceiling about two inches (Photos 14 and 15). The center beam of that room frames into an exterior girt.

**Roof Framing.** The roof is supported with two gable trusses and three intermediate trusses. The trusses support purlins spaced about three feet apart (Photo 16). Recent collar ties, purlin ledgers, and purlin reinforcing provide some marginal strength to the framing. A common problem with old timber trusses is dislocation of members at heel joints. Here one truss chord is pulling out of a mortise in the bottom chord at the heel (17). The front and rear of the roof extend to an overhanging cornice (Photo 18).
EVALUATION

State Building Code

The proposed work will need to meet applicable requirements of the Massachusetts State Building Code which is based upon the 2009 International Building Code (2009IBC), the 2009 International Existing Building Code (2009IEBC), and Massachusetts Amendments. The latest Massachusetts Amendments (MA) for Chapter 34: Existing Structures was published April 11, 2014.

The salient requirements of the above codes will require dangerous conditions to be corrected (Section 1102.2 2009IEBC), floors are to meet code loading requirements except posted reduced loads are permitted (Section 1106.1 2009IEBC), and house museums are exempt from wind and earthquake loadings (MA Section 1106.1).

Foundation. Generally the exterior and interior foundation walls appear in good condition. I did see a crack in the brick next to the bulkhead door to the left upon entry to the basement. Its cause is not readily apparent. Inside the footprint of the crawlspace, rocks are used as isolated footings. Their bearing condition is unknown.

Crawlspace. Crawlspaces can be hostile to wood framed floors as they can hold moisture favorable to many organisms that consume wood. Some areas of the crawl space, mostly near walls, are too shallow. The Code standard is to keep joists at least 18 inches above earth. The Code calls for natural ventilation on at least three sides with openings preferably near corners to ensure adequate air flow. Vapor barriers and mechanical ventilation will reduce the amount and size of openings. At present, the natural ventilation conditions are not met.

Walls. The walls are very thin. The board sheathing while having the strength to resist wind loads common to Sandwich is not stiff enough to support plaster. Sheathing in this house will flex 1/81 of the floor to floor span. The standard for plaster to limit cracking is 1/360, more than four times stiffer. In my opinion, the bow in the north wall is the result of fasteners holding the sheathing to rotted sills have pulled loose.

First floor framing. A considerable amount of framing added to resupport or replace deficient joists and beams is consistent with floors of damp basements and crawl spaces. Ordinarily removal of rotted wood is the best practice so as to remove any of the offending organisms. Leaving rotted wood in place runs the risk of infecting more framing. The sills and the reshored existing framing are a liability. Those that were rotted from molds and fungi can lay dormant for many years with spores reactivating when conditions are favorable to their growth.

Second floor framing. The joists are typically 3 by 4’s spanning a little more than seven feet spaced at 24 inches. These are adequate with a live load capacity of 80 pounds per square foot (psf). These joists are mortised into supporting timber beams. Joists bear on mortises cut at mid height of the beam. This leads to the joists bearing on the bottom halves of the beams aggravating the cracks from shear stresses. This had led to widening of the cracks and joists pulling away from the underside of the board flooring. Additionally, the strength of the beams is less than modern code loading. The live load
capacity of these beams varies from 18 to 26 (psf) depending upon the beam span and load tributary width. Sleeping areas require 30 psf, common areas 40 psf, and offices, 50 psf.

**Attic floor framing.** The attic joists are covered with board sheathing. The 2 by 4 joists here have a live load capacity of 55 psf. The truss bottom chord varying 8 by 8 to 9 by 9 also serves as the supporting beam for these joists. It figures to a live load capacity of between 10 to 16 psf.

**Roof framing.** Some of the original purlins ranging from 3 by 3 to 3 by 4 appear degraded which led to these being sistered and resupported on ledgers. This deficiency appears as a result of decay in these members. Their sizes were adequate. The truss top chords with sections ranging between 4 by 8 and 5 by 8 although appearing in good condition are undersized and overstressed between factors of three to four.

The reader should bear in mind that allowable stress figures in wood construction are based on trade specifications that have a safety factor of about four. Hence, the framing in this structure has likely seen greater loads in its long history. The greater loads did not collapse the structure, but they are not safe to rely upon for continued use.

### RECOMMENDATIONS

Modern materials used to strengthen the structure should be concealed behind traditional materials. In general, the preservation work should meet the guidelines for preservation under *The Secretary of the Interior’s Standards for the Treatment of Historic Properties*.

Improvements to the structure should take into consideration the removing of dangerous conditions (safety) and removing conditions that will accelerate deterioration (durability) as well as considering uses such as a house museum, limited occupancy, and meeting full code load requirements.

The following recommendations are intended to meet the aforementioned needs.

**Crawlspace.** Improve the crawlspace by excavating excess earth. Excavate deep enough to place a double layer of vapor barrier on a two inch bed of sand and in turn covered with two inches of sand. The finished space should be at least 18 inches below the bottom of joists. This will reduce moisture in the space and remove sharp debris and stones making the space safe for workers who need to access electrical and mechanical systems. Provide openings in the exterior walls or install mechanical ventilation to move air sufficiently to keep the space dry.

Ensure the two access areas meet minimum access opening size of 18 by 24 inches.

**Walls.** The original unfurred walls are too flexible to support plaster without expecting cracks to develop over time. They also are a large path for heat loss unless furred, insulated, covered with a new gypsum board or plaster finish. This presents a dilemma of meeting authentic preservation of historic fabric versus meeting energy conservation. As a house museum, the Town may assume the risk of cracking in the plaster by not furring these walls knowing they will need to maintain a minimal building temperature to protect against temperature caused cracking.
Alternatively, the walls can be furred with narrow wood studs, the spaces filled with high performing insulation, and then recovered with plaster to replicate the original finish. Then the walls should meet any occupancy use. The furring would provide the further benefit of adding more support to the perimeter girders.

**First floor framing.** The extent of rot from varying organisms left in place needs to be abated to limit future infestations. This will require carefully lifting (for reuse) the flooring inside the building and skirts on the exterior walls to access compromised wood. The percent of affected framing is unknown as it is concealed. After removing the flooring and skirts, survey the framing and replace rotted members. Reconfigure supports to ensure members are properly supported. The dilemma here with replacing framing is again authenticity to original construction using log joists mortised into supports versus modern dimensioned lumber and timber to facilitate reframing.

The work area should include the crawlspace and the basement area. Offending rotted wood exists in both areas along with shoring. Log joists now mostly replaced with dimensioned lumber in the basement would be visible there if replaced. They would only be visible in the crawlspace if seen through the access openings. It may make more economic sense to reframe there with dimensioned wood.

Following reframing at this floor apply Bora-Care wood preservative to all wood before closing up with finishes.

**Second floor framing.** As a house museum, the live load is very likely to be light or can be controlled to small groups. The present capacity is sufficient for such a use. For other occupancies, the interior beams should be strengthened. This can be accomplished by adding ¼” thick cover plates screwed (with timber screws) to the top and bottom of the beam. At the bottom, the plaster will need to be cut and patched. On the top, the original floor board running parallel over the beam will need to be removed and planed down to accommodate the steel plate. The stitch screws will need to be closely spaced such as four inches apart in two rows. The length of the cover plates should be about 75 percent of the beam span. The screws in the bottom should extend through mid-height cracks.

The strength of the beam tenons in column mortises is unknown. Most are concealed behind finishes. Assume those joints at carrying beams should be reinforced.

**Attic floor framing.** The recommendations of the second floor beams apply to the attic beams, the bottom chords of the three intermediate roof trusses.

**Roof framing.** The roof purlins have performed poorly over the life of the house. These are mostly hewn members. Replace those that have failed. These can be hewn for authenticity or dimensioned lumber for economy.

The undersized top chords of the three intermediate roof trusses can be sistered with a 2 by 8 on each side if the purlins are resupported by joist hangers. Otherwise, the sisters would need to be 4 by 8’s and mortised to receive the purlins.

The truss heel joints need to be refastened with custom metal connections.
This work would attempt to place straight lumber along roof sheathing and truss chords that have acquired a set over the life of the house. Some jacking and pulling members together need to be included in budgeting.

Below is a table suggesting what tasks should be scoped to meet needs.

<table>
<thead>
<tr>
<th>Task</th>
<th>Safety</th>
<th>Durability</th>
<th>House Museum</th>
<th>Limited Occupancy</th>
<th>Code Load Occupancy</th>
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<td>Attic floor beams cover plated</td>
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<td>X</td>
<td>X</td>
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</table>

Sincerely,

[Signature]

Arthur H. MacLeod, P.E., Principal
MacLeod Consulting, Inc.

Attachments: Captioned Photographs and Existing Condition Drawings
1. Probed sill in basement where knife easily penetrated one inch.

2. Tenon in joist pulling out of sill.

3. In the basement, the walls by the entrance from the bulkhead are brick.
4. Foundation walls beyond the entrance area are rubble masonry. Floor framing area by the furnace is replacement and shoring.

5. Framing under the parlor is comprised of log joists shored with new timber and concrete piers.

6. Footing for chimney servicing parlor appears to be reused stone from former column.

8. Joist framing into timber beam over dining room. Note gap between joist and flooring.

9. Ceiling in parlor is rehung with gypsum board, which conceals timber beam casing. Note narrow window stools. The exterior walls are plaster on board sheathing.
With gypsum board

10. Room at south front has exterior walls, which are thick, furred. Note window stools here are wider.

11. At second floor, posts terminate with gunstock shape. Posts are braced to attic beams.

12. Exposed exterior wall at second floor. Recent 2x4 furring on the flat was placed over original plaster and lath directly attached to exterior board sheathing.
13. Another view of exposed exterior wall at second floor. View rotated counterclockwise. This is next to a window. Recent 2x4 furring on the flat was placed over original plaster and lath directly attached to exterior board sheathing.

14. In the north front room, a timber beam at second floor ceiling is the bottom chord of the roof truss. This is carried into a beam in the front wall.

15. The ceiling in the room mentioned in photo 15 is tile on furring over the original plaster ceiling.
16. View in attic. Trusses bracket the chimney. Board sheathing is supported on purlins. The floor is decked with one inch boards.

17. At the gable truss by the south wall, the top truss chord is lifted out of the bottom chord.

18. Three-quarter view of the house from the southeast. The front and rear have large roof overhangs.
No. 3 2 4   Broadway,   P.O.  Box  45248
So  m  ervill e,    M  A     0  2 1  4  5
617.625.8901  -   www.mcginleykalsow.com

Date: 3/4/2015
Scale: 1/4" = 1'-0"
Drawn By: AHM
Reviewed By: AHM
Project No: 2015.04.01

MacLeod Consulting, Inc.
29 Woods Road
Belmont, MA 02478
617-484-4733
structural engineering

Deacon Eldred House
4 Water Street
Sandwich, Massachusetts
Town of Sandwich

ROOF FRAMING PLAN

S1.4

ATTIC FLOOR PLAN
1/4" = 1'-0"
Drawings
Deacon Eldred House
4 Water Street, Sandwich, MA 02563

SECOND FLOOR PLAN

1/4" = 1'-0"
Deacon Eldred House
4 Water Street,
Sandwich, MA 02563

EAST ELEVATION

1/4" = 1'-0"
Deacon Eldred House
4 Water Street, Sandwich, MA 02563

PROPOSED FIRST FLOOR PLAN

1/4" = 1'-0"

UP

ACCESSIBLE ENTRY

ORIGINAL BACK WALL

Date: 04/21/15
Scale: 1/4" = 1'-0"
Drawn By: Author
Reviewed By/Checker: Project No: 1731.00

McGinley Keane & Associates Inc.
124 Broadway, PO Box 45249
Somerville, MA 02145
617.425.9900 - www.mcginleykeane.com

PROPOSED FIRST FLOOR PLAN

No. A1.2.3
Cost Estimate
Deacon Eldred House - House Museum
Preliminary Budget
May 11, 2015

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<thead>
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<td>Replace wood shingles where deteriorated</td>
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**TOTAL PROJECT COST** | **$740,864**
# Preliminary Budget

**May 11, 2015**

## General Work & Site (G)

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<th>Item</th>
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## Exterior Envelope Repairs

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<tr>
<td>Replace wood shingles where deteriorated</td>
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## Interior Improvements

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## Sub-Total Construction

**$527,000**

## General Conditions

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## TOTAL PROJECT COST

**$877,383**