



## **EXISTING CONDITIONS ASSESSMENT**

**Wagon Hill Farm House**  
**156 Piscataqua Road**  
**Durham, NH**

**Prepared for:**  
Town of Durham, NH  
8 Newmarket Road  
Durham, NH 03824

**Prepared by:**  
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## ARCHITECTURAL DESCRIPTION

The Bickford-Chesley House at Wagon Hill Farm, circa 1806, is a two-story, center hall farmhouse. It retains much of its original interior trim and early exterior trim, including original skived clapboards. Significantly, the building was originally capped by a low hip roof; the present gable roof was built in the middle of the 19<sup>th</sup> century. Despite deferred maintenance, the building is an excellent example of a Federal-era rural architecture in New Hampshire's Seacoast region. The following report will confirm the findings of the 1995 Master Plan and the 2009 Stewardship Plan: there is ample opportunity for responsible adaptive re-use which will benefit both the property and the people who visit it. (Photos 1-4)

Our first priority, the timber frame, is largely hidden by these original interior finishes. The first floor framing, or undercarriage, is visible in the basement. It is well-supported over brick partition walls, but the floor girts have suffered from excessive moisture. They are rotting badly, and much of the major framing will need to be replaced. Perimeter drainage must be improved and a ground barrier installed to prevent water infiltration into the space.

On the first floor, no posts are visible because their interior corners were carved out, which is common for higher-style rooms of this period. On the second floor, more of the frame can be observed. Cased corner posts are present at the four exterior corners, and mid-eave and mid-gable posts are expressed at the intersection between partition and interior wall. The second floor has a peculiar layout, with a large center hall and small chambers to the southwest; this arrangement is original. The layout and lack of interior posts may reflect that much of the framing is supported on the chimney masonry, which is also true of the first floor framing.

The attic provides more access and more clues. The front and rear eave walls are joined by a series of closely-spaced continuous tie beams which prevent the eave walls from spreading under the outward thrust of the roof. The chimneys clearly show shadow lines for a much lower hipped roof. Additionally, the ends of the tie beams are chamfered at an angle that indicates the former pitch. The feet of the later, gable rafters are shimmed to make up the difference. The gable roof is still relatively early, the principal rafters are hewn and the continuous purlins taper like the saplings from which they were cut. The roof frame is in remarkably good condition, especially given it has suffered leaks in the past. The most important thing a steward can do is maintain a roof, and this building is a good example of that. In spite of deferred maintenance, most of the original architectural artifacts can still be preserved.

A timber frame differs from a conventional platform frame because the timbers are stouter, and continuous between sections. They are joined by mortise and tenon joinery, secured with wooden pins, rather than nails. The building is built with larger pieces that are far fewer in number. The size of the timbers and the limited number of connections means that the design of those connections is more important. Each piece carries more weight, and each joint is under a multitude of forces. Timber frames can withstand more damage than a conventional stud frame, but during that time, they risk sagging and spreading. Well-designed tying joinery can withstand extreme deterioration in the undercarriage, which is what we find in this building and many of its vintage.

The building has withstood a lot of neglect and abuse. Regardless, it maintains a high degree of historical integrity. It is an incredibly valuable historic resource for the Town of Durham.

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Unfortunately, the necessary repairs are extensive. Both the architectural value and repair needs were documented as early as 25 years ago. The following report will closely echo the findings of the field study addendum in the 1995 Master Plan. A pessimist might be disappointed that so little has been restored since that time, an optimist would be pleased that so much has been saved.

*End of Section*

## EXISTING CONDITIONS

### Foundation and Undercarriage

A timber frame undercarriage is made up of perimeter sills that ring the exterior walls, larger timber floor girts that partition the space, and floor joists coggged into the girts. Typically, the floor girts are arranged in a regular grid, beneath the interior partition walls, and piers support the girts beneath post point loads. The girt layout that could be observed was irregular, but well-supported. It appears that the two chimney masses and interior brick partitions provide a significant amount of support for the first-floor system. There were no full length girts running east-west or north-south, which is unusual, and may be a result of later repairs. About a quarter of the floor framing was replaced along with the new kitchen sometime in the 1960s, so the original floor layout must be inferred from the remaining framing. (Photos 5-8)

Aside from acquiring an additional furnace and water heaters, the basement has not changed much since the 1995 field visit. In the words of that assessor, “The basement looks wet, feels wet, smells wet, and is wet.” He goes on:

“The basement is chronically damp, and wet. The dampness, which is typical of old-house basements, comes about from water vapor rising through the earth floor and masonry walls into the space, where it accumulates and raises the relative humidity, sometimes to dangerously high levels. The wetness comes about from poor exterior drainage, which allows roof runoff to find its way into the basement.”

The same conditions are true today, and our recommendations are in line. The organic matter in the basement should be removed and leveled, interior perimeter installed, and then covered with crushed stone. Then the space should be ventilated, except in the warmer months, when hot humid air can cause moisture to condense upon cool basement surfaces.

The grade should be sloped away from the building on all sides, and vegetation removed entirely, due to limited maintenance resources. Perimeter drainage should be installed with a French drain to daylight. Any excavation should be carefully monitored in the case that any indigenous or earlier colonial artifacts are uncovered. (Photo 9)

The humidity has resulted in pervasive brick spalling. In 1995, selective replacement of individual bricks was the recommendation. A mason will be needed to determine whether the deteriorating bricks can be selectively replaced, or whether walls will need to be rebuilt wholesale. The brick partition walls may have initially been intended to divide the space for storage, but are now structural. Floor girts are a little undersized for their floor loads; they have lasted so long because of the support provided by the brickwork. (Photos 10-13)

Entering the basement by the rear stairs, one is confronted with a major, rotted girt almost immediately. There is evidence of a prior attempt at repair, by nailing a 2x8 to the underside of the beam. The fasteners have failed, and the board is falling away from the girt. The girt must be replaced, in the same species and size, and with proper tying joinery. Much of the framing is partially obscured, but we anticipate that the floor girts in contact with masonry have rotted where moisture

has condensed and been trapped against the wood. This includes all exterior sill timbers. (Photos 14-18)

Elsewhere, beneath the 1960s kitchen, floor girts have been replaced with tripled 2x10 girders and floor joists with 2x10s. The subflooring was replaced with plywood. The joists were installed with toe-nails, and do not have hangers. Because the ambient moisture was never addressed, the ends of a few of these joists are also now failing. (Photo 19)

Undercarriage repair can feel overwhelming for the stewards of an old building, but part of the strength of a timber frame lies in its ability to withstand degradation and change. The strength of its tying joints at the attic level can allow a historic frame to stand long after its foundation has crumbled. Replacing elements of an undercarriage is a big job, but for a building of this vintage, it is also a common one.

### **First Floor Interior**

The interior of the Bickford-Chesley house shows signs of wear and neglect, but retains a remarkable proportion of old or original features. It has a center hall layout, with two chimney masses, and four hearths. The layout is somewhat unusual in that there is an additional entrance on the east gable, and that the front hall does not pass through. Behind the front stair hall is an interior room with no windows, currently a bathroom. The partitioning appears to be original, but it is abnormal for a room to be enclosed like this with no access to daylight. A truncated center hall layout (with no pass through) can be found elsewhere, such as at the Merrill House in Hampton Falls. (Photos 20-28)

There are no posts or casing visible on the first floor, their interior corners having been cut out in order to hide the frame. It was common to reduce or cut away the interior corners of large timbers within the nicer rooms of the house. This can affect their structural capacity, but is generally not a problem unless the timber is further damaged. Although it is typical of a retrofit, the trim details in these rooms are consistent with the reported building date of 1806.

From the front stair hall, a very similar casing profile can be found in plate one “The Country Builder’s Assistant” by Asher Benjamin, published in 1797. The design of the stair handrail is almost identical to the one drawn in Plate 22, and the northwest fireplace surround is similar to the arrangement on Plate 20, without the decorative carving. That said, the reeding profile in the front stair hall is found on plate 35 of “The American Builder’s Companion,” a later building guide by Benjamin, published in 1827. An equally similar fireplace surround is drawn in plate 37, and the newel post is not unlike the one found in Plate 43. The 1995 field notes contain additional references to specific Benjamin details. Regardless of whether the trim is original to 1806 or a fairly early retrofit, it is largely intact and in good condition. With regards to the trim, nearly all the wear is cosmetic and can be reversed with careful washing. (Photos 29-31)

Unfortunately, the original sash were removed and replaced with vinyl around 1987. From the 1995 field notes: “First and second story sash have been replaced with vinyl windows since 1987, and the sash lost. Based on the Federer thesis, the lost sash appear to have been original. This was a serious (and probably avoidable) loss.” Windows really define a building’s character, but the loss of the sash was not only an aesthetic mistake, vinyl sash do not work as well or last as long, they are difficult to

maintain and repair. Original wooden sash can be weatherized and combined with low profile storms to work as well or better than contemporary double or triple glazed sash. The vinyl sash will likely need to be replaced in the next decade. It would be wise to replace a few with high quality reproduction sash rather than replace all with low-quality vinyl.

The north chambers, upstairs and down, retain nearly all their integrated, interior shutters. Unfortunately, when the vinyl windows were installed, their meeting rails were unceremoniously severed, leaving no rail for the upper shutter to ride upon. Even if the vinyl sash are retained, the meeting rail can and should be restored, so that the shutters can again be functional.

Both of the south chambers contain kitchen hearths. A double kitchen layout like this is highly unusual and may reflect that the house was not originally built as a residence for its owner. Both have been renovated. The southeast chamber does not contain its original Federal moldings and contains “bullseye” moldings that can be found in Asher Benjamin’s building guide from 1838 but were also popular throughout the 20<sup>th</sup> century. These moldings may be old and are in good condition. The hearth has also been replaced with flat stock; this appears to date from the 20<sup>th</sup> century. The 1995 Hill report has more details on hearth changes common during the period. (Photos 20, 22, 32)

The southwest kitchen was renovated in the 1960s. It is paneled in pine and dressed in laminate, as was popular for the period. The current finishes are not historically significant. This room is a good place to house contemporary updates, like a kitchenette or larger bathroom. The hearth opening should absolutely be preserved because it is the definitive artifact of the rare double kitchen, but the interpretation for visitors could be improved.

It bears mentioning that much of the trim has an identical profile to that within the Israel Demeritt house, which was disassembled in 2012. The newel posts in their front stairs are exactly identical, as are the reeding that rings the stair opening. The multi-part door casing in the northwest parlor is remarkably similar to the casing found in the Demeritt stair hall. The hearth in the northeast parlor is nearly identical to one found in the Demeritt house. It was a shame that no one could preserve the Demeritt House in situ, and that its future remains uncertain. It appears that the house at Wagon Hill contains a similar proportion of original material and a few nearly identical profiles. (Photos 30, 33, 34)

## **Second Floor**

The second floor layout is quite unusual. The west half is typical, with front and rear chambers sharing a chimney wall and connecting hallway. The east half is unusual, with the typical front chamber followed by two additional, smaller, asymmetrical chambers. The central hallway is quite large; the need for this much open, unheated space is unclear. By and large, this partitioning appears to be original based upon the door thresholds and flooring. (Photos 35-38)

There are no interior posts, much of the framing rests on the chimneys. The floor framing is completely hidden, but there are shadow lines in the first-floor ceilings that indicate the locations of mid-span floor girts and floor joists. Gunstock posts are cased and visible in the corners and closets upstairs. The south eave plate is cased in the front hall and the rear plate is cased and visible within the rear rooms. (Photos 22, 39-41)

Like the first floor, the front chambers contain much of their original trim, including window and door casings and hearth surrounds. The hearth surrounds are similar to and simplified from those found in Benjamin's Country Builder's Assistant. The northeast chamber has been painted sloppily and poorly recently. It reveals a lack of respect for the historical character of the building, but it's fully reversible. (Photos 42-50)

The trim in the north chambers, front hall and smaller chamber at the center of the east gable are intact and original. The profiles are extremely similar to those found in the second floor chambers of the Israel Demeritt House, although the overall arrangement has a less elaborate style. The rear chamber, currently appointed with closet shelves and a hanging rod, was updated at the same time and with the same trim as in the southeast chamber, below. It is more common for the front, higher style rooms to get updated. That the rear rooms were updated indicates possible damage or deterioration due to water or fire.

The rooms are light-filled, and the building materials are sound and intact. The acoustic tile ceilings should be carefully removed. The trim should be cleaned and carefully painted. The client should consider that the woodwork is almost surely painted with lead paint. It is intact and not flaking. Encapsulation can be considered, barring that, and scraping and sanding will require extensive and exacting lead encapsulation. The electrical will need to be updated. After catching up on maintenance and updating, the second floor is quite adaptable to contemporary use, be it commercial or residential.

### **Tie Beam and Attic Level**

The single defining element of a timber frame is the tie beam. It is a continuous timber that ties the building together from eave to eave, resisting the outward thrust of the rafters. The attic floor of the Bickford-Chesley House is constructed of a series of continuous tie beams, that lap over the continuous eave plates. The tops of the posts are flared so that the exterior half may tenon into the plate and the interior half, the teasel, can rise past the plate and tenon into the tie beam. This joint is sometimes called the English tying joint for its ubiquity within English colonies, but its high quality extended its use well into the 19<sup>th</sup> century. In this frame, the tie beams not only connect the eave posts, but are also distributed more or less evenly along the entire length of the building. The ties vary in thickness, and are hidden by the attic floor, but there are at least eight tie beams in addition to the four that cross the eave posts. This is a stout way to build a frame. It is extremely resistant to roof thrust, which is one of the major engineering challenges with any frame.

Originally, Bickford-Chesley was capped by a hip roof, the former roof lines are apparent in shadow lines that remain on both chimneys. The last few inches of each tie beam is pared down at a shallow roof angle, an artifact of the former hip roof. In a hip roof, there are two walls at which the tie level timbers are rotated 90 degrees to receive the jack rafters. The drawings show a series of short tie beams extended perpendicularly from either gable. These short ties are inferred from what we know about hip roof framing. There are also drawn diagonal "dragon" braces extending from the building corners inward. These braces once received the principal hip rafters and are further confirmation of its former roof configuration. (Photos 51, 52)

The current gable roof construction is called a principal rafter-common purlin roof. This type of roof system was common in this area until the 1850s, and, in combination with the hewn surfaces, indicate the roof transition occurred early in the building's life. It consists of five pairs of hewn timber rafters connected longitudinally by a series of smaller continuous purlins. The bottom two rows of purlins are continuous members that run the full length of the building and reflect the taper of the saplings from which they were cut. The remaining purlins are two part, with staggered joints. The rafters are joined by a collar tie that supports the rafter at its mid-span. An additional indication that this roof is not original is that there are five pairs of principal rafters, none of which align with the interior posts. Typically, there would be six pairs of rafters, a pair for each post, and then an additional pair at the mid-span of the larger chamber bays. The center rafters land on a tie beam that appears to have been a later addition, based on its close proximity to the ties on either side. (Photos 53-58)

The roof framing is in good condition, with very little evidence of rot. We saw no evidence of rot on the ends of the tie beams, but we did observe deterioration in the cornice trim and in the overhang along the gables. The trim will need to be repaired, and it may obscure some frame damage. The cornice damage does not appear to be extensive, and any frame repair is likely minimal and limited to face fixes or "Dutchman" repairs.

## **Exterior**

Even in its deteriorated state, the Bickford-Chesley house has a commanding presence on Wagon Hill. It combines Federal and Greek styles, reflecting its vernacular heritage. The north-facing eave exhibits a Federal entrance, with an elliptical fan light, pilasters and tall architrave. But the trim profiles are relatively "flat" and unadorned, which reflects a Greek Revival influence. The flat border on the corner pilasters have a "Greek" character. The cornice is quite "Greek" with a tall frieze board, bed and crown moldings typical of that period. The south eave appears to have been updated during the Greek Revival period, with the addition of the portico. At this time, they may have intended to reverse the "front" of the house, and this may have been the same period in which the roof was made gable. Significantly, the house retains a large proportion of its original skived clapboards, where the ends of the clapboards are beveled and overlap. (Photos 59, 60)

There are at least four different window casings; nominally, Federal, Greek and 20th century. The "Federal" casings border the south eave windows; they have a mitered back band and the windowsills are thicker. The Greek casings are flat and topped by a window cap with a rounded front edge. There are two more "Greek" style windows on the west gable at the attic level. These have a second layer of head casing and a beveled window cap. Additionally, there are flat-cased windows where the head casing projects past the side casings and no cap, these are located above the porch on the South eave. The varied treatments should be preserved; they help illustrate the building's history. (Photos 61, 62)

Overall the condition of the exterior is poor, but there are original elements that can be retained and preserved. The raking cornice (frieze, bed, soffit, fascia and crown) is still crisp and impressive; it feels risky to initiate repair without a cohesive plan to replace it faithfully. So far, doing nothing has been an effective form of preservation. That said, there are open holes in the west gable soffit, and a nest in the southwest return. That return is a particularly problematic area, where the peak of the ell intersects the south wall of the house. The north entrance shows the effects of water damage and



lack of maintenance. The rooflet needs to be replaced and the bottom course of claps has rotted through to the sill. (Photos 63-66)

The south eave takes on even more water. The intersection between ell, main and porch roofs collects a lot of rain and does not appear to be properly flashed. There is a hole in the base of the closest window casing and in the porch crown. It is always hard to flash between a vertical wall and an intersecting roof, and that is the case here. Additionally, the porch roof is dumping water into the southeast corner of the building; the corner board above the roof is taking on water, and the steps below are quite rotted and need to be replaced. (Photos 67-69)

The furnaces in the basement are a problem with a solution. There is an access door on the west gable that is currently enshrouded with vegetation that must be removed. The furnaces should come out this door, and the door better protected from water collecting in this corner. (Photo 70)

### **Outbuildings**

An ell and barn extend off the south eave of the house. A cider house has since been destroyed.

The barn has no historical integrity whatsoever. The few timbers that were arranged and stacked within the barn do not reflect their original function in the slightest, and only serve to confuse visitors. The only remaining timber with any joinery is discarded amongst the weeds and rotting behind the barn. The exterior isn't ugly, but there is zero historical character or architectural information contained within the current barn building. (Photo 71)

### **CONCLUSION**

In 1995, in Hill's conclusion, he wrote that "All things considered, we found the main house to be in quite good condition for a long-under maintained antique building. The exterior envelope and trim are in need of attention, as are interior cosmetics, but the overall fabric of the building appeared generally sound." Much the same is true today. The deterioration of the exterior trim has progressed further, but much of it can be preserved with good methods. Unfortunately, the first floor framing has deteriorated significantly since that report was written. Drainage was not addressed and 25 years of ambient moisture has rotted most of the undercarriage and increased spalling of brick. With the exception of the cornice, the roof is in good condition, with no obvious, active leaks. The building is in need of significant repair, but it also has a lot of potential.

*End of Section*

### **REPAIR RECOMMENDATIONS:**

Pricing is based on projects of similar size and scope. Actual cost will be determined by your timeline and chosen contractors.

**This building has been studied ad nauseam. It is now time for action. Review, adopt and implement the following recommendations. You have lost the barn, you have lost the first floor frame, you will lose the rest of the house if no action is taken.**

**The work below is extensive and will require significant funding to succeed. For this reason, I will propose adaptive re-use for this building that will justify the town's necessary investment in this property.**

#### **Undercarriage and Foundation: \$240,475.00**

The ambient moisture in the basement is causing rot in the framing and extensive brick spalling. We did not observe rot on all sills, but there is a good chance that the sills will need to be replaced, along with most of the framing resting directly on masonry. The best way to address basement moisture will be to install exterior drainage. Excavation should be carefully monitored to avoid disturbing artifacts.

- Support structure with cribbing and jacks and steel beams to allow for undercarriage work.
- Replace perimeter sills as required to ensure structural integrity
- Replace center floor girt
- Replace rotten joists
- Hang new joists on hangers
- Install new joists between old, on hangers
- Excavate interior organic material. Install perimeter drainage, drain to daylight, and fully upgrade sump pump.
- Install compacted gravel floor. Vapor barrier is not advisable as it can telegraph water to the brick walls and increase spalling
- Repair brick spalling and install structural piers as required for integrity
- Install dehumidifier for use in humid summer months, can be installed on a humidistat so that it only operates at high ambient humidity

#### **Exterior: \$197,000.00**

Roof intersections are high risk areas for water infiltration. Flashing will need to be repaired. Original trim can be repaired or replaced with custom cut moldings. Cornice should not be removed until plan and funds are in place for accurate replacement.

- Remove high areas of exterior grade and pitch grade correctly around the house perimeter
- Install perimeter drainage to daylight, with 2' drip edge of crushed stone
- Investigate and repair flashing at intersection with ell roof
- Repair window sill and other rotted trim
- Investigate and repair flashing at intersection between porch and corner board
- Replace rotted sections of corner board
- Install porch gutter that redirects water to perimeter drainage

- Replace porch steps, decking as needed
- Replace cornice and returns on west gable with custom cut moldings
- Repair pediment roof over front door. Replace rotted cornice pieces with custom cut moldings
- Restore water table where sill was replaced
- Scrape and paint entire structure
- Replace roof
- Install new J&R storm windows for energy efficiency

**Interior: TBD (To Be Determined by adaptive re-use.)**

This building will be best preserved by being used. Much of the moldings and partitions are in good condition but suffer from lack of regular cleaning and maintenance. Contemporary utilities should be located in the “updated” kitchen to limit impact on original materials

- Utilize 2009 Stewardship Plan. The recommendations therein are sensible, appropriate and reflect community priorities
- Interior upgrades will be necessary for new adaptive re-use of this important building
- Painting and refinishing and updated bathrooms and kitchen important
- Safety upgrades including sprinklers
- New appropriate sash and repair of interior “Indian shutters”

**A new use for Wagon Hill Farmhouse:**

Poor choices, neglect, and delay has almost ruined the Wagon Hill farmhouse. It is not a lost cause. This house is stronger, better looking, and better built than any newly constructed commercial or residential property. It is time to recognize this historic landmark and embrace your legacy. It is time to save this building. This can only be done if you understand the building and have use for it.

The Wagon Hill property is used and enjoyed every day by Durham residents. Parents with children and their beloved pets. Retirees, school groups, and folks all over the seacoast area. They all love Wagon Hill and they walk the trails and enjoy the landscape and none of them are allowed in the house.

This is terrible and it must be corrected. The house must be updated to allow public access. Provide safe consistent access to the house for visitors of all kinds. Place consistent staff at the property. Forward thinking and good planning will realize an immediate return on your investment. Nowhere else on the seacoast is there a combination of land and building so poised for development for the public good.

Wagon Hill is not a museum. It is a gathering place. A place where the natural environment dovetails with history to make a human space for children and adults of all ages. Do not ignore this opportunity.

Preservation Timber Framing, Inc welcomes a continued collaboration for this building. We are happy to meet with staff and Selectboard to answer any questions you may have about this report.

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We are happy to engage with you to determine the best path forward as you preserve and improve the character and livability of your town.

Respectfully Submitted,

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Accompanying Documents:

- Existing Conditions Photographic Report
- Existing Conditions Structural Drawings