

Historic Building Conditions Assessment

**Wagon Hill Farm, the Bickford-Chesley House, c. 1804
156 Piscataqua Road, Durham, New Hampshire**



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Introduction and Executive Summary

This Conditions Assessment of the historic Bickford-Chesley House, part of the greater Wagon Hill Farm property owned and maintained by the Town of Durham, New Hampshire, was developed for several purposes. First, it serves a documentary purpose that captures a snapshot of the state of the structure as of 2022. It also serves as the basis for assessing need so that adequate funding can be secured to address the required repairs and development for new and varied uses. Moving forward, it will serve as a guiding light as various repairs are undertaken.

The Durham Heritage Commission and Town of Durham Public Works officials have identified leading concerns regarding the condition of the timber frame/ overall structure, roof, exterior wooden elements and mechanical systems over a period of years. In 2019 Aaron Sturgis of Preservation Timber Framing, Inc, from Eliot, Maine did a thorough study of the timber frame, and made many observations and recommendations.

Following the introductory materials, subsequent sections address the current condition of each architectural component by type and make very specific recommendations for repairs and replacements that follow current, accepted historic preservation guidelines, specifically the Secretary of the Interiors Standards and Guidelines for the Treatment of Historic Buildings and each relevant Preservation Brief, developed and published by the National Park Service, United States Department of the Interior.

Summarized in the text below and appended to the report are an Inspector's Report that assesses the current condition of the electrical, plumbing and heating systems, as well as baseline recommendations for what would be required for upgrades pursuant to future expanded use. An Engineering Study is also appended, which addresses the overall condition of the structure and makes baseline assessments for what would be required for structural repairs and upgrades in order to support expanded use in the future. Architectural schematic designs for an ADA-compliant ramp, landscaping and entrance as well as a potential layout for a building program, including first floor public spaces and a second-floor residential unit, are also included. The Fire Marshal for the Town of Durham provided baseline recommendations for fire safety and sprinklers, which are also appended.

The building's period of historic significance spans from 1804 to 1989, which encompasses its entire history of human occupancy. The property was purchased in 1804 by John Bickford (1765-1813) and the existing house was built. In 1830 it was purchased by Samuel Chesley (1772-1863) in 1830. This family built the rear ell and connected Yankee barn. The Chesley family sold the property to and then the occupancy of Loring V. Tirell (1896-1975) in 1966. Loring Tirell first named the property "Wagon Hill Farm." His heirs sold the property to the Town of Durham in 1989.

Historical Background

Excerpted from the New Hampshire Division of Historic Resources Inventory, by Kari Federer LaPrey, 1991. This document was the basis for listing on the New Hampshire State Register of Historic Places in January 2020.

Note: Footnotes and bibliography for the original document are omitted. The full document is available from the Town of Durham or Division of Historic Resources.

Wagon Hill Farm is a large, historically agricultural property on US Route 4/Piscataqua Road that has owned by the Town of Durham since 1989. The farmhouse, sited on the crest of the hill, dates from the early 1800s with mid-1800s updates. The 139-acre property extends from the Oyster River across the highway to the Madbury town line. This was one of the first farms in the area to be settled, and it remained in agricultural productivity for nearly three-hundred years. During that period, it was owned by just three families: Davis, Bickford and Chesley. The size and boundaries of the farm have remained the same and only discontinuous pasture and woodlots sold. Open fields cover much of the approximately 101 acres between the river and Piscataqua Road. The “back forty,” north of the road, is about 38 acres of reforested pasture and woodland. This inventory form was prepared for the Town of Durham to document

The historical background is based on the 1991 master’s thesis of the author of the National Register of Historic Places, Kari Federer, with additional information from the Durham Historic Association and other reports about the property. The inventory form does not reproduce the entire historic background that can be found in the thesis. The main sources are listed in the bibliography below. The thesis contains detailed sourcing and footnotes that have not been reproduced here. The 1991 document relied on materials from the Durham Historic Association, New Hampshire State Archives, New Hampshire State Library and the Essex Institute in Salem, Massachusetts, as well as oral history from the former property owners and long-time neighbors. Illustrations reproduced from the thesis include hand-drawn site plans and 1990 measured drawings by local architect Donald M. Sumner. Historic photographs are from the collection of the Durham Historic Association.

Geographic Context

The early history of Wagon Hill Farm is closely tied to its location on the Oyster River and the highway that is now Piscataqua Road/US Route 4. The Oyster River is a tributary of the Piscataqua and part of the Great Bay Estuary. It flows east through Strafford County to empty into Little Bay. The river is tidal below the Oyster River falls in Durham’s town center, about 2.5 miles upriver from Wagon Hill Farm, which is located near the mouth of the river. The river was an important means of travel historically, navigable up to the falls. The rolling terrain north of the river includes low knolls and ridges, with historic farmhouses sited on the higher points. The south-facing slope was good farm land, while the low-lying wetlands to the north were better suited for pasture.

The banks of the Oyster River have numerous inlets where tidal creeks flow in and out. The shoreline includes saltmarshes and mudflats. The western bound of Wagon Hill Farm at the Smith/Emery Farm has always been defined by the mouth of Smith Creek, which is named for the property owners to the west, but has its source in the wetlands on Wagon Hill Farm. Stoney Brook Cove is the inlet sheltered by a narrow peninsula on the Wagon Hill shoreline. At the end is a small rocky island, less than one-tenth acre above the high-water line and surrounded by mud flats at low tide. In the nineteenth century, it was nicknamed Barnes' Island (alternately Bodge's), for a river boatman whose mates stranded him there. The Wagon Hill Farm shoreline is broken by Davis Creek, which drains the hillside fields. The east bank of the tidal inlet had a beach that was used as a boat landing, assessable at all tides, and later swimming place according to oral history.

Wagon Hill Farm is a roughly triangular tract with over 6,000 feet of shoreline and land on both sides of Piscataqua Road/US 4, coming to a point on the north end at Watson Road near the Madbury line. Other historic farms in the area follow the same pattern, with buildings set back from the highway that was laid out through the middle of existing properties in the early 1800s. Oblong parcels of land extend from the river to Watson Road, which is now a dead-end, but was part of the original road to Durham's town center. Piscataqua Road, formerly the First New Hampshire Turnpike, runs in a straight line east-west, parallel to the north side of the Oyster River. From Cedar Point, in the confluence of the Oyster and Bellamy rivers at Little Bay, Route 4 crosses the Scammell Bridge to Dover Point. The first Scammell Bridge was built in 1934. The earlier turnpike bridge, which stood from the 1790s to the 1850s, crossed to Fox Point in Newington. Back River Road, the route to Dover, intersects Piscataqua Road near the crossing.

1653-1798: Davis Farm

During the seventeenth and eighteenth centuries, the land that is now Wagon Hill Farm was occupied by three generations of the Davis family. When Durham was originally settled by English colonists, it was part of Dover, which was centered on Dover Point from the 1620s. Out-lots of farm and marsh land on the shores of the Little and Great bays were granted to the settlers. In 1643, Valentine Hill received land between a creek at Oyster River "that hath an island at the mouth of it" and Royal's Cove at the Back River. Hill was a merchant in Boston and Dover and subsequently settled in Durham where he had a mill at the falls from 1651. As the original grantees sold to the next wave of settlers, farms were established on the valuable farmland along the Oyster River. Seven houses shown on the north side of the river on the ca. 1660 map represent the density of settlement at the time.

Sixty acres of the land that is now Wagon Hill Farm was sold by Valentine Hill to John Davis in 1654. Davis (1623-ca. 1685) had come from England with his father in the 1630s and lived in Newbury and then Haverhill, Massachusetts. He was married in 1646, and he and his wife had five children when they moved to Oyster River, plus six more born there. The Davis home was sited on high ground near the riverfront. First

appearing on the tax list in 1657, John Davis became one of the area's wealthier residents; active in local affairs as Surveyor of Lands and Dover selectman. His probate record suggests the house was two-stories with a lean-to. There were a barn and other outbuildings. The foundation stones were still visible in the early twentieth century before the gravel pit was excavated.

The property was inherited by youngest son, James Davis (1662-1749) who married Elizabeth Chesley in 1688. The house was garrisoned during King William's War (1688-1697). In the 1694 raid on Oyster River, when about 100 settlers were killed or captured and five garrison houses and other dwellings destroyed, Davis sent his wife and young children away by boat and successfully defended his home, extinguishing the fire applied to it. In later French and Indian Wars, Davis led northward expeditions. He achieved the rank of Captain in 1703 during Queen Anne's War and was made a Colonel in 1720. Locally, he played a role as selectman, tax assessor, justice of the peace, Dover town moderator and moderator of Durham's first town meeting in 1732 and in the following decade.

Col. Davis also held religious meetings at his home and the town history tells of a tragedy that occurred at a time when the region saw a series of small-scale attacks by Indian raiders. In about 1706, six or seven people were killed while on their way home from a meeting at Col. Davis' as they were returning to their boat to cross back over the river to Durham Point, presumably from the beach at the mouth of Davis Creek, then owned by the Meader family and later part of Wagon Hill Farm. The victims are said to have been discovered a few days later and covered with earth where they lay. The mound was pointed out to visitors by the Chesley family. In 1939, a historical marker was placed there by the Northam Colonists, but it was removed in about the 1960s and the exact location is now unknown according to the Durham Historic Association.

The earliest public road between the farms on the north side of the Oyster River, and connecting to the King's Highway between Durham/Oyster River and Dover/Coheco, was laid out in the early 1700s. This was today's Watson Road, formerly connected to Drew Road and Jenkins Road in Madbury. The road skirted the upper reaches of the tidal creeks and crossed the northern ends of the Davis farm and other adjacent properties. Watson Road is three-quarters of a mile from the Davis house of that time and was accessed via the present farm road, Wagon Hill Farm driveway and the path through the north forty-acre parcel.

The Davis farm is documented beginning in 1657 by tax records of Dover and Durham from 1732. Cattle were the primary focus here and throughout the region, with its salt marshes. The Davis family was taxed for ten cattle in 1732 and seventeen in 1742. They owned 4-6 oxen and several horses. The present boundaries of Wagon Hill Farm were established by the end of the eighteenth century including land east of Davis Creek acquired from Joseph Meader in the 1770s or 80s.

In addition to the main farm, there were two parcels nearby in Madbury on Watson Road, estimated at forty acres, which were long associated with the property. The Davis' also owned thirty acres on Durham Point and woodlands in Barrington and Lee at one time.

It is not known whether the Davis family lived in the same seventeenth century house near the riverfront throughout their long occupancy of the farm, or if it was replaced. The local history suggests that the old house stood until at least the mid-1700s, when it says James Davis died in 1749 in the same house in which he had been born in 1662.¹² His grave in the burial ground is marked, as is his wife's. Ephraim Davis (1704-1791), the youngest surviving son, inherited the farm where he lived with wife Ruth and five children.

The property passed to Ephraim's daughter Hannah Davis Drew (ca. 1745-1797) and her husband Andrew Drew (1750- 1841). From Madbury, he was her first cousin once removed and related to other members of the Drew family in the area. Tax records suggest they lived here for a time and also elsewhere nearby. Their son was buried in the cemetery in 1788. In 1795, they transferred ownership to prominent local resident Judge Ebenezer Thompson who held it for several years, possibly to protect it from an execution that was being made against Drew at the time.

1798-1829: Bickford House on First New Hampshire Turnpike

The 1790s were a period of change. The Piscataqua Bridge between Fox Point in Newington and Cedar Point in Durham was built in 1794 to facilitate travel west to inland towns. Planning for the First New Hampshire Turnpike (now US 4) between Portsmouth and Concord began in 1796 and construction took place 1800-1803. The new road cut through the existing farms in the area. On this property and others nearby, new houses were soon built along the new road. The river was still used for transport of heavy goods such as hay and bricks and there was a small wharf on the waterfront here into the twentieth century.

Beginning in 1798, after Hannah Davis Drew's death, Andrew Drew and the other heirs sold their shares of the 127-acre farm to sea captain John Bickford (1765-1813), who also acquired the two Madbury pastures separately. Bickford was a resident of Salem, Massachusetts, but owned his family's homestead across the river on Durham Point. A few years later, his younger sister, Esther Cromwell Bickford would marry Andrew Drew who was then living on another farm in the area. Captain Bickford, or Beckford as he was also known, had gone to Salem as a young man and become ships master for William Gray, as did his brother Thomas. Both used the name Beckford in Salem, though in Durham, the family was always Bickford. John Beckford was married to Mary Ramsdell (1767-1851), daughter of mariner William Ramsdell and Mary White, whose father was also a sea captain. They lived on Bridge Street in Salem and Beckford was an early member of the East India Marine Society, founded in 1799 and now part of the Essex Institute. He was frequently away from home on trading

voyages and others must have managed his properties. In New Hampshire, he owned several farms in Durham in addition to his father's homestead, farms in Gilford and New Holderness and a house lot in Portsmouth. All of the farms were occupied and operated by tenant farmers, most of who were taxed for the land and livestock jointly with Bickford. This was known as the Drew Farm or Back River Farm.

Tax records and other documents indicate the present Bickford-Chesley House on Wagon Hill Farm was built around 1804, shortly after the First New Hampshire Turnpike opened. It was home to a series of Bickford tenants. Two full-sized cooking fireplaces suggest two households could occupy the house separately. It was not unheard of for a single family home to have two cooking hearths, but two of full size is unusual. Captain Bickford may have maintained quarters in the house for his own use when in town. This was the only one of his New Hampshire farms where he had belongings at the time of his death. The probate inventory listed a bedstead and bedding, a pine bureau, a four-foot table and six chairs, two arm chairs, crockery, and fire tools.

The large farm, of 129 or 137 acres was essentially today's Wagon Hill Farm and the same two pastures of 25 and 35 acres to the north on Watson Road remained associated with it for many years. While the house and barn were near the river, land use was likely similar with hay on the hillside, crops on high ground and pasture in the wetter areas. Livestock maintained on the farm were 2-3 pair of oxen, two horses, 10-20 milk cows, a bull and a few hogs. There was a flock of about thirty sheep plus lambs. Captain Bickford was absent for several years before he died in December 1813 in Montevideo (Uruguay), South America, where his ship had been seized. News of his death did not reach the family until summer. The value of Bickford's property in New Hampshire was reported in the Portsmouth Oracle in August, 1814. It amounted to over \$25,000 and was in addition to \$16,000-worth in Salem. Shares, stocks and notes held amounted to another \$10,000.

Mary Bickford/Beckford and her children remained in Salem. Her widow's dower included a life- right in the "Drew farm" in Durham, said to be 129 acres, plus pastures of 25 and 30 acres to the north on the Madbury line. She owned the farm under tenant farmers, David Balch and Moses Thompson, for fifteen years. In 1829, the Bickford heirs began selling Samuel Chesley their shares of the farm, then called 137 acres, and the two pastures. This was the last of the properties to be disposed of. At the time, Mrs. Beckford was acting as housekeeper for her uncle Captain Joseph White (1748-1830), owner of the Gardner-Pingree House, until he was murdered. She spent the end of her life with her daughter's family in Wenham, Massachusetts.

1830-1869: Samuel and Stephen Chesley

Samuel Chesley (1772-1863) and his wife Nancy Perkins, both descendants of the region's early settlers, moved from Madbury to Durham in 1830 and their son Stephen Chesley (1804-1869) stayed on the Madbury farm with his growing family. They had a teenage boy and a young woman, possibly grandchildren, living with them

in 1830 and in 1840, an older male and a woman lived in the house. They were taxed for five acres of arable land, about thirty acres of mowing, thirty of pasture and an orchard. Livestock were four oxen, two horses, three or four milk cows, plus four or five two-year-olds and a dozen sheep.

Around 1840, when he was nearly seventy, Samuel Chesley distributed his real estate among his children. The Durham farm became property of Stephen. The elder Chesleys retained the use and income of it, but they spent their last years in the homes of various children. Stephen and his second wife Elizabeth Woodman moved to Durham, with his daughters and their young son, John S. Chesley. The children attended the district schoolhouse that stood just across the road from their house on a lot deeded to the town by Samuel Chesley in 1838. Three hired-hands boarded on the farm according to the population censuses. The roof of the house was raised sometime in the 1830s-40s to provide extra storage space. The large gable front barn that stood east of the house until the 1950s may also have been built in that period. From 1841, there were railroad stations in Durham and Dover, about 2.5 and 4 miles away respectively. Traffic on the First New Hampshire Turnpike declined and when the Piscataqua Bridge was washed out in 1855, it was not rebuilt. For about eighty years, the roads to Durham and Dover came to a dead end on Cedar Point. The Chesley family had ties with Madbury and Dover and they are buried in the Pine Hill Cemetery in Dover.

Diversified farming based on cattle and sheep continued. Wool was profitable in the 1830s and the Chesley flock reached twenty-four sheep, but declined to only a few in the next decade. When railroad transportation brought competition from western sheep and cattle farms, dairy farming became the focus in New England. The Chesleys milked six cows and raised young stock. There were about fifty acres of pasture and thirty acres of mowing land for hay, as well as saltmarsh. The cows were driven down the driveway and across the road to the pasture each day. The northern land was wet and rocky but it had a spring for watering the cattle. The five acres of arable land was behind the house. The orchard expanded in the mid-1800s as there was increasing demand for fruit in the growing cities. An ell, largely replaced in 2017, was added to the house to provide a milk room, woodshed and other storage. It dates from the 1850s or early 1860s which was when John Chesley married and took over management of the farm prior to his father's death in 1869 at age 65.

1869-1896: John S. and Nancy Chesley

John S. Chesley (1839- 1896) and Nancy Adaline Sanborn (1839-1916) had seven children born between 1862 and 1875. Four of them lived on the farm throughout their lives. Mixed farming with a focus on dairy and orchard continued. Deeds give the acreage of the farm as 134 acres, most of which was tilled land and hay field, plus the separate pastures and woodlot.

The Chesleys continued to milk about six cows according to the censuses. Lacking proximity to a railroad depot, they produced mainly butter and some cheese, rather

than fresh milk as was typical of the region. In 1880, 600 pounds of butter were made. Poultry farming became increasingly important and the Chesley flock reached 75 birds. They built a chicken house on the hilltop southeast of the barn. Sheep were raised, which was not typical, but perhaps it was lucrative because of the proximity of Sawyer Woolen Mills, just up Back River Road in Dover. Hay was one of the most important crops including salt hay and thatch. It was a cash crop for urban markets and could be transported from the farm by gundalow. Horse drawn mowers and hake rakes came into use in this period. Fifty acres of mowing land, mostly on the hillsides around the buildings, yielded a hundred tons of hay each year. The orchard expanded, at its height covering the hillside around the barn. There were a hundred bearing trees as of 1880. Apples were shipped by rail from Durham or Dover and cider and cider vinegar were produced on the farm. As many as 200 bushels of corn were grown, including sweet corn, popcorn and silage corn. Other crops were barley and potatoes. Cord wood was necessary and additional wood lots were acquired during this period. The schoolhouse lot on the north side of the road reverted to the family when the Bridge School was closed and the few students then living in the district were transported to the Village School.

1896-1943: Chesley Siblings

The widow Nancy Chesley and four unmarried Chesley siblings, Stephen, Wilbert, Elizabeth and Gadiella, carried on the farm into the twentieth century. Their brothers and sister married and lived elsewhere but continued to visit and help on the farm. During the early twentieth century agriculture in New England declined, but farmers with established dairy and orchard operations like the Chesleys were able to fill existing markets for fresh produce, milk and eggs, which were still too costly to ship from the west.

Nancy Chesley's 1912-1914 diary in the collection of the Durham Historic Association, combined with Durham tax inventories, documents the farm in this period. They kept one or two carriage horses, a team of work horses for plowing and a team of oxen to haul wood and gravel. Wilbert Chesley built a stable off the back of the ell ca. 1900, freeing up space for as many as ten cows in the barn. Cream was their main cash dairy product according to the diary. They used a hand separator. The milk room in the ell had an ice cooler and there was an ice house in the back. The basement of the stable housed the pigs whose feed included the skim milk, which was a byproduct of cream for butter production. All types of vegetables were grown and potatoes were an important crop. New Hampshire College students were hired to assist at harvest time. The early 1900s diary tells that the Chesley men cut and hauled wood on their land and others. They worked for hire on other neighboring farms. As of the 1920s, the poultry flock totaled fifty hens, as well as ducks, geese and turkeys. There was a henhouse southeast of the large barn. Crates of eggs and live fowl were shipped by rail to Boston. The family acquired an automobile by the 1920s. The cider mill was no longer in use. The old schoolhouse remained standing empty until about the 1930s.

Here, and elsewhere in the region, farm income was supplemented by taking in summer boarders. Up to ten guests were accommodated at the Chesley farm. Most were from the Boston area and came by train to Dover, where they were picked up in the automobile. They stayed for a week or a month; rowed, swam and dined on fresh produce. A local girl was hired to assist with cooking and serving.

A swimming beach was located at the mouth of Davis Creek. There was a telephone by 1913. In the house, running water to the kitchen and an upstairs bathroom was installed in the 1920s. Electrification came relatively late to this part of town on a dead end road. An easement suggests the installation of an electric line in 1931. The old ice house was removed and an electric cooler installed in the milk room. Coal and then oil stoves heated the downstairs rooms and all but one of the fireplaces were closed up.

Chesley's Grove, where oak trees shaded the edge of the field overlooking the water, became the site of the annual Durham Day picnic in the 1920s. A popular event was an automobile race up the hill from the shore. Durham held a bicentennial celebration at Chesley's Grove in 1932. In the 1930s, gravel was hauled from the riverbank and a gravel pit near the original house site. This was used when US Route 4 was re-routed across the new Scammell Bridge to follow the former First NH Turnpike through Durham rather than the circuitous route through Dover, part of a Public Works Administration funded project to restore a direct route between Portsmouth and Concord.

Bert Chelsey died in 1935, Stephen in 1937, and Gadriella in 1943.

1943-1966: Elizabeth Chesley

Elizabeth Chesley acquired full ownership of the farm and she lived there alone for over two decades. She kept poultry and a few cows and sold eggs and butter to local residents. The barn was severely damaged by Hurricane Carol in 1954 and the cows were moved to the stable. Elizabeth Chesley was then eighty-one years old and ceased farming not long after. In 1960, she sold the main portion of the farm (said to be 142 acres) to Loring V. and Mary Tirrell. They were neighbors who lived on another farm to the west on Piscataqua Road and had helped on the Chesley farm for many years. The parcels of old pasture and woodland off Watson Road were sold separately. Elizabeth Chesley retained the right to live in the house and when she died in 1966, she was the last of the Davis descendants to own the farm. She was the sixth great granddaughter of John Davis who settled the farm more than 300 years earlier.

1966-1989: Tirrell Family

The Tirrells moved in to the old house in 1968. Loring V. Tirrell (1896-1975) was a retired professor of animal husbandry at UNH. The house was modernized with central heating, new kitchen and bathroom. They bought an old beer hauling wagon at an auction and placed it on the crest of the hill to create a picturesque silhouette. Over

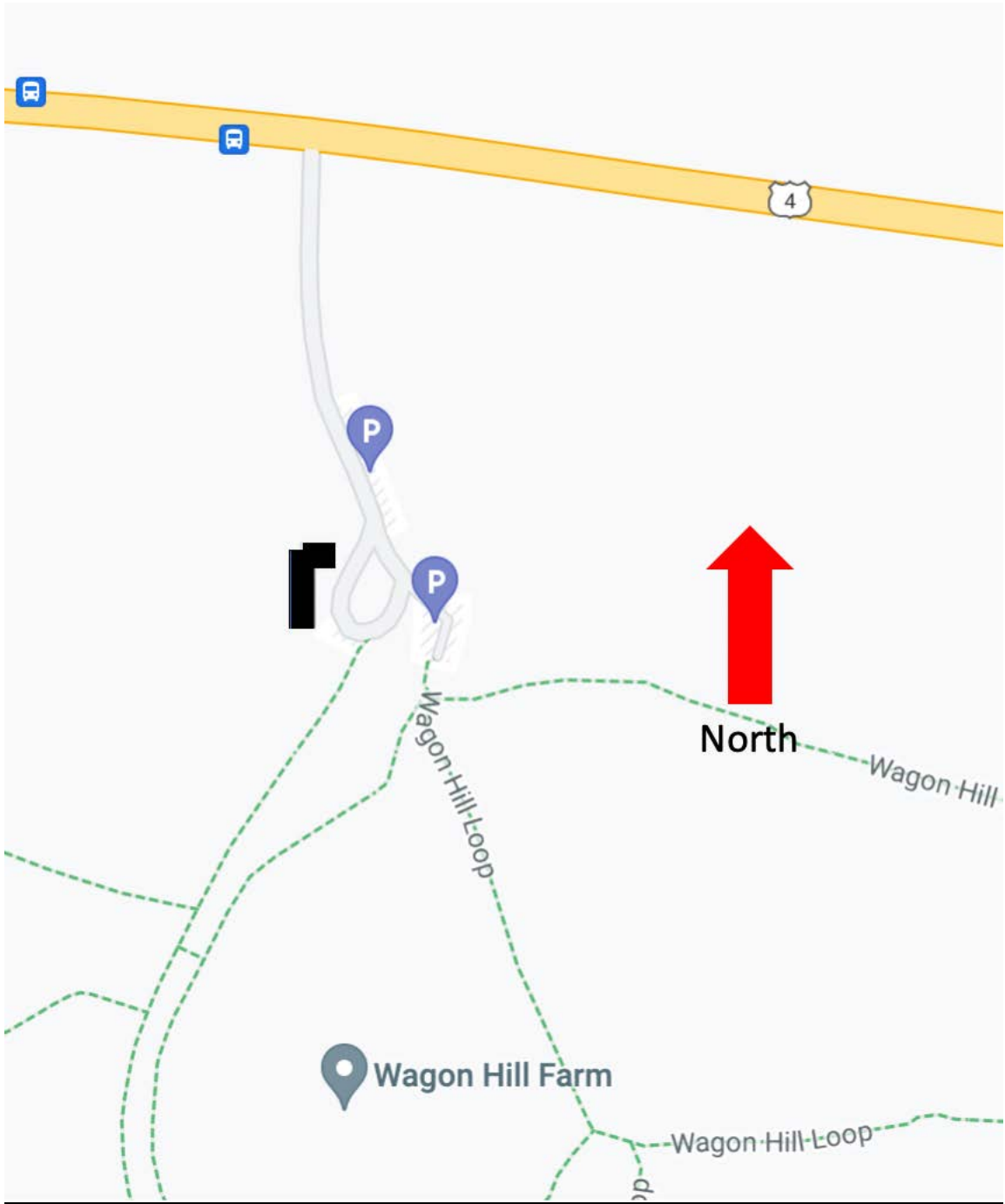
time, the site became known to area residents as “Wagon Hill Farm.” The scenic spot was often depicted in paintings and photographs making it a well-known local landmark of the late twentieth century. The cider house was taken down except the foundation and the henhouse was removed. After Loring Tirrell’s death, Mary J. Tirrell (1901-1988) moved into an apartment created in the ell and Theron and Alma Tirrell came to live with her. Theron Tirrell ran a gas station in Durham. He hayed some fields, but the pasture north of the road began to reforest. The apple trees were no longer pruned. Christmas trees were planted south of the orchard, but not harvested, and white pines filled in the field around them.

1989-present [2019]: Town of Durham

Mary Tirrell’s will stipulated that the property was to be sold and the proceeds distributed among her heirs. Shortly after her death in 1989, when developers began considering the site for housing construction, the Town secured a purchase and sales option from June to September. Following the public referendum necessary for expenditure of over one million dollars, the Durham Town Council voted at the end of July to purchase the property for 3.1 million dollars and the Town received general obligation twenty-year municipal bond. The stated purpose of the acquisition was “To preserve its scenic vistas, provide for future municipal purposes and preserve open space in order to provide for healthful and attractive outdoor environment for work and recreation and to conserve land, water, forest and wildlife resources.”

The property was opened to the public almost immediately. The driveway was rebuilt and parking created in 1990-92. Temporary stabilization measures were made to the stable. The house was re-roofed in 1995. The windows were replaced and the exterior has been painted several times. The house was rented to a long-time tenant until recently. Wagon Hill Farm is used for walking, picnicking, kayaking and swimming, cross-country skiing and sledding on the hill. Public Works Department maintains the fields, picnic tables, trash cans, etc. A community garden was established in 2009. The Town has replaced the wagon several times. The most recent was funded by donations from Mr. and Mrs. Howard Brooks, who are related to the Tirrell who placed the original wagon. The stable was determined to be structurally unsound and a decision was made to replace it with a new building of the same form and footprint in 2017. Roof trusses allow for a large open space that can be used for public meetings and events and there is a full concrete basement for storage.

Site Plan



Excerpted and adapted from Google Maps

Architectural Narrative Description

Form and Plan *See Images 1-8*

The Bickford-Chesley House takes the form of a large, timber-framed, twin-chimney building in the Federal style. It faces US Route 4, a well-established historic road corridor dating from the First NH Turnpike of 1803. Facing north toward the road rather than the more historically typical south toward the water, underscores that the farm was more agriculturally oriented than maritime. Importantly, and unlike many contemporary surviving houses along Route 4 but similar to the Smith-Emery House at 135 Piscataqua Road, this building was placed far back from the road and on a hilltop, creating a deliberate aesthetic and sense of approach.

Exterior

The building features a one-story rear ell extending from the south or rear, which connects to an attached, gable-front barn with its roof ridge parallel to the main house. The historic stable and the southern half of the ell were demolished in 2017 and replaced with the current structures, constructed on the same footprint. The northern half of the ell, which connects to the southwest end of the rear elevation, is historic material. The connecting ell and the now-missing historic stable were added in the 1830s or 40s, at the same time that a major roof alteration was made to the main house, discussed below.

The main house and the surviving original portion of the ell are footed on a stone foundation. The front (north) and east elevations of the main house are rubble granite laid in lime mortar below grade, and dressed slab granite above grade. The remaining areas of the original foundations are rubble stone above and below grade. The new portions of the ell and barn are cast concrete foundations.

The main house is currently topped by an unusually steep-pitched and massive gable roof. It began as a hip-roofed building, which is discussed further below. An alteration from perhaps the 1830s or 40s, this roof features boxed and molded eaves and gables in the early Greek Revival style. Below the eave line the original, first-phase wooden elements predominantly survive. These include door and window trims, and the majority of feather-edged clapboards fastened with early machine-cut nails. The molded corner pilasters are in the early Greek Revival style and relate to changes made to the roof and cornice moldings at that time. All of the windows in the main block of the building, which were originally in a nine-over-six glazing pattern at first-floor level and six-over-six at second-floor level, were replaced in the late twentieth century with one over one vinyl units in an overall false muntin grille six-over-six glazing pattern. Historic six-over-six light wooden-sash windows survive in the gables. These date to the alteration of the roof line. The paired interior chimneys consist of soft-fired red brick laid in traditional lime mortar. They are topped by two-course corbels and double-lancet brick caps that are parged with mortar along the top surfaces.

The front (north) elevation is organized in five symmetrical bays with a centrally placed main entrance. The frontispiece consists of an Adamesque pilaster-and-frieze design, topped by a glazed semi-elliptical fanlight. The frontispiece frames its original six-panel,

Federal-style door. This entrance services the main front stair hall. A granite stoop and two steps lead down to grade.

The east gable-end elevation [serves as a secondary façade with a less formal entrance, presenting itself to the driveway. It is arranged in three bays at first-floor level with a centrally-placed entrance that services an interior “porch” or pass-through vestibule. The entrance, while in its original position, features a much later architrave with false transom and single-light wooden door. These elements appear to date to the last quarter of the nineteenth century. The bays are not symmetrically arranged on the façade, being slightly shifted to the north. The second-floor features two bays of windows, aligned above the first-floor windows. There was never a centrally-placed window above the door because of the locations of original chimney closets on the interior. The attic gable features two symmetrically-placed historic six-over-six windows, discussed above. The east entrance door has a stone and masonry stoop with one step leading to grade.

The west gable-end elevation of the main house is arranged in two bays and the fenestration follows the offset arrangement of the east elevation, but there is no first-floor entrance. The southernmost first-floor window was replaced with a two-light casement window in the mid twentieth century when the current kitchen was installed. It aligns with the kitchen sink on the interior west wall. Below this window, grade abruptly drops off, accommodating an original cellar entrance. The attic gable features two symmetrically-placed historic six-over-six windows, discussed above.

The western elevation of the original (northern) portion of the connecting ell features a tripartite picture window at its northern end, dating to the 1950s or 60s. To the south of this is a door that formerly gave access to a porch, no longer extant. To the south of this is a vertical trim piece that demarcates the end of the original portion of the ell and the new portion of the ell and connected barn. The replaced portion of the ell features two small six-over-six windows. The west elevation of the replacement barn features three bays of six-over-six windows, positioned to the north of center. The gable end features two such windows, symmetrically placed. At the barn’s foundation level, the landscape pitches downward to accommodate a drive-in basement entrance. This may reproduce original circumstances to some extent. The entrance features paired, sliding barn doors, flanked on either side by a single six-over-six window. The south elevation of the replacement barn has a row of five small ventilation windows that may represent stall vents that could have existed in the original stable.

Included in the overall east elevation of the building complex are the ell and replacement barn. As discussed above, the northern portion of the ell is original to the 1830s or 40s. An exterior door accesses the ell from an open porch, added later in the nineteenth century, discussed further below. The door is in its original location but exhibits a later nineteenth century architrave and door that were probably added in concert with the construction of the porch and also the updates made to the entrance on both the east and south elevations of the main house. A pair of double-hung windows, probably dating from the 1950s or 1960s and contemporary with the kitchen, is positioned to the south of the ell entrance. This may have replaced and enlarged the opening of an earlier six-over-six window. The

modern replacement portion of the ell contains two bays of small wooden six-over-six windows, one positioned on each side of a sliding barn door. The modern connected barn features a centrally-placed sliding barn door and one six-over-six window to the south of it. The gable has two symmetrically-placed six-over-six windows. All of these modern replacement elements approximately resemble the appearance of the demolished original structures.

The south (rear) elevation of the main house was originally arranged in five symmetrical bays with a centrally-positioned rear entrance that accessed the barnyard. Most of this pattern is intact today. However, the westernmost first and second-floor window bays were altered when the ell and stable were added c. 1830-40. The first-floor window was converted to a door accessing the ell and the second-floor window was removed because it interfered with the western roof slope of the added ell.

The south elevation features a single-story full-width porch. It shelters both the rear entrance to the main house and the entrance to the ell. The porch exhibits boxed and molded posts. One at the west end attached as a pilaster to the ell wall, retains the original more elaborate trim, of an Italianate style, indicating that addition in the fourth quarter of the nineteenth century. [

Plan See Images 3 and 4

The plan of the main house is quite typical for the region and historical period in some respects, and unusual in others. The house is a typical four-room plan with front, main parlors, and ancillary rooms behind. In typical circumstances for the period, a twin-chimney plan was intended to accommodate a formal, front-to-back central stair passage. In this case, there is no such passage. A double-run stair is positioned at the front entrance; this features decorative lathe-turned elements. It is backed by a winding utility stair to the south. Thus, the circulation of the floor plan functions in the same way as the more common center-chimney house of the period.

Another unusual aspect of the plan and room designations is that the rear (south) first-floor main rooms both feature cooking fireplaces with ovens placed to the side of the main opening, meaning that the house was built with two kitchens from the outset. This relates to family circumstances that may have governed the initial design and construction (see the History section above). The kitchen fireplace on the east, also accessed by the east entrance to the building, is larger than that on the west, and the woodwork in the front parlor on the east end is also slightly finer, suggesting historical household hierarchy. In typical circumstances, one of the twin chimneys would contain the kitchen fireplace on the rear side, and the other a parlor-type fireplace that could have been for an informal parlor or first-floor bedroom.

The four-over-four room plan is essentially historically intact from the time of initial construction at first-floor level. Each of the rooms retains its original wooden architectural elements and plaster. The replacement windows are discussed above. At first-floor level, the only later alterations are the removal/ widening of the entrance to the front, northeast parlor c. 1900, and the renovation of the southwest kitchen into the current kitchen in the

1950s or 60s. For the latter, it is unlikely that any historic plaster and woodwork survives behind the current knotty pine wainscoting. The only surviving original feature appears to be the fireplace masonry.

At second-floor level, the essential original four-room plan is also intact, though in the rear stair hall alterations were later made in two phases. The first was when the roof was raised and altered, c. 1830-40, and a staircase added to access the attic. This involved re-working what may have been a back bedchamber into a larger stair hall and closet area, which clearly included re-use of earlier architectural materials in a new context. Later, in the twentieth century, a bathroom was added at the south end of this space; this exists today.

Basement *See Images 9-13*

As discussed earlier, the building is footed on a granite foundation that forms a full basement. The foundation consists of quarried rubble granite laid in traditional lime mortar throughout, but the exterior above grade areas of the north (front) and east elevations are finished in dressed granite slabs.

On the interior, the basement originally consisted of a single space, with massive brick vault foundations for the two chimney stacks. Three rooms were partitioned off later in the nineteenth century, probably c. 1830-40 when the roofline of the main building was altered and the ell and stable added. These partitions were formed by structural brick walls, forming two rooms on the east end of the building and a third in the northwest corner. These all served utilitarian purposes. The room in the northeast corner is the most intact. It was outfitted with a lath and plaster ceiling, which survives but is in a state of collapse. This feature suggests that the space was historically used as a dairy. The floor was paved in brick and the stone foundation walls finished in a veneer of whitewashed brick. The remaining spaces have indeterminate use but could have been used for such things as heating coal storage and winter vegetable storage. At the same time the brick partitions were added, several brick support columns were added to bolster the main floor deck. This could have been because of a degree of interior downward settling that may have gradually taken place in the building's first forty years of service.

The floor consists of dirt which is very irregular and uneven, with areas of a deteriorating floor covering or walking mats of some kind.

The majority of the original first-floor framing deck is intact, consisting of hewn and log timbers. However, below the center hall and current first-floor bathroom as well as the 1960s kitchen, the framing was either replaced or bolstered with modern 2"x10" dimensional framing, with plywood subflooring. This is a sign that long-term high moisture levels in the basement caused failure. Ongoing evidence of this can be seen elsewhere in original elements still in place.

Attic *See Images 14 and 15*

The attic, open and unfinished, is an immense space where all of the roof framing is visible. The roof framing, a c. 1830-40 replacement of the original low-profile hipped roof, is composed of five bays of white pine principal rafters, which are spanned by six courses of

horizontal purlins. These support vertical roof sheathing boards that are original to the period. The floor is finished with rough-sawn white pine plank that exhibits a bare, walked-smooth surface in most places.

Above the access stairs from the second floor and positioned centrally between the two chimneys, is a narrow wooden double-run staircase that accesses a roof scuttle that was intended for access to the roof for repairs and chimney cleaning. The railings to the stairs accessing the attic from the second floor contain re-worked earlier elements from the house, salvaged in the c. 1830-40 renovation campaign.

The chimney stacks in the attic bear more evidence of the later roof change. Both stacks remain in their original state including their corbels. They were extended upward when the roof was changed and raised with a larger, harder brick that is clearly differentiated from the original work below.

Ell, Original Portion *See Images 16 and 17*

About 50% of the historic 1830s-40s ell was retained when the historic barn was demolished and replaced. The surviving portion of the first floor was renovated into an apartment in the 1970s, converting the house to a two-family for widow Mary Tirrell and her son Theron Tirrell and his wife. The space consists of a main room, probably a living room, with a small galley kitchen partitioned off at the north end. No historic materials are visible except for the pine flooring and exposed corner beams. The attic area above was left unfinished. Likely the other half of the ell that was demolished contained a bathroom and one or two bedrooms [*Comment: the 1990 plan shows it as a studio apartment with the rest of the ell as "Shed"*]. Today the space is unheated and deteriorated.

Refer to the following section, Room-By-Room Summary, for more detailed information about each interior space.

Room By Room Summary

Refer to Images 3 and 4 (Plans) in this document for specific room references.

First Floor

Front Stair

The front stair hall is entirely intact from the time of construction. It retains a double-run Federal-style staircase executed in eastern white pine that was probably originally painted, but was refinished in the mid twentieth century. The plaster, flooring and front entrance components are intact as well. *See Image 18*

East Parlor

This space is substantially intact from the time of initial construction, but with some alterations. The fireplace area retains its original mantel and the firebox may be intact behind later infill. The doors, trims and window trims and chimney closet are original features. Though the sliding pocket window shutters are in place, the sliding tracks were cut out when the vinyl replacement windows were installed. Flooring and plaster survive

intact. The floor was sanded and varnished in the mid twentieth century. The original doorway leading from the East Kitchen and side entrance into this space was enlarged around the turn of the 20th century to its current condition, and the woodwork consists of re-worked original 1806 elements. *See Image 19*

West Parlor

This space is also substantially intact from the time of initial construction, but with some alterations. The fireplace area retains its original mantel and the firebox may be intact behind later infill. The doors, trims and window trims are original features. As with the East Parlor, though the sliding pocket window shutters are in place, the sliding tracks were cut out when the vinyl replacement windows were installed. Flooring and wall plaster survive intact. As with most areas of the first-floor rooms the flooring was sanded in varnished in the mid twentieth century. The ceiling appears to be finished with drywall that may have been installed over failing original plaster. *See Image 20*

East Kitchen

The fireplace wall, wall and ceiling plaster remain intact from the early 19th century. The flooring is original as well, but as per elsewhere in the building was sanded and varnished in the 20th century. The door and window trims were replaced with late Victorian bulls-eye moldings probably in the fourth quarter of the 19th century. *See Image 21*

West Kitchen

The only surviving historic feature in this space is the fireplace itself. The floor was re-framed in the mid twentieth century in concert with the installation of the current kitchen and bathroom. The walls are finished in varnished knotty pine and it is unlikely that original plaster surfaces survive behind it. The ceiling is modern drywall. The floor is covered in linoleum. The ceiling is modern drywall. Kitchen cabinets are fitted along the west and north walls, also knotty pine, and the countertops are formica laminate. An original window on the west wall was removed and replaced with a double casement in the, twentieth century, above the location of the kitchen sink. *See Image 22*

Mud Room and Back Stairs

This space is intact in terms of plan from the time of original construction. However, the woodwork and back door date to the last quarter of the nineteenth century. The flooring is covered in linoleum that is contiguous with that in the Kitchen. The wall and ceiling surfaces appear to be plaster but of a later period than initial construction. *See Image 23*

First Floor Bathroom

This space exhibits no historic features, having modern drywall surfaces, linoleum floor and bathroom and laundry fixtures. However, it occupies its original space within the plan and is accessed from both the East and West kitchens, indicating it most likely served as a shared pantry or storage area. *See Image 24*

Second Floor

Front Stair

At second-floor level front stair hall is entirely intact from the time of construction. It retains a double-run Federal-style staircase executed in eastern white pine that was probably originally painted, but refinished in the mid twentieth century. The plaster, flooring and front entrance components are intact as well. *See Image 25*

Northeast Chamber

This space is also substantially intact from the time of initial construction. The fireplace area retains its original mantel and the firebox may be intact behind later infill. The chimney cupboard is an original feature. The space retains all of its doors, trims and window trims. As with many other rooms in the house, although the sliding pocket window shutters are in place, the sliding tracks were cut out when the vinyl replacement windows were installed. Flooring and the wall plaster survive intact. The ceiling features acoustic tiles, probably installed to conceal deteriorating plaster. As with most areas of the first-floor rooms the flooring was sanded and varnished in the mid twentieth century. *See Image 26*

Northwest Chamber

This space is overall quite intact from the time of initial construction, but with some alterations. The firebox may be intact behind later infill. The doors, trims and window trims are original features. Though the sliding pocket window shutters are in place, the sliding tracks were cut out when the vinyl replacement windows were installed. Flooring and wall plaster survive intact. The floor was sanded and varnished in the mid twentieth century. The ceiling is finished in acoustic tiles that were presumably installed in the mid twentieth century to cover damaged plaster. *See Image 27*

Walk-In Storage (Southeast corner)

This small space is original within the plan and also in substantially original condition including plaster finishes, woodwork and trims. The ceiling is covered with acoustic tiles, probably installed to conceal failing plaster. The flooring was refinished in the twentieth century. Though identified in previous studies as "Walk-In Storage," it more likely served as a small, ancillary bedchamber that lacked a direct source of heat. *See Image 28*

Southeast Middle Chamber (East side, adjacent to chimney stack)

This space, positioned to the south of the east chimney stack and partitioned off at its south end from the Walk-In Storage space described above, remains intact from the time of construction, including woodwork, flooring and plaster. As with other spaces, the ceiling was covered in acoustic tiles in the twentieth century. The fireplace mantel survives but the firebox was later sealed and a thimble for a woodstove installed. The floors were refinished in the twentieth century. *See Image 29.*

Southwest Chamber

This space is intact in terms of its position in the overall plan. Its entrance and egress from the Northwest Chamber and Back Stairs are original as are the associated doors and trims.

The flooring is original pine plank, refinished in the twentieth century. The fireplace wall experienced the loss of the mantel and chimney cupboard at a later time but clear infill outlines in the plaster indicate their original locations. Possibly the firebox is intact behind the infill. The rear or south wall retains one original window at the eastern end, and a clear plaster infill on the west end from a second window that was removed when the rear ell was added c. 1830-1840 because it interfered with the roof line of the added structure. The ceiling is finished with acoustic tiles, probably installed in the mid twentieth century to conceal failing plaster. *See Image 30*

Rear Stairs

This space is intact in terms of plan from the time of original construction, but with some later alterations made c. 1830-1840 when more substantial stairs were added to access the attic with the higher roof and the enlarged attic. The plain board railings associated with the stairs descending to the first floors may be original to 1806.

When the enclosed stairs leading to the attic were installed, they were boxed with salvaged beaded wainscoting that was clearly original materials that were re-worked in order to both enclose the attic stairs and create an understairs storage area. The east wall of this space retains an original hall closet but the shelves were removed later to create a closet space that communicates with the Southwest Chamber chimney closet. The flooring is original pine plank, refinished. The wall and ceiling surfaces are old and perhaps substantially original plaster. *See Image 31*

Second Floor Bathroom

This bathroom space exhibits no historic features except for the window trim. Today it contains modern drywall surfaces, linoleum floor and bathroom fixtures dating from the 1960s. However, it occupies an original space within the plan and may have been another storage area or small ancillary bedchamber originally. *See Image 32*

Character-Defining Features

The following entries list the character-defining features present on the interior and exterior of the Bickford-Chesley House as well as elements that are non-character defining. This information will help guide what is to be protected, up for consideration, or negligible in future development plans. Evaluation of all building materials and determination of their importance follows guidelines set forth by the National Park Service Preservation Brief 17: "Architectural Character- Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character."

The main block of the house was changed very little from the 1840s through the mid-twentieth century under the Chesley ownership. The period of significance is defined for the State Register as ending at 1969. After this time, under the Tirrell ownership a number of interior alterations and modernization occurred. These can thus be considered non-contributing features.

Primary Character-Defining Features

These are elements that should be preserved and restored in any future repair, reused or expansion campaigns for the building.

Exterior

- Overall exterior building form, massing and fenestration
- All surviving framing elements from the original construction as well as the surviving nineteenth-century ell components
- Chimneys
- All surviving historic wooden window sashes
- Original/ historic exterior siding and trims:
 - Cornices
 - Corner pilasters
 - Historic window and door architraves
 - Historic exterior doors
 - Original feather-edged clapboards
- Rear porch
- Foundation and granite steps

Interior

- Overall floor plan, including the four-room plan, stair halls
- Brick vault chimney foundations and other original foundations
- Fireplaces and hearths
- Original flooring throughout
- All original interior woodwork (doors, trims, staircases, built-in closets, sliding window shutters)

Secondary Character-Defining Features

These are features that meet the requirements for “historic” as per National Park Service guidelines being a minimum of 50 years old, but post-date the period of significance, and do not substantially contribute to the overall sense of historic character in the building. In advance of any future renovation plans involving their removal or alteration, they should be thoroughly documented in their current condition.

Exterior

- Modern locking hardware, exterior doors

Interior

- None

Non-Character-Defining Features

These are interior and exterior details that are less than 50 years old as per National Park Service guidelines, and should be considered expendable in future repair and renovation projects. However, they should be documented prior to any significant alteration or removal as part of the building’s overall history.

Exterior

- Modern asphalt roof covering
- Modern replacement windows
- All elements pursuant to the replacement barn and replaced portion of the ell

Interior

- Mid-twentieth-century kitchen finishes (older than 50 years but non-contributing)
- First and second-floor bathrooms (non-contributing)

Conditions Assessment and Treatment Recommendations

Summary

From a historical as well as overall physical standpoint, Bickford-Chesley House survives in a very good state of preservation, having experienced a certain amount of regular maintenance by the Town of Durham and having been inhabited by a tenant until 2002. The exterior architecture is almost entirely intact from its period of historic significance with the exception of the replacement of the original vinyl units in the late twentieth century. The interior is very much intact from the period of historical significance with the exceptions of the modern kitchen installed in the 1950s or 60s, and the first and second-floor bathrooms, both added in secondary spaces.

This study has revealed that while the Town of Durham further plans for the building's future adaptive and expanded use, the exterior building envelope is the primary concern. The roof requires replacement in the very near term, the exterior woodwork and siding require repairs, and the building requires an overall high-quality paint job. The interior is in stable condition and should remain in its current state except for a thorough cleaning, as future plans develop.

Structurally the building is in overall stable condition. All framing above the main floor deck is in excellent condition and requires no intervention. A Building Conditions Assessment was completed by Aaron Sturgis of Preservation Timber Framing, Inc. (PTF) in 2019. The PTF report is appended to this document. Independent analysis for this study largely agrees with PTF's findings regarding the necessary repairs needed to correct decay and structural deficiencies in the main floor frame. These align well with accepted historic preservation practices for private residences, house museums, etc. However, with the planned mixed use, public access and code-required structural load capacities that need to be met, likely these suggestions are likely moot and building administrators will likely be required by building codes to have additional or replacement structure added, designed very carefully by a structural engineer.

A baseline engineering study, completed as part of this report, has made recommendations for what would be required to make the structure suitable for expanded and mixed use in the future. The building's current mechanical systems were evaluated by a licensed building inspector. The current heating system is relatively recent and functions to keep the building in minimal heat as future planning takes place. The plumbing is functional but the water has been turned off. The electrical wiring in the building is functional but outdated. However, recent upgrades to the service were very well done and can support expanded use. Summaries of these report findings are discussed below and the reports themselves are appended.

Also, as part of this document a baseline accessibility study was undertaken to generate ideas for making the building ADA compliant for an intended change of use, with minimal intrusion into the historic fabric. A summary of those results is discussed here, and the separate report and schematics appended.

Structural

As discussed above, the central and southwest areas of the first-floor frame exhibit a mid-twentieth century episode where most of the southwestern area of original framing was replaced with modern dimensional joists and in other areas some original timbers were retained but bolstered with dimensional lumber. There is evidence of past insect damage to many framing members, which seems to be no longer active but requires evaluation by a licensed pest control expert. An area toward the center of the western front-to-back carrying timber supporting the center of the floor deck exhibits extensive decay related to a leaky plumbing fixture in the bathroom above. It is not currently active. The floor framing is supported additionally by several brick masonry walls forming three rooms in the basement, brick columns and steel columns. The front (east elevation) sill is badly decayed particularly toward the center and western end. *See Images 3, 9-11, 33 and 38.*

The floor deck framing, including the area of mid twentieth-century dimensional lumber framing in the southwest quadrant, can be made structurally sound for planned, expanded use with simple repairs, and, replacement of existing vertical supports, and installing additional, carefully designed supports in key areas. At second-floor and attic level, as well as the lateral forces in the exterior walls and roof framing are adequate in their current state and will require no additional bolstering in order to support expanded use.

All of this is discussed in greater detail in an engineering study completed for this report by Structures North, Salem Massachusetts and appended to this document.

The brick columns that were added in the nineteenth century, as well as the brick partition walls that form the three basement rooms discussed above, exhibit extensive moisture-related brick deterioration known as "rising damp." This can be slowed or perhaps halted with installation of an adequate ventilation and dehumidification system. Pending the necessary re-engineering of the first-floor framing to accommodate adaptive reuse, these will in the future likely become structurally unnecessary but should be retained as part of the building's accumulated historic fabric and record of change. *See Image 34*

Roof/ Attic

From a structural standpoint, the roof framing is in very good condition and requires no intervention. There is evidence of old leaks, mostly associated with the chimney flashing, but no evidence of chronic leaks relative to roof failure is clear. *See Image 33*

The current asphalt shingle roof has surpassed its expected lifespan. Particularly on the south slope the shingles are curled and brittle. Repairs have been undertaken toward the west side of the south slope. Replacement of this roof with a new asphalt shingle roof should be a first priority, in concert with repairs to existing historic cornice elements, discussed further in the Project Priority List section further below. *See Image 14*

Exterior Siding and Trims

The exterior siding and trims survive remarkably intact from the early period of historic significance, c. 1806-1840. Though there are isolated areas of decay and also widespread paint failure, the overall historic skin is easily preserved with careful repairs.

The most significant areas of concern are the compound eaves and gable-end cornices, which exhibit localized decay due to roof drainage issues, joint separation and possible animal chewing. These elements can be repaired by a competent restoration carpenter, matching the profiles, materials and workmanship of the original work. They should be completed in concert with the replacement of the roof covering. *See Image 37*

There are other areas of deterioration of primary architectural elements, namely the front (north) entrance and rear (south) porch. With respect to the front entrance, the threshold, column plinths and kick plate, these can either be repaired with architectural epoxies or replaced in kind by a competent restoration carpenter. Also, the original granite steps approaching this entrance have deflected and settled over time and need to be properly reset. *See Images 38 and 40.* The entire exterior should be scraped, primed and painted following preservation specifications appended to this document.

Porch

The porch on the south elevation, added closer to the end of the nineteenth century, is overall in structurally sound condition but is settling downward toward the southeast. Warping and mildew in the bead-board ceiling finish indicate past and perhaps active roof leaking. The majority of the deck flooring was replaced probably in the late twentieth century.

The porch requires significant structural repairs at the deck level. The structure has settled downward to the southeast and while currently safe to walk on, it flexes underfoot and feels under-framed. The porch will likely be subject to some level of alteration as part of future design for an ADA-compliant access ramp and entrance. This should include replacing the existing floor framing with a designed/engineered framing system to support change in use, and replacement of the current flooring with higher-quality material such as vertical-grain douglas fir. The frieze and crown components and post bases require basic carpentry repairs while the post trim should be restored to match the extant original. The cornice repairs should be folded into repairs to the main house cornices as part of upcoming roof replacement. *See Images 39-40*

Chimneys

The building contains two chimneys, paired on the ridge of the main house roof. They are footed in the basement on typical brick arches laid in lime mortar. There are significant areas of rising damp and spalling brick at the feet of the arches, due to prolonged high moisture levels in the basement and soil. The deterioration has not reached a level of structural concern and can be slowed down and perhaps stopped with the right intervention consisting of an exterior drainage plan, interior ventilation and dehumidification system. *See Image 42*

Within the body of the house, the chimneys contain four fireplaces each, positioned at the front (north) and rear sides of the stacks. At first-floor level the south fireplaces are both cooking hearths with built-in bake ovens. Both of these fireplaces exhibit minor debris on the hearth floors, suggesting a degree of mortar loss and falling creosote. Because the chimneys are adequately capped (see below), structurally sound overall, and will likely never be wood-burning in the future, no treatment is recommended. *See Images 21 and 22*

The east chimney also features a front, parlor-style fireplace. The firebox has been sealed off and is not accessible for further inspection. *See Image 19*. At second-floor level the east chimney exhibits two chamber fireplaces, heating the northeast and southeast chambers. These fireplaces are also sealed off and not accessible for further inspection. *See Image 26*.

The west chimney stack also has a front-facing fireplace that fed the front west chamber. Like the northeast chamber, it is sealed off and not accessible. At second floor level, like the east chimney, there are two fireplaces feeding the northwest and southwest chambers. Like the other non-cooking fireplaces throughout the house they have been sealed off. The mantel in the southwest chamber was removed long ago and the plaster infilled. *See Image 27*

At attic level, the original 1806 stacks rise from the floor, and were added onto with later, harder brick which is stacked directly on top of the original corbels. This work is associated with the c. 1830-1840 replacement of the original low-profile hipped roof with the current massive gabled roof. Though there is minor mortar loss here and there that is the result of age, the stacks at attic level are in very good condition with no required intervention. Both stacks exhibit old water stains that are associated with past roof and flashing leaks. There is no evidence these leaks are active now despite the poor condition of the existing roof covering. *See Image 35*

Above the roof line, the portions of the stacks that are exposed to the elements are overall in very good condition, with only minor mortar loss here and there. The double-lancet brick chimney caps, parged on their top surfaces with mortar, are also on very good overall condition. The chimneys should be more closely inspected and selectively re-pointed by a qualified historic chimney mason in order to halt any further deterioration. Extreme care should be taken to match the color, texture and composition of the surrounding original mortar. *See Image 43*

As part of upcoming replacement of the roof, a qualified chimney mason should inspect all of the chimney flashing and make any necessary repairs as part of the roofing project.

Foundation

The building rests on a full cellar with a foundation consisting of split granite slabs above grade and rubble granite below, bound by traditional lime mortar. Overall the foundation is in good condition on the north (front) and east elevations. The granite slabs above grade exhibit minor deflection and mortar loss, and some areas have been filled with expanding spray foam insulation. The south elevation foundation above grade is concealed by the porch. *See Image 44*

The west elevation of the foundation, where the landscape slopes downward to access a walk-in basement entrance, exhibits significant mortar loss and shifting stones. Viewed from inside, areas of daylight can be seen through many of the stones. This wall will require significant reconstruction by a qualified restoration mason experienced with stonemasonry. Specifications that carefully consider both the correct mortar type and application, but also the expanded future use of the building should guide the process. *See Image 45*

As viewed from inside the basement, the remaining three foundation walls below grade (north, south and east) appear to be in stable, sound condition. *See Images 44, 45*

The only visible portion of the original ell foundation is visible along the north end of the west elevation. Here it is in three sections. The center portion is rubble stone that appears to be original but heavily re-mortared with gray Portland cement probably in the mid twentieth century. The north end was replaced by cast concrete. There is a significant crack at the north corner but it appears to be stable and repairable with hydraulic cement injection. The south portion is a different type of stone, comparatively square and quarried in appearance, also laid in Portland cement and perhaps a later repair. It is separated by the main portion of the foundation by a narrow strip of wooden clapboards and its connection to the rest of the foundation, if any, is unclear. *See Image 48*

As part of a complete planning process for the building, which will include extensive renovations to the ell, the mix of stone and concrete should be removed and replaced with cast concrete on a proper footing, tying into the existing cast concrete foundation supporting the new portion of the ell and the modern barn and better support expanded use. This can be faced with split granite on the exterior to be visually consistent with the main house.

Basement Moisture

Assessments from as early as 1995 and up to and including this report agree that high moisture levels and wet basement conditions have been a long-term factor in the decay of wooden floor framing elements and areas of significant rising damp in the brick chimney bases and support columns. Because the building is situated at the top of a hill and the site drains away from the building well on all sides, the high levels of moisture must be related to roof drainage and lack of a complete gutter system, and total lack of ventilation. Soil type could be a factor in retaining water but at the time of the several site visits for this study the dirt floor was dry and dusty but the nature of the compacted soil indicates chronic water infiltration. *See Image 49*

A first priority regardless of future planning for the building's use, all of the cellar windows should be restored or replaced due to decay. They should be reproduced according to their original design and made operational so that they can be opened and fitted with sturdy screens to promote air circulation in spring through late fall.

As part of moisture mitigation in the basement, consideration should be given to installing a vapor barrier. This cannot be done until the structural work to bolster the first-floor framing and the foundation footings is complete. Grade will have to also be leveled and smoothed. A vapor barrier should consist of a continuous installation of rubber membrane such as EPDM rubber roofing material, with welded seams between panels done in the same manner as when applied in roofing applications. Unlike thinner materials such as polypropylene sheeting, this material is not prone to shifting, tears or punctures.

Also a hard-wired whole-basement dehumidification unit should be installed, with a humidistat so that it automatically comes on when moisture levels reach a programmed level. This should be fed to a sump or perhaps directly outdoors along the west elevation where grade drops away the most precipitously. A portable commercial-grade unit such as AllorAir ® Sentinal HDi 100, or the equivalent will be adequate.

Ell, Original Portion

The surviving original portion of the ell is a timber-framed structure that was most likely unfinished on the interior as a utility area until it was renovated into an in-law apartment in the mid twentieth century. The only visible historic elements on the interior are exposed hand-hewn structural posts. The floor is covered with bare plywood and the walls and ceiling finished in drywall. There is an area of ceiling collapse near the entrances to the ell from the main house kitchen and the porch. This appears to be related to an old roof leak, currently inactive. *See Image 50*

The floor feels flexible underfoot, and as mentioned earlier, will require significant structural bolstering or replacement, in concert with replacement of the west foundation wall, also mentioned above, in order to adequately support public occupancy.

The roof framing of the original portion of the ell is visible from inside the new portion of the ell and barn, looking up and to the north. The framing system consists of mill-sawn pine rafters and hewn pine posts, girts and sills. It appears to be in sound condition.

Room By Room Existing Conditions and Recommendations

Overall, the interior plan and historic features of the building are remarkably intact, with most later alterations being associated with minor changes made in the 1830s-1840s associated with the ell, and with central heating and bathrooms in the mid twentieth century.

In the planning process for future adaptive reuse of the building, project administrators are strongly encouraged to retain the original floor plan and primary architectural elements. Planning for reuse is anticipated to include an automatic fire suppression (sprinkler) system, and this will permit the existing plaster wall and ceiling assembly to remain in place. The wall and ceiling plaster throughout will require repairs and in some locations replacement due to poor condition (ceilings in particular) in order to accommodate insulation and updated electrical, plumbing and fire suppression. However, the woodwork elements can be preserved in place and surfaces can be selectively drilled to install blown-in cellulose insulation.

The original pine flooring throughout should be considered very carefully. It was sanded and refinished once, and now exhibits a worn and abraded surface. Sanding and varnishing should not be considered an acceptable option going forward. Rather, the existing varnish should be chemically stripped and then sealed with a water-based penetrating sealant that does not create surface build, and can be periodically refreshed without further wood loss resulting from sanding. Consideration may be given to installed carpet as a protective wear surface in high traffic areas.

Undoubtedly moving forward, lead paint issues will emerge. Because the paint films are mostly sound and not in a dusting/flaking situation with risk of airborne contamination, administrators are strongly advised to encapsulate all wooden surfaces that test positive for lead, rather than consider abatement. Abatement involves aggressive stripping of wooden elements that always results in considerable damage, and afterward often the wood itself still tests positive for lead regardless because of penetration into the wood over time.

Refer to Images 1 and 2 in this document for specific room references.

First Floor

Front Stair

The front stair hall is historically intact but exhibits significant rot and poor repairs associated with the front door, fanlight and associated woodwork. These elements are repairable but require the skills of an experienced restoration carpenter.

The wall and ceiling plaster are stable. The walls are covered with failing old wallpaper. In this room, the plaster could be retained in a future renovation.

East Parlor

This space retains original elements as discussed in previous sections. [Original trims, flooring and window pocket shutters should be retained.

West Parlor

As with the East Parlor, this space retains original elements as discussed in previous sections. Original trims, flooring and window pocket shutters should be retained.

East Kitchen

This space remains historically intact with original features as well as woodwork updates dating from the late nineteenth century. All historic woodwork and flooring should be retained.

West Kitchen

The current kitchen only retains the fireplace masonry as a historic feature, which should be retained and protected in future endeavors. This space can be renovated to accommodate future public use, which will involve replacement of the floor framing. All

current wall, floor and ceiling finishes are non-contributing and may be replaced. If appropriate, the south wall can be adapted as a fire-rated separation between the house and ell/barn with little to no loss of historic material.

Mud Room and Back Stairs

A secondary means of egress from the second floor, this space is in good condition but will likely experience floor framing replacement as part of future plans for the current kitchen and first-floor bathroom space because these areas are all structurally tied together. The historic stair should be retained.

First Floor Bathroom

This space exhibits no historic features. It can be reconfigured as needed for future uses. The floor framing will require replacement as a greater project involving the current kitchen.

Second Floor

Front Stair

At second-floor level front stair hall is intact from the time of construction and should be retained in future planning. Separating a future second-floor residential unit from potential first-floor public areas may be accomplished by locking doors at the first floor level so that they function only for egress from public spaces. All other existing historic features should be retained.

Northeast Chamber

This space retains almost all of its original primary historic architectural features, which should be retained in future reuse.

Northwest Chamber

Like the Northwest Chamber, this space retains many of its original primary historic architectural features, which should be retained. It is recommended that the missing fireplace mantel be replicated, matching the surviving example in the corresponding Northeast Chamber.

Southeast Chamber (adjacent to chimney stack)

This space, like most others on the second floor, retains substantial historical material. The woodwork should be retained in future reuse.

Walk-In Storage (Southeast corner)

As per above and like most others on the second floor, retains substantial historical material. The woodwork from the period of significance should be retained in reuse.

Southwest Chamber

This space retains many of its original primary historic architectural features, which should be retained in future reuse. This space has experienced some alteration, and may therefore be considered for modern alterations needed for reuse.

Rear Stairs

As mentioned above, this space should remain architecturally intact in terms of historic features. If necessary, consideration may be given to enclosure of the stair if required for mixed use adaptive reuse.

Bathroom

As with the first-floor bathroom space exhibits no historic features except for the window opening and trim. Administrators should preserve this space in terms of historic plan, but the non-contributing fixtures may be replaced or reconfigured for reuse.

Grade, Drainage and Landscape

Overall, the immediate site promotes active drainage away from the structure on all sides, as discussed above with regards to the condition of the foundation and the basement. Water infiltration and high interior ambient moisture levels can be mitigated best by a well-designed and vigilantly maintained gutter system that directs roof runoff well away from the building. This inexpensive and ultimately reversible system should be a first step in overall moisture management. Most likely, a below-grade perimeter drainage system will not be required due to the overall very favorable site and grade conditions.

The chief concerns with the grade and immediate landscape surrounding the building are rising topsoil levels along the east and north elevations and extensive overgrowth of brambles along the west elevation. Over time, grade levels have risen several inches from their original state. This is a natural process over two centuries of the building's existence due to leaf litter and other compostable debris gradually adding to the soil. This is particularly problematic along the east elevation, where grade levels have risen enough to bury the sills and lower frame portions of the basement windows, causing significant decay. As part of foundation repairs and replacement of the basement windows grade should be lowered to at least five inches below the window sills, and care taken to make sure the landscape continues to slope away from the building and promote active drainage. *See Image 49*

In advance of a final landscape plan for the site, all of the brambles along the west elevation, not only along the foundation but also extending northward into the front yard of the building should be removed and the landscape smoothed out so the area can be easily mown on a regular basis to prevent re-growth of the brambles. For use of the north entrance in reuse plans, the north area adjacent to the building should be regraded to provide a walkway to the front door, and the stoop and steps should be reset to provide code-compliant rise and run access to the doorway. *See Image 50*

Accessibility Study

As part of this report, Durham resident, architect and member of the Durham Heritage Commission, Charlotte R. Hitchcock has contributed schematic plans for how to make the building accessible as per the Americans with Disabilities Act of 1992 (ADA) and to reuse the building for a mixed use including a Residential use for a Second Floor dwelling unit

and a Business use for First Floor spaces to be accessible to public activities. The schematic drawings are appended to this report.

In summary, any future adaptation and reuse of this building will require that that main public entrance be located in the rear portion of the building, more or less in the current location of the entrance door to the ell. The porch will require significant structural repairs due to both deterioration and to make it structurally sufficient to support public access. The accessible ramp to the building will be in an L- shape in order to accomplish the correct rise-over-run relative to grade and the height of the porch deck from the ground.

Accessibility to the modern barn can be accomplished with careful use of grade and landscape rather than a built structure such as a second ramp. Grade can be adjusted with relationship to the circular driveway. Specific soil surface type and methods of soil stabilization in order to prevent drift and erosion must be considered.

Residential Unit Schematic

Part of the anticipated adaptive reuse of the building is to include a single dwelling unit on the second floor of the main house. Charlotte R. Hitchcock has contributed a design schematic for how this can be accomplished. The original floorplan is retained more or less in full and the apartment will be accessed via a private entrance, the current front door and center hall stairs. The design schematic is appended to this document.

Structural Engineering Study, Summary of Findings

Adaptive reuse of the building to include a publicly accessible Business use (meeting and gallery space for a maximum load of 50 persons) with also a Residential use on the second floor will require careful consideration of the building's structural capacities, particularly pertaining to the first-floor deck framing. As part of this report a structural engineering study was completed by John Wathne of Structures North, Salem, Massachusetts. The official report is appended to this document.

In summary, the findings of the report produced by Arron Sturgis of Preservation Timber Framing Inc (PTF) and that of Structures North are in agreement that regardless of future planning, many areas of the first-floor deck framing are inadequate and require major repairs and bolstering. The PTF report advises an approach that involves using traditional timber framing techniques and materials, and specific repairs to salvage some original elements to essentially restore the main floor deck to its original capacity. This is a suitable approach for private residences and historic house museums.

However, the Structures North study points out that a change in use will likely trigger code requirements, which come into play in circumstances of mixed use – particularly when areas of a building are designated for public occupancy and others for residential. With regards to the first-floor deck framing this will mean future engineering design and specifications will be required to reinforce and support the existing floor framing system designed to accommodate increased load.

The area of floor framing replaced in the mid twentieth century in the southwest quadrant of the building (*See Image 1*) can be retained. If additional fasteners and properly-footed support columns are added in specific locations the floor will meet load requirements. This is the same for the surviving original timber-framed floor structure elsewhere.

Leveling and grading the floor will likely require installing a poured concrete bolster along the lower portions of the foundation walls in order to stabilize the footers and prevent the possibility of the walls kicking inward.

All of these things are discussed in detail in the engineering report appended to this document.

The porch, which will become the main, accessible entrance to the building in the future, will likely require substantial bolstering of the floor deck, or entire replacement, depending on findings of overall condition and design of the existing material during the removals phase of the project.

Building Systems Inspection Report, Summary of Findings

Plumbing system:

- There was no active water service to the property at the time of this evaluation. The functionality of the dwelling's supply, drain, waste and vent systems were not tested. Their condition and configuration, however, were evaluated.
- Numerous irregularities and inappropriate materials present in plumbing drain line configurations
- Significant rusting on aging cast iron drain lines; some areas of prior failure, blistering and scabbing at pipe fitting and unions. (This would be the most comprehensive, costly and significant defect in the home's current drain, waste and vent system.)
- Based on serial number dating, the electric water heater was manufactured in January of 2017, (5 years old). The need for replacement should be anticipated in, or before, 2025.
- Several loose plumbing fixtures

Heating system:

- The furnace was not operational at the time of this evaluation. Only its installation and configuration were examined.
- 145,000 Btu/hr, oil-fired furnace manufactured by Thermo Products.
- While serial number dating is not available for this manufacture, device appears to be relatively new and in decent condition. Average life expectancy for an oil-fired furnace is approximately 20-25 years.
- Potential compromise in the oil-fired furnace's stainless steel vent connector. This could create the potential for CO₂ to enter the building.
- Insulation missing on all ductwork throughout basement, reducing efficiency of system and increasing cost of operation.

Electrical system:

- Incoming electrical service enters the building overhead at the front, left corner of the exterior.
- Three independent disconnects for electrical service on property, (as labeled and wired):
 - House Panel (200-amps)
 - Barn Panel (100-amps)
 - Garden Panel (100-amps)
- Property lacks a clearly identified single, main disconnect for entire system
- Panel labeling throughout the property is unclear and outdated.
- While not labeled as such, it is suspected that the smaller panel in the basement is actually the Garden Panel, as it is not wired properly to be a sub panel.
- Fire hazards (double tapped breakers) exist in current wiring configuration in the smaller, (garden?) panel in the basement.
- Numerous unintended openings in each of the panels in the basement
- Evidence of small rodent activity inside the larger basement panel
- Several open electrical junction boxes throughout basement
- Numerous 'Open Ground' readings identified on three-prong, grounded receptacles. Highly likely that these outlets are still wired with older, ungrounded wiring.
- Distribution wiring throughout the home is usable but represents varied levels of risk and obsolescence. Panel and wiring throughout the barn are entirely current and represent very good electrical practices.
- Nearly all wiring to second floor outlets is older, ungrounded wiring to two-prong outlets.
- Lack of properly functioning GFCI outlets, (ground fault circuit interrupter) at all required areas in main house and rear ell.
- Numerous outlets are loose on the wall throughout the dwelling create potential for electric short or shock.

Septic system:

Little is known about the existing septic system and its inspection was beyond the purview of this report. Installation of composting toilets could solve the need for public facilities, if existing septic is sufficient for the residential component.

Fire suppression system:

Preliminary code analysis in collaboration with the Durham Fire Marshal and Building Official has indicated that an automatic fire suppression system is feasible, potentially by making use of a water source from an existing hydrant on site that connects from the Portsmouth water main which has an easement and passes across the Wagon Hill Farm property. This will permit plans for reuse to incorporate provisions of the applicable building code for certified historic buildings.

Fire Safety and Sprinkler System Recommendations

Brendan O'Sullivan, Fire Marshal for the Town of Durham provided recommendations for fire safety and sprinklers as part of this study. His report is appended to this document. In summary, much of the fire safety issues present with the expanded and mixed use of this building are largely up to the discretion of local authorities, so long as certain requirements

are met within more broad code issues. Historic buildings that do not conform to local fire-rated construction requirements are required to be protected by an automated sprinkler system, at the discretion of local authorities.

Existing doors and windows designated as emergency egress points can remain with their existing height and width dimensions as long as they meet the requirements of local officials. Existing historical doors do not need to swing in the direction of emergency egress as long as other approved exits are provided as per occupant load. Existing transoms can remain in place as long as they are sprinklered on the interior on both sides. Staircases can remain unenclosed as long as they only service one adjacent floor. Existing hand rails on historic stairs are exempt from minimum height requirements. Interior historic wall and ceiling finishes can remain in place and as long as the building is protected throughout by an automated sprinkler system, and are exempt from the minimum one-hour fire resistance requirements as long as they are in good condition.

Project Priority List and Cost Estimates

The following list of necessary and optional projects are listed in order of priority as well as logical order of operations and project sequence. Outside-figure cost estimates are also provided where relevant. All work completed on the building should involve specifications from a qualified architectural conservator where relevant, in accordance with the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties, and specific National Park Service (NPS) Preservation Briefs and Tech Notes where relevant, specified below.

[

Phase 1: Immediate/ Near Term

1. Replace the roofs on the main house and porch. **\$45,000**
2. Complete exterior woodwork and siding repairs. At least the eaves and cornice elements should be done before or in concert with the roof replacement. **\$25,000**
3. Restore the porch. This will likely involve replacing or bolstering the existing floor framing and flooring based on engineering recommendations to support public occupancy and an ADA-compliant ramp. **\$30,000**
4. Complete exterior preparation, prime and paint of main house and ell. **\$40,000**
5. Removal of all vegetation along the west elevation and north lawn, grade and seed. **\$5,000**
6. Installation of a whole-house dehumidifier in the basement, connected to a sump. **\$3,000**
7. Design and installation of a high-quality and historically sympathetic system of copper gutters, downspouts and leaders. **\$5,000**
8. Junk removal and deep-cleaning of the interior. **\$1,500**

Phase 2:

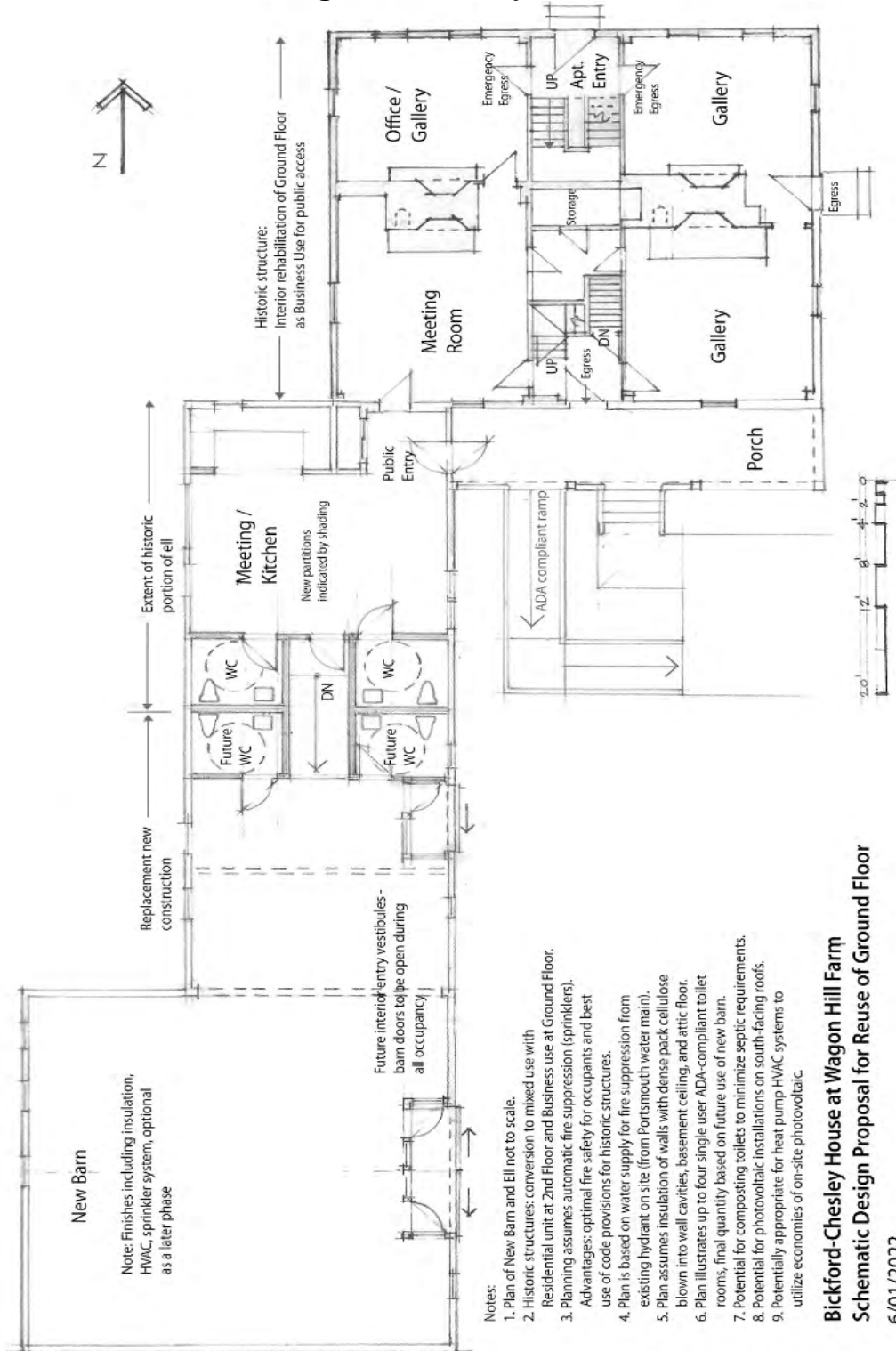
1. As per further engineering study and recommendations, stabilize and repair the west-elevation foundations of the main house and ell.
 - a. Engineering study and design- **\$1,500**
 - b. Construction- **\$30,000**
2. Following schematic design by a structural engineer, address first-floor framing issues to support expanded future use.
 - a. Engineering study and design- **\$5,000**
 - b. Construction- **\$50,000**

3. Reset and point existing remaining house foundation and repoint both chimneys above the roof line.
 - a. Foundation- **\$25,000**
 - b. Chimneys- **\$4,000**
4. Interior fit-out for reuse of First Floor, Second Floor, and Historic portion of the Ell. Budget to be determined.

Phase 3:

1. After exterior building envelope repairs are made and the interior renovation is complete, a Comprehensive Maintenance Plan should be developed and vigilantly followed, including staff training for new Town employees who work with the property.

Appendix 1: Schematic Design: Accessibility and Residential Unit



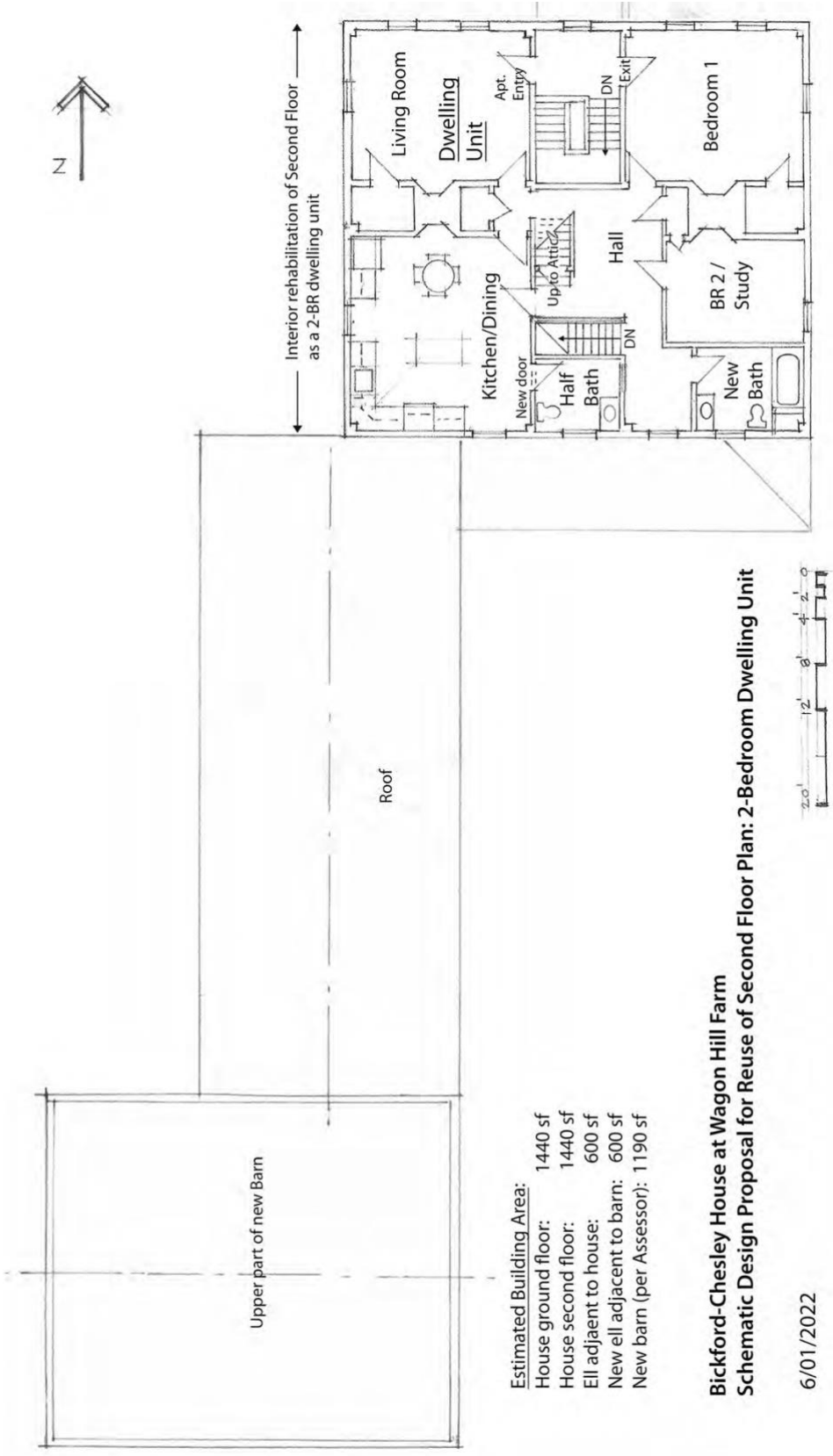
Notes:

1. Plan of New Barn and Ell not to scale.
2. Historic structures: conversion to mixed use with Residential unit at 2nd Floor and Business use at Ground Floor.
3. Planning assumes automatic fire suppression (sprinklers).
Advantages: optimal fire safety for occupants and best use of code provisions for historic structures.
4. Plan is based on water supply for fire suppression from existing hydrant on site (from Portsmouth water main).
5. Plan assumes insulation of walls with dense pack cellulose blown into wall cavities, basement ceiling, and attic floor.
6. Plan illustrates up to four single user ADA-compliant toilet rooms, final quantity based on future use of new barn.
7. Potential for composting toilets to minimize septic requirements.
8. Potential for photovoltaic installations on south-facing roofs.
9. Potentially appropriate for heat pump HVAC systems to utilize economies of on-site photovoltaic.

**Bickford-Chesley House at Wagon Hill Farm
Schematic Design Proposal for Reuse of Ground Floor**

6/01/2022

Charlotte R. Hitchcock



Estimated Building Area:
 House ground floor: 1440 sf
 House second floor: 1440 sf
 Ell adjaent to house: 600 sf
 New ell adjacent to barn: 600 sf
 New barn (per Assessor): 1190 sf

Bickford-Chesley House at Wagon Hill Farm
Schematic Design Proposal for Reuse of Second Floor Plan: 2-Bedroom Dwelling Unit

6/01/2022

Appendix 2:
Fire Safety and Sprinkler System Recommendations

National Fire Protection Association 2015

43.10.5 Change of Occupancy.

43.10.5.1 General.

Historic buildings undergoing a change of occupancy shall comply with the applicable provisions of Section 43.7, except as otherwise permitted by 43.10.5.

43.10.5.2 Means of Egress.

Existing door openings, window openings intended for emergency egress, and corridor and stairway widths narrower than those required for nonhistoric buildings under this *Code* shall be permitted, provided that one of the following criteria is met:

1. (1)

In the opinion of the authority having jurisdiction, sufficient width and height exists for a person to pass through the opening or traverse the exit, and the capacity of the egress system is adequate for the occupant load.

2. (2)

Other operational controls to limit the number of occupants are approved by the authority having jurisdiction.

43.10.5.3 Door Swing.

Where approved by the authority having jurisdiction, existing front doors shall not be required to swing in the direction of egress travel, provided that other approved exits have sufficient capacity to serve the total occupant load.

43.10.5.4 Transoms.

In corridor walls required to be fire rated by this *Code*, existing transoms shall be permitted to remain in use, provided that the transoms are fixed in the closed position and one of the following criteria is met:

1. (1)

An automatic sprinkler shall be installed on each side of the transom.

2. (2)

Fixed wired glass set in a steel frame or other approved glazing shall be installed on one side of the transom.

43.10.5.5 Interior Finishes.

Existing interior wall and ceiling finishes shall meet one of the following criteria:

1. (1)

The material shall comply with the requirements for flame spread index of other sections of this *Code* applicable to the occupancy.

2. (2)

Materials not complying with 43.10.5.5(1) shall be permitted to be surfaced with an approved fire-retardant paint or finish.

3. (3)

Materials not complying with 43.10.5.5(1) shall be permitted to be continued in use, provided that the building is protected throughout by an approved automatic sprinkler system, and the nonconforming materials are substantiated as being historic in character.

43.7 Change of Use or Occupancy Classification.

43.7.1 Change of Use.

43.7.1.1

A change of use that does not involve a change of occupancy classification shall comply with the requirements applicable to the new use in accordance with the applicable existing occupancy chapter, unless the change of use creates a hazardous contents area as addressed in 43.7.1.2.

43.7.1.2

A change of use that does not involve a change of occupancy classification but that creates a hazardous area shall comply with one of the following:

1. (1)

The change of use shall comply with the requirements applicable to the new use in accordance with the applicable occupancy chapter for new construction.

2. (2)

For existing health care occupancies protected throughout by an approved, supervised automatic sprinkler system in accordance with 9.7.1.1(1), where a change in use of a room or space not exceeding 250 ft² (23.2 m²) results in a room or space that is described by 19.3.2.1.5(7), the requirements for new construction shall not apply, provided that the enclosure meets the requirements of 19.3.2.1.2 and 19.3.2.1.3.

43.10.4.7 Stairway Enclosure.

43.10.4.7.1

Stairways shall be permitted to be unenclosed in a historic building where such stairways serve only one adjacent floor.

43.10.4.7.2

In buildings of three or fewer stories in height, exit enclosure construction shall limit the spread of smoke by the use of tight-fitting doors and solid elements; however, such elements shall not be required to have a fire rating.

43.10.4.8 One-Hour Fire-Rated Assemblies.

Existing walls and ceilings shall be exempt from the minimum 1-hour fire resistance-rated construction requirements of other sections of this *Code* where the existing wall and ceiling are of wood lath and plaster construction in good condition.

43.10.4.9 Stairway Handrails and Guards.

43.10.4.9.1

Existing grand stairways shall be exempt from the handrail and guard requirements of other sections of this *Code*.

43.10.4.9.2

Existing handrails and guards on grand staircases shall be permitted to remain in use, provided that they are not structurally dangerous.

43.10.4.10 Exit Signs.

The authority having jurisdiction shall be permitted to accept alternative exit sign or directional exit sign location, provided that signs installed in compliance with other sections of this *Code* would have an adverse effect on the historic character and such alternative signs identify the exits and egress path.

43.10.4.11 Sprinkler Systems.

43.10.4.11.1

Historic buildings that do not conform to the construction requirements specified in other chapters of this *Code* for the applicable occupancy or use and that, in the opinion of the authority having jurisdiction, constitute a fire safety hazard shall be protected throughout by an approved automatic sprinkler system.

43.10.4.11.2

The automatic sprinkler system required by 43.10.4.11.1 shall not be used as a substitute for, or serve as an alternative to, the required number of exits from the facility.

43.10.5.6 One-Hour Fire-Rated Assemblies.

Existing walls and ceilings shall be exempt from the minimum 1-hour fire resistance-rated construction requirements of other sections of this *Code* where the existing wall and ceiling are of wood lath and plaster construction in good condition.

Table 6.1.14.4.1(a) Required Separation of Occupancies (hours),† Part 1

Occupancy	Assembly ≤300	Assembly >300 to ≤1000	Assembly >1000	Educational	Day-Care >12 Clients	Day-Care Homes	Health Care	Ambulatory Health Care	Detention & Correctional	One- & Two-Family Dwellings	Lodging or Rooming Houses	Hotels & Dormitories
Assembly ≤ 300	—	0	0	2	2	1	2‡	2	2‡	2	2	2
Assembly >300 to ≤1000	0	—	0	2	2	2	2‡	2	2‡	2	2	2
Assembly >1000	0	0	—	2	2	2	2‡	2	2‡	2	2	2
Educational	2	2	2	—	2	2	2‡	2	2‡	2	2	2
Day-Care >12 Clients	2	2	2	2	—	1	2‡	2	2‡	2	2	2
Day-Care Homes	1	2	2	2	1	—	2‡	2	2‡	2	2	2
Health Care	2‡	2‡	2‡	2‡	2‡	2‡	—	2‡	2‡	2‡	2‡	2‡
Ambulatory Health Care	2	2	2	2	2	2	2‡	—	2‡	2	2	2
Detention & Correctional	2‡	2‡	2‡	2‡	2‡	2‡	2‡	2‡	—	2‡	2‡	2‡
One- & Two-Family	2	2	2	2	2	2	2‡	2	2‡	—	1	1

Dwellings													
Lodging or Rooming Houses	2	2	2	2	2	2	2‡	2	2‡	1	—	1	
Hotels & Dormitories	2	2	2	2	2	2	2‡	2	2‡	1	1	—	
Apartment Buildings	2	2	2	2	2	2	2‡	2	2‡	1	1	1	
Board & Care, Small	2	2	2	2	2	2	2‡	2	2‡	1	2	2	
Board & Care, Large	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercantile	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercantile, Mall	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercantile, Bulk Retail	3	3	3	3	3	3	2‡	2‡	2‡	3	3	3	
	1												
Business		2	2	2	2	2	2‡	1	2‡	2	2	2	

Appendix 3:
Building Systems Inspection Report



Beacon Street Home Inspection Hull Street
Cohasset, MA 02025

781-733-7892 Massachusetts Lic # 721

www.beaconstreethi.com

todd@beaconstreethi.com



June 28, 2022
Dear Steven Mallory,

RE: Report No. 2054
Wagon Hill Farm @ 156 Piscataqua Road Durham, NH
03824

I'd like to thank you for choosing Beacon Street to conduct this mechanical inspection for Wagon Hill Farm in Durham, NH. All directions given in the report are done assuming the reader is standing outside facing the front of the building. This mechanical evaluation closely examined the current condition and functionality of the building's principal systems and components that were readily accessible and in working order: the plumbing system's waste, drain and vent components as well as the water heater; all accessible electrical panels, wiring and other electrical components; as well as the heating system in the

building. Some limitations were present at the time of this evaluation. They are noted in the document itself.

The report is effectively a snapshot of the building, recording the conditions on a given date and time. The report itself is copyrighted, and may not be used in whole or in part without my express written permission. The inspection began at 11:00am on February 9, 2022 and concluded at 2:00pm. The weather was: 23 degrees with recent snow. It was a pleasure conducting this evaluation. Remember, if you have any questions about the report and its findings don't hesitate to give me a ring: 781-733-7892

Sincerely,

Todd Goff
on behalf of
Beacon Street Home Inspection

Beacon Street Home Inspection Hull Street Cohasset, MA 02025 781-733-7892 Massachusetts Lic # 721
www.beaconstreethi.com todd@beaconstreethi.com

ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

Report No. 2054

www.beaconstreethi.com

Description
Service entrance cable and location: Overhead - cable type not determined



Service size:

100 Amps (240 Volts) 100 Amps (240 Volts) 200 Amps (240 Volts)

Incoming electrical service

Beacon Street Home Inspection: Bringing What Matters to Light Page 1 of 22

ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

Report No. 2054

www.beaconstreethi.com





Main disconnects for electrical service

Main disconnect/service box type and location:

Breakers - exterior wall



Location of main disconnects

System grounding material and type: Grounded by Driven Rod


Beacon Street Home Inspection: Bringing What Matters to Light Page 2 of 22

ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

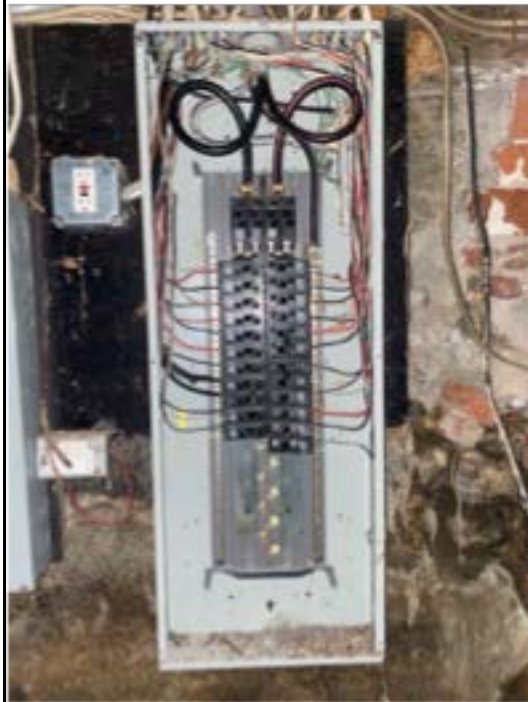
Report No. 2054

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Distribution panel type and location:

Breakers - basement



House panel with cover removed

Breakers - basement



"Garden" panel with cover removed

Breakers - barn

The panel and wiring throughout the barn are entirely up-to-date and in fine working order.

House panel

"Garden" panel

Beacon Street Home Inspection: Bringing What Matters to Light Page 3 of 22

ELECTRICAL

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Barn panel

Distribution wire (conductor) material and type: Copper - non-metallic sheathed Aluminum - non-metallic sheathed Metallic sheathed

Type and number of outlets (receptacles): Grounded and ungrounded - typical

Limitations

System ground: Continuity not verified Quality of ground not determined

Recommendations

SERVICE BOX, GROUNDING AND PANEL \ Distribution panel

1. Condition: Openings in panel

There are several unintended openings in the two basement panels. There is a small knockout missing on the right side of the larger, right side panel and duct tape has been placed over several slots missing breakers in the smaller, left side panel. In fact, debris accumulating inside the bottom of the larger panel on the right indicates that rodents are already gaining access to this panel. These openings should be properly closed by a qualified electrician.

Implication(s): Electric shock | Fire hazard
Location: Basement

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ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

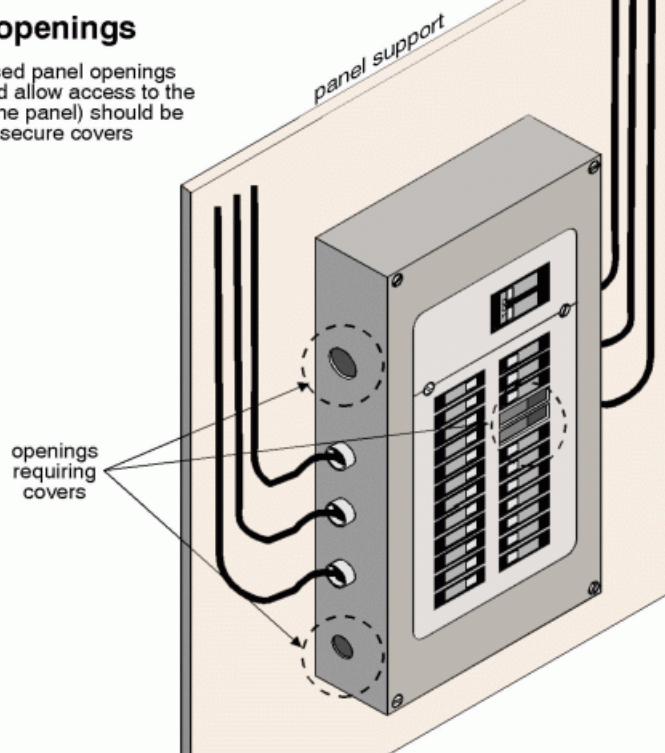
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Panel openings

any exposed panel openings (that would allow access to the inside of the panel) should be fitted with secure covers



Missing knockouts in small panel Debris bottom of larger panel

Beacon Street Home Inspection: Bringing What Matters to Light Page 5 of 22

ELECTRICAL

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Small opening in large panel

2. Condition: Circuits not labeled

The panel labeling for most of the building is outdated. This report is only assuming that the smaller panel in the basement is the actual Garden Panel, as it is not labeled as such. When renovations and improvements are made to the property's electrical system, all circuits should be properly labeled so that future work and improvements can be informed.

Implication(s): Nuisance

Location: Throughout

Panels and circuit labeling outdated

SERVICE BOX, GROUNDING AND PANEL \ Panel wires

3. Condition: Double taps



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ELECTRICAL

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There is one double tapped breaker in the small panel in the basement. Breakers are manufactured and intended to carry one line of service. The introduction of additional lines creates a lack of clarity in the transfer of electricity. This lack of clarity can generate heat, which can lead to a fire. Recommend you have this wiring configuration evaluated and repaired by a licensed electrician.

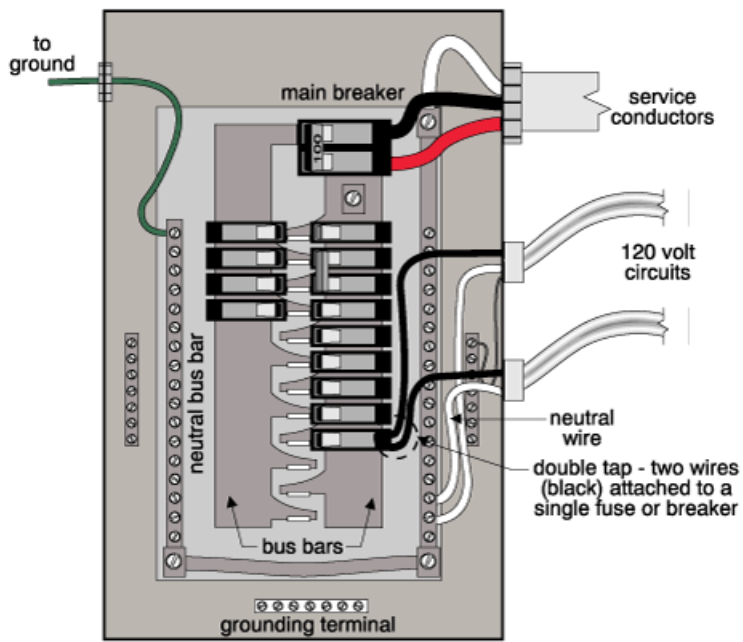
Implication(s): Fire hazard **Location:** Basement

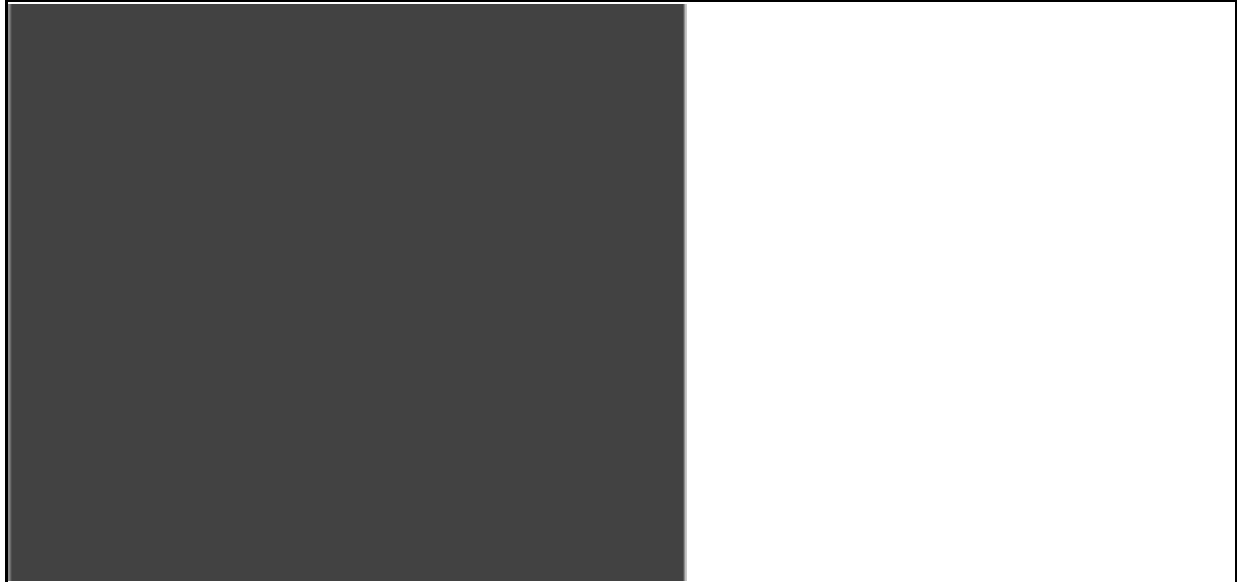
View fo double tap in small panel

DISTRIBUTION SYSTEM \ Wiring (wires) - installation

4. Condition: Extension cord used as permanent wiring

Double tapping (double lugging)





ELECTRICAL

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This extension cord was running to a two-prong outlet located in the vanity mirror above the sink in the second floor bathroom. This outlet source is not grounded and extension cords are not recommended as a permanent source of wiring. Improvements are needed to the electrical supply in this bathroom.

Implication(s): Electric shock | Fire hazard

Location: Second Floor Bathroom

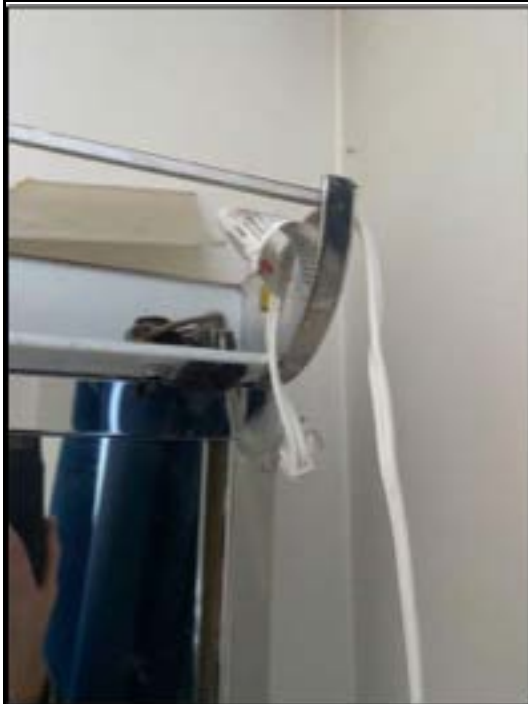
extension cord in second floor bathroom

DISTRIBUTION SYSTEM \ Junction boxes

5. Condition: Openings

There are numerous junction boxes on the property that are missing their protective covering, leaving live wiring exposed. This is a shock hazard that should be properly repaired.

Location: Various



Example of open junction box

Beacon Street Home Inspection: Bringing What Matters to Light Page 8 of 22

ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

Report No. 2054

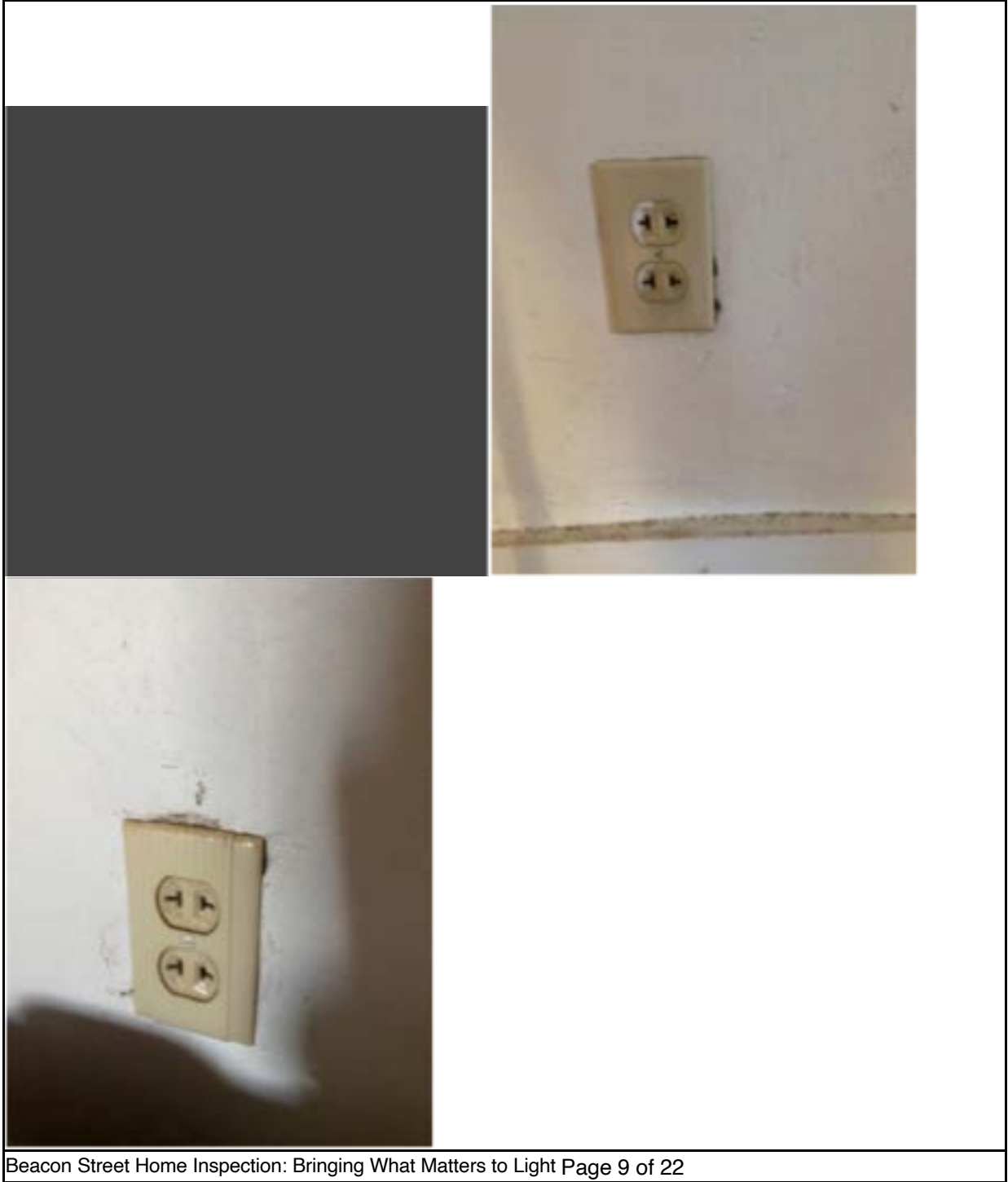


DISTRIBUTION SYSTEM \ Outlets (receptacles)

6. Condition: Ungrounded

The majority of outlets in the original building - on both floors - are two-prong, ungrounded outlets, (with the exception of the first floor bathroom and kitchen). These outlets remain an active part of the home's electrical system. Ungrounded outlets are considered to be obsolete by today's electrical standards and usage. They may prove to be a short or shock hazard due to the lack of a proper ground. It is recommend that you remove or upgrade any ungrounded outlets remaining in the home. This would require re-wiring most of the building. Discuss with a licensed electrician. **Implication(s):** Electric shock

Example of outdated outlets Example of outdated outlets



Beacon Street Home Inspection: Bringing What Matters to Light Page 9 of 22

ELECTRICAL

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022



Active two-prongs in bulilding

7. Condition: Ground needed for 3-slot outlet

Several three-prong outlets in the main section of the home tested to have Open Grounds, indicating that no ground wire was present or properly connected to the outlet. Given the age of the home, it is highly likely that these outlets are serviced by older, ungrounded wiring. A comprehensive review of the building's wiring and outlets will be a fundamental requirement of any renovation efforts. Discuss with a licensed electrician.

Implication(s): Electric shock

Location: Various

Some Three-prong outlets were ungrounded

8. Condition: GFCI/GFI needed (Ground Fault Circuit Interrupter)



Beacon Street Home Inspection: Bringing What Matters to Light Page 10 of 22

ELECTRICAL

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GFCI outlets are recommended at any and all electrical outlets that are located in areas exposed to water. There are several places in the home: such as the bathrooms, and the kitchen that currently do not have this level of protection. Improvements are recommended. Discuss with a licensed electrician and consider improving.

Implication(s): Electric shock

Location: Various

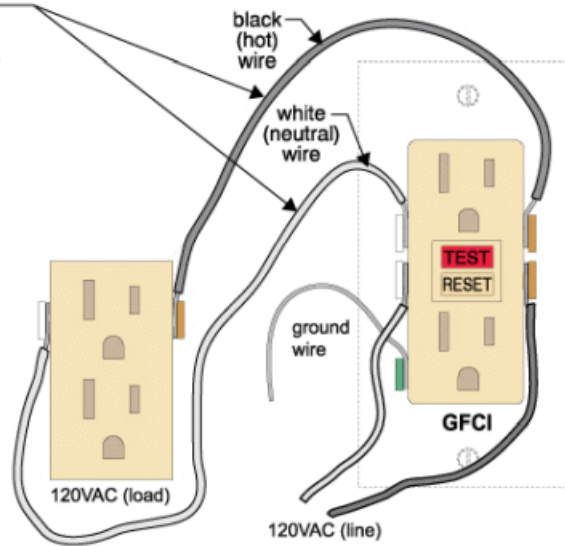
Ground fault circuit interrupter
also known as ground fault interrupter (GFI)

the GFCI circuitry within the outlet checks the load (connected downstream and/or plugged into receptacle) constantly for a difference between the current in the hot (live) and neutral wires

if there is a difference of at least 5 milliamps, there is a current leak and the GFCI shuts off the outlet and all outlets downstream

note:

if the GFCI is in the panel, the entire circuit will be shut down to reduce the risk of electric shock



Main kitchen

ELECTRICAL

Report No. 2054

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9. Condition: Test faulty on GFCI/GFI (Ground Fault Circuit Interrupter)
The GFCI outlet in the first floor bathroom did not appear to contain a proper ground wire. This wire may have become disconnected at the back of the receptacle or the wiring to the device may be older wiring that does not contain a ground wire. Have further evaluated by a licensed electrician and improve as needed.

Implication(s): Electric shock

Location: First Floor Bathroom

No ground at bathroom outlet



Beacon Street Home Inspection: Bringing What Matters to Light Page 12 of 22

HEATING

Report No. 2054

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Description

Heating system type: Furnace

Fuel/energy source: Oil

Furnace manufacturer:

Thermo Pride



Main fuel shut off at:

Supply temperature:

Return temperature:

Temperature difference: 75° Rounded to nearest 5 degrees **Exhaust pipe (vent connector):**
Galvanized steel

At Unit 125°

Oil furnace in basement

Heat distribution: Ducts and registers

Approximate capacity: Not determined 140,000 BTU/hr **Efficiency:** Conventional

Combustion air source: Interior of building

Approximate age:

Not determined

While the exact age of the oil-fired furnace could not be clearly determined, based on condition and

visual presentation the furnace appears to be relatively new and in decent condition. The average life expectancy for an oil-fired furnace is approximately 20-25 years.

Typical life expectancy: Furnace 20 years

50° Rounded to nearest 5 degrees

Beacon Street Home Inspection: Bringing What Matters to Light Page 13 of 22

HEATING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

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Chimney/vent: Metal **Chimney liner:** Not visible

Limitations

Inspection prevented/limited by: Chimney clean-out not opened Chimney interiors and flues are not inspected **Heat exchanger:** Not accessible

Recommendations

OIL FURNACE \ Venting system

10. Condition: Rust, dirty, obstructed

Rusting on the underside of the furnace's vent piping suggests that combustion gases and condensation are settling in the horizontal sections of the vent piping. Draft testing and close inspection of the venting configuration for the furnace should be conducted by a qualified HVAC contractor.

Implication(s): Equipment not operating properly | Hazardous combustion products entering home

Location: Basement

Rusting may suggest poor venting

OIL FURNACE \ Ducts, registers and grilles

11. Condition: Insulation missing, damaged

None of the metal duct work associated with the furnace in the basement is insulated. This is drastically reducing the efficiency of the furnace. Recommend having these duct lines properly insulated.

Implication(s): Increased heating costs | Reduced comfort

Location: Basement



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HEATING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

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Furnace duct work uninsulated Furnace duct work uninsulated

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PLUMBING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

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Description

Supply piping in building: Copper

Water heater type: Conventional There is a pressure/temperature value located on the water heater
There is a

vacuum relief valve located at the water heater

Water heater fuel/energy source: Electric

Water heater manufacturer:

Bradford White



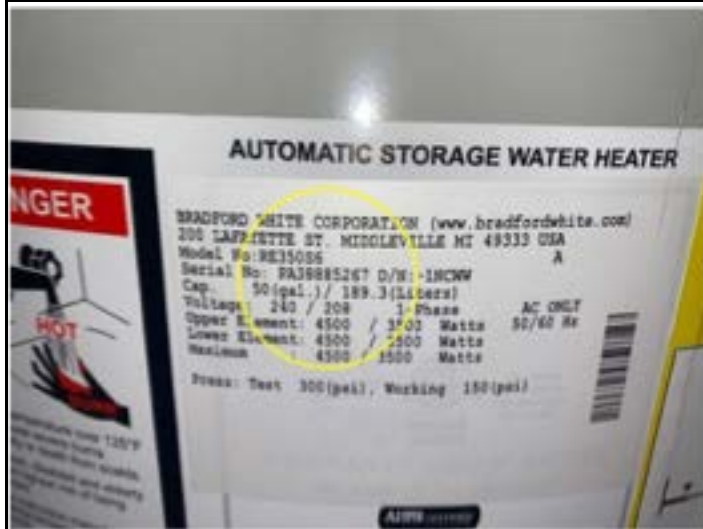
Water heater tank capacity: 50 gallons

Water heater approximate age:

5 years

Manufactured in January of 2017

Electric water heater in basement



Age embedded in serial number

Beacon Street Home Inspection: Bringing What Matters to Light Page 16 of 22

PLUMBING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

Report No. 2054

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Water heater typical life expectancy: 8 to 12 years
Waste and vent piping in building: Plastic Cast iron Metal

Limitations

Inspection limited/prevented by:

Water supply turned off

There was no active water service to the property at the time of this mechanical evaluation. The functionality of the dwelling's supply, drain, waste and venting systems were not tested. Their condition and configuration, however, were evaluated. It is strongly recommended that a proper evaluation of the plumbing's functionality be conducted by a qualified contractor or licensed plumber prior to using any components of the system.

Recommendations

WASTE PLUMBING \ Drain piping - performance

12. Condition: Leak

A bucket underneath the kitchen sink drain line suggests the history of a leak here. We were not able to test the drain line's effectiveness due to the water being off at the time of this evaluation. This

assemblage should be evaluated by a licensed plumber once water service has been restored.

Implication(s): Sewage entering the building

Location: Kitchen

Bucket beneath kitchen sink drain

13. Condition: Rust

There are numerous runs of cast iron drain lines in the basement. Areas of rusting were noted on each section and union. Some rusting was more severe than others. Cast iron drain lines have a life expectancy of 50 years or so. It is likely these drain lines meet or exceed this limit. Given their condition it is recommended that you have all cast iron drain lines in the building replaced. Consult with a licensed plumber to gain a better understanding of the scope of work needed for this repair.

Implication(s): Sewage entering the building



PLUMBING

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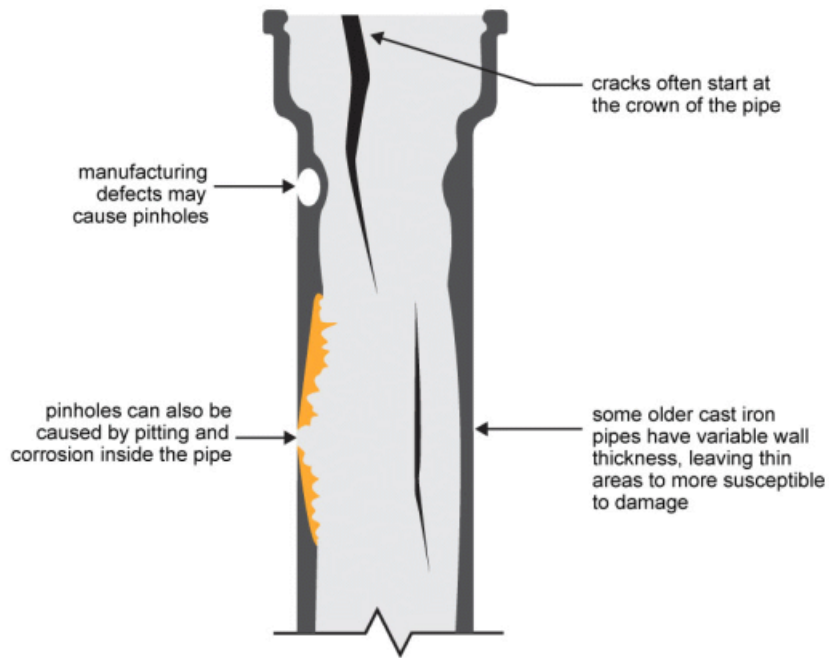
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Location: Basement

Pinholing and cracks in cast iron stacks





Surface rusting on cast iron drains Rusting on cast iron unions

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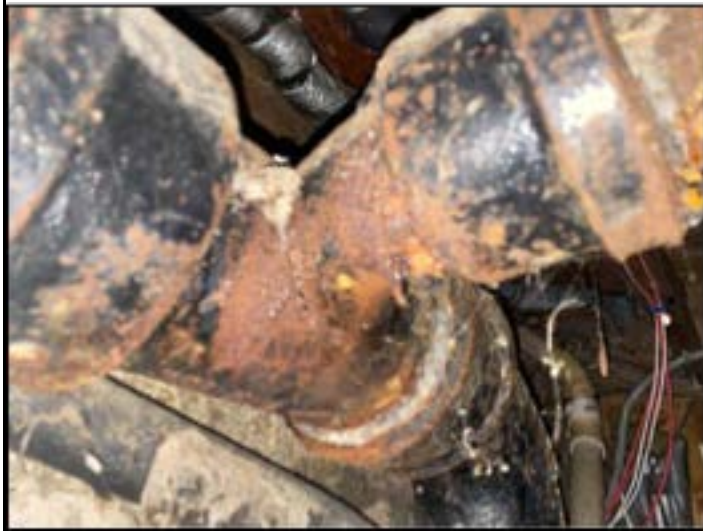
PLUMBING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

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Heavy rusting at union Example of rusting in drain lines

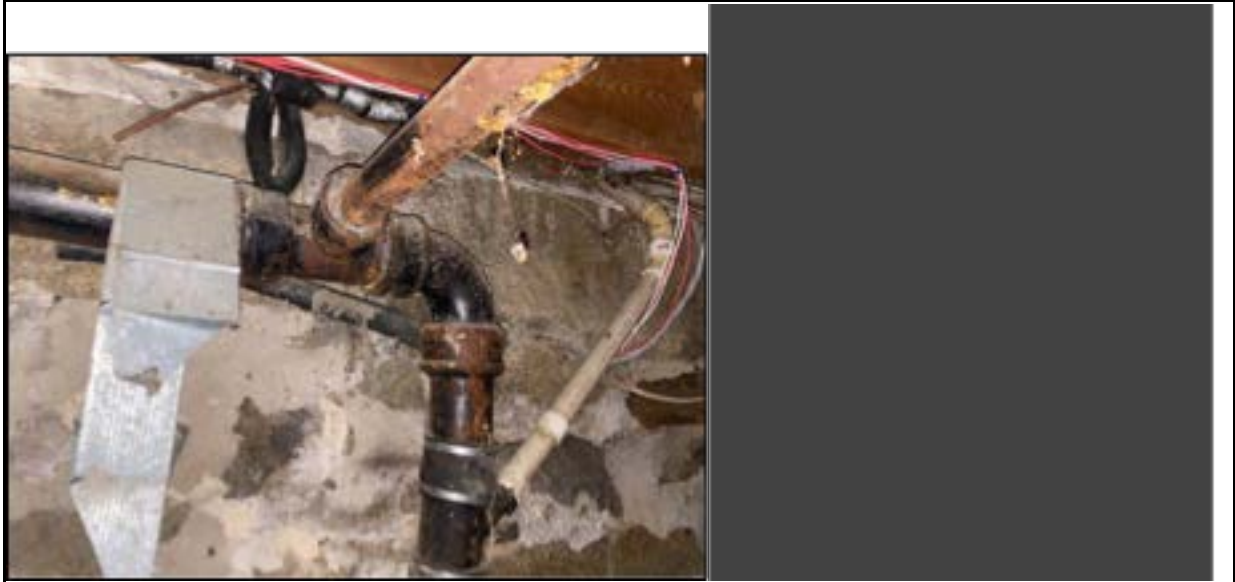
Example of rusting in drain lines

WASTE PLUMBING \ Traps - installation

14. Condition: Nonstandard shape or material

The second floor vanity sink is serviced by a suboptimal trap configuration. The drain line contains what's called an S-trap. These configurations oftentimes can be self-siphoning, suggesting that water draining from the line can also drain the trap. P traps are universally considered to be more reliable and effective. Discuss feature with a licensed plumber and consider improving.

Implication(s): Reduced operability | Fixtures slow to drain



Beacon Street Home Inspection: Bringing What Matters to Light Page 19 of 22

PLUMBING

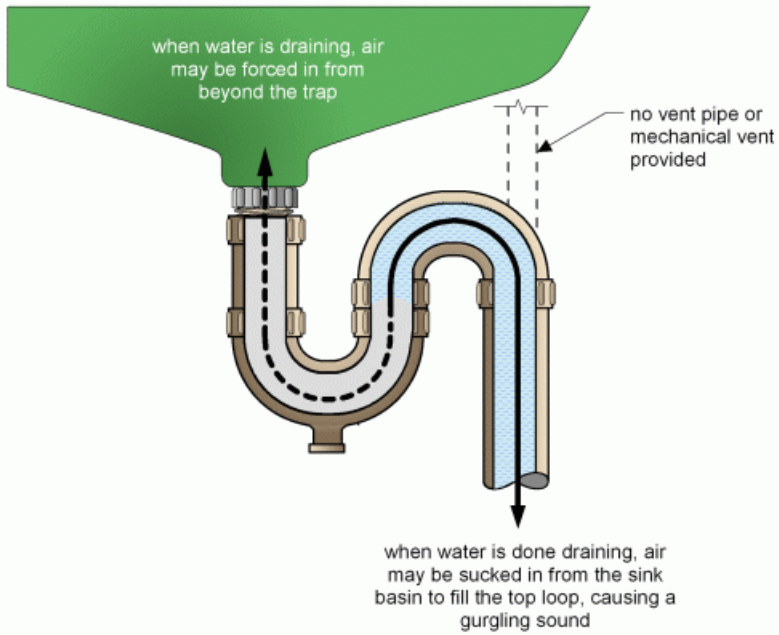
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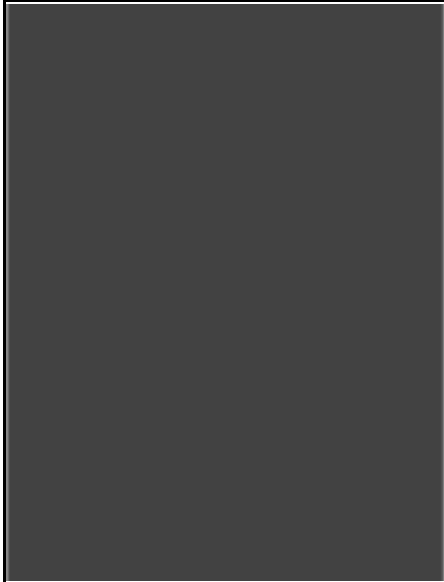


S-traps can lead to siphoning



FIXTURES AND FAUCETS \ Faucet

S-trap, may self-siphon



15. Condition: Loose

Most of the plumbing fixtures in the building are loose and not properly secured. Improvements are needed.

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PLUMBING

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Implication(s): Equipment failure **Location:** Various

FIXTURES AND FAUCETS \ Toilet

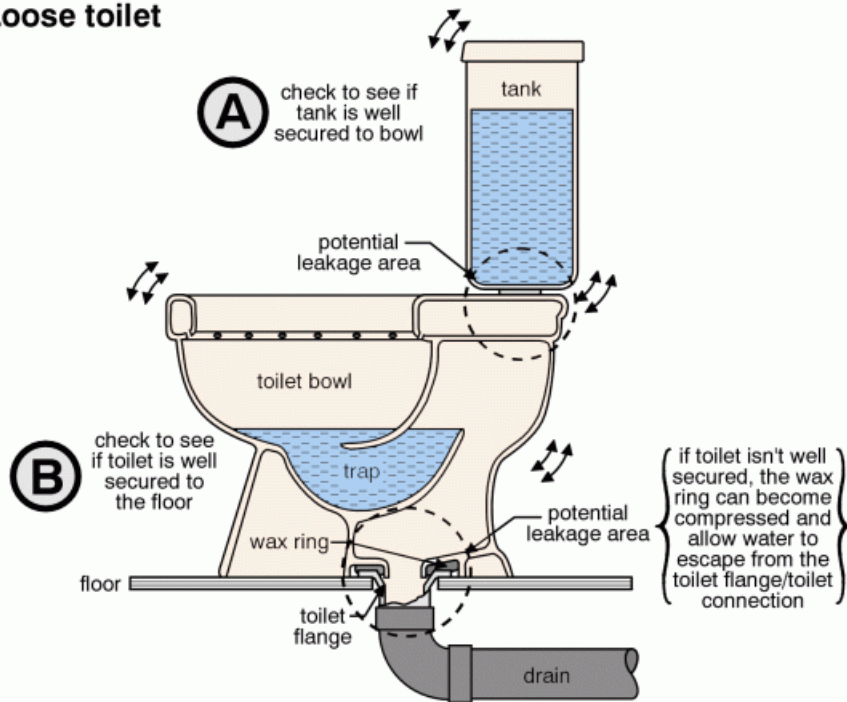
16. Condition: Loose

The toilet in the first floor bathroom is loose on the floor. This needs to be properly secured by a licensed plumber. **Implication(s):** Chance of water damage to structure, finishes and contents | Sewage entering the building | Possible hidden damage

Location: First Floor Bathroom

Loose toilet in first floor bathroom

Loose toilet





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PLUMBING

Wagon Hill Farm @ 156 Piscataqua Road, Durham, NH February 9, 2022

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END OF REPORT

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Appendix 3: Structural Engineering Report



60 Washington St, S
Salem, Massachusetts
P.O. Box 01971-8561
T 978.745.6817 | F
www.structures-north.com

17 June 2022

Steven Mallory

Reference: Wagon Hill Farm
156 Piscataqua Road
Durham, New Hampshire
Structural Conditions Survey

Dear Steven:

Earlier this spring we met with you at the Wagon Hill Farm in Durham, New Hampshire to inspect the main house, which is located at the north end of the property. The primary purpose of the survey was to observe the readily visible structural conditions, specifically with regards to a partial reconstruction of the structure generally include portions of the foundation, first floor framing, and roof framing. For the purposes of this report, the front entry of the building faces north towards Piscataqua Road, and the entrance that is frequently used is at the south.

General Description

The building is a two-story wood-framed residence that was constructed in the late 1700s. There is a barn to the south end of the house, which is connected by means of a one-story ell spanning between the two. The barn was demolished in 2017 and rebuilt with modern construction methods. The barn is discussed generally, however its condition is not covered in the scope of this report and it is our understanding that it will not be included in any upcoming restoration scope. The house has a full basement while the connector has wood sleepers on grade. The ridges of the main house and barn run east-west, and the connector ridge runs north-south between the other two buildings. While the front of the house faces north, the most off-used entrance is located at the south end of the main house, which provides access to both the main house and the ell.



A portion of the first floor framing of the main house has been reconstructed with modern materials and concrete-filled gage-metal columns at the southwest corner below the kitchen area. The balance of the first floor framing appears to be constructed with a mix of materials used in several generations, including log joists and rough sawn lumber. Framing direction varies, and girders span north-south and is supported by perimeter foundation walls, interior basement brick walls, and wood beams. Foundation walls consist of partially-mortared rubble stone masonry exterior walls. The barn, which used cast-in-place concrete for its reconstruction. Second floor framing is concrete, however this likely follows a similar pattern as the first floor. Roof framing consists of timber bents that span north-south with purlins spanning east-west. The west wall of the house was not visible from the exterior as this area was overgrown with vegetation at the time of our visit.

Noted Conditions and Recommendations

There is severe rot at the sill along the north elevation, particularly at the west half (see Photo 2 on Page 1 of the Appendix).

The sills should be replaced using a naturally durable and historically appropriate material, such as seasoned white oak. For planning purposes, the entire north elevation should be included in any replacement scope. The entire sill of the main house should be exposed, and a unit price provided for any additional work that is discovered as a result of the exploratory work or during the course of base scope replacement.

The south entrance is in generally poor condition.

It is our understanding that this will be completely reconstructed and incorporate accessibility upgrades, such as a ramp.

The facing stones at the top of the foundation wall have shifted outward at their tops (see Photos 3 through 6 on Pages 2 & 3 of the Appendix).

These stones should be re-set. Mortar for repointing and rebuilding should be compatible with historic masonry, such as a Type N. Please note that a Type N mortar consists of 1:1:6 (cement: lime: sand) proportion by volume, however pre-packaged mortars rarely state the mortar mix proportions in the bag. Therefore, the mortar should be proportioned by hand per the proportion specification of ASTM C1713 unless a pre-bagged mortar specifically intended for historic masonry is used, with the proportions clearly listed on the bag with product information readily available for submittal and approval prior to ordering material. For stone and granite such as the capstones, a bonding agent should replace 1/3 of the mix water to help the bond with the relatively low porosity of the granite.

The entry steps at the north and east elevations of the main house have shifted (see Photo 2 on Page 1 & Photos 5 through 7 on Pages 3 & 4 of the Appendix).

The stones that comprise the entry steps should be carefully documented so that they can be stockpiled and accurately re-installed. While the stones are stockpiled the grade below should be over-excavated and filled with compacted gravel, then the steps re-set as close to their original positions and in as code-compliant manner as possible.

The west foundation wall of the ell is buckling inward and appears to have received ad-hoc repointing in the past (see Photo 8 on Page 4 of the Appendix). While the floor structure of the ell is covered by finishes, there is distinctive movement in the floor under footfall, and according to your account the floor structure merely consists of wood members in direct contact with the underlying soil.

It is our understanding that the floor and foundations of the ell will be completely removed and replaced with new structure. This should either consist of new wood framing with an appropriate crawlspace, or a slab-on-fill. As the grade slopes downward from east-to-west, the walls will need to be properly designed to support unbalanced fill by bracing at the top of the walls or by designing the walls as cantilever retaining walls.

There are several vertical supports that have insufficient connections and are deteriorated, mostly at their bases where moisture will accelerate rusting of steel columns and rising damp that damages masonry elements (see Photos 9 & 10 on Page 5 of the Appendix). These concrete-filled gage-

metal columns do not have proper connections at their caps and bases and the footings are scant. The cap and base plates are fitted to the top and bottom of the column with raised lugs that lack positive connection to the column. Similarly, these cap and base plates do not offer a substantial connection to the footing or supported beam beyond small holes for nailing. The columns are severely corroded at their bases and are susceptible to further corrosion damage since their initial coating is not robust and they have not received any additional protective coatings, such as cold-galvanizing or epoxy coatings. Additionally, the relatively small cap plates do not provide sufficient bearing area where they contact the wood, as wood generally has low capacity in compression perpendicular to its grain (also referred to as side grain). Similarly, a brick pier adjacent to the steel column in Photo 10 has deteriorated, mostly at its base where the mortar joints have eroded, and bricks have started to spall. This damage is due to rising damp, which is a common issue seen in buildings of this age and an inherent issue with this type of construction.

The vertical supports should be removed and replaced with a more durable support, such as a standard steel pipe or tube section with welded cap and base plates. New steel should be coated with a protective marine-grade epoxy or cold-galvanizing coating to prevent future corrosion. Cap and base plates should be a minimum of 8"x8"x $\frac{3}{4}$ " welded to each end of the column, however the exact size and configuration will need to be detailed in the design phase. Existing columns for the steel columns are inadequate, and any existing footings for the brick piers are likely scant as well, if present at all, and new footings should be included as part of the replacement. New or replacement footings should consist of new cast-in-place concrete with a minimum dimension of 3'-0" x 3'-0" x 15" thick and reinforced with #4 rebar spaced at 6" on-center each way, bottom (provide 3" side and bottom cover). This footing size should also apply to any new columns as discussed below, and any columns that are in close proximity can use a combined footing with a narrow dimension of 3'-0" minimum and the long dimension as required to support both columns with a minimum extension of 12" beyond the face of each column. While we typically do not recommend concrete-filled gage-metal "lally" columns, these may be considered in conjunction with improved cap and base plates, sometimes referred to as "Springfield Plates," with short concrete pedestals or piers that elevate the column above the slab to increase the corrosion resistance (in addition to a robust coating). For any timber members with irregular surfaces, bearing plates made of engineered wood, such as laminated veneer lumber (LVL) or parallel strand lumber (PSL), should be installed between the column cap plates and the underside of the beams. Construction adhesive should be used to fill any gaps between the top of the LVL plate and the underside of the timbers to provide uniform, continuous bearing. The underside of the LVLs will provide a flat surface for the cap plates to attach to.

The interior brick masonry walls and fireplace bases are deteriorated, most severely at their bases due to the aforementioned rising damp (see Photos 10 through 12 on Pages 5 & 6 of the Appendix). *All coatings should be removed, and the damaged areas rebuilt, and the balance repointed. Mortar used for this work should be a Type N as described above.*

The original framing conditions vary substantially, including flush-framed connections that are toenailed (see Photos 13 & 14 on Page 7 of the Appendix), heavily notched mortise & tenon joinery that is susceptible to splitting (*background* condition in Photo 15), and a mortise & tenon joint that uses a gradual slope on the tenon (*foreground* condition in Photo 15). The timbers at the intersection shown on Photos 13 & 14 are heavily rot-damaged, possibly from a plumbing leak.

Any heavily notched flush-framed conditions, such as those shown in the background of Photo 15, should be properly supported with new Simpson-type metal face-mount hangers. Please note that due to irregular sizes, custom sizes may need to be special ordered or larger hangers selected and any and all gaps shimmed tight so that the hanger flanges and seats remain at 90-degree angles. At conditions such as those shown in Photos 13 & 14, as well as the background of Photo 15, a

new column and footing should be installed with a cap plate large enough to support all intersecting members. Any rotted members will need to be replaced or sistered.

The framing in the southwest corner of the main house consists of modern, nominal 2x10 framing spaced at 16" on-center, which is fairly common for new construction. The framing was not properly supported where the joists are flush-framed into the supporting beam. Additionally, the beams consist of built-up triple 2x10s, however the splices are not consistently located at column locations (see Photo 16 on Page 8 of the Appendix).

Similar to what is discussed above, all flush-framed conditions should be properly supported with new Simpson-type metal face-mount hangers; however, these may be standard hangers. Additional columns and footings as described above should be added at any splice locations in order to take advantage of the full capacity of the triple 2x10.

Roof framing was not analyzed and is beyond the scope of this report, however it appears to be in generally good condition.

While the roof is performing well in its current configuration, insulation should be avoided as it will increase the snow load on the roof, which is discussed in greater detail below.

IEBC Implications and Code-Compliance

Changes of occupancy of existing structures are governed by the New Hampshire State Building Code, which in its current edition has adopted the 2015 International Existing Building Code (IEBC) for work on existing structures. The applicable section of the IEBC is Chapter 10 (Change of Occupancy) in conjunction with Chapter 12 (Historic Buildings) if the Work Area Method for compliance is used.

Gravity loads

It is our understanding that capacity restrictions will be placed on the building that will limit its use and occupancy. While the building may be used as an educational center and/or a museum house, the capacity restrictions will likely maintain loads that are commensurate with the residential live loads that the first floor structure has historically supported. This allows the first floor to fall under the exception of IEBC Section 1007.1, however the floor will require a more detailed analysis that may require the occupancy load to be less than what is being imposed from the fire department. With the aforementioned repairs and improvements to the framing at the southwest corner, a newly outfitted kitchen will be able to be accommodated. Please note that this is for a standard residential-type kitchen and not a commercial kitchen, which requires a live load capacity of 150 pounds per square foot (psf).

This approach should be presented to the Building Official of Durham for approval prior to or during the design process.

As noted above, the roof is in good condition, particularly for a building of this vintage. As discussed above, insulation should not be added.

While insulation is generally favorable for comfort and energy savings, it changes the way roof snow loads are calculated. Ground snow loads are converted to sloped roof snow loads using several factors, one of which is a Thermal Factor. When insulation is added, this factor changes from 1.0 to 1.1, resulting in a 10% increase in the snow load. Since the dead load of the roof is lighter than the snow load, this will represent a total increase in

Structures North
17 June 2022

Wagon Hill Farm
Durham, NH

load between 5-10%, which will not allow the roof structure to fall within the exception of IEBC 1007.1. Similarly, attic floor insulation should be avoided. The proposed change in occupancy does not change the risk category and therefore does not need to be evaluated further so long as the behavior of the roof is not altered in any other way.

Lateral loads

Lateral loads are addressed in IEBC Section 1007.2 and 1007.3. Similar to the snow load provisions of Section 1007.2, the change of occupancy will not result in a higher wind risk category and the lateral force resisting system will not need to be analyzed or reinforced to comply with the snow load provisions of the IBC. Similarly, Section 1007.3 does not require that the building comply with the IBC-level seismic forces since there is no change of risk category.

This analysis of the IEBC should be presented to the Building Official of Durham for approval prior to or during the design process.

Requirements for the Prescriptive Compliance Method are similar those noted above, subject to specific building official approval. IEBC Section 401.1 states:

"...Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use."

Given the limitations of the use of the property and occupancy restrictions, a case for this may also be made if the Prescriptive Compliance Method is used.

This approach should be presented to the Building Official of Durham for approval prior to or during the design process.

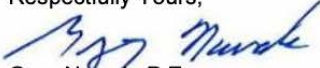
Please note that the above recommendations represent a minimum level of work, and old structures such as these will require ongoing monitoring and maintenance. Additional deficiencies may be encountered during the course of any repair work and contingencies should be carried in the budget.

Report Limitations

This report is a summary of readily visible observations conducted during a single visit to the property. No finishes were removed to expose hidden structure except where specifically noted and no calculations have been performed to determine if the overall building complies with past or present building codes. This report is strictly limited to structural considerations noted. Other building systems were not reviewed, and they are beyond the scope of this report.

We hope that the above information is helpful in determining your next steps. If we can be of further assistance, please do not hesitate to contact this office.

Respectfully Yours,


Greg Nowak, P.E.
Principal

Attachments: Appendix, 9-pages, including cover

APPENDIX, 8-pages

Page 1

Photo 1: North elevation

Photo 2: Rot damage at sill along north elevation, just west of front door

Page 2

Photo 3: Shifted stones at north elevation of main house (facing southwest)

Photo 4: Shifted stones at north elevation of main house (facing southeast)

Page 3

Photo 5: Shifted stones at northeast corner of main house

Photo 6: Shifted stones at north elevation, including steps (facing west)

Page 4

Photo 7: Shifted stones at east entry of main house (facing north)

Photo 8: Foundation buckling inward at west wall of ell (facing north)

Page 5

Photo 9: Previously re-framed section at southwest corner of main house

Photo 10: Corroded column base and deteriorated bases of brick walls and pier

Page 6

Photo 11: Deteriorated bases of brick walls

Photo 12: Chimney base

Page 7

Photo 13: Rotted beam at intersection, also lacking proper connection hardware (facing north)

Photo 14: Rotted beam at intersection, also lacking proper connection hardware (facing north)

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Photo 15: Various flush-framed conditions

Photo 16: Reframed area at southwest corner of main house lacking hangers at common joists, beam is improperly spliced



Photo 3
Shifted stones at north elevation of main house (facing southwest)



Photo 4
Shifted stones at north elevation of main house (facing southeast)



Photo 5
Shifted stones at northeast corner of main house (facing west)



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Shifted stones at north elevation, including steps (facing west)



Photo 7
Shifted stones at east entry of main house (facing north)



Photo 8
Foundation buckling inward at west wall of ell (facing north)



Photo 9
Previously re-framed section at southwest corner of main house



Photo 10
Corroded column base and deteriorated bases of brick walls and pier



Photo 11
Deteriorated bases of brick walls



Photo 12
Chimney base



Photo 13

Rotted beam at intersection, also lacking proper connection hardware (facing north)



Photo 14

Rotted beam at intersection, also lacking proper connection hardware (facing north)



Photo 15
Various flush-framed conditions



Photo 16
Reframed area at southwest corner of main house lacking hangers at common joists,
beam is improperly spliced

National Fire Protection Association 2015

43.10.5 Change of Occupancy.

43.10.5.1 General.

Historic buildings undergoing a change of occupancy shall comply with the applicable provisions of Section 43.7, except as otherwise permitted by 43.10.5.

43.10.5.2 Means of Egress.

Existing door openings, window openings intended for emergency egress, and corridor and stairway widths narrower than those required for nonhistoric buildings under this Code shall be permitted, provided that one of the following criteria is met:

3. (1)

In the opinion of the authority having jurisdiction, sufficient width and height exists for a person to pass through the opening or traverse the exit, and the capacity of the egress system is adequate for the occupant load.

4. (2)

Other operational controls to limit the number of occupants are approved by the authority having jurisdiction.

43.10.5.3 Door Swing.

Where approved by the authority having jurisdiction, existing front doors shall not be required to swing in the direction of egress travel, provided that other approved exits have sufficient capacity to serve the total occupant load.

43.10.5.4 Transoms.

In corridor walls required to be fire rated by this Code, existing transoms shall be permitted to remain in use, provided that the transoms are fixed in the closed position and one of the following criteria is met:

3. (1)

An automatic sprinkler shall be installed on each side of the transom.

4. (2)

Fixed wired glass set in a steel frame or other approved glazing shall be installed on one side of the transom.

43.10.5.5 Interior Finishes.

Existing interior wall and ceiling finishes shall meet one of the following criteria:

4. (1)

The material shall comply with the requirements for flame spread index of other sections of this Code applicable to the occupancy.

5. (2)

Materials not complying with 43.10.5.5(1) shall be permitted to be surfaced with an approved fire-retardant paint or finish.

6. (3)

Materials not complying with 43.10.5.5(1) shall be permitted to be continued in use, provided that the building is protected throughout by an approved automatic sprinkler system, and the nonconforming materials are substantiated as being historic in character.

43.7 Change of Use or Occupancy Classification.

43.7.1 Change of Use.

43.7.1.1

A change of use that does not involve a change of occupancy classification shall comply with the requirements applicable to the new use in accordance with the applicable existing occupancy chapter, unless the change of use creates a hazardous contents area as addressed in 43.7.1.2.

43.7.1.2

A change of use that does not involve a change of occupancy classification but that creates a hazardous area shall comply with one of the following:

3. (1)

The change of use shall comply with the requirements applicable to the new use in accordance with the applicable occupancy chapter for new construction.

4. (2)

For existing health care occupancies protected throughout by an approved, supervised automatic sprinkler system in accordance with 9.7.1.1(1), where a change in use of a room or space not exceeding 250 ft² (23.2 m²) results in a room or space that is described by 19.3.2.1.5(7), the requirements for new construction shall not apply, provided that the enclosure meets the requirements of 19.3.2.1.2 and 19.3.2.1.3.

43.10.4.7 Stairway Enclosure.

43.10.4.7.1

Stairways shall be permitted to be unenclosed in a historic building where such stairways serve only one adjacent floor.

43.10.4.7.2

In buildings of three or fewer stories in height, exit enclosure construction shall limit the spread of smoke by the use of tight-fitting doors and solid elements; however, such elements shall not be required to have a fire rating.

43.10.4.8 One-Hour Fire-Rated Assemblies.

Existing walls and ceilings shall be exempt from the minimum 1-hour fire resistance-rated construction requirements of other sections of this *Code* where the existing wall and ceiling are of wood lath and plaster construction in good condition.

43.10.4.9 Stairway Handrails and Guards.

43.10.4.9.1

Existing grand stairways shall be exempt from the handrail and guard requirements of other sections of this *Code*.

43.10.4.9.2

Existing handrails and guards on grand staircases shall be permitted to remain in use, provided that they are not structurally dangerous.

43.10.4.10 Exit Signs.

The authority having jurisdiction shall be permitted to accept alternative exit sign or directional exit sign location, provided that signs installed in compliance with other sections of this *Code* would have an adverse effect on the historic character and such alternative signs identify the exits and egress path.

43.10.4.11 Sprinkler Systems.

43.10.4.11.1

Historic buildings that do not conform to the construction requirements specified in other chapters of this *Code* for the applicable occupancy or use and that, in the opinion of the authority having jurisdiction, constitute a fire safety hazard shall be protected throughout by an approved automatic sprinkler system.

43.10.4.11.2

The automatic sprinkler system required by 43.10.4.11.1 shall not be used as a substitute for, or serve as an alternative to, the required number of exits from the facility.

43.10.5.6 One-Hour Fire-Rated Assemblies.

Existing walls and ceilings shall be exempt from the minimum 1-hour fire resistance-rated construction requirements of other sections of this *Code* where the existing wall and ceiling are of wood lath and plaster construction in good condition.

Table 6.1.14.4.1(a) Required Separation of Occupancies (hours),† Part 1

Occupancy	Assembly ≤300	Assembly >300 to ≤1000	Assembly >1000	Educational	Day-Care >12 Clients	Day-Care Homes	Health Care	Ambulatory Health Care	Detention & Correctional	One- & Two-Family Dwellings	Lodging or Rooming Houses	Hotels & Dormitories
Assembly ≤ 300	—	0	0	2	2	1	2‡	2	2‡	2	2	2
Assembly >300 to ≤1000	0	—	0	2	2	2	2‡	2	2‡	2	2	2
Assembly >1000	0	0	—	2	2	2	2‡	2	2‡	2	2	2
Educational	2	2	2	—	2	2	2‡	2	2‡	2	2	2
Day-Care >12 Clients	2	2	2	2	—	1	2‡	2	2‡	2	2	2
Day-Care Homes	1	2	2	2	1	—	2‡	2	2‡	2	2	2
Health Care	2‡	2‡	2‡	2‡	2‡	2‡	—	2‡	2‡	2‡	2‡	2‡
Ambulatory Health Care	2	2	2	2	2	2	2‡	—	2‡	2	2	2
Detention & Correctional	2‡	2‡	2‡	2‡	2‡	2‡	2‡	2‡	—	2‡	2‡	2‡
One- & Two-Family	2	2	2	2	2	2	2‡	2	2‡	—	1	1

Dwellin gs													
Lodging or Roomin g Houses	2	2	2	2	2	2	2‡	2	2‡	1	—	1	
Hotels & Dormito ries	2	2	2	2	2	2	2‡	2	2‡	1	1	—	
Apartme nt Building s	2	2	2	2	2	2	2‡	2	2‡	1	1	1	
Board & Care, Small	2	2	2	2	2	2	2‡	2	2‡	1	2	2	
Board & Care, Large	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercant ile	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercant ile, Mall	2	2	2	2	2	2	2‡	2	2‡	2	2	2	
Mercant ile, Bulk Retail	3	3	3	3	3	3	2‡	2‡	2‡	3	3	3	
Busines s	1	2	2	2	2	2	2‡	1	2‡	2	2	2	

