

Chase Wiggin Barn Exeter, New Hampshire



Historic Structures Report

June 2018

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Introduction

The initial Historic Structures Report was prepared by Preservation Company for the Exeter Conservation Commission in 2002. Over the last sixteen years the Exeter Conservation Commission has completed several projects so this current report reflects those changes while building on the initial baseline. The 2002 report established the cause of problems in the barn and made recommendations for their correction. For the initial report, fieldwork was conducted by Lynne Emerson Monroe and Frank Whittemore. Other consultants included Lucien Lizotte, site work contractor, and Arnold Graton, frame and moving specialist from Ashland, New Hampshire. Additional fieldwork was completed in June 2018 by Lynne Emerson Monroe, Frank Whittemore, and Reagan Ruedig of Preservation Company in order to create the current update, which reflects any changes in conditions and repairs that were made since. This update includes information provided by Kristen Murphy, Natural Resource Planner for the Town of Exeter, and Don Briselden, member of the Raynes Farm Stewardship Committee, as well as information provided in a barn assessment report prepared for the Exeter Conservation Commission by Ian Blackman through a 52 Barns, Barn Assessment Grant-funded project from the NH Preservation Alliance. There have also been engineering studies completed by CLD in 2005 and Emanuel Engineering in 2015.

This report is an update of the 2002 Historic Structures Report and incorporates information from subsequent reports and work, including the Baseline Documentation from 2005, the NH Preservation Alliance Barn Assessment Worksheet from 2017, and the NH State Register Nomination from 2017.

Historic Background

(From the Determination of Eligibility prepared by Preservation Company in the fall of 2000.)

The Chase Wiggin property along the tidal Squamscott River played an early role in the development of the Town of Exeter. The Frank Gilman Peavey map of Exeter drawn in 1932, depicting the development of Exeter between 1639 and 1700, includes one of the original town landing sites which abuts the Chase Wiggin property and the highway that leads across the Chase Wiggin property to common lots set aside for inhabitants of Exeter.

According to Exeter Historical Society files, the farmhouse on the west side of Newfields Road was built ca. 1695. According to tradition, it was built as a wedding gift by Jeremiah Gilman for his wife Mary Wiggin (born 1668). The property eventually passed into ownership of Joshua Wiggin who was living there as of 1802 (Merrill 1802). Joshua Wiggin, born in 1769, was married in 1795 to Comfort Wiggin (1774-1824). They had seven children (Fitts 1912). According to his probate records, when Joshua Wiggin died in 1840, his homestead consisted of 58 acres on the east side of the road 104 acres on the west side.

This property figures prominently in a significant economic development stage in Exeter's history, the coming of the Boston & Maine Railroad. Just prior to Joshua Wiggin's death, he signed a deed for a four-rod wide strip of land through the property to B&M railroad (Deed 1840). The deed specifically calls out the exception of a right of way across the strip of land "as other persons may be legally entitled to," which may refer to the old highway to the Town landing.

The farm was inherited by Stephen Wiggin, who sold it to his brother Chase Wiggin in 1860 (Deed 1860). Who occupied the farm during the intervening twenty years has not been determined, though C. Wiggin was shown in this location on the 1857 county map (Chace 1857). Chase Wiggin (born 1814) and Lydia Ann Neal (born 1818) were married in 1844 and had two daughters (Fitts 1912).

During this period, Chase Wiggin erected a very large barn across the road from his house and developed a substantial cattle market on the property. According to his obituary, Chase Wiggin was "one of Exeter's most substantial farmers and respected citizens," founder of the Exeter cattle market "long an important and unique institution of the town. Wiggin made his farm a stopping place for drovers from northern New Hampshire, Maine, and Vermont on their way to the Brighton (Boston) Market. The droves followed established routes and had regular stopping points, which became known as cattle markets. Drovers of 100-200 cattle, primarily beef cattle, were common, though some contained as many as 1,000 head. Wiggin "provided every needed facility in and about his spacious barn." Meals were provided in the house, with extra women sometimes called upon to help with the cooking. The site became a cattle market for deals between the drovers and local cattle buyers (Exeter News-Letter 1877, 1899; Merrill 1988:49). The market's operations diminished during the later years of Wiggin's life, because of the decline of the Brighton market. A cattle market operated in Exeter as late as 1908 and the cattle pens on Chase Wiggin's farm stood into the 1930's (Merrill 1988:50).

In 1891, Wiggin deeded land for a new railroad bed, closer to the Squamscott River, to the Boston & Maine Railroad Corporation. The deed refers to the Town landing parcel and requires the Railroad to build a cattle underpass (still extant) and a farm crossing (Deed 1891).

Chase Wiggin died in 1899. The property was inherited by his daughter Lydia Clark. In 1902 she sold it to George Sanborn and Lyford Connor, her brother-in-law, husband of Abby Francis Wiggin (Deed 1902; Fitts 1912).

The property changed hands frequently in the early 20th century but was continuously farmed, at one time as a pig farm. In 1946, John C. Raynes purchased the historic farm, including 58 acres east of the road and two tracts totaling 104 acres on the west side (Deed 1946). Raynes conducted a modest dairy

farm with a herd of 20 cows. He also worked for the Farm Home Administration for 39 years, assisting other farmers with loans to improve farm buildings and purchase equipment. Raynes conducted operations on the main floor of the barn. In 1958, dairy inspectors required Raynes to install concrete floors in the milking parlor area. At this time, Raynes relocated the dairy operation to the basement of the barn and doubled the size of his herd to forty cows. The creation of a milking parlor in the barn basement required pouring a concrete floor, installing stanchions, a milking parlor, and an automatic gutter cleaning system. Raynes had a background in agricultural engineering and designed the improvements himself. At this time, Mr. Raynes also erected the steel silo and constructed the silo connector and exterior milk room on the southeast corner of the barn. (He had torn down a deteriorated wooden silo in this location when he purchased the property.) Raynes continued to operate a dairy farm until 1970, when he sold the historic house and surrounding land, and erected a new residence for himself to the north (on the west side of the road). The barn has not been in active agricultural use since that time. More recently, Raynes sold 100+ acres on the west side of the road which became the site of Captain's Meadow Subdivision. Raynes retained ownership of the barn and 50+ acres on the east side of the road until 2001, leasing the land for hay and corn production and storing hay and lumber in the barn. The Town of Exeter purchased the barn and land on the east side of the road in 2001 with funds from the State of New Hampshire's Land and Community Heritage Investment Program (LCHIP) (Raynes 2002).

The Chase Wiggin Barn and Farmland are eligible for the State Register for their significance in agriculture. The barn and its ancillary structures and the surrounding hay and cornfields document 19th and 20th century trends in local farming and land-use practices. The primary period of significance documents the height of cattle and dairy farming in the second half of the 19th century, during the productive life of Chase Wiggin. During this era, the property was highly significant locally, both as a large farm, and as the location of the Exeter Cattle Market, which may have had regional significance. The barn was updated in 1958, when the basement was converted, and the milk house and silo were constructed for modern dairy farming practices by John C. Raynes, but they were only in active use for twelve years, until 1970.

The large barn, surrounded by open farmland, is a long-standing community focal point, an important historic landscape in the town of Exeter. Still in modest agricultural use, this property is one of the most intact farm landscapes remaining in Exeter. The way the barn is sited, on a curve in the road surrounded by the open fields dotted with abandoned farm machinery, is a visual agricultural landmark, and the site is popular with photographers.

The property, bisected by an early railroad bed and an active rail line, and the location of the early "town landing" is also locally important within the contexts of railroad and river transportation.

This property is also important for its association with the life of Chase Wiggin who made a significant contribution to the local and regional economy by establishing a large cattle market that helped supply the Boston market and benefited farmers from the community and throughout the state, and northern New England region. The barn and land retain integrity for his period of occupancy.

The Chase Wiggin Barn is architecturally significant as the only hundred-foot barn in the town of Exeter, the largest surviving historic barn in the community. It is important as a well-preserved example of mid-19th century barn design and construction.

Description



South and east elevations and silo under construction. Historic photo ca. 1958



South and east elevations, 2018

The Chase Wiggin Barn and Farmland is located on the east side of Newfields Road in the northeast corner of Exeter. The property, which consists of 50+ acres of primarily open land, extends east from the road to the Squamscott River. The large New England barn, built ca. 1860 is set close to the edge of the road, sited prominently on a sharp curve. The historic Wiggin Homestead (66 Newfields Road) and one other outbuilding are located directly across the road on land that is now under separate ownership. The large, 2½-story, 5 X 2 bay, center chimney house is traditionally dated ca. 1695. It faces south, with ells and outbuildings extending to the rear, parallel to the road. The former barn has been extensively remodeled for modern uses. Its age, and the dates and locations of any other historic outbuildings have not been determined for this report.

The Chase Wiggin Barn, erected ca. 1860, has been the property's primary outbuilding since its construction. It is a New England barn with its entries off center on the front (west) and rear (east) gable ends. The massive structure, 95'-8" long and 42'-0" in width, is oriented essentially with its long walls

facing north and south and the gable ends oriented east and west. The front gable end is set close to the edge of the road. Mid-20th century additions include a milk room off the southwest corner and a steel silo off the rear (east) gable end. A small, shingled pump house stands south of the barn.



West gable end from Newfields Road, 2018

The exterior walls are covered entirely in clapboards, over horizontal pine sheathing. The walls are trimmed with corner boards and frieze. The eaves project with a molding on the raking cornice and no returns on the gable ends. The roof is sheathed in asphalt shingles. Windows and doors have flat board trim. The barn is painted red with white trim. The clapboard sheathing and is painted with a color scheme, using inexpensive red iron oxide paint that was widely popular in New England by the 1860's (Visser 1997:31). The foundation is made up of natural and dressed, dry-laid stone, with mortar, concrete, and cement blocks added in the mid-20th century.

The Chase Wiggin Barn is built into a banking of earth, which slopes down from the north side, creating enough height to use the entire lower basement floor, with access on the south elevation. This type of barn construction became popular after 1850 and was known as the "gable front bank barn". Most new barns built by the 1850's were bank barns. Unlike their predecessors, these barns had full or partial basements, primarily for storage of manure. Earth ramps, sometimes with stone retaining walls, led to the ground floor doors. Basement doors allowed for removal of manure (Visser 1997:41, 76). This barn is typical in its orientation, with sheltered yard on the south side, protected from the winter winds. The interior arrangement includes off-center drive floor running the length of the barn. The wider northern bay contained several horse stalls and the haymow, while milking and feeding stanchions for cows and a calf pen were located along the warmer south wall (Visser 1997:75). The asymmetrical interior arrangement accounts for the off-center drive bay doors. In barns built before 1850, hay storage was usually located on the colder, north side of the barn, and animals were housed on the warmer, south side of the barn. As hay storage required more space than the animals, the north aisle was often wider (Hubka 1984:55-56).



North elevation, facing east, before overhead door area was dug out. Historic photo ca. 1950.



North elevation after repairs to foundation, 2018

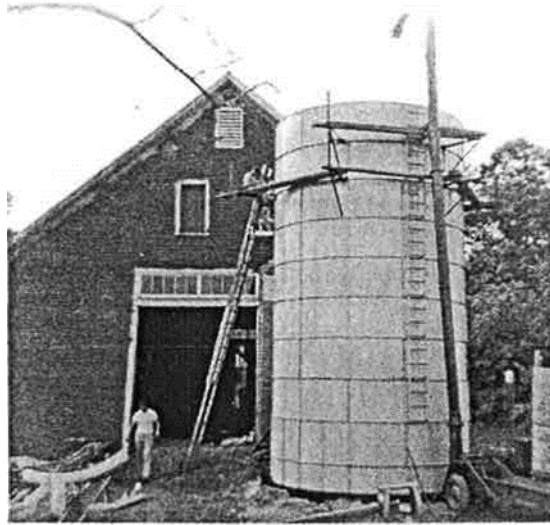
The drive bay doors on both gable ends are rolling pairs, measuring 12½' tall by 6' wide (Photos 18, 21). The doors roll on an interior track within a cavity made by splitting the mid posts in half and pegging them together just above the door track. Rolling doors were common by the mid-19th century. They were easier to open in deep snow and did not blow in the wind as hinged doors did. Interior tracks were preferred, because they did not get clogged with snow and ice, but required special framing as was used in this case (Visser 1997:35). Above the doors on the Chase Wiggin Barn is a very large pair of transoms, ten panes wide each, with glass size measuring 22' x13' inches. The west gable also has two entry doors on its north and south corners (Photos 19, 20). Both doors are hung on heavy, hand-made

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strap hinges, probably reused from elsewhere, with tapered edges and a bead decoration. The rear (east) gable end once had similar doors, which are now replaced with a mid-20th century door and the silo connector (Photos 22, 24). On the south elevation, there is a door opening for cows to enter the barn via an earth ramp. It is fitted with an exterior wood door (Photo 14). A smaller, earlier cow entrance is centered on the elevation and has been filled in with a window and clapboards (Photo 15). A large galvanized metal ventilator survives on the south wall of the barn between the two doors. The ventilator is an automatic warmed air variety manufactured by Star Line Inc. of Harbordale Illinois and Albany, New York (Photo).



Historic photo of barn and silo under construction, ca. 1958. Note that the domestic door on the southeast corner did not exist.



East gable end and 1958 silo, 2018

Windows, particularly rows of small windows to light the stalls, were commonly used by the mid-19th century, as it was recognized that light and ventilation benefited animal health (Visser 1997:38-39). The Chase Wiggin Barn is typical in its sparse window placement on the north elevation, which was subjected to cold winds and received no direct sunlight (Photo 10). The south elevation is lined by eight evenly spaced windows on the ground floor and more at the basement level (Photos 3, 4). The horizontal rectangular windows are primarily double, sliding sash, each with six 8" x10" panes. The

windows appear to be reused double-hung sash, set in sideways to slide from left to right instead of up and down (Photos 13-15). Each gable end contains two windows with double-hung 6/6 sash, and a louvered vent above. The windows have a variety of muntin profiles, dating from the early 19th-century Greek Revival period to the early 20th-century Colonial Revival period.

The south elevation originally had openings to the basement level at front (west) and rear (east) ends. These were filled-in in the mid-20th century with concrete foundation blocks, clapboards, and windows (Photos 3, 13). The front opening was covered by the concrete-block milk room addition, now demolished. An earth ramp with stone abutments leads to two cattle doors in the center of the ground floor. These provided access to the barnyard, which would have been located on the south side of the barn.

The barn frame is made entirely of Eastern White Pine and a small amount of Red Pine. All of the frame elements were cut by a circular saw, while the sheathing, roofing, and floorboards were cut by an up & down reciprocating saw. The north sill measures 8x8 inches and the south, 8x12. The floor joists are 3x10, 24 inches on center, with 6x10 joists under each bent. Supporting the joists are two 10x12 carrying beams running the entire length of the barn, and supported by granite posts (Photo 52). The flooring consists of a sub floor of one inch thick rough pine boards covered by two inch thick planks as the finish layer.

The barn frame is made up of



posts. Thirty-six posts extend upward 16½ feet to meet the

into the top of the tie beam
span roof purlins running the
into both sides of these purlins

beams 6x8 inches. Mortised
They support 6x6 inch, mid-
6x6 inch collar tie is mortised
aced with diagonal beams for

lateral support. The 2x7 inch rafters are 28' long and are notched to rest on the purlins. Rafters are 24 inches on center. The overall height from floor to ridge is 33', 9 inches. The rafters are butted together and nailed with no ridge board. The tie beams support 4x6 joists and one-inch floorboards which form a scaffold for the hay trolley, which is still mounted to its track under the ridge. The ropes and pulleys for the hay-rake are still in place. Hay storage was located in the northeast corner of the main level and above the south and center aisles.

The barn was updated twice in the mid-20th century to accommodate the latest practices in dairy farming. The first improvements continued the use of the main floor for milking operations. The south side of the barn was whitewashed and concrete floors were paved in the southeast section to create a calf feeding area and the southwest corner to create a milk room (Photos 38, 40). Milk rooms such as this were built in the early to mid-20th century, as sanitary regulations required milk storage separate from stable and milking areas (Visser 1997:115-116). This room had walls created of southern yellow pine laid horizontally; the boards have edge and center bead on the exterior (Photo 37). There is evidence of early electrical work in this area. Milking was done in wooden stanchions (not extant) in the open space between these areas.



Basement milking area looking east, 2018

In 1958, milking operations were moved to the cellar, which was outfitted for more up- to-date, sanitary milking practices. The walls and ceiling were white-washed, and 40 metal pipe stanchions, concrete floors and a mechanical gutter cleaner for the removal of manure were installed. The milking parlor, which accommodated four cows, was located in the northwest corner (Photos 51). Metal feeding stanchions run down the center of the milking parlor the entire length of the barn. Concrete block walls separated the space into maternity pens (Photo 56). In 1960, a small milk room was built at the front, southwest corner of the barn, which was removed in 2004. Set at basement level, this small structure had concrete block lower walls, clapboards above, and a gable roof with overhanging eaves, sheathed in corrugated metal. The walls were constructed from Cellotex brand fiberboard. The door was located on the gable end. The room had remnants of piping for a milk tank and pumping assembly that ran through the milking stanchions located along the south elevation of the barn. An overhead garage-type door was installed on the north elevation to allow access for larger loads and cows, and this was also removed in 2004.

The small pump house, which stands south of the barn, would historically have provided water to the barnyard. This small gable roofed structure is set on loose rubble stone and sheathed in wood shingles (Photo 12).

A prominent feature of the property is the galvanized steel silo with a domed roof connected to the northeast corner of the barn. This silo replaced an historic wooden silo in the same location, which was

not directly connected to the barn. The present silo was constructed in 1958 from 2' x 3' and 8' x 2½' steel panels and has an intact, covered exterior ladder (Photos 7). This type of silo became popular in the mid-20th century. The silo is connected to the barn by a short passageway with a gable roof, enclosed by clapboard walls and reused windows. The wooden connector between the silo and the barn has a cable that runs to a winch and then into the silo, which was likely part of a mechanism to open the silo doors (Photos 44, 46).

The main parcel (24/30), on which the Chase Wiggin Barn is located, contains 31 acres of open farmland. Parcel 23/1, between the two railroad corridors, contains 9.9 acres of forested land. Parcel 23/2 between the railroad tracks and the river consists of 9.7 acres of unproductive, marshy land, including the old Town Landing site. Totaling 50.6 acres, plus the railroad corridors, this is the bulk of the 58 acres on the east side of the road, which has always been associated with the historic farm. The only change was the division of a 4.5-acre house lot from the southwest corner in the 1970's for John Raynes' daughter (map 24/parcel 31).

Across Newfields Road from the barn, the historic Wiggin house and outbuildings are now located on a 5.4-acre parcel. Historically, the property contained 104 acres of land on this (west) side of the road. About 1970, a five-acre house lot was divided off from the northern edge of the lot for John Raynes. In the 1980's, the remaining land was subdivided into the Captains Meadow residential development. This cluster subdivision consists of many small lots on a series of cui-de-sacs, with a buffer zone totaling 77 acres of undeveloped land along the streets and surrounding the whole.

Existing Conditions and Recommendations

Overview

The Chase Wiggin Barn was exceptionally well constructed. The quality of the timber framing is very high as is the masonry work in the granite foundation and supporting posts. The barn appears to have functioned well throughout the 19th into the 20th century as it was able to absorb whatever changes were needed to accommodate changes in function. In 1958-60, the barn was "modernized" to become an up-to-date dairy farm. At that time substantial alterations were made that changed the way the mid-19th century barn functioned both agriculturally and as an architectural system.

At that time, the primary dairy functions were moved to the basement. This was done to meet federal guidelines and specifications for sanitary and efficient dairy practice. The dirt floor was covered with a tiered system of concrete with built-in feeding troughs and manure gutters with a self-cleaning system. Metal stanchions and a four-cow milking parlor were installed. A milk room was constructed on the southwest corner. The open areas on the south elevation of the foundation were closed with concrete block and across the barn on the north the granite foundation was opened and an overhead door installed.

The site work needed to install this door included digging a passage through the banking in front of this opening; the dirt was piled on each side. Newfields Road had been paved and an informal driveway created from the raised pavement to the new opening. Newfields Road slopes up to the north and water follows this drive to that opening. A catch basin was installed in the center of the overhead door connecting to a system of drains beneath the concrete floor to the south side of the barn (Raynes 2002).

In addition, a large steel silo was constructed on the northeast corner, connected to the barn by a small gable-roof structure. The original framing and sheathing were cut away to create space for this structure.

Unfortunately, all of these well-intentioned changes were made without knowledge of the repercussions they would have on an historic structure. The barn was no longer able to shed water away from its foundations and water collected behind the banking and ramping, freezing in the winter and expanding with tremendous force sufficient to shift the huge granite stone walls. In several cases these walls no longer support the heavy sills, which are rotting so that the barn frame is sagging, creating corresponding shifting in the frame. The drainage under the barn ceased functioning and the water backed up on the north elevation. These conditions are extremely serious. However, overall, the 19th century frame and foundation materials are still in excellent condition.

Interestingly, the 1958-60 additions are in very poor condition. The cement block has cracked and shifted, the cement floors have heaved and cracked irreparably. The silo, stanchions, and milking parlor are rusted and cannot be restored. Wherever these additions have been made, the historic barn is experiencing severe difficulty.

Long-term consideration needs to be given regarding maintenance of these artifacts of the mid-20th century dairy operation. It seems reasonable to document that era thoroughly, with the help of Mr. Raynes's daughter Kathy Norton, who is still available to help, then remove them to allow the 19th century barn to function better. This might also allow for a better contemporary use of the spaces if that became desirable. The barn has been determined eligible for the National Register under Criterion C as the best example of this scale mid-19th century barn in the town of Exeter, and it was approved for listing on the NH State Register of Historic Places in October 2017.

The following list discusses elements of the barn individually, followed by recommendations for maintenance or interventions to address areas of concern.

Exterior

Roof

The asphalt shingle roof was installed in 2014 and is currently in excellent condition.

Previously, portion of the roof was patched in 2010 following storm damage. Between 2010 and 2014, several leaks were detected during the Commission's annual inspection process. In June 2014, the roof that had been installed in 1991, was replaced by Valliere Construction, 13 Depot Road, East Kingston, NH. Replacement costs of \$33,350 were funded through a combination of town budget (\$22,000), conservation fund (\$8,000) and the town building maintenance budget (\$3,350).

Recommendations: The roof should be maintained and watched for signs of future failure, e.g. buckling or curling shingles. No treatment is necessary at this time.

Wall Surfaces

The exterior walls of the barn are clad in short clapboards with square butts finished with plain corner boards (Photo 17). The clapboards are in good condition overall, though there are several key areas where the sheathing has failed. The clapboards on the west gable end are in good condition. On the south elevation, the clapboards are badly cracked, curled, loose, and falling off in some places below the door level along the entire wall length (Photos 3, 13, 15). The clapboards on the east elevation are in very poor condition (Photo 6). In 2015, a portion of the rotting clapboards on the east side of the barn were replaced by Keith Whitehouse (of Yeti Landscaping of 14 Front Street in Exeter, NH) as a volunteer. Materials used were clapboards found inside the barn. (Photo 8).

Recommendations: Failed clapboards should be replaced. New clapboards should be of similar length, size, and reveal: four inches to the weather. The short clapboards should be replicated, as they are indications of early clapboard saw use. They are circular sawn. New radial sawn pine clapboards are available from a company in Vermont at a competitive price. Remove old clapboards carefully, so as not to damage the good ones. Clapboards should be replaced by pulling the nails out of the clapboard above, removing the damaged clapboard, inserting a new board and re-nailing it in from above and below. Clapboards on the east elevation should be fully replaced and extensive repairs elsewhere as needed.

Replacement at this time comprises of approximately 30% of the clapboards or approximately 2,400 square feet. Using a per square foot cost of \$12.00 (demo and replace), leads to an allowance of \$29,000 ($\$9.00 \times 2,400 \text{ sq. ft.} = \$28,800$ —round to @\$29,000) for clapboard repairs.

Note: These repairs should not be made until after the sill and foundation repairs are complete as there may be additional work needed at that time and it would be more cost effective.

Trim

The eaves on all elevations are in good condition. The corner boards, door and window trim are also in good condition except on the east gable around the drive bay door. There may be some rot at the base of the jamb near the sills. Paint is peeling and flaking in many areas. The molding beneath the eave on the north side of the east gable has separated from the soffit.

Recommendations: The trim near the drive bay door on the east gable end needs replacement. The rotted section should be cut out and a new board of exactly the same dimensions should be fitted to replace it.

Paint

The walls were painted with Eastern States brand barn red paint in ca. 1985 (Raynes 2002). The paint is wearing thin and bare wood is showing through on the clapboards in several areas, particularly where there are water problems. Particular problem areas are located near the ramp area on the south elevation, around the silo connector on the east gable end around, and the filled in basement area on the north elevation (Photos 15, 17, 24).

Recommendations: A thorough painting and staining is needed throughout on the exterior, with special attention paid to clapboards and windows. New clapboards, trim and door boards should be painted with similar products. Currently, the recommended paint method is oil base primer with high quality latex, *i.e.*, Benjamin Moore or an equivalent brand, on the trim and a preservative barn stain for the clapboards. Proper preparation, including sanding, scraping, and washing, is important before applying the primer or stain.

The barn and trim (approximately 8,000 square feet) need 2 full coats of paint and stain. Using a sq. ft. cost factor of \$3.00 for preparation and two coats of stain suggests a cost of \$24,000 (\$3.00 x 8,000 sq. ft. = \$24,000) plus \$6,000 for windows and trim; an allowance of \$30,000 should be considered. The barn surface will need to be checked for lead. Lead protection procedures could significantly increase the cost.

Windows

The windows are in poor condition and there are several areas of broken or missing glass in the sash. There are at most six lights on the south elevation that are broken or cracked, and the glazing putty is falling out of many of the sash. On the west gable end, the two windows in the half-story are in reasonable condition, though some of the panes of glass are broken. The windows on the north elevation are in good condition. The east gable end has two new ca. 1998 double-hung replacement windows in the half-story (Photo 21). These windows are functional and serviceable. The 10-light transom sash over the bay doors on both gable ends of the barn have several panes of broken glass and crumbling putty (Photos 18, 21). Some window repairs were made in 2015.

Recommendations: The broken, cracked, or loose panes in the windows should be repaired as soon as possible. It is important to repair the sash in a timely manner to prevent further bird damage inside the barn. Windows should be repaired using traditional glazing techniques. Oil-based #33 glazing compound is recommended to hold the new replacement glass.

Allowance of \$3,000. Volunteers could be trained to re-glaze and re-putty windows. Window Woman of Amesbury might be willing to provide training.

Doors

Doors are in various conditions depending on their location and exposure to water damage.

On the **west** gable end bay doors, the sills have been repaired recently due to rot and shifting foundation walls. The large, central sliding doors were reconstructed with similar materials as the original by the Seacoast School of Technology in 2016 (Photo 18). The other bay doors date from the late 19th or early 20th centuries and are constructed from edge and center bead board with clinched nails (Photos 19, 20).

On the **south** elevation, the sills of the extant door opening and the sealed cow entrance were replaced in 2006 (Photos 14, 15). The extant cow door has sunk and is likely a 20th-century replacement.

On the **east** gable end, the center drive bay, the vertical plank on each bay entrance door has been broken away (Photo 6). The southern door has sagged and is slightly wider at the bottom than at the top. The sill of the bay doors is butted up against the dirt entrance ramp, which is accelerating deterioration. The sill under the ca. 1960 domestic door on the east elevation is badly rotted. This door accesses the calf pen and originally had an interior sliding door. It was restructured for pedestrian access in 2007 (Photo 22).

Recommendations: Most of the doors require some repair and should be securely closed to deter animals and birds from entering. An allowance of \$4,000 is suggested for securing gaps and openings in doors. New boards should match the existing ones. The sills under the domestic doors should be replaced after the foundation work is completed in these areas, and the sliding door central drive bay doors on the east elevation should also be repaired or replaced.

Foundations

Each wall has a different degree of damage and will require a different course of action.

The **north** and **east** walls were the most severely damaged. The foundation failure was due to changes that were made to the mid-19th century barn in the 20th century to accommodate technological advances in transportation and agriculture. These changes included the paving of Newfields Road in the second quarter of the 20th century when upgrading the area's roads was prevalent. This involved raising the road bed and creating a retaining wall and sharp slope beside the road bed on the west gable end of the barn. The gable wall is currently very close to the road, suggesting that the curve is presently closer to this end, making the drive bay door functionally useless, as it would be too dangerous to allow animals and machinery to exit through this door. The additional 19th-century ramp on the south side is somewhat unusual and reflects the needs of the cattle business. These areas are in relatively good condition.

The mid-20th century changes that were done to accommodate the large dairy operation and new sanitation laws are the ones that are creating the present difficulties. At that time the milking operation was moved to the basement level. In the 19th century, this space was open on the southeast corner for manure and shelter for animals. A new concrete floor was created. The open area on the southeast corner was filled with concrete blocks, new windows, and a door. The milk room was constructed on the southwest corner. A new entry was created on the north elevation. Originally, the ground sloped away from the foundation, which allowed it to shed water. In order to create a new opening, this slope was excavated and the earth piled to the sill level on each side. This created several problems. The earth that is mounded to the sills is holding moisture creating frost problems. The dug out area is the largest problem as the water is draining from the road and surrounding slopes and pooling in this dug out entry. Water then makes its way under the door into the basement area. According to Mr. Raynes, the catch basin in this area connects to a system of drains under the barn floor which functioned during his use of the basement area.

The **north** foundation wall was partially repaired in 2004. Prior to that work, the north wall was tilted inward and had shifted so radically that it no longer supported the sills. The eastern end of the north foundation wall has moved inward over a foot and has been shored up on the exterior with additional rubble stone. On the interior, the wall has been reinforced with concrete in various places. In 2004 the western half of the north foundation wall was rebuilt, and the sills replaced. A catch basin was installed along the north wall that captures stormwater and directs it beneath the floor of the basement to an outlet downhill on the south side of the barn (Photos 64, 65).

The **west** foundation wall has some shifted stones which have moved away from under the sill; however, the sill is still adequately supported. There is water infiltration in this area, but not severe. The northwest sill was stabilized in 2015.

The **south** foundation wall is granite in the middle and concrete block on each end. Historically, the ends were open as evidenced by the foundation granite. The granite foundation walls are functional, but both the block and stone walls have tilted inward a few inches due to frost action behind the earth ramp. On the interior of the wall, the granite has been reinforced with concrete in the area below the two exterior doors at the top of the ramp on the main level of the barn. This area is in fairly good shape because of the reinforcement. Many of the individual stones are bulging from the wall surface. These will present a problem long term, but are not immediately dangerous. The stone ramp on the south elevation that accessed the sealed cow door is in good shape. The milk room on the southwest corner was removed in 2006 and the opening was infilled with boards. The south foundation walls were repaired, the sills were replaced above the foundation walls, and a doorway was reactivated to access the space in the area of the former milk room. Funding for the 2004-2006 work on the north and south walls was provided by warrant article, Conservation Commission funds, and two LCHIP grants.

The **east** granite wall is in extremely poor condition, with visible water infiltration and algae growth on the interior. This wall is also tilting inward due to frost action, and the concrete floor in the basement is cracking. The southeast corner is the worst as the foundation has shifted from under the sill.

Recommendation: The eastern half of the **north** foundation wall should be rebuilt to match the work done in 2004, removing concrete facing and installing further stormwater drainage system that connects to existing catch basin. The sills should be replaced. The town contracted with Emanuel Engineering of 118 Portsmouth Ave, Stratham NH to develop design drawings for a permanent repair of this portion of the north east foundation and sill. An estimate was obtained by Riverbend Masonry of 144 Court Street in Exeter for \$46,651. We applied an inflation factor for each year and rounded to the nearest \$500 to obtain a final estimate of \$57,500. Note: The bow in the wall above should be repaired in connection with the sill work as they are related.

The southeast corner should be rebuilt by excavating and re-laying the granite stone. Drainage should be corrected.

Interior

Frame

The barn interior is in excellent condition overall. The frame is fairly light in scaling, but has stayed plumb. The entire barn has shifted slightly to the east, perhaps due to prevailing winds or the failure of the east foundation wall. This is not a problem that needs correction.

The main carrying beams down the middle of the barn are in good condition and remain fairly true and well fitted. The hay loft has a distinct sway in the beams from the load they have carried in the past, but the members are still intact and require no correction (Photos 26).

When the silo connector was constructed, the vertical framing members on the east wall of the barn were cut to connect the structure to the barn. Although there is some sagging around the connector, there appears to be adequate support as the area does not carry much weight at present. Another column could be added in this area as temporary support. If the connector is removed, this support should be re-created with the new wall.

In the past, the central post of the south aisle, supporting the hayloft, had severely rotted, causing the post to drop. The dropping of this post put pressure on the bent tie beam that connects the post to the

plate above the hay loft, and the tie beam had cracked at the scarf joint near the post. The barn framing of the second floor was lifted, the mortise and tenon re-engaged, and the rotted section of the post was replaced in 2004. The tie beams between the posts of the third and fourth bents and the plate had also partially disengaged from the plate due to the foundation shift on the north wall (Photo 39).

Also noted in the 2002 Historic Structures Report was major bowing of the **north** wall in the western half, which was due to the deterioration of the foundation in that area and outward pressure from the deflected tie beam. In 2003-4 the western half of the north foundation wall was repaired. The barn was jacked up, the sill replaced, and the structural members were reconnected to the plate. The wall studs and posts were realigned, and cables along the top truss were installed to assist in the removing the wall bowing (Photos 27, 55).

The eastern half of the north sill plate is also in need of replacement, and temporary supports have been installed in the basement area in the form of a large carrying beam supported by Lally columns (Photo 56). The open framing and undersized tie beams have caused bowing in the eastern half of the wall framing in the hay storage area, though it is unclear how long this condition has been in place. Weight from the roof onto the purlin plates puts pressure on the purlin posts, which sit on top of the tie beams. The deflection of the tie beams has pushed the knee brace against the wall posts, causing bowing in the vertical wall posts (Photo 36). This bowing, in turn, has caused the sill to rotate outward.

On the basement level, the **east** ends of the two main carrying beams have rotted due to water infiltration through the east foundation wall. One half of the sill was replaced in 2004. Substantial structural work was done in the basement along with the rebuilding of the north foundation wall in 2003-4. Granite columns were used to replace failed columns throughout (Photos 52-54). On the east end of the **north** wall, the kneewall framing under the sill has kicked inward from foundational shifting. This has caused the studs in the north wall to tilt outward as well. A temporary beam supported by Lally columns supports the floor joists in this area that were installed in 2015 (Photos 56).

The sills had a number of serious structural problems related to foundation instability and water infiltration; many of these issues have been corrected as sections of foundation have been repaired.

On the **west** elevation, sill repairs were made in the southwest area in 2006, replacing approximately 70' of foundation sill that had been damaged by carpenter ants.

On the **south** elevation, approximately 50 feet of sill were replaced and a new kneewall added in 2003-4. Deteriorated joists and studs were replaced as necessary. The earthen cow ramp on this elevation has allowed water to infiltrate the sills near the extant and sealed cow doors, and these have been replaced. (Photos 62, 63). The area at each end where the concrete block is added is in good condition, probably due to the fact that the basement level was partially open on the ends before the mid-20th century, allowing air to flow around the sill and keeping it dry (Photos 47, 61).

Recommendations: On the **east** elevation near the silo connector, an extra column could be added to provide additional wall support where the vertical framing members were cut. The rotted areas of the sill on that elevation should be replaced. Approximately 20 feet remains to be repaired. A cost allowance of \$15,000 is recommended.

The **west** sill repairs include replacing approximately 40 feet of sill. Based on the cost of the west side sill replacement, with adjustments for difficulty of access, and for inflation, a cost allowance of \$25,000.

The eastern half of the **north** sill should be replaced along with the reconstruction of the foundation wall. To repair the bowing of the north wall, several options can be considered. Full-height support posts could be added beneath the deflection of the tie beams, directly underneath the purlin posts, extending to the floor. Extra supports would be necessary beneath the floor in the basement area as well. An

allowance of \$4,000 should be given for the labor costs for this work. Another option would be to install a beam 3 feet under the tie beam and add a post to support the tie beam under the purlin post. The installation of a metal roof might be considered in the future to relieve the load on the tie beams. An allowance of \$6,000 should be given for the labor costs for this option.

Floors

The original wood flooring exists in most areas of the first main barn area. There is some minor rot in the floor area on the south aisle of the barn near the stanchions as well as throughout due to age and wear (Photo 31, 37, 40, 41). Some planks were installed reusing wood from the barn in 2015. Many areas of flooring are rotted and are completely lost, so that the level of the floor is hazardous for walking.

The poured concrete floor in the first floor milk room, in the southwest corner, has cracked and has a large hole in the floor (Photo 38). This floor may have originally been installed for an early milk room and was later possibly used as a grain room.

At the basement level, the concrete flooring has been removed in areas where the underground stormwater drainage system was installed in 2004. Instead of replacing the flooring with poured concrete, gravel has been used for the flooring infill (Photos 52, 64, 65).

Recommendations: In the interest of safety, the rotted floor boards near the stanchions on the main level of the barn should be removed and replaced with new rough-sawn planks. Approximately 50% or 2,000 sq. ft. of the 4,000 sq. ft. barn flooring needs to be replaced. Using a sq. ft. cost of \$3.00/ft. sq., an allowance of \$6,000 should be included.

The concrete floor in the milk room should be addressed since its current condition is unsafe. The concrete should be removed and replaced with wood flooring after the joists beneath are repaired. Allowance of \$3,000 for materials and labor.

Basement Milking Area

The basement milking area has a number of physical problems. The metal milking and feeding stanchions are severely rusted, as is the milking parlor (Photos 53, 54, 56). A number of artifacts from the milking production remain in this area.

The southwest milk room and the adjacent milking parlor room have asbestos on the ceiling and dilapidated celotex ceiling.

Recommendations: Consideration should be given to documenting this area and removing the artifacts. The floor could be leveled with additional concrete as removal, while desirable, would be very expensive. The difficulty for reuse will be the lack of ceiling height in this area due to the floor having been raised. The asbestos and celotex ceilings should be removed from the milk room and milking parlor. An allowance of \$2,000 should be made for this remediation work.

Silo and Silo Connector

The silo is severely rusted and appears to be in fair condition structurally. Several sheets of steel have fallen off the covered ladder (Photo 7).

Recommendations: The silo is no longer useful for agricultural purposes, though it is an important element in the visual landscape. These conflicts will need to be decided regarding its maintenance. The connector area and silo are creating serious water damage to the east wall of the foundation. The area of framing that was removed has let in water causing the sills to rot and the carrying beams to sag. The

silos may present a liability problem long-term and consideration should be given to documentation and removal which would further improve drainage condition.

If retained, the silo should receive an exterior preservation coating. Perhaps a minimalist approach of simply priming and painting the silo, after the old silage is removed, would suffice. This work would need to be coordinated with the repairs to the connector. Assuming a sq. ft. preservation factor of \$1.70 for the approximately 3,000 sq. ft. surface suggests an allowance of \$5,000; plus hay removal, staging and set up of \$2,000 indicates that an allowance of \$7,000 would be appropriate.

The silo connector could be repaired and retained. This may include shoring up the foundation as needed, removing the deteriorated wood, repair and replace along with a new roof. The work should be able to be completed by two carpenters in 4 days (64 hours). Allowing for \$5,000 in labor and \$2,000 in materials, suggests an overall allowance of \$7,000.

Electrical System

The main electrical panel is located on the floor level of the barn in the southeast corner milk room. A sub-panel is located in the basement milking area that connects to the main panel. Electrical service and lighting was installed in 2006.

Recommendations: It is recommended that a fire detection and alarm system be installed. An allowance of \$15,000 should be given for this work.

Site Work

In 2002, the site work needed to correct the drainage problems and rebuild the foundation was the most crucial part of the stabilization. Historically, the north elevation of the barn had drainage problems because the land slopes down from the road and hillside to this area. This was exaggerated when the road was paved. When the dairy operations were shifted from the main level of the barn to the basement section on the north elevation of the barn was excavated and an overhead door was installed below grade. The excavation made the water problem worse by allowing the water to infiltrate the basement directly. The drains that are supposedly under the floor ceased functioning and there had been no drainage to this area for some time. Worse problems have been caused by water getting behind the dirt ramps and freezing, creating huge frost pressures. This caused numerous structural problems in the foundation and floor framing.

The work to correct the majority of the problems along the north foundation wall was undertaken in 2003-2006, as discussed above. Site work may still be necessary along the northeast corner of the barn, where repairs to the foundation wall and sill are still needed.

Recommendations: The water infiltration near the west foundation wall can be corrected by grading away from the building and adding a more impervious layer of clay or heavy loam on top.

The bushes and plants growing close to the barn should be cut back so that they will not hold moisture near the building and increase existing moisture-related structural problems. Plants growing in and from the foundation walls should be killed with pesticides to prevent structural damage. The surrounding field also needs to be kept cleared and mowed up to the building to reduce moisture levels.

Miscellaneous

There are various pieces of machinery in the interior of the barn. The room connecting the barn with the silo has the silo machinery in pieces (Photo 44). The machinery includes harrows, older milking machines, and a Leaches Silo Unloader. The machinery should be identified, inventoried, and preserved. This should be done with Mr. Raynes's daughter, if possible, for the most reliable account. Bob Gilman from Durham, New Hampshire, may also be of assistance in this matter, as may the New Hampshire Farm Museum in Milton, New Hampshire.

Engineering assistance may be necessary for much of the proposed work. Emanuel Engineering provided an estimate for engineering support in the amount of \$6,000. \$2,000 has already been committed for the design of repairs to the northeast foundation wall. It would be prudent to reserve an allowance of \$4,000 for engineering consultation, such as the sill repairs and structural enhancements.

Prioritized Work Plan

High Priority

- Paint and Staining clapboards and trim, including clapboard replacement (\$59,000)
- Window repairs, including glazing and glass replacement (\$3,000)
- Floor repairs (\$9,000)
- Remove asbestos in basement milk room and celotex ceiling (\$2,000)
- Repairs to the northeast foundation wall (\$57,500)
- Repairs to doors (\$4,000)

Medium Priority

- Barn structure enhancements and repairs (\$6,000)
- Sill repairs (\$40,000)
- Fire detection and alarm (\$15,000)

Low Priority

- Silo preservation and connector work (\$14,000)

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1860	Book 384, Page 391.	1946	Book 1047, Page 496.
1891	Book 530, Page 52.		
1901	Book 591, Page 278.		

Contacts and Sources

New Hampshire Division of Historical Resources (NHDHR)
19 Pillsbury Street, Box 2043, Concord, NH 03301-2043
603-271-3483 or 271-3558
<http://webster.state.nh.us/nhdhr/>

New Hampshire Preservation Alliance
P.O. Box 268 Concord, NH 03302-0268
603-224-2281
<http://www.mv.com/ipusers/nhpreservation/index.html>

New Hampshire Farm Museum
PO Box 644
Route 125, Plummer's Ridge Milton, NH 03851-0644
(603) 652-7840
<http://www.farmmuseum.org/>

A list of New Hampshire Building Movers:
<http://buildingmovers.com/nhl>

Preservation Institute at Historic Windsor (provides full list of qualified contractors)
Windsor, VT
www.historicwindsor.com
802-674-6452.

North Bennett Street School Preservation Carpentry Program
Robert Adam, Director
39 North Bennett Street
Boston, MA 02113
617-277-0155
<http://www.nbss.org/>

National Park Service Preservation Briefs
<http://www2.cr.nps.gov/tps/briefs/presbhom.htm>
These include: The Repair, Replacement & Maintenance of Historic Slate Roofs, Repointing Mortar Joints, Repair of Historic Wooden Windows, Exterior Paint Problems on Historic Woodwork

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Walter E. Phelps Company (wood sash and windows)
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Brattleboro, VT 05301
802-257-4314

Rejuvenation Hardware www.rejuvenation.com
2550 NW Nicolai Street, Portland, OR 97210
Toll-free 888-401-1900

Old House Journal <http://www.oldhousejournal.com/>
Includes a Restoration Directory and Preservation How-To

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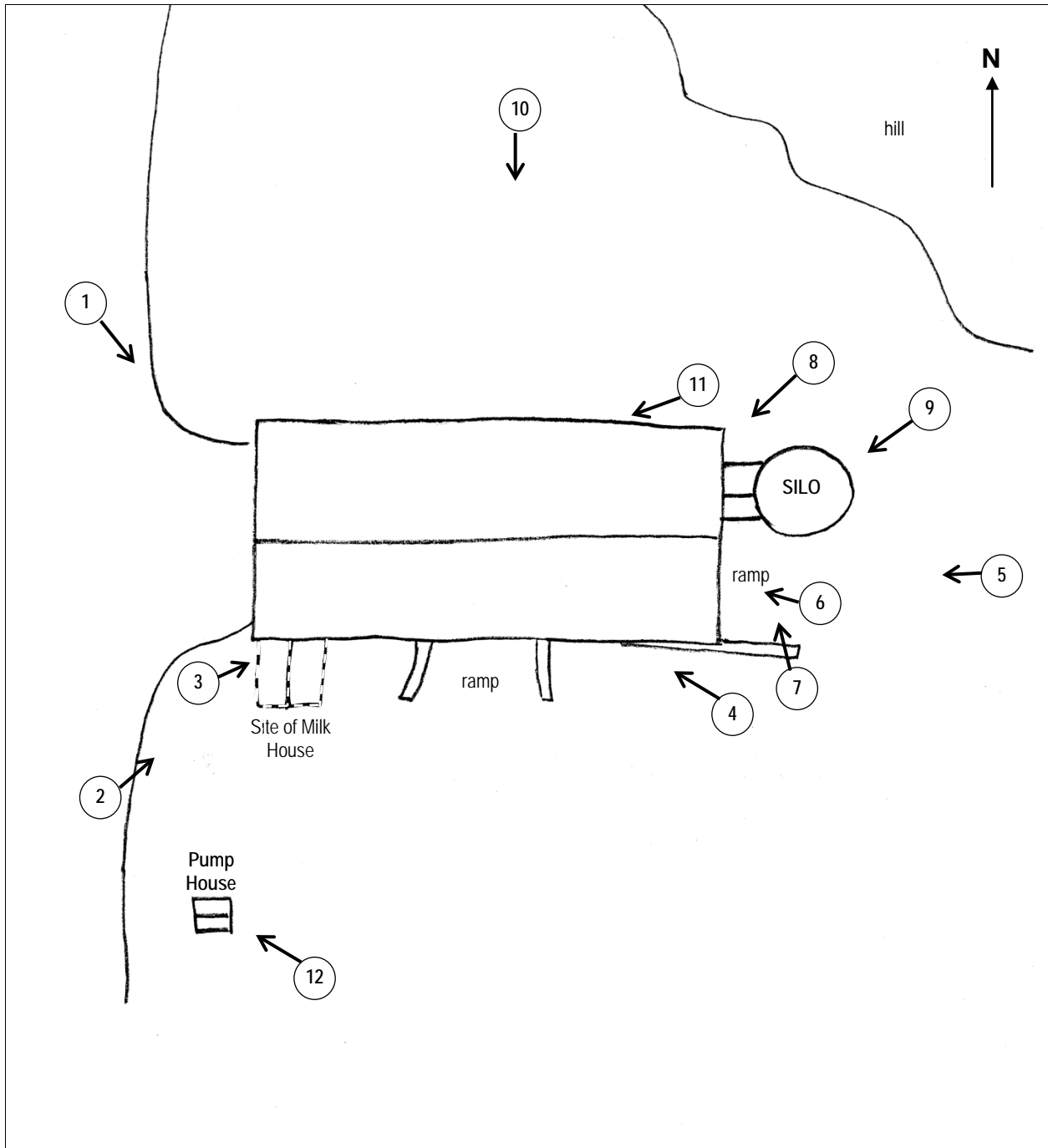
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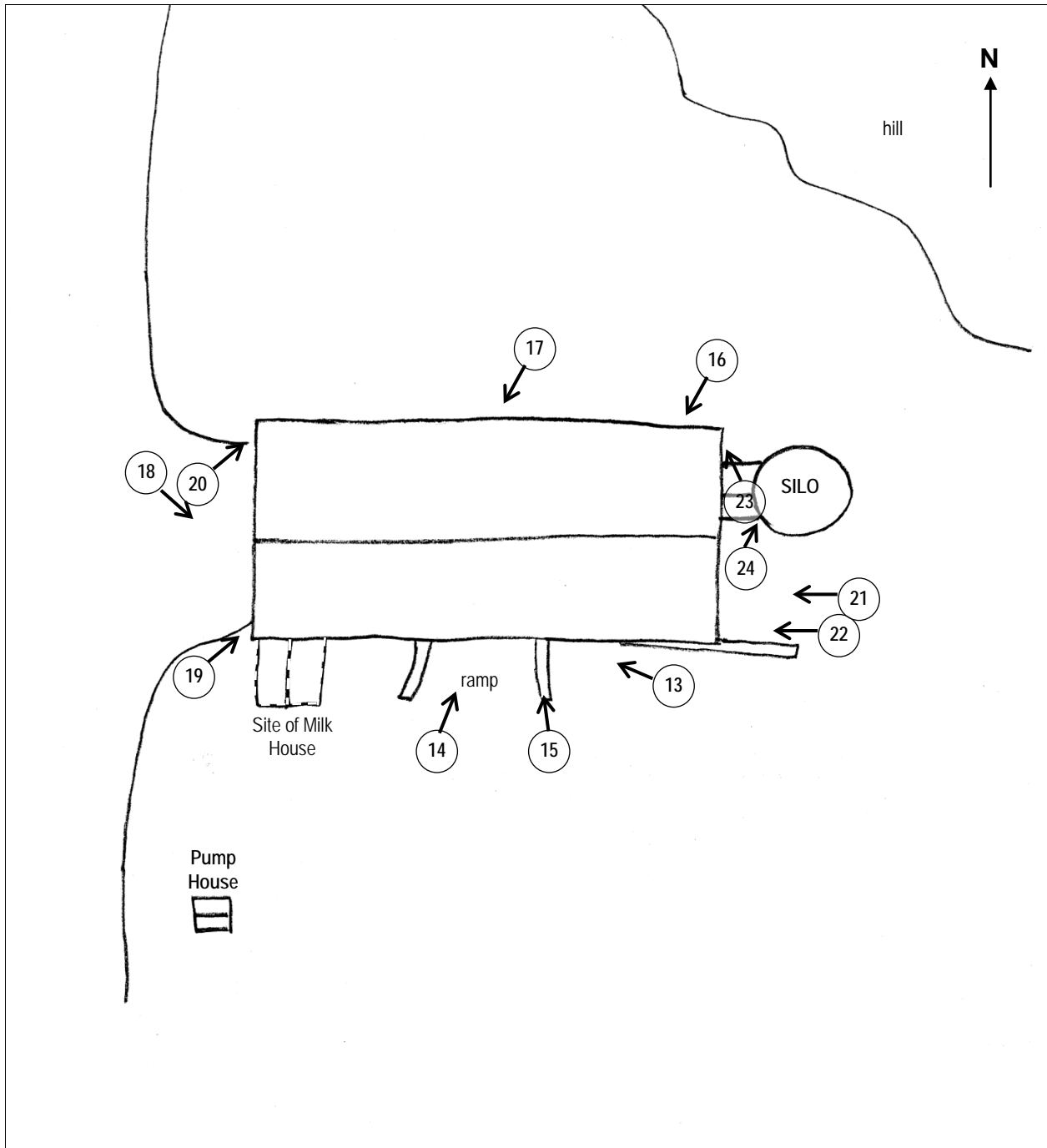
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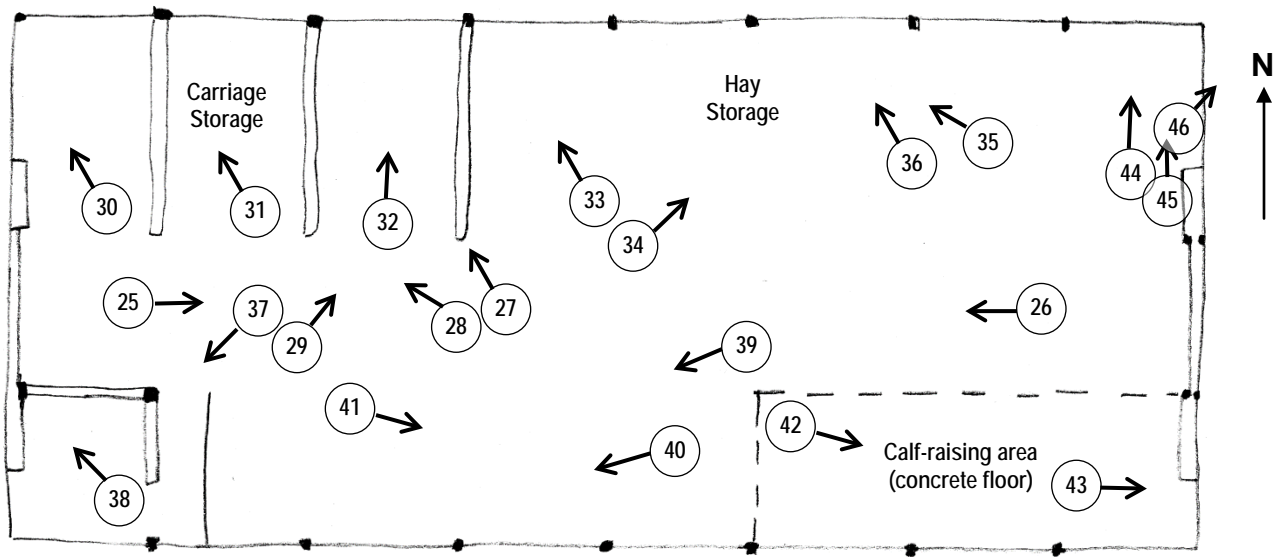
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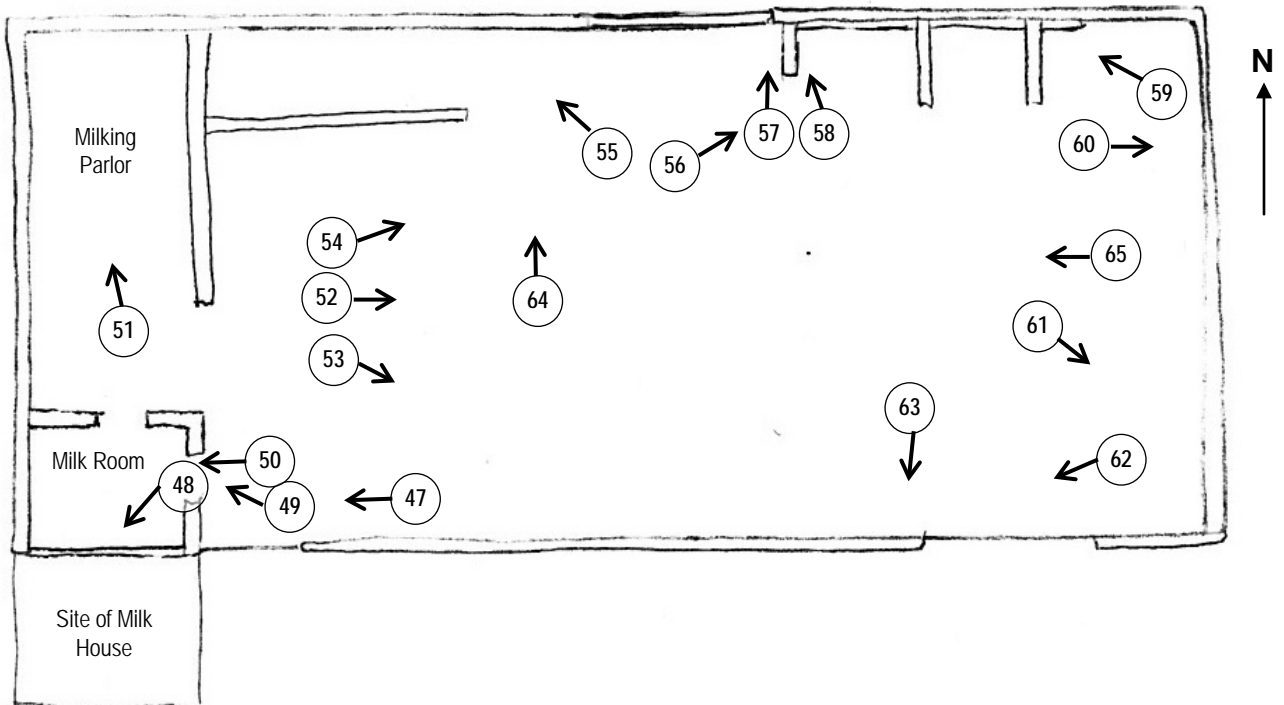
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Interior - Main Floor



Interior - Basement



Photographs

Exterior



Photo 1) North and west elevations, from Newfields Road
Direction: SE



Photo 2) West and south elevations, from Newfields Road
Direction: NE



Photo 3) Southwest corner, south elevation showing area of former 1960 milk room addition, removed in 2004

Direction: ENE



Photo 4) Southeast corner, south elevation

Direction: WNW



Photo 5) East elevation and silo
Direction: W



Photo 6) East elevation showing central bay drive doors
Direction: W



Photo 7) East elevation and silo, from the south
Direction: NW



Photo 8) Northeast corner and silo, showing connector and north elevation of barn
Direction: SW



Photo 9) Silo
Direction: WSW



Photo 10) North elevation
Direction: S



Photo 11) North exterior wall, looking west
Direction: WSW



Photo 12) Pump house
Direction: NW

Exterior Details



Photo 13) South elevation, showing variety of windows and condition of clapboards
Direction: WNW



Photo 14) South elevation, cow door at top of ramp, showing window conditions
Direction: NNE



Photo 15) South elevation, infilled door with clapboards and window sash, showing window conditions and ventilator hood at left

Direction: NNE



Photo 16) North elevation, ventilator hood

Direction: SSW



Photo 17) North elevation, showing clapboard condition and foundation walls. Foundation wall repair from 2004 seen at right, failing foundation wall in need of repair at left.
Direction: SE



d in 2016



Photo 19) West elevation, door at south end
Direction: NE





Photo 21) East elevation, showing clapboard condition and broken transom lights, vinyl replacement windows in gable
Direction: W



Photo 22) East elevation, south doorway, showing 1960s residential door in former sliding door opening
Direction: W



Photo 23) East elevation, north raking eave, showing separation of molding from the building
Direction: N



Photo 24) Silo connector, south side
Direction: NE

Interior



Photo 25) Central drive bay, looking east,
with haymow area on left and animal
feeding area on right with hayloft above
Direction: E



Photo 26) Central drive bay, looking west,
with haymow area on right, calfpen area on
left, and hayloft above
Direction: W



Photo 27) Detail of wall and roof framing showing temporary post beneath the purlin posts to support the tie beam, cables visible.
Direction: NW



Photo 28) Detail of framing along central drive bay, showing tie beams and temporary supports beneath purlin posts, adjacent to the hayloft above
Direction: NW



Photo 29) North aisle carriage storage areas
Direction: NE



Photo 30) Northwest corner, carriage storage area
Direction: NNW



Photo 31) Floor condition, carriage storage area, north aisle
Direction: NW



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Photo 33) North aisle, hay storage area
Direction: NNW



Photo 34) North aisle, hay storage area in northeast corner
Direction: NE

Photo 35) Structure, wall and roof framing, north aisle, showing where tie beams have deflected (row)

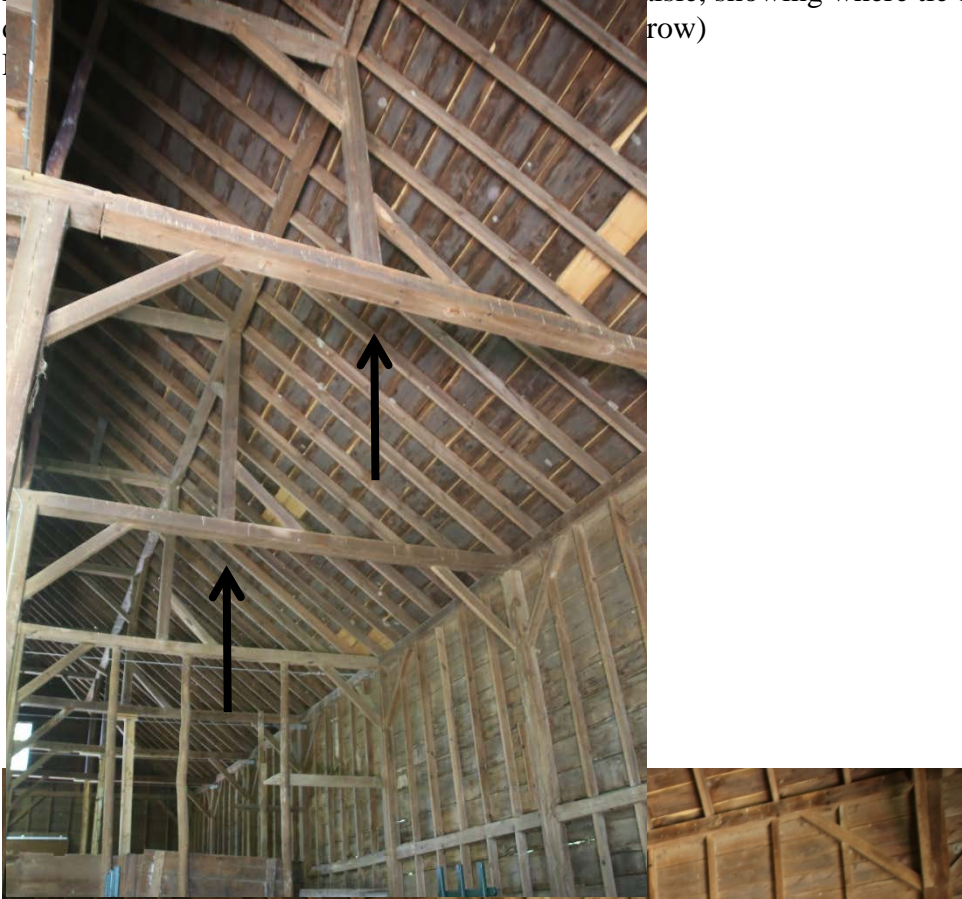


Photo 36) North wall, showing slight bowing of wall framing
Direction: NNW



Photo 37) Southwest corner milk room, ladder to hayloft, animal tie up area at left with deteriorated flooring at stanchion
Direction: SW



Photo 38) Main floor milk room later grain room, southwest corner, showing yellow pine walls and ceiling boards, deteriorated concrete floor, and upgraded electrical system
Direction: NW



Photo 39) Central drive bay and south aisle with hayloft above, looking west
Direction: W



Photo 40) South aisle and whitewashed animal tie up area, outline of original gutter, showing deteriorated floor condition

Direction: WSW



Photo 41) South aisle and whitewashed animal tie up area, showing deteriorated floor condition

Direction: E



Photo 42) Southeast room, privy area with whitewashed walls and 1960s residential door in former sliding doorway. Assume cable introduced to maintain integrity of corner posts while foundation was being repaired.

Direction: ESE



Photo 43) Southeast corner and wall, whitewashed privy area, showing 1960s residential door
Direction: E



Photo 44) Looking at the interior of silo connector area showing removed framing and miscellaneous farm tools
Direction: N



Photo 45) Trap door in Northeast corner, next to silo connector, leading to basement
Direction: N



Photo 46) Silo ladder within connector
Direction: NNE

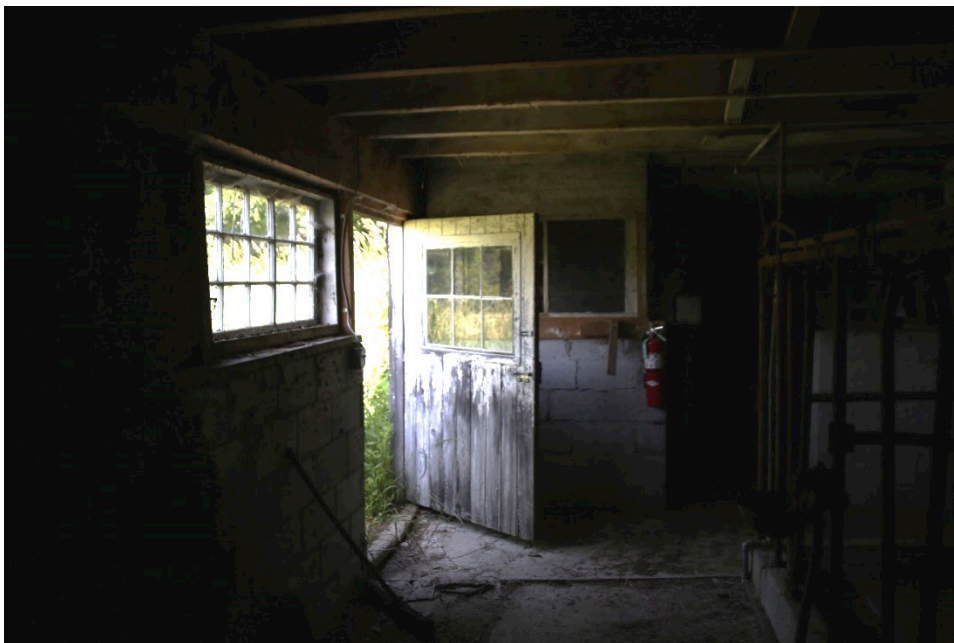


Photo 47) Door to basement milking area at Southwest, former milk room addition area
Direction: W



Photo 48) Interior view of walled opening at former milk room addition, 2004
Direction: SW



Photo 49) Basement milk room area, southwest corner, showing sagging asbestos sheeting on ceiling
Direction: NW



Photo 50) Basement milk room area with grain chute, southwest and asbestos ceiling
Direction: W



corner



Photo 52) Basement milking area, milking stanchions and central aisle with granite support columns, looking east. New drainage catch basin in center aisle.

Direction: E



Photo 53) Milking stanchions, south wall, looking east

Direction: SE



Photo 54) Milking stanchions, north wall, looking east
Direction: NE



Photo 55) Interior of north foundation wall, reconstructed in 2004
Direction: NNW



Photo 56) Milking area, calf pens North wall, showing temporary support to northeast floor joists
Direction: NNE



Photo 57) North foundation wall and sill, reconstructed area to left
Direction: NNE



Photo 58) North foundation wall and sill, replaced sill
Direction: N



Photo 59) East end of North foundation wall and sill, exhaust fan
Direction: NW



1 level through trap door

Photo 61) Basement milking area, southeast corner rebuilt 2006 and new drainage stone
Direction: SSE



l, sections replaced in 2006



Photo 63) South foundation wall, new sill, and floor joists, sections replaced in 2006
Direction: S



Photo 64) Basement milking area floor, showing stormwater drainage system in floor installed in 2004

Direction: N



Photo 65) Basement milking area floor, showing stormwater drainage system in floor installed in 2004

Direction: W