

Conditions Assessment and Preservation Plan for
the

LEVI WETHERBEE FARMHOUSE



Study prepared for
Boxborough Building Department,
Steele Farm Advisory Committee, and the
Boxborough Historical Society, Inc.
Town of Boxborough
Boxborough, Massachusetts

**Conditions Assessment and Preservation Plan for the
LEVI WETHERBEE FARMHOUSE**

study prepared by

RED HAWK STUDIO ARCHITECTS, INC.

with the assistance of

STRUCTURES NORTH CONSULTING ENGINEERS, INC., structural engineers
D.G. JONES INTERNATIONAL, INC., cost estimator

December 19, 2016

TABLE OF CONTENTS

1. ACKNOWLEDGEMENTS	1.0
2. EXECUTIVE SUMMARY	2.0
3. HISTORICAL ANALYSIS	
▪ HISTORY	3.1
▪ SIGNIFICANT HISTORICAL FEATURES	3.2
4. CONDITIONS ASSESSMENT	
▪ ARCHITECTURAL CONDITIONS ASSESSMENT	4.1
▪ STRUCTURAL ENGINEERING REPORT	4.2
5. PRIORITIZED TREATMENT OPTIONS	5.0
6. CONSTRUCTION CONTRACT COST ESTIMATE OF TREATMENT OPTIONS	6.0
7. APPLICABLE CODES, REGULATIONS, AND PERMITS	7.0
8. APPENDICES	
▪ LIST OF SOURCES	8.1
▪ EXISTING CONDITIONS DRAWINGS	8.2
▪ PHOTOS	8.3

ACKNOWLEDGEMENTS

1.0

- Ed Whitcomb, Jim Moss, and Bruce Hager of the Steele Farm Advisory Committee
- The Boxborough Historical Society, Inc., Jeanne Steele Kangas, President
- Gerry Noel, Inspector of Buildings, Town of Boxborough, Massachusetts

Red Hawk Studio is pleased to submit this Condition Assessment and Preservation Plan for the 1784 Levi Wetherbee Farmhouse at the Steele Farm in Boxborough.

The project consists of an architectural and structural conditions assessment and a prioritized treatment plan addressing requirements and associated costs to preserve and maintain the Wetherbee Farmhouse.

One of our first steps was to measure the Farmhouse and prepare CAD base plan and elevation drawings. These were used as a tool for the study and a template for documentation of our findings.

Condition Assessment

The Condition Assessment was carried out by a thorough architectural assessment of the building's interior and exterior conditions which is part of this report. The structural engineer, Structures North Consulting Engineers, accompanied by Red Hawk Studio, performed a thorough structural inspection and issued a paper with recommendations and priorities which is also part of this report. They gave particular focus to the conditions at the fieldstone foundation and chimney base. While conditions at most of the house are reasonably stable, the foundation shows considerable instability, a condition that is recommended to be addressed as an immediate priority.

Treatment Recommendations

Based on the Condition Assessment we made prioritized treatment recommendations according to immediate (1-2 years), short term (3-5 years), and long term (beyond 5 years) needs. The structural recommendations take into account the findings of the Structures North report as well as the earlier report by Groton Engineering. The recommendations for stabilizing the foundation for the long term are extensive. Shorter term temporary stabilization by bracing may be easier to implement, but eventually a long term solution will be required. The engineer's solution involves replacing the historic stone

foundation. The loss of one of the defining historic features of the house is not desirable and other approaches that reconstruct the stone walls inside a reinforced concrete retaining wall on new footings can be explored. It appears, however, that temporarily displacing the superstructure is inevitable. There is historic precedent in this, though, in the house's original move to this location in the eighteenth century.

Cost Estimates

Cost estimates are provided based upon the identified treatment recommendations according to the different level of priority by the professional cost estimator, D.G. Jones International, Inc.

Future Options

At present, the building is not occupied or used. Under the requirements of the Building Code, human occupancy would require upgrading many of the building systems, including providing a water source and a Title V compliant septic system. While these systems were functioning at one time, they no longer are.

If any use is to be considered, a single family residence would probably be the most feasible in terms of cost. Most building systems would have to be installed from scratch however. In that case de-leading of painted surfaces would probably be necessary. Requirements for uses involving public access are more stringent and costly, although a designation as a "house museum" would offer some flexibility..

Much of the following material is derived from the Mass. Historical Commission Inventory form (Form A for 484 Middle Road, 2001 BXB.A) prepared by Anne McCarthy Forbes.



Photo of the Levi Wetherbee Farmhouse circa 2001

One of Boxborough's oldest and most historic properties, the Levi Wetherbee (Wetherbee-Cobleigh-Steele) Farm is located near Boxborough's old town center dating from the late 18th century.

The property, at 484 Middle Road, comprises a single 36-acre parcel of land that gradually descends south from Middle Road through an evolved agricultural landscape. A narrow streambed with high banks courses south through the west part of the property from a

small round farm pond just below the road. A network of trails connects to the adjacent Beaver Brooks Meadow Conservation land, part of Boxborough's open space network.

The Levi Wetherbee House, built by one of the town's founders, stands close to the south edge of Middle Road with an early 1940s barn behind it. Prior to 1856, the line of Middle Road passed just south of the farmhouse, rather than north.

Historical Significance

Certain decorative features raise the question of whether the first story of the house, which is referred to as late as 1784 as "Levi Wetherbee's new house," was actually standing in the second quarter of the 18th century, and if so, whether "new" may mean that it was moved to the farm from another location. The house recorded as having been taxed in 1798 was one story, and had nine windows containing 73 square feet of glass, indicating a configuration seen in the typical "Cape Cod" style house of that period. Based on these features this might have been the "old house" mentioned in a deed of 1784.

The second floor was likely added ca. 1800-1815.

The following features should be preserved in any work to rehabilitate the structure:

- The center entry has a mid-nineteenth-century door
- Some of the sash of the mid-nineteenth-century type with narrow ogee muntins remains.
- North and south side decorative cornices
- One story-high posts with flared ("gunstock") shoulders are detectable under later casings at both rear corners
- Front and rear first-story girts (formerly the plates) are planed and carved with a fine beveled chamfer with lambstongue stop—a finish detail that is characteristic of framing that was well out of fashion after 1750.
- The large fireplace in the rear original kitchen has angled side walls; the bake oven is located just west and outside of the main firebox. The fireplace wall is finished with planed boards incorporating doors to a cabinet above the fireplace.
- Vertical beaded board at mantels
- southeast room—apparently a parlor mantel shelf backed by a low board with a raised center section, which probably dates to between 1830 and 1850.
- wide floor boards
- Doors to the lobby entrance from the side rooms are a 4-panel type, raised on one side and recessed on the other, and hung on H-and-L hinges.
- The closed-string, three-run stair has a typical federal-period balustrade of square dowels placed on the diagonal, a heavy molded railing, and 3 1/2-inch square newel posts.

The character of much of the second story is more elaborate and formal than the first, and includes many elements of the federal style, possibly from when the house was enlarged:

- Corner posts have beaded casings
- The doors are 6-panel, hung on H-hinges in molded surrounds, with the raised-panel side toward the rooms
- The southeast chamber is the most high-style room in the house, with an even larger and more elaborate crown molding than that in the southwest chamber, and a beaded-board dado with molded baseboard, and at the top edge, a line of finely-carved vertical reeding under a molded chair rail. The mantelpiece is an outstanding example of local federal-period carpentry. The frieze is decorated with squares of reeding oriented in alternating directions, and above it is a line of vertical reeding under a simple mantel shelf. The molding of its surround matches that at the doorways.
- Stylish woodwork, consistent with carpentry of the 1810s seen in other houses in the Boxborough area, raises the question of whether Levi Wetherbee's son-in-law, cabinetmaker Samuel Stevens (b. 1791) may have executed some of it.
- Door hardware throughout the building includes H- and H-and-L hinges, Suffolk latches, later cast-iron latches, and ceramic knobs. Iron cranes remain in the rear kitchen fireplace.
- At the attic, the five-sided ridge beam and the eased tongue of the principal rafters where they are let into the ridge beam.
- A full cellar with unmortared fieldstone foundation exists under the entire building except for the center area from the fieldstone chimney base to the rear wall. The east part of the

cellar floor is paved with large flat stones. The first-floor joists in the front part of the house are primarily heavy sleepers running eastwest, approximately 6 by 6 inches in dimension, placed about 28" on center. The under side of the subfloor visible under the west room is planed. Beneath the rear room the joists run north to south, and the subflooring is vertical-sawn.

Non-Historical Features

These features may be removed or restored to a more appropriate historical character. They include:

- The wide opening with a pair of 3-over-3- paneled doors between that room and the rear kitchen appears be an alteration of the early twentieth century.
- Two modern windows on the west side at the modern kitchen
- The east wall has a twentieth-century, 6-light- over 2-panel door in the north portion
- Artificial brick at the modern kitchen wall.

This study is a preliminary stage in a multiple year initiative by the Boxborough Historical Society in partnership with the Freedom's Way Heritage Association and the Town of Boxborough to preserve the Wetherbee-Steele Farm and the Levi Wetherbee Farmhouse.

The property has been listed on the National Register of Historic Places.

I. DESCRIPTION OF EXTERIOR MATERIALS AND CONDITIONS

A. Site

- The ground slopes down slightly from Middle Road toward the north side of the house where the grade is very close to the bottom of the siding. This has led to infiltration of water into the basement, damage to the sill under the wall, and other deterioration in this vicinity described below and in the Structural Inspection report.
- There is a drainage catch basin on the northwest corner about 15-20' away from the house.
- Downspouts at both ends of the north façade are connected to boots which connect to a corrugated plastic pipe that is buried below grade and apparently empties into the catch basin.
- At the west side the land slopes to toward a tributary to Beaver Brook and a small pond

B. Roofs

- The 3-tab asphalt shingle roofing is nearing the end of its lifecycle. On the south side many shingles show signs of curling and on the north side there are patches of lichen that can be acidic and have strands that can penetrate into the shingles, though it is not as destructive as moss. The north side appears darker than the south side which may be the effect of mildew. The aggregate on the shingles has not eroded severely and they will probably last for another five years or so.

C. Chimney

- The exterior of the brick masonry chimney was observed through binoculars from the ground and it appears to be in moderate condition. Based on an inscription in the attic, there was work done on the chimney in 1990. Above the roof there appears to be some brick spalling on the east side. The pointing does not appear to be deteriorated.
- Step flashings are not interleaved with shingles, allowing water to get under the horizontal portion of the flashing.

- The downslope apron flashing does not extend far enough to keep water from getting under it. It should extend 6 inches over the roofing and be hemmed for stiffness.
- There is an EPDM membrane covering over the top of the chimney to keep water out. This is a temporary measure.

D. Cornices

- There is a wood crown molding and fascia board along the eave and rakes. Along the eaves the molding and fascia form a boxed cornice with a soffit. The cornices return around the corners at the gable ends. There are a number of squirrel holes, especially at the southeast corner. The molding and fascia is decayed in some spots, especially behind gutters. It is not clear through binoculars whether all the cornice returns are capped with flashings.
- There are modern aluminum gutters and downspouts on the north and south eaves. Based on the presence of the crown molding, it is not likely that the house originally had gutters, but they may be a necessity until the site drainage issues (see above) are remedied.

E. Siding and Trim

- The siding consists of clapboards exposed about 4-1/2 in. to weather. The original material was probably pine. Paint is peeling in a number of areas especially at lower edges of siding boards.
- Siding boards show splitting in a number of areas: $\pm 1\%$ on the north side, $\pm 2-3\%$ on the west side, $\pm 5-7\%$ on the south side, $\pm 2\%$ on the east side. There are a number of holes on the south side.

F. Windows and Doors

- Double-hung windows are typical. A number of sash have been replaced recently with new wooden sash, however some of the earlier sash appears to be stored in the house.

- Window head flashings are evident at the south side and east side of floor 1, the kitchen window, and the west side of floor 2. They were not evident in other areas.
- On the south door (101) the exterior casings are decayed at the bottom,
- South door (101) has screen door stops remaining on the jambs.
- The south door (101) has a concrete apron.
- At the head of east door (106) the exterior casings is split and there is no flashing. The casings at the jambs are split and rotted at the bottom, the door sill is severely split, and the apron is decayed.

G. Foundations

- Exterior foundation walls are uncoursed boulders with an uneven interior surface.
- Several areas on the east and south appear to have been parged with concrete.
- See Structural Inspection report.

H. Floor Framing

- See Structural Inspection report.

II. DESCRIPTION OF INTERIOR MATERIALS AND CONDITION BY ROOM

Generally, there are few interior conditions that are severely deteriorated. Wall, ceiling, and floor finishes need cleaning, scraping, and re-finishing. Some particular comments are:

A. Floor 1

102 Parlor

- The wood floor consists of 17"± wide boards.

105 Old Kitchen

- The floor consists of 12"± wide boards.
- The wood floor is noticeably sunken between the main beams below, especially along the north wall. Several boards near the west end of the north wall are deteriorated. These conditions are related to the site drainage issues at the north side.

106 Pantry/Lavatory

- This room was historically a pantry, but has been turned into a lavatory.

107 Kitchen

- There is a porcelain double bowl sink possibly from the early 20th century on the west wall.
- Artificial brick covers the east wall. It is likely there is a fireplace hidden behind this material.
- Door (109) to the basement is off its hinges.
- There is a hole in the ceiling for a stove pipe.

B. Floor 2

205 Closet

- This space is a late non-historic addition, framed with 2x4 studs and enclosed by a single layer of sheetrock.

206 West Chamber

- This room has a wainscot and decorative details of historical significance (See A. Forbes, Mass. Historical Commission Inventory form (Form A for 484 Middle Road. 2001 BXB.A).

C. Attic

- There are gaps of daylight between siding and sheathing at the gable ends.

III. DESCRIPTION OF WINDOW CONDITIONS

Window #	
Floor 1	
1.1	1900's sash, casings in moderately good condition, paint is cracked, stool in good condition
1.2	Both sash new, casings in moderately good condition, stool in good condition
1.3	New lower sash, early upper sash, stool in good condition
1.4	Both sash new, casings in moderately good condition, stool in good condition

1.5	New lower sash, early upper sash, paint peeling, stool in good condition
1.6	New lower sash, early upper sash, paint peeling, stool in good condition
Floor 2	
2.1	New lower sash, early upper sash, paint peeling, stool in good condition
2.2	Both sash new, paint peeling, stool in good condition
2.3	New lower sash, 1900's upper sash, stool in moderately split
2.4	Both sash early, stool in moderate condition, screen
2.5	Both sash early, stool paint cracked with some splits
2.6	New lower sash, stool in good condition
2.7	Both sash early, stool in moderate condition
2.8	Both sash early, stool paint gone with some splits in wood
2.9	One sash early, one from 1900's, stool paint gone with some splits in wood
Attic	
A.1	Sash appear early, but not original. The lower sash appears to be from elsewhere as the meeting rails are far out of alignment. Inside stops are in place only at part of the lower sash.
A.2	Sash appear to be 19 th century.

- In many cases newer sash were installed recently to secure the building. The older sash have been retained and are stored in the house.

IV. DESCRIPTION OF BUILDING SYSTEMS

Mechanical

Septic

- The location or condition of an existing cesspool or septic system is not known.

Plumbing

- The existing well does not function.
- The plumbing in the house is not connected to the well.
- Existing pressure tank in the basement is very old

Heating:

- There is no central heating system.
- There are 2 small ceiling mounted electrical fan-forced coil heaters in the basement.

Electrical

Security and fire detection:

- No existing system

Power and Lighting

- There is an existing, relatively new 100 amp service panel in the basement and a meter and overhead service on the west side.
- There are unconnected convenience outlets in most of the main rooms, although they do not provide the coverage required by Code.
- Some lighting in the Basement is functioning.
- There are unconnected ceiling mounted light fixtures and switches in several of the main rooms.
- The condition of the wiring is not known.

CAUSES OF DETERIORATION

There are no particular characteristics of the house's construction or its materials that would cause more deterioration than otherwise. The root cause of deterioration on the exterior is lack of maintenance, especially capital maintenance such as re-painting. These materials have a defined life-cycle and they have been left in place for decades past their life-cycle.

For example, brittle roof shingles, long overdue for replacement, break off allowing water to enter. Water follows paths through the attic and walls causing deterioration of roof sheathing, interior finishes and substrates and the structure itself.

22 November 2016

Attn: Karle Packard
Red Hawk Studio Architects
18 Main Street
Concord, MA 01742

Reference: Levi Wetherbee Farmhouse
Boxborough, Massachusetts
Structural Conditions Survey

Dear Karle:

At your request we visited the Levi Wetherbee Farm in Boxborough, Massachusetts to perform a general conditions survey of the farmhouse. For the purposes of this report, the front of the building faces south (though the street runs along the north face, as Middle Road originally ran between the house and barn). Following is a summary of our noted conditions and recommendations, which are noted in italics.

General Description

The building is a two-story wood-framed residence that was built circa 1784. The building has a walk-up attic, central chimney and a full basement with the exception of the north-center section, which is a crawlspace. The crawlspace is just north of the chimney, which bears on soil that was originally confined by a 3-sided foundation that has partially collapsed at the west side, and is bulging at its east. The balance of the foundation walls are bulging inward with few exceptions.

The roof system consists of equally-spaced bents that span north-south with purlins that span east-west between bents or from exterior gable end walls-to-bent. The roof was recently replaced, including a layer of new plywood that was installed directly over the original board sheathing.

The first floor consists of timber beams that span north south flanking the chimney, and wood joists that span east-west. The rear/north is the exception, where timber beams span east-west and the framing direction changes to span north-south from the rear walls to these timber beams.

Second and third floor framing is largely concealed by finishes; however it likely follows a similar configuration to the first floor framing.

Noted Conditions and Recommendations



The roof framing is in fairly good condition and appears to be performing well, despite the relatively small sizes of the roof purlins.

Any eventual future re-roofing projects should avoid adding additional layers of roofing, and should involve complete removal of the existing shingles prior to adding new roofing materials. This method will eliminate any increase in dead load on the existing structure and maintain its historic performance. Additionally, the application of any insulation should be avoided at the attic or roof level without substantial framing reinforcement. Similar to avoiding an increase in the dead

load, adding insulation will change the thermal factor in the snow load calculation and increase the snow load on the roof. Since this statement is based on an occupied, heated building, the building, in its current vacant state, should be monitored during the winter, especially during extreme snow events, and the roof cleared of snow if necessary.

The central chimney has been parge-coated at the attic level, which can trap moisture and result in accelerated deterioration.

The parging at the attic level should be removed so that the brick masonry can be fully assessed, and repaired as needed.



The foundation walls that support the chimney are severely compromised, particularly the west chimney wall, which has already partially collapsed. The stones from the collapsed section have been stacked at adjacent walls in an attempt to arrest further movement of these walls. While shoring of the first floor has been added at the northwest corner, little else has been done to the foundation walls to prevent further collapse. Additionally, the balance of the foundation walls is bowing inward, with fewer locations in good condition than not.

The entire foundation needs to be shored in order to preserve the upper levels. While there are several options available to mitigate or remedy the issues presented in Groton Engineering's 2014 report, these will either be trial-and-error approaches (such as water diversion) or severely impact the useable space of the basement (such as adding shotcrete along the interior face, which would also involve pouring a new slab and would rely on tying the new shotcrete into the first floor framing). The best solution is to temporarily shore the entire structure above the top of the foundations in a manner that would allow for an entirely new concrete foundation to be installed. The design of the new foundations should be cantilever retaining walls so that they are independently stable and do not rely on the first floor framing for lateral support.

The first floor framing appears to be in relatively good condition at the southern two thirds of the footprint; however rear/north portion is rot- and insect-damaged. The damage at the east section appears to be minimal enough so that the floor is still stable, while the west section has been reinforced. The west-most joist has not been reinforced, and is not in contact with the subfloor. The damage at the center-north section is severe enough to have resulted in a collapse at the north end; while this space is generally inaccessible, it is likely that the sill is rotted at this location as well. The collapse of the west chimney wall has resulted in unsupported notched tenons of timber beam ends, which were likely previously receiving full-depth support from the collapsed walls. One of these has been restored by means of temporary shoring, while the other is not and appears to be splitting, which is common with this type of connection (see photos 3 & 4 on Page 2 of the Appendix).

As part of the restoration and repair, the north half of the first floor framing will require a combination of reinforcement and replacement, including sill replacement. Portions of this scope will need to precede the lifting/shoring of the structure to remain.

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, and no calculations have been performed to determine if the overall building framing or foundations of the structure comply with past or present building codes. This report is strictly limited to structural considerations noted. Egress, guard rails, fire protection, and other building systems were not reviewed, and they are beyond the scope of this report.

We trust this information will help in determining your next steps. We would be happy to provide a project manual or drawings for the repairs noted herein, which should be engineered and properly detailed. If you have any questions regarding this report or should need further assistance, please do not hesitate to contact us.

Respectfully Yours,
Structures North Consulting Engineers, Inc.

A handwritten signature in blue ink, appearing to read "Greg Nowak".

Greg Nowak, E.I.T.

Attachments:

Attachment: Appendix, 4-pages, including cover (additional photos)

APPENDIX (additional photos)

Page 1

Photo 1: Failing foundation wall, east side of chimney (facing north, toward Middle Road)

Photo 2: Failing foundation wall, west side of chimney (facing east, toward driveway/parking area)

Page 2

Photo 3: Beams previously supported by now-collapsed chimney wall (facing south, towards barn)

Photo 4: Beam previously supported by now-collapsed chimney wall (facing north, toward Middle Road, showing split at mid-depth)

Page 3

Photo 5: Collapsed first floor framing section (facing north/Middle Road, center section north of chimney as viewed from crawlspace)

Photo 6: Collapsed first floor framing section (facing northeast/Middle Road, center section north of chimney as viewed from first floor)



Photo 1
Failing foundation wall, east side of chimney
(Facing north, toward Middle Road)



Photo 2
Failing foundation wall, west side of chimney
(Facing east, toward driveway/parking area)



Photo 3
Beam previously supported by now-collapsed chimney wall
(Facing south, toward barn)



Photo 4
Beam previously supported by now-collapsed chimney wall
(Facing north, toward Middle Road, showing split at mid-depth)



Photo 5
Collapsed first floor framing section
(Facing north/Middle Road, center section north of chimney as viewed from crawlspace)



Photo 6
Collapsed first floor framing section
(Facing northeast/Middle Road, center section north of chimney as viewed from first floor)

I. RECOMMENDATIONS FOR EXTERIOR MATERIALS AND CONDITIONS

A. Site

- There should be positive slope away from the foundation at 2%-5% grade starting 6-8" below the siding. It is recommended that a swale be placed along Middle Road, far enough away from the house to facilitate drainage away from the house. This may require cooperation and permits from the Town and engineering assistance.
- Ensure that existing drainage from the roof downspouts discharges to the catchbasin.

B. Foundations

- Temporarily shore the entire structure above the top of the foundations in a manner that would allow for an entirely new concrete retaining wall foundation to be installed. See Structural Inspection report.
- Alternate: Apply Shotcrete to the inside of the foundation wall. This method is not recommended.

C. Floor Framing

- The north half of the first floor framing will require a combination of reinforcement and replacement, including sill replacement. Portions of this scope will need to precede the lifting/shoring of the structure to remain.

D. Roofs

- The 3-tab asphalt shingle roofing is nearing the end of its lifecycle. At a point in the relatively near future existing roofing should be removed and replaced.

E. Chimney

- Replace spalling brick s on the east side.
- Inspect and repoint where necessary.
- When re-roofing, replace step flashings interleaving with shingles, replace the downslope apron flashing extending it 6 inches over the roofing and hemming it for stiffness.
- Replace the EPDM membrane covering over the top of the chimney with a chimney cap or other permanent measure to keep water out.

- The parging at the attic level should be removed so that the brick masonry can be fully assessed, and repaired as needed. See Structural Inspection report.

F. Cornices

- Replace cornice moldings and fascia at squirrel holes, especially at the southeast corner, and behind gutters where decayed. Inspect cornice returns close up and install flashings at the tops if missing.
- Ideally the modern aluminum gutters and downspouts on the north and south eaves should be removed as it is not likely that the house originally had gutters, but first the site drainage issues (see above) should be remedied. A 12-16" wide gravel strip should be installed in the ground below the north and south eaves.

G. Siding and Trim

- A priority would be repainting the exterior, which is showing signs of peeling and paint deterioration which will allow siding and trim to get wet and decay.
- Hand scrape off paint that is not tenaciously adhered to the substrate, hand sand ALL surfaces, feathering edges of remaining adhered paint. Assume existing paint contains lead. Take suitable precautions required by law to protect workers and prevent spread of paint dust to adjacent properties. Follow recommendations of National Park Service Preservation Brief #10 -Exterior Paint Problems on Historic Woodwork.
- Paint with one coat oil based primer and two coats acrylic alkyd house and trim paint
- Replace siding boards show splitting with pine clapboards to match (±1% on the north side, ±2-3% on the west side, ±5-7% on the south side, ±2% on the east side. Fill holes on the south side.
- Patch, caulk, or otherwise fill exterior siding where gaps of daylight appear between siding and sheathing at the gable ends.

H. Windows and Doors

- Repair historical sash that are stored in the house (approximately 12). Strip paint, remove loose glazing putty, and glass that is not well secured. Inspect corner joints and reinforce with hardwood dowels with resorcinol glue. Re-glaze where necessary. Remove modern replacement sash and reinstall refurbished historical sash.
- Scrape and paint all frame and exterior casings.
- Install window head flashings at window heads except where they exist (south side and east side of floor 1, the kitchen window, and west side of floor 2).
- Replace door casings at the south door (101)
- Remove screen door stops on the jambs at south door (101).
- Replace exterior casings, sill, and apron at east door (106) and install head flashing.

II. RECOMMENDATIONS FOR INTERIOR MATERIALS AND CONDITION BY ROOM

A. General

- Hand scrape off paint that is not tenaciously adhered to the substrate, hand sand ALL surfaces feathering edges of remaining adhered paint. Assume existing paint contains lead. Take suitable precautions required by law to protect workers and prevent spread of paint dust to adjacent properties.
- Paint with one coat latex primer and two coats latex finish paint.

B. Floor 1

105 Old Kitchen

- Repair/replace damaged flooring at the north side. See C. Floor Framing above.

106 Pantry/Lavatory

- Remove toilet and lavatory and patch floor and wall.

107 Kitchen

- Remove artificial brick at the east wall. Patch existing as required.
- Reinstall door (109) to the basement on its hinges.
- Patch stove pipe hole in the ceiling with plaster to match existing.

C. Floor 2

- Remove 2x4 and sheetrock partition of Closet 205

D. Attic -

- See item under E. Siding and Trim above.

III. RECOMMENDATIONS FOR WINDOWS

Window #	
Floor 2	
2.3	Replace stool or fill splits with epoxy
2.4	Fill splits in stool with epoxy
2.5	Fill splits in stool with epoxy
2.7	Fill splits in stool with epoxy
2.8	Fill splits in stool with epoxy
2.9	Fill splits in stool with epoxy
Attic	
A.3	Replace lower sash so meeting rails align. Install full length inside stops and parting bead.

IV. RECOMMENDATIONS FOR BUILDING SYSTEMS

Mechanical

Septic

- Reconnection and reactivation of the septic system is not contemplated.

Plumbing

- Reconnection and reactivation of the plumbing system is not contemplated.

Heating:

- If the house is not to be occupied or used during the heating season a central heating system is not necessary. However, the interiors of buildings that are unheated for several years deteriorate, typically with cracked and flaking paint and cracking plaster. This is caused during warm spells, especially in the winter, when warm moist air comes into contact with cold material surfaces. Condensation forms, often with water dripping off overhead beams and projections. The remedy for this is generally to maintain an indoor temperature that is higher than the dew point in the winter. Electric baseboard heating or ceiling mounted electric fan-forced coil heaters, similar to those in the basement, should be installed and set at a low thermostat setting. This will require partially reactivating the electrical system on Floors 1 and 2.

Electrical

Security and fire detection:

- Installation of a fire detection system is recommended.
- Installation of security cameras may be considered.

Power and Lighting

- Further reconnection and reactivation of the electrical system is not contemplated.

The Detailed Construction Cost Estimate is on the following pages. This represents the anticipated Construction Contract price. However additional costs should be recognized in establishing the Total Project Cost. These include design fees for developing the contract bid documents and supervision of construction and for engineering for permits that may be related to drainage remediation, and a Construction Contingency (or Owner's Contingency) to cover unforeseen conditions that may arise during construction. Additionally, if the project (or projects) are delayed beyond the assumed mid-point of construction indicated in the estimate cost escalation should be added for each additional quarter.

The Construction Cost Estimate includes a Design Contingency. The Design Contingency is not a design fee. The cost estimator includes this factor at this preliminary stage of the design, because final design documents including details, site design, engineering drawings, etc. have not been completed yet. The Design Contingency anticipates additional cost items that may develop during the design process. The amount of the Design Contingency and the General Contractor's Fee depend on the raw cost of construction.

These costs should be estimated at the following recommended percentages:

- Design fees 10-15% X Estimated Construction Contract Cost
- Construction Contingency 10-15% X Estimated Construction Contract Cost
- Escalation 1.25% per quarter (5% per year)

Because the building is owned by the Town construction work may have to adhere to the laws for public construction in terms of bidding procedures and prevailing wage requirements. For small to medium size projects this can add costs that a typical small contractor s not used to, thus narrowing the selection of bidders willing to take on the project. According to the cost estimator building contractors are quite busy these days, so they are charging more for their work. Other sources I have spoken with concur. Lack of competition in bidding due to current market conditions translates into higher bids for the work.

ESTIMATED COST OF TREATMENT RECOMMENDATIONS BY PRIORITY

* Immediate: 2 years to mid point of construction
 Short Term: 5 years to mid point of construction
 Long Term: 10 years to mid point of construction

Item	TREATMENT	PRIORITY*	COST (\$)	QTY	RATE
Exterior					
A. Site					
1	Establish positive slope away from the foundation at 2%-5% grade starting 6-8" below the siding. It is recommended that a swale be placed along Middle Road, far enough away from the house to facilitate drainage away from the house.	Immediate/Short Term	\$5,575	1	\$5,575.00
B. Foundations					
2	Using steel needle beams and heavy timber wood cribbing, raise the entire structure, including the chimney, above the top of the foundations in a manner that would allow for an entirely new reinforced concrete cantilever retaining wall foundation to be installed. Footings to be 5' wide. Wall to be 12" thick below grade with 4" fieldstone veneer above grade. SOG	Immediate	\$158,404	1	\$158,404.21
3	8" reinforced shotcrete to the inside of the foundation wall	Immediate	See below	945	\$20.00
3A	4" concrete slab on grade at Basement w/WWM, insulation & 6" gravel substrate	Immediate	See below	861	\$15.00
C. Floor Framing					
4	The north half of the first floor framing will require a combination of reinforcement and replacement, including sill replacement. Portions of this scope will need to precede the lifting/shoring of the structure to remain.	Immediate/Short Term	\$5,510	380	\$14.50
B. Roofs					
5	Remove existing shingles. Replace asphalt shingles and underlayment.	Short Term	\$9,713	1,278	\$7.60
6	Replace roof edge flashings at roof rakes and eaves	Short Term	\$2,015	155	\$13.00
C. Chimney					
7	Replace spalling bricks on the east side, allow 5 sf	Short Term	\$290	5	\$58.00
8	Inspect and repoint where necessary, allow 20% above Attic Floor	Short Term	\$2,712	113	\$24.00
9	When re-roofing, replace step flashings interleaving with shingles, replace the downslope apron flashing extending it 6 inches over the roofing and hemming it for stiffness.	Short Term	\$351	18	\$19.50
10	Replace the EPDM membrane covering over the top of the chimney with a chimney cap or other permanent measure to keep water out.	Short Term	\$905	1	\$905.00
11	Replace the outer wythe of brick in the attic.	Short Term	\$6,750	135	\$50.00

Item	<u>TREATMENT</u>	<u>PRIORITY*</u>	<u>COST (\$)</u>	<u>QTY</u>	<u>RATE</u>
D. Cornices					
12	Replace cornice moldings and fascia at squirrel holes, especially at the southeast corner, and behind gutters where decayed. Inspect cornice returns close up and new flashings at the tops if missing.	Short Term	\$1,104	24	46
13	Remove the modern aluminum gutters and downspouts on the north and south eaves.	Long Term	\$630	105	\$6.00
14	Install a 12-16" wide gravel strip in the ground below the north and south eaves.	Long Term	\$238	71	\$3.35
E. Siding and Trim					
15	Hand scrape off paint that is not tenaciously adhered to the substrate, hand sand ALL surfaces, feathering edges of remaining adhered paint. Assume existing paint contains lead. Take suitable precautions required by law to protect workers and prevent spread of paint dust to adjacent properties. Paint with one coat oil based primer and two coats acrylic alkyd house and trim paint	Short Term	\$35,169	2,151	\$16.35
16	Replace siding boards show splitting with pine clapboards to match (±1% on the north side, ±2-3% on the west side, ±5-7% on the south side, ±2% on the east side. Fill holes on the south side.	Short Term	\$702	61	\$11.50
17	Patch, caulk, or otherwise fill exterior siding where gaps of daylight appear in the attic between siding and sheathing at the gable ends (2 locations 1ft ± long).	Short Term	\$150	2	\$75.00
F. Windows and Doors					
General					
18	Repair historical sash that is stored in the house (approximately 12). Strip paint, remove loose glazing putty and glass that is not well secured. Inspect corner joints and reinforce with hardwood dowels with resorcinol glue. Re-glaze where necessary. Remove modern replacement sash and reinstall refurbished historical sash.	Long Term	\$7,360	12	\$613.36
19	Scrape and paint all frame and exterior casings.	Short Term	\$1,564	287	\$5.45
20	Install window head flashings at window heads except where they exist (south side and east side of floor 1, the kitchen windows, and west side of floor 2).	Short Term	\$677	41	\$16.50
21	Replace door casings at the south door (101)	Short Term	\$235	20	\$11.75
22	Remove screen door stops on the jambs at south door (101).	Short Term	\$65	1	\$65.00
23	Replace exterior casings, sill, and apron at east door (106) and install head flashing.	Short Term	\$512	23	\$22.25
Window #					
Floor 2					
24	2.3 Replace stool or fill splits with epoxy	Long Term	\$45	1	\$45.00
25	2.4 Fill splits in stool with epoxy	Long Term	\$45	1	\$45.00
26	2.5 Fill splits in stool with epoxy	Long Term	\$45	1	\$45.00
27	2.7 Fill splits in stool with epoxy	Long Term	\$45	1	\$45.00
28	2.8 Fill splits in stool with epoxy	Long Term	\$45	1	\$45.00

Item	TREATMENT	PRIORITY*	COST (\$)	QTY	RATE
29	2.9 Fill splits in stool with epoxy	Long Term	\$45	1	\$45.00
Attic					
30	A.1 Replace lower sash so meeting rails align. Install full length inside stops and parting bead.	Long Term	\$519	1	\$519.10

G. Interior

General					
31	Hand scrape off paint that is not tenaciously adhered to the substrate, hand sand ALL surfaces feathering edges of remaining adhered paint. Assume existing paint contains lead. Take suitable precautions required by law to protect workers and prevent spread of paint dust to adjacent properties.	Long Term	\$70,174	1	\$70,174.00
32	Paint with one coat latex primer and two coats latex finish paint.	Long Term	\$18,770	1	\$18,770.00
Floor 1					
106 Pantry/Lavatory					
33	Remove toilet and lavatory and patch floor and wall.	Long Term	\$770	2	\$385.00
107 Kitchen					
34	Remove artificial brick at the east wall. Patch existing as required.	Long Term	\$336	56	\$6.00
35	Reinstall door (109) to the basement on its hinges.	Long Term	\$175	1	\$175.00
36	Patch stove pipe hole in the ceiling with plaster to match existing	Long Term	\$135	1	\$135.00
Floor 2					
37	Remove 2x4 and sheetrock partition of Closet 205	Long Term	\$263	75	\$3.50

H. Mechanical

Plumbing - No work is planned

Heating:

38	Ceiling mounted electric fan-forced coil heater (ProFusion EH-4604B) at each floor.	Short Term	\$746	2	\$373.10
----	---	------------	-------	---	----------

I. Electrical

Security and Fire Detection:

39	New fire detection system	Short Term	\$12,538	2,950	\$4.25
40	New security cameras	Long Term	\$7,000	4	\$1,750.00

Item	<u>TREATMENT</u>	<u>PRIORITY*</u>	<u>COST (\$)</u>	<u>QTY</u>	<u>RATE</u>
41	Power and Lighting Wiring to heaters @ Fl 1 and 2	Short Term	\$350	2	\$175.00
Sub Total Construction Cost			\$352,675		
Immediate - Mid Point of Construction 4Q2018			\$169,489		
	General Condiitons/Requirements	12.00%	\$20,339		
	Bonds	1.25%	\$2,373		
	Insurance	1.50%	\$2,883		
	Builders Risk Insurance		Excluded		
	Building Permit Fee		Excluded		
	Escalation to mid-point of construction 4Q2018	10.25%	\$19,996		
	Design Contingency	15.00%	\$32,262		
	GC's O&P	7.50%	\$18,551		
	Construction Contingency		Excluded		
Immediate - Mid Point of Construction 4Q2018 : Total Construction Cost			\$265,892		
Short Term - Mid Point of Construction 4Q2021			\$76,546		
	General Condiitons/Requirements	12.00%	\$9,186		
	Bonds	1.25%	\$1,072		
	Insurance	1.50%	\$1,302		
	Builders Risk Insurance		Excluded		
	Building Permit Fee		Excluded		
	Escalation to mid-point of construction 4Q2021	27.63%	\$24,342		
	Design Contingency	15.00%	\$16,867		
	GC's O&P	7.50%	\$9,699		
	Construction Contingency		Excluded		
Short Term - Mid Point of Construction 4Q2021 : Total Construction Cost			\$139,013		
Long Term - Mid Point of Construction 4Q2026			\$106,640		
	General Condiitons/Requirements	12.00%	\$12,797		
	Bonds	1.25%	\$1,493		
	Insurance	1.50%	\$1,814		

Item	<u>TREATMENT</u>	<u>PRIORITY*</u>	<u>COST (\$)</u>	<u>QTY</u>	<u>RATE</u>
	Builders Risk Insurance		Excluded		
	Building Permit Fee		Excluded		
	Escalation to mid-point of construction 4Q2026	62.89%	\$77,193		
	Design Contingency	15.00%	\$29,990		
	GC's O&P	7.50%	\$17,244		
	Construction Contingency		Excluded		
	Long Term - Mid Point of Construction 4Q2026 : Total Construction Cost		\$247,171		
<u>Deduct Alternate - Shotcrete to Basement Walls & new SOG ilo of Item 2</u>					
<u>Deduct</u>					
2	Using steel needle beams and heavy timber wood cribbing, raise the entire structure, including the chimney, above the top of the foundations in a manner that would allow for an entirely new reinforced concrete cantilever retaining wall foundation to be installed. Footings to be 5' wide. Wall to be 12" thick below grade with 4" fieldstone veneer above grade. SOG	Immediate	-\$158,404	1	\$158,404.21
<u>Add</u>					
3	8" reinforced shotcrete to the inside of the foundation wall	Immediate	\$18,900	945	\$20.00
3A	4" concrete slab on grade at Basement w/WWM, insulation & 6" gravel substrate	Immediate	\$12,915	861	\$15.00
<u>Net Deduct</u>					
	General Condiitons/Requirements	2.00%	-\$2,532		
	Bonds	1.25%	-\$1,614		
	Insurance	1.50%	-\$1,961		
	Builders Risk Insurance		Excluded		
	Building Permit Fee		Excluded		
	Escalation to mid-point of construction 4Q2018	10.25%	-\$13,601		
	Design Contingency	15.00%	-\$21,945		
	GC's O&P	7.50%	-\$12,618		
	Construction Contingency		Excluded		
	Deduct Alternate - Shotcrete to Basement Walls & new SOG ilo of Item 2		<u>Gross Deduct</u>		-\$180,860

The Levi Wetherbee House was originally constructed in the late 18th century. Work on this building is governed by the 2009 *International Existing Building Code (IEBC)*, the 2009 *International Building Code (IBC)*, and the *Massachusetts Amendments to the International Building Code Chapter 34*.

Use Group - R3 (existing use)

Construction Type - V-b

Chapter 11 Historic Buildings - An *historic building* is defined as listed with the National Register of Historic Places or eligible to be listed per letter from the State Historic Preservation officer (SHPO). See National Register of Historic Places Registration Form signed by Brona Simon of the Mass. Historical Commission dated November 3, 2006.

1101.1 Mass. Amendments - For historic buildings Chapter 11 preempts all other provisions of the Code.

1102.1 Report - A report may be required by the building official identifying features in compliance with Chapt. 11 and where compliance with other provisions would damage contributing historic features.

1103.9 At a grand stair railings and guards need not comply (with 705.9 and 705.10).

1103.10 Repairs to guards shall maintain the level of accessibility.

1105.1 Change of Occupancy - the building must comply with Chapt. 9 (Change of Occupancy) except where permitted in Chapt. 11. The provisions of 1103.7 and 1103.9 prevail (per 1105.10 and 1105.11).

Chapter 9 - Change of Occupancy

Not applicable at this time.

Chapter 7 Alterations - Level 2

701 All new construction elements, components, systems, and spaces shall comply with IBC

Chapter 6 Alterations - Level 1

Not applicable at this time.

Chapter 5 Repairs

506.2. Repairs to damaged buildings - Where there is less than substantial structural damage (particularly damage to vertical load bearing elements) damaged elements may be restored to their pre-damage condition (506.2.1). Where there is substantial structural damage the lateral force resisting system shall be evaluated and repaired per Code.

Chapter 6 Types of Construction

Chapter 3 Use and Occupancy Classification

Section 310 - Residential Use Group

310.1 - R-3 Residential occupancies where occupants are primarily permanent in nature including Buildings that do not contain more than two dwelling units. *(No change in Occupancy Classification from previous use).*

Massachusetts Architectural Access Board regulations 521 CMR

Do not apply to Use Group R-3.

Conclusions

The current plan is to preserve the Wetherbee House without uses that require human occupancy. This would be a use similar to storage (S use group). Human occupancy requires providing water service, upgraded finishes, mechanical and electrical systems (2009 IBC section 1205), water service and toilet rooms (plumbing code 248 CMR 10.02.1), fire alarms, and temperature control. It is questionable whether a building used for display of artifacts could be considered in this category or would be considered a museum, which be in use group A-3 (Assembly) which would imply public access and barrier-free accessibility. However, there are provisions in the Mass. Amendments (Chapter 34) to the Existing Building Code for a "house museum" (1101.3) which allow more flexibility to the Building Official.

Government Documents

Federal Government

Secretary Of The Interior's Standards For Reconstruction And Guidelines For Reconstructing Historic Buildings

Commonwealth of Massachusetts

A. Forbes, Mass. Historical Commission Inventory form (Form A for 484 Middle Road. 2001 BXB.A)

National Register of Historic Places Registration Form for the Levi Wetherbee Farm by Brona Simon, November 3, 2006

Prior Studies

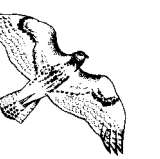
FOUNDATION ASSESSMENT for the 1754 Levi Wetherbee Farmhouse, by Groton Engineering, LLC, June 17, 2014

**The
LEVI
WETHERBEE
HOUSE**

**Conditions
Assessment**

484 Middle Road
Boxborough,
Massachusetts

**RED
HAWK
STUDIO**
ARCHITECTS, INC.



18 Main Street
Concord,
Massachusetts
01742
978 369 2340

date: november 23, 2016

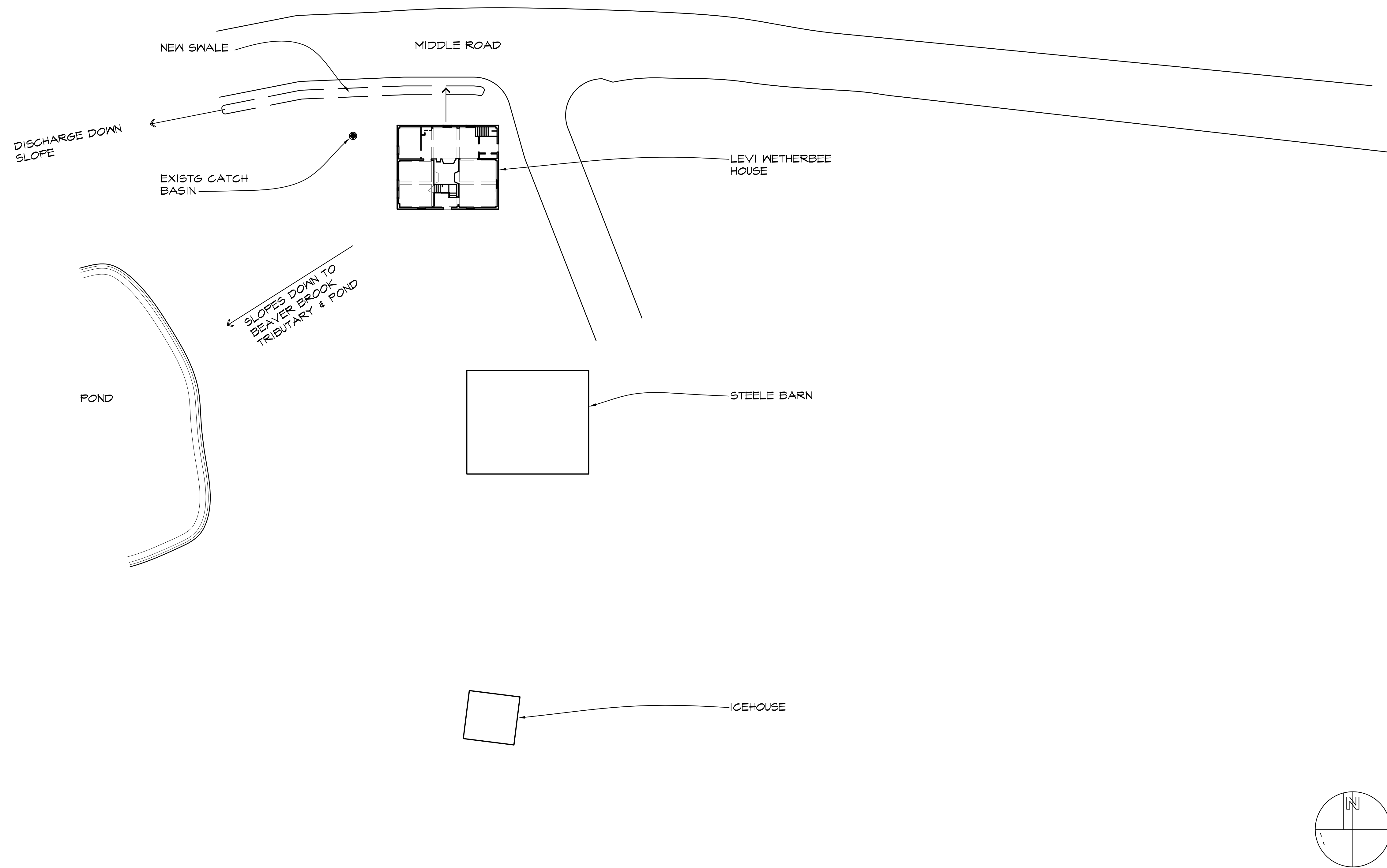
Revisions

NONE

Site Plan

L1.0

scale: 1" = 20'-0"

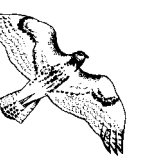


**The
LEVI
WETHERBEE
HOUSE**

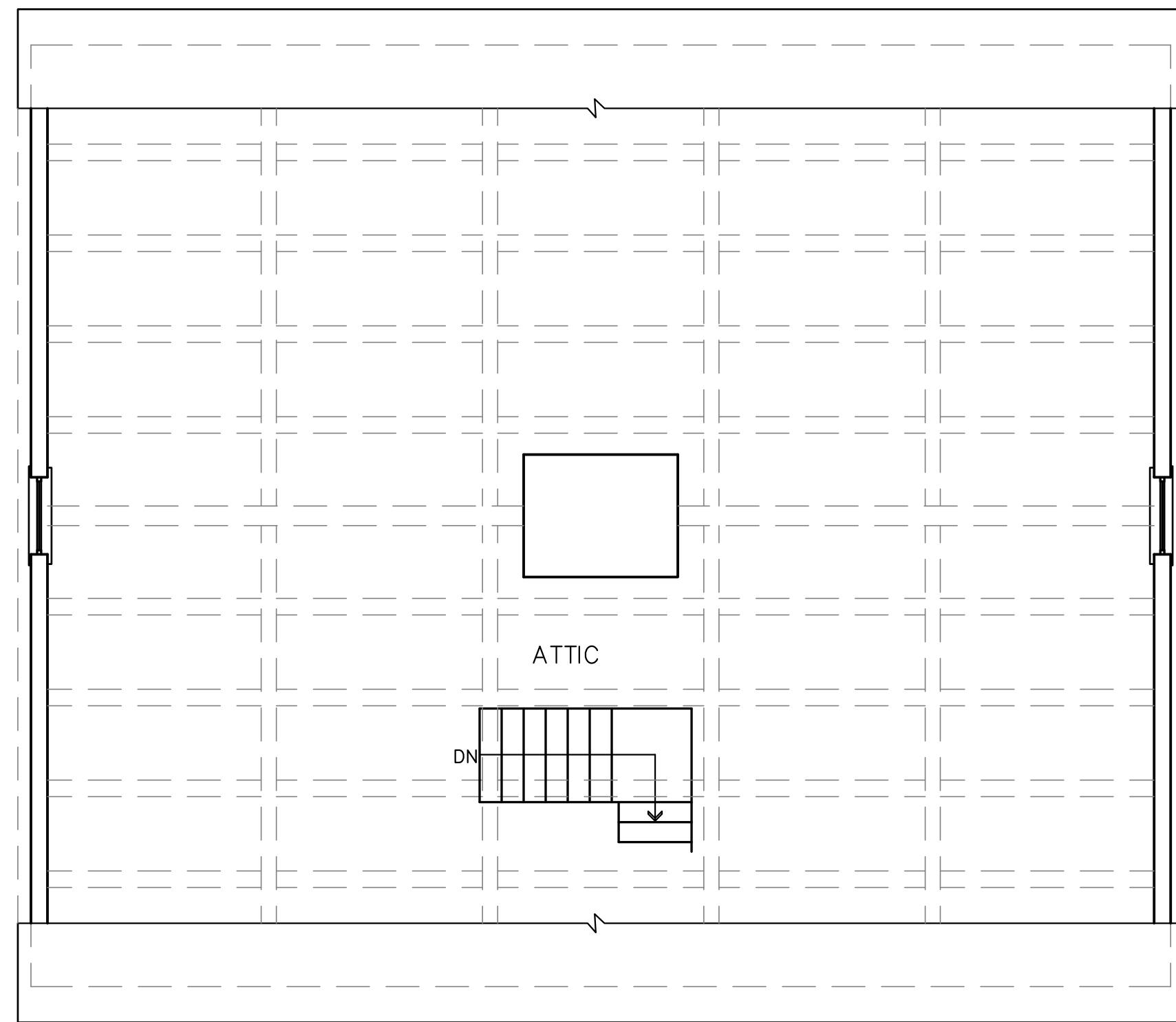
**Conditions
Assessment**

**484 Middle Road
Boxborough,
Massachusetts**

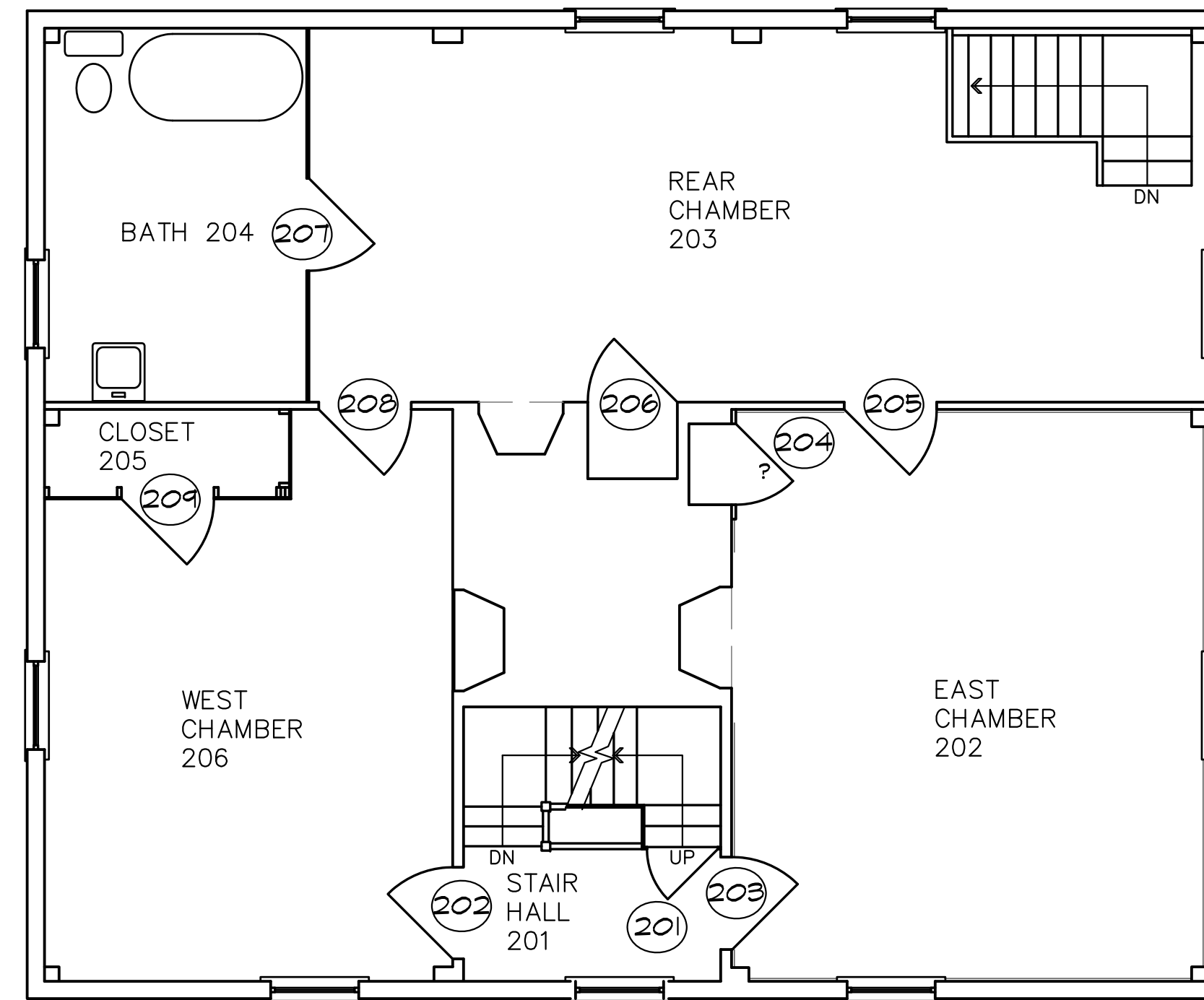
**RED
HAWK
STUDIO**
ARCHITECTS, INC.



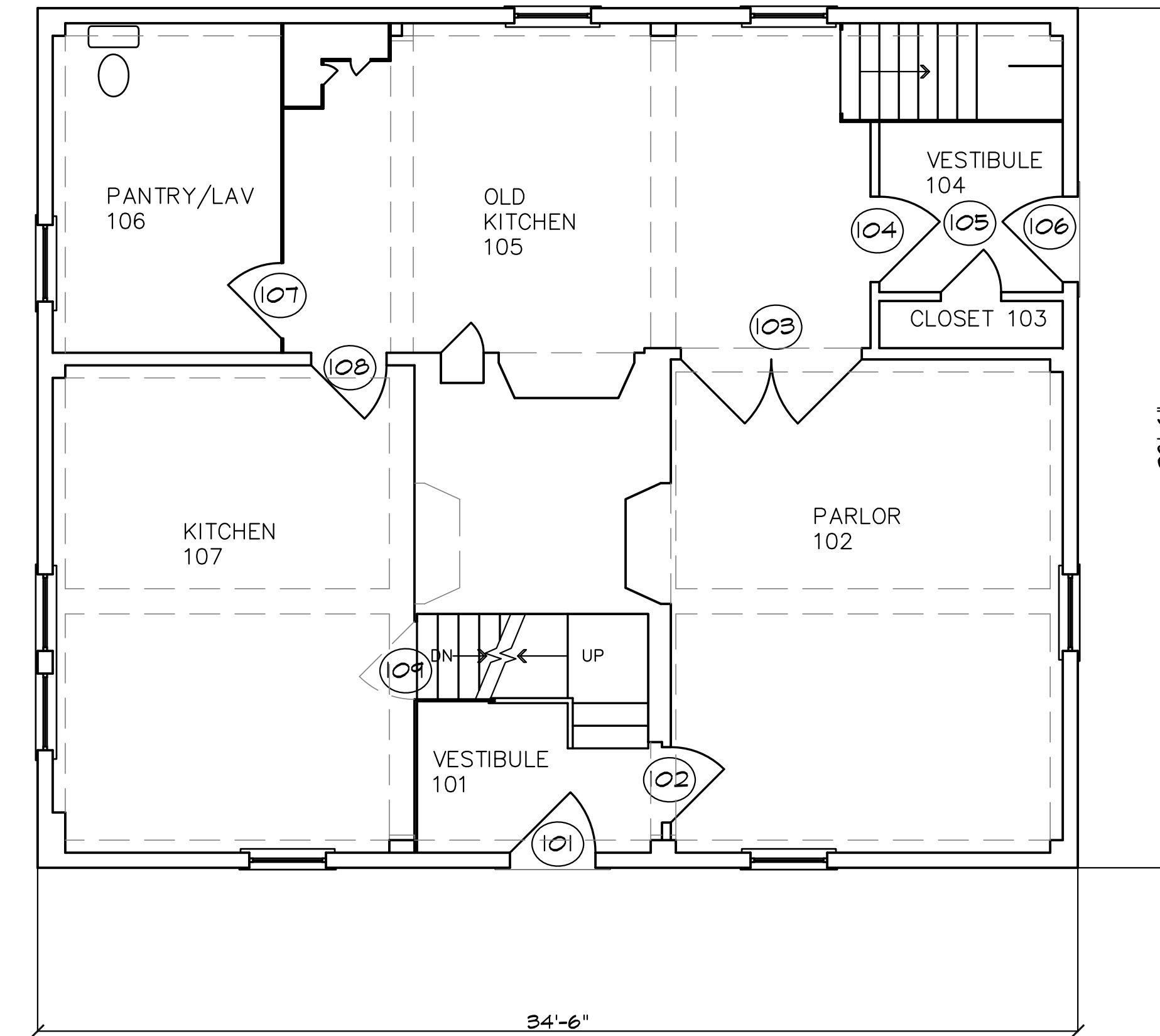
18 Main Street
Concord,
Massachusetts
01742
978 369 2340



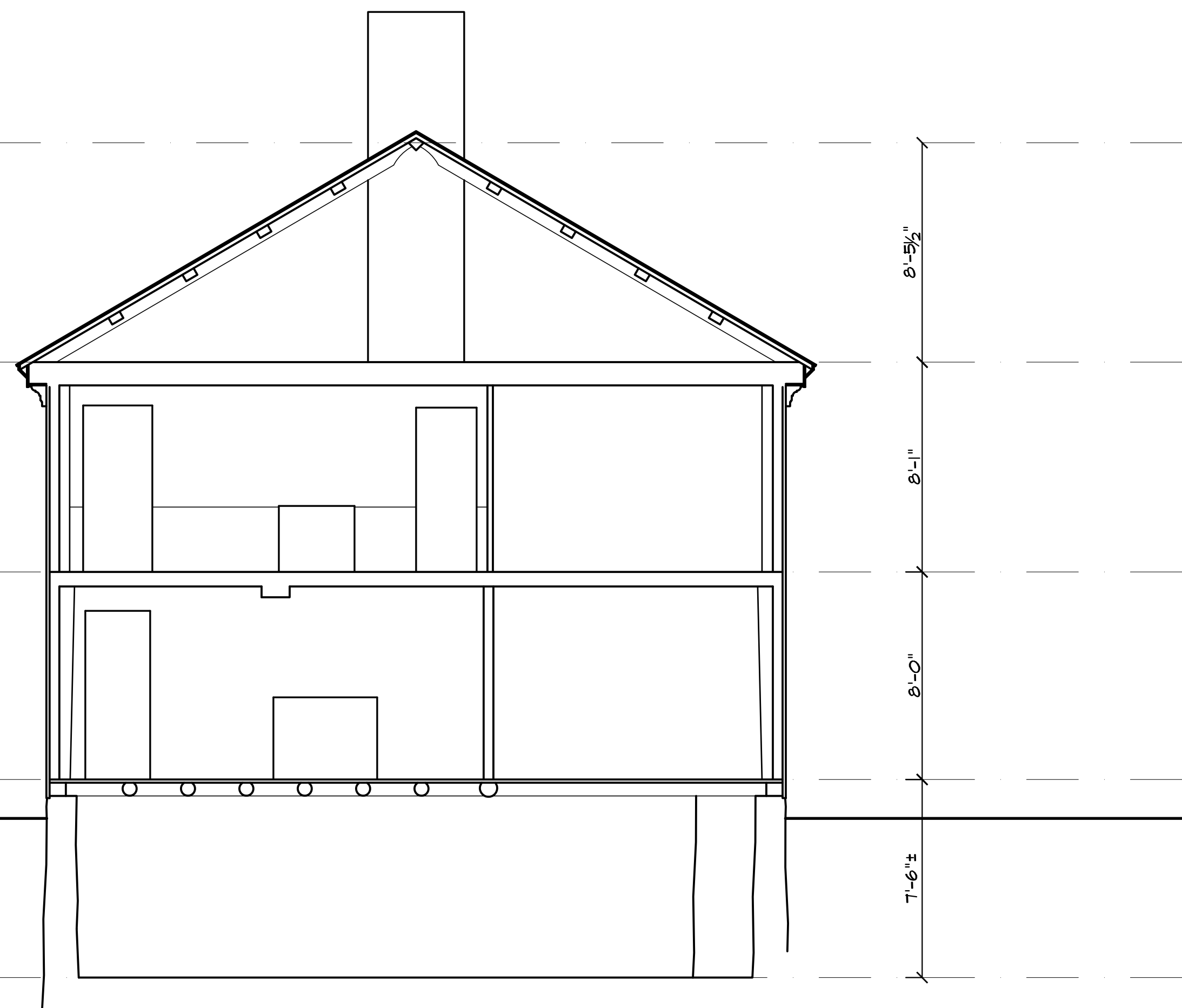
Attic



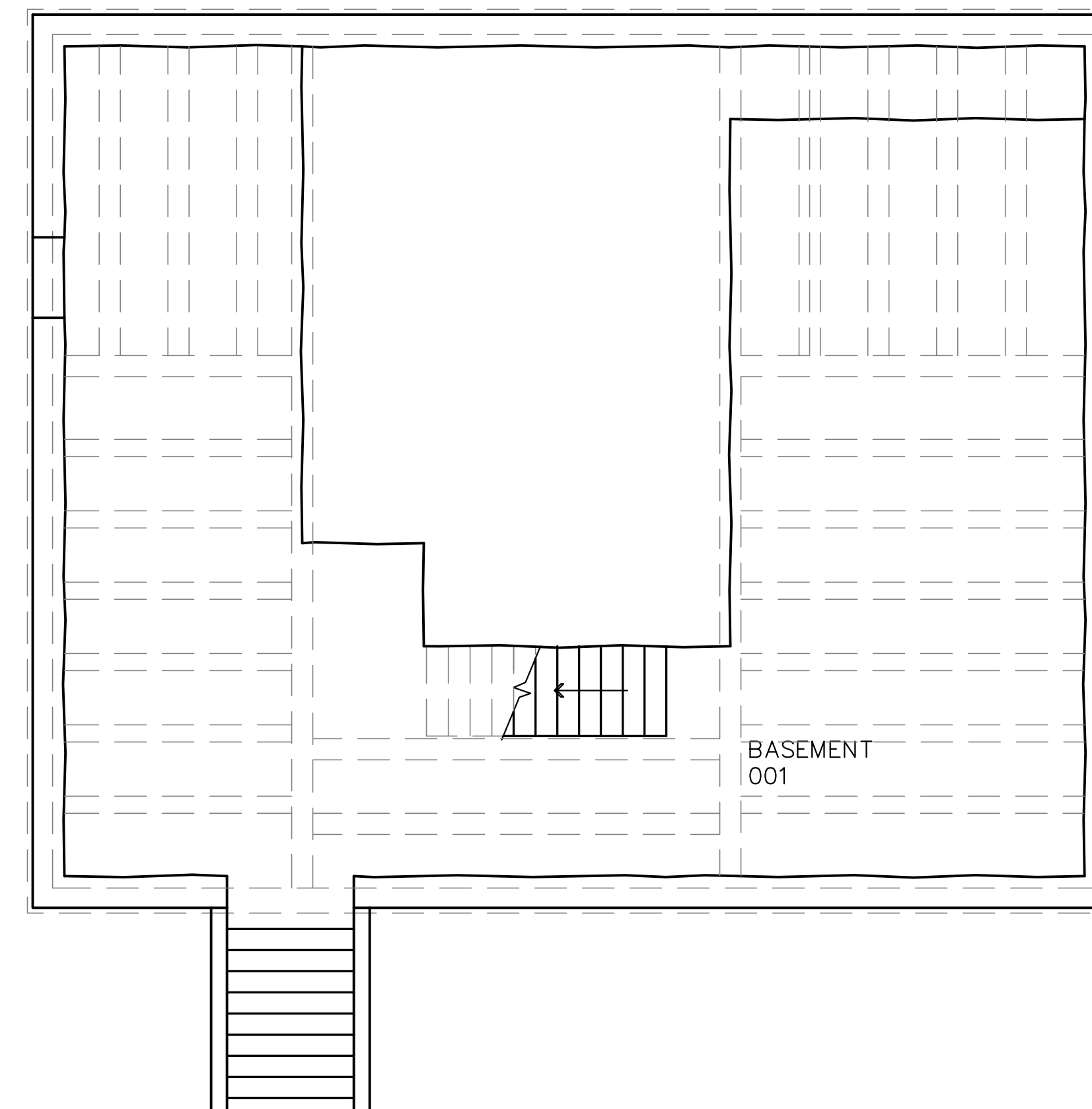
Floor 2 Plan



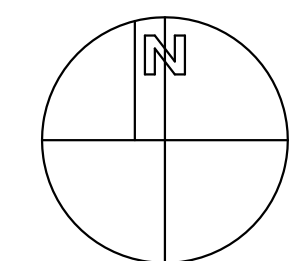
Floor 1 Plan



Transverse Section



Basement Plan



date: october 21, 2016

Revisions

NONE

**Existing Plans &
Section**

X1.1

4' 8' 10'

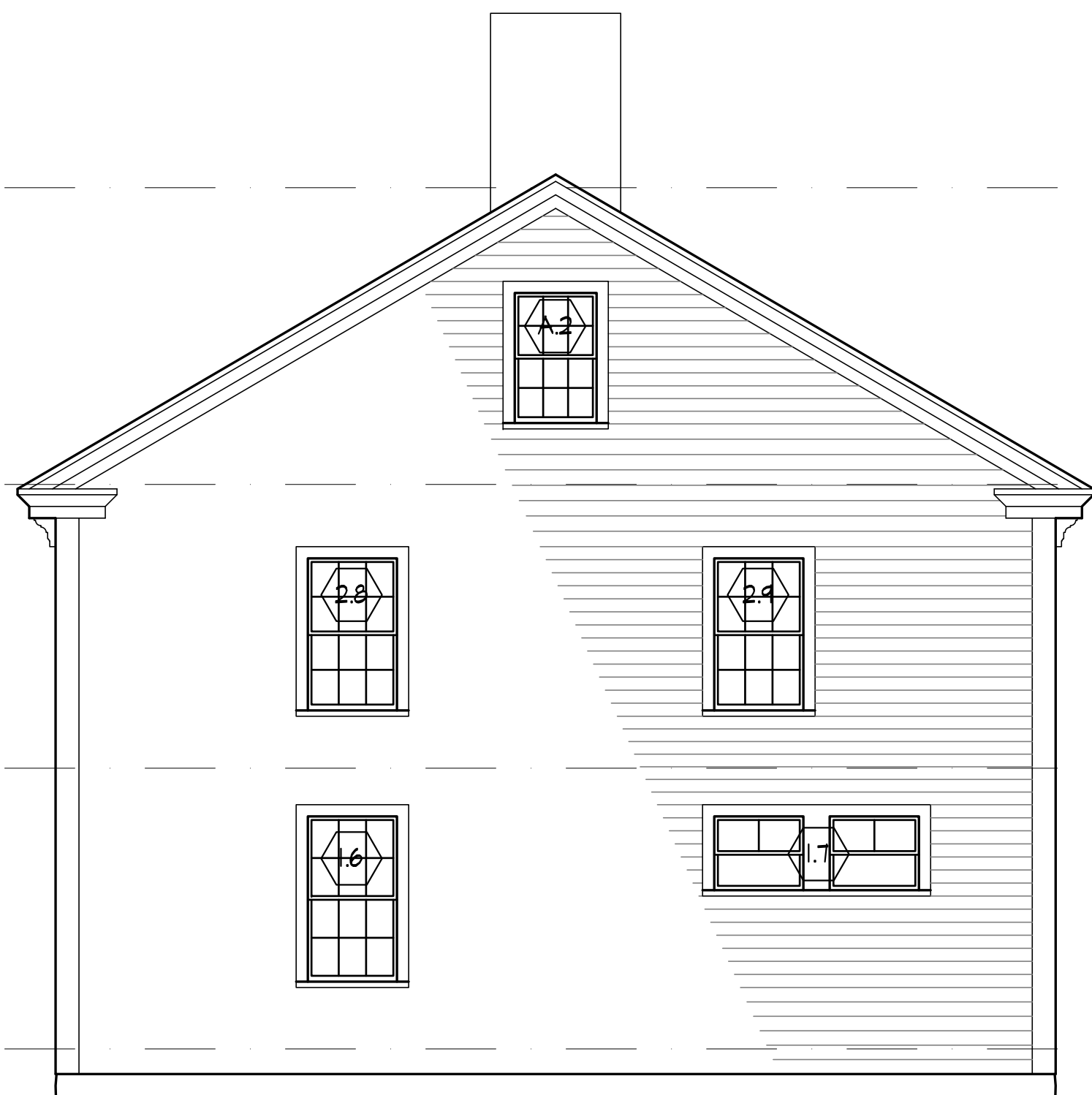
scale: 1/4" = 1'-0" uno



South Elevation



East Elevation



West Elevation



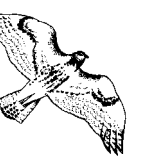
North Elevation

**The
LEVI
WETHERBEE
HOUSE**

**Conditions
Assessment**

484 Middle Road
Boxborough,
Massachusetts

**RED
HAWK
STUDIO**
ARCHITECTS, INC.



18 Main Street
Concord,
Massachusetts
01742
978 369 2340

date: november 23, 2016

Revisions

NONE

Existing Elevations

X1.2

scale: 1/4" = 1'-0" uno



Chimney



Historical sash stored in the house



Condition at southeast cornice return. Note cornice below soffit.



Condition at southeast cornice return. Note sheet metal repair.



Sagging floor at north side of the Old Kitchen.



Wainscot and cornice at the East Chamber, floor 2.



Mantelpiece at the East Chamber, floor 2.



Gaps in the gable end siding and sheathing at the attic.



Artificial brick at the modern Kitchen.



Failure of the stone foundation at the chimney.



Typical condition of paint. East side shown.