

Town of Lincoln

Building Needs Assessment

16 Lincoln Road
Lincoln, Massachusetts

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Executive Summary

The Town of Lincoln selected McGinley Kalsow & Associates, LLP (MK&A), Architects and Preservation Planners to conduct a building needs assessment of six town owned buildings. These buildings are: Bemis Hall at 15 Bedford Road, Lincoln Town Hall at 16 Lincoln Road, The Pierce House at 3 Weston Road, Public Safety Building at 169 Lincoln Road, The Houses & Barns on Codman Farm at 58 Codman Road, and the DPW Garage at Lewis Street. Independent of this work, the Town of Lincoln engaged Jackson Home Inspection to conduct an assessment to town owned houses at 65 and 75 Tower Road. As a convenience we have reprinted the Tower Road report as an appendix to this report.

MK&A was tasked with making a comprehensive assessment of the condition of the town's buildings, to assist the town in developing an investment plan for making necessary improvements and for predicting and planning for future improvements. For the purposes of this analysis, it was assumed that the town buildings will continue to be utilized as they are currently. It should be noted that this study did not include an assessment of the programmatic needs of the departments and the degree to which building enhancements may be required in order to accommodate new programmatic requirements. Before any long-term investment plans are finalized, the town will need to evaluate evolving programmatic needs and determine where programmatic considerations are important factors in determining whether to pursue a particular investment and in what sequence.

The building needs assessment is organized as follows

- ◆ Building Envelope
- ◆ Structural
- ◆ Accessibility and Code Compliance
- ◆ Mechanical
- ◆ Electrical
- ◆ Preliminary Cost Estimate

The assessments also involved a review of all documentation of work previously performed on the buildings, meetings with various town officials associated with each structure to

understand known deficiencies, an on-site survey, and tests necessary to assess structural integrity, with provision of a report outlining the findings on each structure, including preliminary cost estimates and prioritization of any deficiencies or suggested improvements noted.

We wish to acknowledge and thank: Tim Higgins, Town Administrator, Anita Scheipers, Assistant Town Administrator and Earl Midgley, Town Building Inspector for their assistance during assignment. MK&A was assisted by Structures North Consulting Engineers Inc., Structural Engineers and Johnson Engineering and Design Inc., Mechanical electrical engineers.

These buildings span 200 years of design and building technology, however there is no correlation between a building's age and its condition. All of the buildings have numerous deficiencies, which need to be addressed with an organized program of repairs and restoration. There are a number of repairs identified as "urgent" and we recommend that they be addressed in 2006. These items are generally active or very likely leak or safety issues. "High priority" items are recommended to be repaired in 2007; "normal priority" items by 2008-2009 and "low priority" by 2010-2011. Simply following the prioritization of needed repairs will not result in very efficient design, bidding or construction. Sometimes it will be most efficient to group many repairs together at one or two buildings into a design and contracting package. Other times it may be best to group work needed at several buildings but of one trade together into a single design and contracting package. Other small items, which are basically routine maintenance but are beyond town staff capabilities, should be dealt with a simplified procurement process.

Bemis Hall, Town Hall, Pierce House and Codman Farm are all significant historic buildings. The repairs and renovations of these buildings should include restoration of character defining elements. All work on these buildings should follow the Secretary of the Interior's *Standards for Historic Preservation*.

Bemis Hall



Bemis Hall was constructed in 1892 and served as the town hall until the 1980's. The asphalt shingle roof, copper gutters, flashings and downspouts all need to be replaced. There are also numerous repairs to the cupola and masonry, which should be done at the same time as the building is staged for roofing. Consideration should be given to the decision on whether to replace the roof with another asphalt shingle roof or restore the original slate roof. Life cycle costing of slate roofs is often less expensive than asphalt shingle roofs. The lack of an accessible front door on a facility that serves the elderly is a significant deficiency.

Town Hall



The Town Hall was constructed in 1908 as the Center School Building. It was used by the Lincoln School system until the 1980's, when town offices were moved into the building. Although the building does have some building envelope issues, its major deficiencies are functional. These deficiencies include: A non accessible second floor, open stairways that have no fire separation, a record storage room that does not meet the secretary of state requirements for a 6 hour rated vault and a clear need for a modern HVAC system. We believe that the open stairways present a fire hazard, which is not fully addressed by the exterior fire escapes. Rather than to approach these items individually, we recommend that consideration be given to a comprehensive renovation of the town hall. A significant increase in usable area on the ground floor could be gained.

Pierce House



The Pierce House was constructed in the late 19th century and serves as a meeting and function facility. There are selective but rather numerous repairs or replacement needed on exterior decorative wood elements of the house. The accessible brick ramp leads to a 6" step and kitchen side door, which is not normally used by the public. A fully accessible main entrance should be constructed by adding railings to the existing walk

and modifying the existing porches. Food preparation for the public is taking place in a kitchen that does not meet commercial kitchen standards. There is also the need to construct accessible first floor men's and women's bathrooms.

Public Safety Building



The older section of the Public Safety Building was built in 1966 with a major addition and remodeling in 1999. As one might expect with such a modern building, the list of deficiencies is fairly short. There is however, an active leak between the built-in gutters and the interior downspout, which should be fixed before this winter. After the two remaining "compact" 1999 roof top units are replaced with "standard" roof top unit; air balancing and remedial repairs are needed to make the HVAC system work properly. Consideration should be given to the installation of operable windows.

Codman Farm



The Codman Farm is a complex of six buildings and the surrounding fields and community garden.

The six buildings are:

Farm House: Built in the 1860's and contain one residential unit used by the farmer hired by the Codman Farm Trust and one apartment unit.

Farmhouse: 3,254 Sq. ft

Barn A: Built 1792, 747 Sq. Ft.

Barn B: Built early 19th century, 2926 Sq. ft.

Barn C: Built ca. 1876, 2880 Sq. ft.

Barn D: Built 1998

Hen house: Built 2000

The only significant roofing work that is needed on the complex of buildings is on the farmhouse. There are numerous structural framing and stone masonry issues that need to be addressed at many of the barns. There has been great leadership demonstrated by the Codman Farm Trust and Town in correctly prioritizing and completing the most needed repairs over the last ten years and doing this with good workmanship and a remarkable economy. A connection between the Codman Farm and The North Bennett Street School preservation carpentry program might be advantageous

in securing high quality, low cost repairs to some of the smaller barns.

DPW Garage



The DPW Garage and office is a single level, somewhat sprawling facility that was constructed in multiple phases. There is the need for two additional passage doors for egress. There is the need for various structural, mechanical, electrical accessibility upgrades, which are modest in cost compared to a new facility. The existing DPW Garage is very utilitarian and should continue to be very serviceable. However, it is not a very energy efficient structure. Major upgrades to the existing building envelope are not recommended. At a certain point in the future, the building should simply be replaced with a more modern facility.

ACCESSIBILITY REGULATIONS AND DESIGN

The extent of compliance with the Massachusetts Architectural Access Board regulations that is required by any construction or repair project depends on the cost of repairs in relationship to the assessed value of the buildings. There is a 36-month window, which combines the cost of all repairs within any 36-month period. Some repairs are exempted if they total less than 30% of the assessed value of the building. It is important to review the impact of accessibility on each project as the specific scope is being defined and construction costs estimated.

Accessibility work is often required by code due to unrelated repairs and renovations to a building. According to the regulations of the Massachusetts Architectural Access Board (MAAB), the extent of compliance depends upon the “full and fair cash value” of the building without land. The “full and fair cash value” of the building is normally considered the assessed valuation of the building equalized at 100% valuation. The MAAB has established three levels of compliance that are based on the value of construction in relationship to the “full and fair cash value” of the building:

1. If the value of the work being performed is **less than 30% of the “full and fair cash value” and is less than \$100,000**, only the work that is

- being performed needs to conform with MAAB regulations.
2. If the value of the work being performed is **less than 30% of the “full and fair cash value” and is greater than \$100,000**, the work being performed needs to conform with MAAB regulations. In addition, an accessible public entrance and an accessible public toilet must be provided. Furthermore, if the building has a public phone or a public drinking fountain, these too must also be accessible.
 3. If the value of the work being performed is **greater than 30% of the “full and fair cash value”**, the entire building must conform to the requirements for new construction.

There are several qualifications for these general requirements. Certain work such as roof repair or replacement, window repair or replacement, repointing and masonry repair work is exempt as long as the total cost of this work is less than 30% of the “full and fair cash value” of the building. In addition, alteration work that is limited solely to electrical, mechanical, or plumbing systems is also exempt provided that the total cost of this work is less than 30% of the “full and fair cash value” of the building.

ADA (Americans with Disabilities Act) is separate from the MAAB and focuses on making services available to those public and accommodation for employees. Compliance with Lincoln’s ADA transition plan should be regularly reviewed.

When accessibility improvements are planned it is important that they be well designed, like the front entrance to the town hall, and not halfway measures like access to the Pierce House, or the ground floor of the Town Hall.

Other considerations:

The scope of this building assessment did not include lead paint, asbestos, or pest problems. We recommend that paint and asbestos tests be conducted before any major work is undertaken. Although not part of our scope or expertise, pest problems were observed at several buildings and should be

promptly addressed.

PRELIMINARY COST ESTIMATES

The preliminary cost estimates use 2006 construction costs. Budgets for future work should be increased by the anticipated cost of inflation. It is important that the selected designer thoroughly review site conditions and up to date estimated construction costs based on that information.

TOWER ROAD HOUSES

Jackson Home Inspection conducted a needs assessment of 65 Tower Road and 75 Tower Road, which has been reprinted in the appendix to this report.

BUILDING SYSTEMS CHECKLIST

The major categories are organized according to the “Town Owned Building Needs Analysis, Building Systems Checklist”. See Appendix. While we did not use the identical subcategory organization as shown on the Building Systems Checklist since we had written significant portions of the report before receiving the checklist, we have addressed all the subcategory items.

Bemis Hall

Description



Bemis Hall was constructed in 1892 and served as the town hall until the 1980's. The building integrates a rich classic vocabulary from many styles into a well-proportioned building. There is extensive use of glazed off-white terra cotta trim on Bemis Hall. The entry is a Palladian design with Corinthian columns. The roof is surmounted by a large spired cupola. The two-story brick building is approximately 74'x47' and contains 7,250 total square feet. Bemis Hall is used by the Council of Aging.

BUILDING ENVELOPE



B-1 The building originally had a slate roof, which was replaced approximately 25 years ago with a black asphalt shingle roof. The building's copper gutters and flashings were not replaced at that time. The asphalt shingles are still serviceable but are showing their age with shrinkage between shingles, and they should be replaced in about five years. At that time, all of the building's flashings and gutters should be replaced. The small basement stair roof at the rear of Bemis Hall is quite weathered and brittle. We have priced a new asphalt shingle roof in our prioritized cost estimate. Although, the first cost of slate roof is significantly more than asphalt, the life cycle cost of slate is usually less if slate is considered. We strongly recommend that only natural slate be considered for the slate option, since faux slate has a very mixed performance record.



B-2 The horizontal cornice at the front and back of the building is covered with tin coated steel sheet metal. There is one open seam on the west elevation, which needs to be caulked this summer with a good quality urethane sealant. The rear horizontal cornice was not accessible via the town's tree trimming lift because of the cemetery during our inspection, and should be checked by a contractor to see if a similar condition exists.





B-3 The horizontal cornice sheet metal roofing is also starting to rust. Painting is no longer effective at controlling the rust. The horizontal cornice roof should be replaced at the same time as the main roof is done with *zinc-coated* copper.

B-4 The large cupola is in fair condition. The roof of the cupola is black slate, which appears very serviceable however, on the spire section of the roof, some of the copper hips have blown off and need to be replaced. The baluster railing is in need of a comprehensive restoration; several balusters are missing and temporary repairs have been made to the decorative top rail. Because of the need for staging to be placed on the main roof, we recommend that this work be done at the same time as the main roof. There is a need for staging to be placed on the main roof; therefore, we recommend that this be implemented while replacing the main roof. Paint cupola when repairs have been completed.



B-5 There is a rusted exhaust vent on the northeast corner of the roof, which needs to be replaced in a couple of years.

B-6 The small second floor balcony has a very old flat seam copper roof and gutter, which should be replaced at the same time as the main roof. We recommend a new flat seam copper roof as the most durable roof for this type of balcony. Some baluster and railing repairs and painting will be needed as part of the roofing work.



Walls, Windows and Floors

B-7 Part of the north elevation of Bemis Hall is covered by dead vines. These vines keep the masonry wet for long periods and detract from the building appearance. It is a simple job to remove the vines.



B-8 The brick chimney at the north elevation of the building has a small tree growing out of the brickwork at the top of the chimney. The mortar on the exterior of the chimney appears to be in adequate condition; however, the mortar inside the chimney near the top is in poor condition. The chimney also tilts southward, which suggests that mortar has debonded and that the chimney should be rebuilt from the roofline to the top of the chimney.



B-9 Portions of the exterior brick and terra cotta masonry have eroded mortar joints and are in need of repointing. These include the following areas:

- The northern third of the front (west) elevation at the first floor level, along with second floor “plaques” each side of raised bay.
- The east end of the main north elevation and surrounding the bottom of each rake in the north elevation’s projecting gable.
- The top north corner of the rear (east) elevation, near the eave, and the south end of the rear elevation’s raised center section.
- The west end of the south elevation, second floor and the east of the south entrance.

These areas should have all unsound mortar removed from the joints. The joints should then be repointed with new, matching compatible mortar.

B-10 Portions of the projecting brick cornice that align with the second floor have deteriorated to the point that they must be dismantled and rebuilt. These include the following:

- The extreme north and south ends of the front elevation and the north end south quarter point of its raised from “bay.”
- The extreme west end of the north elevation.
- The extreme north and south ends of the rear elevation and two areas that are south of the raised “bay’s” north and south elevation.
- The east and west ends of the south elevation.
- All loose brickwork in the cornice should be removed to a depth where sound masonry is reached, and then reconstructed to match the original construction. Consideration should be given to providing metal flashing to protect the shouldered portions of the cornice, typically to the north and south of the front and rear elevations’ raised bays.



B-11 The bottom of the exterior door for the basement stair is in poor condition and needs to be replaced. Likewise, the adjoining light is not working and should be replaced.

B-12 The main roof eave cornice is very deteriorated at the southwest corner of the building, (extending several feet to the north and east) and must be dismantled and reconstructed.

B-13 The first floor windowsills, at the south elevation are deteriorated, have shifted and must be reset.

B-14 The mortar wash atop the south elevation's terra cotta "portico," has delaminated and lifted off the terra cotta. Several of the terra cotta units have cracked or chipped. The terra cotta units should be restored with patching mortars and injections adhesive and a new metal flashed mortar wash should be created atop them.



B-15 Abandoned metal brackets, on the south end of the rear elevation, should be removed.

B-16 On the west elevation, sparrows are nested in the top most cornice bracket. Moisture from the nesting will rust the tin plated sheet steel bracket. The bracket should be removed, cleaned, primed, painted inside and reinstalled.



B-17 A granite areaway, on the east elevation, has bulged 3". It should be disassembled and rebuilt.

B-18 Four areaway gratings need to be replaced with new gratings that fit securely on the granite areaways to prevent pedestrians from falling into the areaway. Short-term repairs to grates can be made if replacement of the grates is delayed.



B-19 There is a few cracked or broken windowpanes that need to be replaced.

B-20 Most windows in Bemis Hall are single glazed double hung windows, which appear to be original to the building with mostly original glass. Four office windows have full wood storms. Many half screen or screen inserts can be seen on other windows. The window sashes are in average condition. Many of the top sash have been painted shut. One Assembly Hall sash has been badly modified from a double hung window to a fixed sash and caulked on both sides. This one window will need to be replaced in the next 5-10 years.

Triple track exterior aluminum storm windows are recommended for all windows. Storm windows will reduce heat loss and energy costs and help preserve the original windows. Before installing storm windows, the upper sash should be freed and the entire window repainted.



B-21 Although not a high priority, the original window sash will certainly benefit from a comprehensive restoration effort, which will involve paint removal, re-glazing with original glass, repairs to joinery and sills, re-roping and weather stripping. Due to the building's daily occupancy and the time involved to complete this project, we recommend that storm windows be first installed.

Summary

The building envelope issues are so extensive at Bemis hall we recommend that they be undertaken one at a time. This will allow the building to be fully staged for a good access by all trades as well as an economy of scale.

STRUCTURAL

Structural Description

Bemis Hall is constructed of load bearing multi-wythe brick walls with terra cotta accents and stone trim surrounding the exterior, resting upon a wet-laid fieldstone foundation.



The first floor structure is composed of wooden planking on dimensional lumber joists supported on timber beams over brick piers at the interior and the foundation walls at perimeter. The second floor structure is composed of dimensional lumber joists on timber beams and posts, and wood stud bearing walls at interior, and pocketed into brick exterior walls at the perimeter.

The roof structure consists of wood plank sheathing on dimensional lumber rafters and purlins, supported upon exposed timber and metal tension rod trusses. The trusses form a cross-buck in plan, following the hipped

configuration of the roof. The intersection between the two crossing trusses supports a spired cupola at the center of the roof.

Structural Recommendations

- S-1 The exposed stone foundation at the south end of the rear elevation is exposed and the mortar joints have been eroded. The stonework should be repointed and the grade restored to protect it.
- S-2 The north chimney tilts southward, which suggests that the mortar joints on its north side have debonded and expanded and the chimney must be rebuilt.

Interior/Basement

- S-3 There is no blocking or direct support below the columns that support the second floor within the central lobby area, and the first floor framing vibrates when the second floor is bounced upon. This condition is partly responsible for the unevenness of the second floor and the first floor ceiling. All first-to-second column and supporting elements should be identified, their loads should be determined and direct support should be provided in the form of wooden blocking and/or joist sistering within the framing plane of the first floor.
- S-4 First floor joist and beam-ends should be checked to verify that the ends have not rotted where they are embedded into the stone foundation.

Interior/First Floor

The first floor shakes when the second floor is bounced upon. This relates to framing conditions that are noted above (see “basement”).

There are cracks in the woodwork around the fireplace mantle of the meeting room at the north end of the building.

These have most likely been caused by fluctuation moisture conditions (swelling and shrinking of the wood) and appear to be an on-going concern with the cracks running through dried sealant and relatively new paint. The flashing and the overall condition of the north chimney should be checked (see “exterior”).

Interior/Second Floor and Roof Truss Framing

The second floor is irregular, with sags and high spots that only in part relate to the framing layout below. Some of this irregularity is due to the lack of bearing element support within the first floor framing (see “basement”) while the rest is due to typical bending deflections of beam and joist spans. Portions of the floor feel relatively soft underfoot but it appears to have historically performed sufficiently under past and present live loads. If any change in use is proposed that would significantly increase the live or dead load on the floor, the framing should be evaluated.

- S-5 The roof trusses look good. The tops of the second diagonal struts from each end are loose and there is a gap above them. This is a common condition that is caused by wood shrinkage and lack of live load. The gaps should be shimmed to prevent bending deformations from occurring in the chords when snow accumulates on the roof and the gaps would typically close.

ACCESSIBILITY AND LIFE SAFETY COMPLIANCE

While recent renovations have addressed accessibility and life safety issues at Bemis Hall, there still are a number of items to be resolved. Egress is of a particular concern because of the use of the building by elderly, and because of the large number of occupants that the auditorium can legally accommodate.

- A-1 When recent renovations were conducted, it was likely that the north exit stairs were viewed as an existing means of egress not requiring upgrading to meet present codes. However, the north stair and its exterior steps and ramps

contain a number of features, which would not be permitted by code in new construction, namely:



- a) Present tread and riser dimensions would be non-compliant. Existing treads are 10½", and risers are 8". (Code would require minimum 11" tread, and maximum 7" riser). This condition may be considered acceptable if the other conditions are upgraded.
- b) There is a handrail only on one side of stair. (Code would require handrails on both sides)
- c) The present handrail is mounted at 28" above the treads. (Code would require 34" minimum height)
- d) There is a head height of 74" in the stair at one point. (Code would require a minimum of 80")
- e) There is a handrail only on one side of the exterior steps (Code requires railings on both sides)
- f) The handrail on the south side of the ramp is not continuous, and does not follow the entire length of the ramp.
- g) The exterior door at the steps, while equipped with exit devices, requires extreme force to operate. This should be fixed immediately.



A-2 The auditorium exit door, which leads to the new enclosed exit stair, does not have panic hardware (exit device). But curiously, the door adjacent to it, which leads to the open stairway, has both an exit sign and panic hardware



A-3 The stage at the auditorium is not accessible.

A-4 The monumental stair at the south end of the building has railings, which are 32" high. If constructed today, the code would require a minimum height of 42" to protect occupants from falling over the edge of the floor opening. While the code does not require correction of this condition, the fact that there are elderly occupants, in a busy circulation area adjacent to the new elevator landing brings concern. The railing and baluster is an important character-defining feature of the stair hall of this historic building, and therefore, modification of the railing must be carefully designed and detailed to preserve the character. Modification would also be an opportunity to replace the four missing balusters.



A-5 Recent renovations provided an accessible men's toilet room, but there is no accessible women's toilet room.

A-6 Door hardware at the administration suite is not accessible.

A-7 The panic hardware at the south door, first floor needs repair.



A-8 The main entrance to the building is not accessible. Since Bemis Hall houses the Council on Aging, we feel that the front door should be accessible to all users of the building of the building. Since there are only 2 steps to the front door this can be readily achieved.

A-9 There is a cremone bolt at the door, which is designated as an exit on the west side of the building. The hardware on these doors should be replaced with a pair of vertical rod exit devices.

A-10 The handicap parking sign needs to be reinstalled and the parking space better marked. A sign should be installed near the front entrance with directions to the accessible entrance and a doorbell installed at the accessible door since it is generally not unlocked.

MECHANICAL

Mechanical System Description

The heating and ventilating system is a one pipe steam system and includes the following:

- One (1) H.B. Smith oil fired, cast iron sectional type low-pressure steam boiler that serves the basement and first floor areas of the building.
- One (1) Weil McLain oil fired, cast iron sectional type low-pressure steam boiler that serves the upstairs hall area of the building.
- Three (3) 275-gallon capacity indoor fuel oil tanks with individual fill and vent pipe connections. The fuel oil suction lines connect to a common header to serve both boilers.

Suction piping is installed buried below the floor from the oil tanks to the burners (individual lines from the header to the burners).

- One (1) electric type domestic hot water heater, Maytag series 10, 40-gallon capacity.
- Cast iron radiation of the tube and column type. Each radiator includes a valved supply connection and air vent.
- The upstairs hall includes a heating and ventilating system consisting of a H&V unit in the basement, supply and return air ductwork, supply air grilles in the floor of the hall and return air grilles in the face of the stage at the floor. The H&V unit includes a fan, air filter section, supply, return and outdoor air intake duct connections and a steam heating coil in the main supply air discharge duct.
- Low-pressure steam piping distribution system from the boilers to the direct radiation and heating coil. The steam condensate return system is a wet system.
- Steam and city water piping are partially insulated.
- The control system is electric type. Each boiler system includes a wall-mounted thermostat that cycles the oil burner on and off (thru a high limit pressure switch) to maintain set point temperature. The H&V unit fan is interlocked with the oil burner. The heating coil does not include an automatic control valve.

Mechanical System Recommendations

None of the recommendations below are required to be done because the existing building is grandfathered under the Massachusetts Building Code; however, these are recommended improvements:

- M-1 The older boiler serving the lower areas of the building is in bad condition and should be removed and replaced with a new cast iron packaged type boiler/burner unit. The alternative to installing a new boiler is to continue to operate

the existing boiler with ongoing repair work performed as required resulting in nuisance shut downs of the system and high maintenance and operating costs.

- M-2 The three (3) indoor fuel oil tanks do not include a containment dike around the tanks to prevent the oil from spreading in the event of a leak. This is now a requirement of the Massachusetts State Building Code. The spread of oil from a leak (if not contained) may result in a very costly toxic waste removal situation.
- M-3 Remove the three (3) existing fuel oil tanks and replace them with double wall type fuel oil storage tanks with leak alarms per latest code requirements.
- M-4 Remove existing buried fuel oil pipe lines and replace them with new oil piping with secondary containment per latest code requirements.
- M-5 Install a combustion air intake louver and motorized damper behind the louver for the boiler room per latest code requirements. The motorized damper opens whenever one or both of the boiler oil burners operate and closes whenever both boiler burners are inoperative. Presently, there is no combustion air intake opening in the boiler room.
- M-6 Insulate all existing uninsulated steam and city water piping per code requirements.
- M-7 The elevator machine room is not heated and ventilated. It includes a smoke vent opening to the elevator shaft. Elevator machine rooms should be maintained between 50 and 100 degrees Fahrenheit. The elevator appears to be operating satisfactorily however, should the system be upgraded to meet the latest code requirements, a normally closed combination smoke/fire damper would need to be installed behind the vent louver at the top of the shaft. This may necessitate the installation of a ventilation system for the machine room.
- M-8 Install fusible link fire dampers in all existing duct and grille openings thru floors per code requirements.

ELECTRICAL

Electrical System Description

Bemis Hall is generally in good condition. The existing electrical system is explained as follows:

- Service #1 – 400A, 120/240-volt single phase serving the entire building except for the elevator.
- Service #2 – 200A, 240 volt, three phase serves the elevator.
- Emergency Lighting and Exit Signs – Appear to be in good condition. Exit signs and emergency lighting fixtures are in position for emergency egress throughout the building.
- General lighting – General lighting and switching is also adequate. Decorative pendant fixtures illuminate the entrance and fluorescent lighting is efficient and used throughout most all other rooms.
- Fire Alarm Systems – The fire alarm system appeared to be fairly new with devices located throughout the building.

Electrical System Recommendations

- E-1 The emergency call system pushbuttons in the restrooms (call for rescue assistance) are typical doorbell type pushbuttons. Recommend UL Listed red mushroom type push buttons be installed.
- E-2 The IMSA cable (fire alarm cable) routed from the street to the building is not properly mounted inside the basement. The cable is hanging from the splices, i.e. the weight of the cable should not be pulling on the splices.
- E-3 Above the kitchen countertops GFI type receptacles should be installed to replace the existing receptacles. Also, more receptacles are required per NEC.

Town Hall

Description

The Town Hall was constructed in 1908 as the public school. The exterior of the building is mostly original with the addition of two metal fire escapes. The main entrance has been made fully accessible by skillfully altering grading in front of the Town Hall. We recommend that similar efforts be made at Bemis hall and the Pierce House to make their front doors fully accessible.

Although the Town Hall is fundamentally sound there are many deficiencies or conditions that need to be addressed for the building to function reliably. The main question to ask is whether to focus on correcting these deficiencies or to combine that effort with a comprehensive renovation that will also address current programmatic needs. A comprehensive renovation could allow the building to function as a modern Town Hall while retaining its historic character and benefit from the economic of renovating a fundamentally sound existing building.

BUILDING ENVELOPE

B-1 Portions of the exterior masonry have weathered with eroded mortar joints and are in need of repointing in the following areas:

- A small area of foundation stonework at the bottom of the east elevation.
- Scattered areas of the stone foundation at the south elevation, particularly near center and east portion.
- The east portion of the projecting center bay's brick wall at the south elevation.
- A small area on the stone foundation at the bottom center of west elevation.

These areas should have all unsound mortar removed from the joints, which should then be repointed with new, matching, compatible mortar.

B-2 There is a cement stucco-covered brick step, or watertable that rings the top of the foundation and makes a transition from stonework below to brickwork above. The stucco is cracked and starting to spall, exposing the brick below, which is starting to deteriorate. This is occurring in these areas:



- There are vertical cracks in the stucco for much of the north elevation and a chunk of it is missing at the center of its eastern bay.
- There is a large spall in the stucco watertable at the southeast corner of the building, and a smaller hole in at the southeast corner of the south projecting bay.
- The stucco watertable has frequently occurring vertical cracks along most of the south elevation.
- The stucco is ready to spall at the southwest corner of the building and it is chipped at the southeast corner of the south projecting bay.
- The stucco is vertically cracked in random locations on the west elevation.

The stucco coating on the watertable should be hammer tested and inspected. All loose delaminating stucco should be removed, along with all deteriorated brick substrate below, and the stucco should be re-applied to the removed areas. Consideration should be given to provide metal flashing to protect the watertable and prevent this condition from reoccurring.

STRUCTURAL

Structural Description

The Lincoln Town Hall is constructed of load bearing multi-wythe brick walls surrounding the exterior, resting upon a wet-laid fieldstone foundation.

The first floor structure is composed of wooden planking on dimensional lumber joists supported on steel beams over brick piers and walls at the interior and the foundation walls at the perimeter. The second floor structure is composed of dimensional lumber joists supported on wood stub bearing walls at the interior and pocketed into the brick exterior

walls at the perimeter.

The roof structure consists of wood plank sheathing on dimensional lumber rafters and purlins, supported by riveted steel trusses that span between exterior walls.

Noted Conditions and Recommendations

- S-1 The concrete stairways and wing walls that exit the rear of the building are randomly cracked and spalled. This is mostly due to the effects of poor concrete (potentially reactive aggregates) and weathering, along with vehicular impact. Both stairways are still serviceable but will eventually need to be reconstructed as conditions continue to worsen.
- S-2 The usage of the fire escapes is limited. They appear to be in reasonably sound condition, but if they were to be reused as a legal egress, then the fire escapes need a thorough, piece-by-piece inspection, spot-repair, and they will need to be repainted.

Interior/Basement

- There were no structural deficiencies noted in the basement.

Interior/First and Second Floors

- Other than for narrow sparsely occurring cracks in the interior plaster finishes, which are typical of wood construction that moves with season, there were no structurally related conditions detected at the first or second floors.

Interior/Attic

- There were no structural deficiencies noted in the attic.

ACCESSIBILITY AND CODE COMPLIANCE

The list of accessibility and life safety issues at the Town Hall are as followed:



A-1 There is no accessibility to the second floor.

A-2 A ramp was built outside of the meeting room, at the basement level, presumably to provide accessibility. This ramp has a one-sided railing, and it leads to a door, which has no accessible hardware. A newly remodeled toilet room, which provides all of the necessary code compliant (e.g. fixtures, clearances, and mounting heights), is rendered inaccessible to the meeting room due to a floor level change approximately 4”.



A-3 Egress from the building is via open stairs (i.e. no fire rated vertical separation of floors) and fire escapes at the rear of the building. The fire escapes presently have no means of prevention of snow or ice accumulation. Former doors that provided exit to the fire escapes, at the mid-level, between the basement and on the first floor have been permanently closed off. In sum, the code will allow this type of egress system in an existing building, but it would not be permitted in new construction.



A-4 The typical door hardware, now in place, does not provide accessibility.

A-5 Exit steps, at the rear of the building, have handrails only on one side.

A-6 At the first floor meeting room, the interior storm door that has been installed prevents the door from functioning as an exit, so the exit sign attached there is in the wrong location. The exit sign should be attached over the door that leads to the main corridor.



A-7 The building has a former standpipe and hose system, but there is no sprinkler system.

A-8 The records’ storage vaults, while recently upgraded, does not comply with the Secretary of the Commonwealth’s performance standards for archival storage in regards to fire rating and environmental conditions.

- A-9 In the toilet room, which is currently designated as accessible, a pipe-insulating wrap should be installed at the exposed lavatory piping.

MECHANICAL

The heating ventilation and air conditioning system includes the following:

- Oil fired steam boiler, Burnham Model V-909 A, gross output 1342 MBH, net steam rating 1014 MBH. The boiler was installed January 2002 and is in good condition.
- Four (4) 275-gallon capacities each indoor fuel oil storage tanks. The fuel oil suction lines connect to a common header and the main suction line is installed buried below the floor to the oil burner.
- Steam condensate return receiver and pump unit, fairly new and in good condition.
- Two pipe steam heating system with various types of cast iron radiation. The typical radiator piping hookup includes a shut off valve or (in some locations) an automatic control valve on the supply connection and a thermostatic trap on the return collection.
- The basement includes cast iron radiation mounted high on walls and horizontal type unit ventilators at the ceilings.
- This building is a classroom building converted to a Town Hall. The old classroom type unit ventilators are still installed and in some cases being utilized for heating.
- The attic space includes large abandoned ventilation ductwork that used to serve the classroom building gravity ventilation system. The system includes vertical branch ductwork to ventilation grilles in the hallways. The entire system is non-operable and abandoned.
- The partial air conditioning system includes some through window A/C units and some ductless type A/C systems with outdoor condensing units and wall mounted indoor fan coil units.
- The meeting hall A/C system includes a clock type thermostat and a ductless the A/C system as described above.
- The toilet rooms do not include mechanical ventilation systems.
- There is basically no steam control for the building heating system.

- The steam and condensate return piping includes asbestos insulation.
- The boiler room does not include a combustion air intake louver with motorized damper.
- The fuel oil tanks do not include spill containment diking.
- Buried below floor oil piping is not double wall type.

Mechanical Recommendations

None of the recommendations below are required to be done because the existing building is grandfathered under the Massachusetts Building Code. However, we recommend the following improvements:

- M-1 Remove the four (4) existing fuel oil tanks and replace them with new double wall type fuel oil tanks with leak alarms per latest code requirements.
- M-2 In lieu of item M-1 above, construct an oil spill containment dike around the existing oil tanks per latest code requirements. The spread of oil from a leak (if not contained) may result in very costly toxic water removal situation.
- M-3 Install a new outdoor intake louver and related motorized damper and ductwork for the boiler room per latest code requirements. Pricing includes electrical work.
- M-4 Remove existing buried fuel oil piping and replace with new oil piping with secondary containment per latest code requirements.
- M-5 Remove asbestos insulation from steam and steam condensate return piping and replace with fiberglass type insulation.
- M-6 Install self-contained mechanical type automatic control valves for all steam radiators. Pricing includes control wiring.
- M-7 Remove all thermostatic traps for radiators and float thermostatic traps for pipe mains and replace with new traps.
- M-8 The old school gravity ventilation system ductwork may remain abandoned however, fusible link fire dampers should

be installed behind all grilles connected to vertical duct shafts to prevent the spread of fire, should a fire condition occur in the building.

- M-9 Install new exhaust ventilation systems including grilles, ductwork and fans for the toilet rooms. Pricing includes electrical work.
- M-10 Install a new central air conditioning system to serve the entire building. The system will include packaged rooftop HVAC units, medium velocity ductwork from the rooftop units to zone variable air volume terminal units, low velocity ductwork from the discharge of the terminal units to air distribution outlets and low velocity return air ductwork. Existing duct shafts will be utilized where feasible. Remove all existing through window A/C units and split systems in addition of classroom unit ventilators. The existing heating system, with the recommended improvements, will remain. The new HVAC system will include a direct digital control (DDC) system (included). Pricing does not include electrical work.

ELECTRICAL

The electrical system to the Town Hall is in acceptable condition. The existing system is described as follows:

- Service-200A, 1 phase, 120/240 volts fed overhead from street.
- Exit signs and emergency lighting- appear to be in good condition; however, generally the emergency lighting exists only in the egress corridors. Other public areas need added emergency lighting fixtures and exit signs.
- General Lighting- some areas have existing incandescent lighting. These fixtures, if desired, could be replaced with higher efficiency fluorescent fixtures.
- Fire Alarm- The fire alarm system is present, but more devices are required to meet existing codes. The boiler room should have heat detection and horn/light devices. Other basement areas should also be protected such as shop area and storage rooms.

Electrical Recommended Improvements

As a no-cost item, the existing Romex can remain; however any future wiring should be accomplished with MC cable. Romex is not permitted in the Town Hall Building- Places of Assembly.

- E-1 The fire alarm system has old style heat detectors (button type). These detectors could be replaced with smoke detectors for a quicker response time. In areas such as the boiler room, new heat detectors should be installed with horn lights. Generally, the system should be improved to meet current codes and updated to enable replacement of old devices.
- E-2 The Town Hall does not have a security system. A new security system could be installed if desired.
- E-3 Incandescent fixtures can be removed and replaced with fluorescent fixtures. Most incandescent fixtures are in the basement and storage areas.
- E-4 Electrical work to support a new central air conditioning system is explained in item M-10 above. Pricing includes a new pad mounted transformer and three phase service.

Pierce House

Description



The Pierce House is a large wood-framed, colonial revival-style home with two floors, a partial third floor and a full basement. The floor framing consists of dimensional lumber joists running east-west and supported at the first floor by the house's wet-laid stone foundation walls and a line of brick pier-supported steel beams running through the center of the house. The second and third floors are supported by the wood stud-framed exterior walls and an intermittent line of wood stud bearing walls and wood post-supported steel beams running through the center of the structure. The roof is constructed in typical tied-hip or gable fashion and the basement floor is a concrete slab grade.

BUILDING ENVELOPE



B-1 The roof above the side entrance (kitchen entrance) including associated wood gutter, fascia and soffit is in poor condition and needs to be repaired and rebuilt.



B-2 The wood gutters on the main roof are old and dried-out. They need to be cleaned and oiled every year.

B-3 In a few years, these wood gutters will need to be replaced with new cedar gutters.



B-4 There is missing and eroded mortar on the center chimney. The chimney needs to be completely repointed and copper flashing added at both the top of the chimney and at the roofline. This work should have been completed before the recent roof was installed.



B-5 There are bees swarming at the soffit at the northwest corner of the house. An exterminator should remove or relocate these bees.



B-6 The following exposed elements were found to be rotted or damaged:

- The north eave rake on the west elevation's center entry bay, there is a rotted hole in the bottom in the northwest corner of the house's main section and the main west entry pediment pitches southward, suggesting rotted conditions below.
- The south column is split and the entablature is rotting at the north wing's west entrance.
- The bottoms of three columns at the north elevation are damaged- two have rotted and one has split.
- At the east elevation, the trim-work where the pilasters at each side of the central doorway step are rotted, along with the water-table at the northeast corner of the main section of the house, and the base of the northeast porch's corner column.
- One of the columns in the north porch is partially rotted and split and another has a rotted base.
- The widow's walk railing is in need of selective repairs. The rotted wooden components should be replaced and all split columns should be replaced or repaired, depending upon the condition of the wood and the causes of the splits.



B-7 After the repairs noted above are completed, the exterior of the house will need to be repainted.

B-8 Existing wood windows require restoration work to improve operation and effectiveness and to repair deteriorated wood elements. Fortunately, the existing storm windows are in good condition and serve to protect the existing windows.

ACCESSIBILITY AND CODE COMPLIANCE

A-1 While there presently is a ramp on the main entry side of the building, it is not compliant with the Requirements of the Architectural Access Board. The ramp has railings in only one side. The ramp provides accessibility to the porch, but there is still a 6" high step, which prevents access to the main floor. We recommend that the wood porch be rebuilt to slope from the brick side entrance porch elevation to the first



floor elevation at the main door. The wood porch beyond the main door should also be raised to first floor elevation.



A-2 The kitchen at the Pierce House is used by caterers for preparation of food served at functions. The kitchen does not meet the standards required of a commercial kitchen. We feel that it is bad public policy for the Town of Lincoln not to follow the same regulations required of restaurants operating in Lincoln.

A-3 There is no accessible bathrooms located in the house. There is a very small half bath, which is located near the west porch, which can be accessed by going through the kitchen. Neither the size nor location of the bathroom is adequate. We recommend that first floor bathrooms be added to the house even if this might mean losing use of the left rear room of the house for function activities.



A-4 The brick paving at the main entry walk has settled causing an irregular walking surface, which can present a tripping hazard.

A-5 Entrance/ egress doors open into the house rather than swing in the direction of the egress. We recommend that the three main doors be re-hung and exit device hardware with accessible lever be added to these doors.

A-6 As part of an effort to make the house fully accessible we recommend the thresholds be reduced in height or illuminated, We also recommend that public activities be limited to the first floor unless an elevator is added.



A-7 The basement ceiling does not provide an adequate fire protection separation from boiler and the first floor. A new fire rated ceiling should be constructed.

STRUCTURAL

Structural Conditions

Exterior

S-1 The west wall dips at each side of the center entry bay, suggesting compressed downward onto the supporting wooden sill. The sill should be exposed and replaced along with the bottoms of studs and posts that bear on it if found to rotted.



- There appears to be a gentle crown at the roof level of the south elevation. This is an affect of the steel framing that runs along the center of the building and is not of structural concern.

Interior/ Basement

S-2 Much of the exposed mortar pointing in the basement foundation walls is very powdery and has eroded. As a result, in the most extreme cases individual stones are becoming loose, especially below the curbed window bay near the northeast corner of the main section of the house. All loose and sandy mortar joints should be deeply raked clean of all friable material and any stones that are loose or become loose should be removed and re-set. The raked joints should then be re-packed with a compatible mortar.

- The basement was very damp at the time of our visit and a dehumidification system should be considered.

Interior/ First, Second and Third Floors

S-3 There is a soft spot in the first floor to the immediate south of the west entrance that should be investigated from below.



- There is a gentle but noticeable hump running longitudinally through the middle of the first, second and third floors, affecting the walls and doorways as well. This hump is created by the steel framing around which all of the wood construction differentially shrinks and is not of structural concern.

S-4 There is a plumbing leak at the 2nd floor bathroom and damage to the floor. The caretakers suite, if left un-repaired that area. could result in further structural damage in

repaired
that area.

Interior/ Attic

- The attic was not accessible during our visit.

MECHANICAL

Mechanical System Description

The heating system is a zoned two pipe hot water heating system and includes the following:

- Gas fired Weil McLain hot water heating boiler 660.0 MBH input, 560.0 MBH output, 438.0 MBH new IBR rating. The boiler was installed in 1979.
- The boiler is in good operating condition and has a normal life expectancy of approximately 45 years.
- Three (3) hot water heating zones. Each zone includes an in-line pump, piping and radiation.
- Gas fired domestic hot water heater 75-gallon capacity.
- Cast iron radiators. Each radiator includes a valved inlet and manual air vent. Some areas include cast iron baseboard radiation.
- There are cast iron grilles in the floor from an old warm air system. The grilles are not used.
- Certain areas of the house are air conditioned with through window type air conditioners.
- The hot water heating piping is insulated with asbestos insulation.
- The interior bathrooms include ceiling type exhaust fans. No fans for perimeter bathrooms.
- There is no combustion air intake for the boiler room.

Mechanical Recommendations

None of the items recommended below must be done since the existing building is grandfathered under the Massachusetts Building Code. However, these are recommended improvements:

- M-1 Remove the asbestos pipe insulation and replace the insulation with fiberglass type pipe insulation.
- M-2 Install ceiling type exhaust fans for the perimeter bathrooms per latest code requirements.
- M-3 Install a combustion air intake louver with motorized damper behind the louver and high and low duct outlets to the boiler room per latest code requirements.
- M-4 Consideration may be given to air conditioning the entire house with split systems; one system for the first floor and one system for the second floor. Each system shall include an outdoor condensing unit, indoor air handling unit, duct distribution up-feed through floor grilles for the first floor system and down-feed through ceiling diffusers for the second floor system. Existing through window air conditioning units will be removed with this system. Both air handling units will be located in the basement. Pricing does not include electrical work.

ELECTRICAL

Electrical System Description

The electrical system in the Pierce House is generally in good condition. The system is described as follows:

- Service – 200A, 1 phase, 120/240V, installed new in 1999.
- Exit Signs and Emergency Lighting – Presently no exit signs and emergency lighting is existing.
- General Lighting – General lighting is incandescent and in good condition.

- Fire Alarm System – Fire alarm system is generally in good condition. Some upgrading could be done in attic and basement areas. The existing system is FCI, 12-zone main panel.

Electrical Recommendations

- E-1 Add exit signs and emergency lighting fixtures as required by code.
- E-2 Replace older fire alarm devices, old style button type heat detectors, with new heat detectors.
- E-3 Provide electrical work, including new service, to support new central air conditioning system as mentioned in item M-4 above.

Public Safety Building



Description

The older section of the Public Safety Building was built in 1966 with a major addition and remodeling in 1999. At this time, the building was made fully accessible. As one might expect with such a modern building, the list of deficiencies is fairly short.

BUILDING ENVELOPE

The Apparatus Room roof and the pitched roof sections of the main building are covered with painted, standing seam aluminum roofing. The flat sections of the roof are covered with an EPDM (rubber) roof.



B-1 In general, the roof appears to be in good condition and is performing adequately. The roof of the Apparatus Room is arched, sloping gently front to back with large overhangs above the apparatus doors. At the building line, in these locations, are built-in gutters, which chronically leak. We were able to reproduce these leaks with a garden hose and with the assistance of the fire department. The likely cause of these leaks is the termination between the EPDM liner and the roof drain body. A representative of the drain manufacturer Zurn should meet with a qualified roofing contractor to correct this ongoing problem.



B-2 There have been chronic problems with ice dams at the rear of the Apparatus Room roof and ice sliding off the roof and freezing on the walk area below. This situation is caused by the four or five foot overhang located beyond the gutter and the gaps between the gutter sections, which allows the roof trusses to pass. In 2005, electric snow melting wires were installed near the eaves. These wires seem to have improved the situations; however, we received very little snow last year.



Typically snow melting wires only last a few years and require frequent repairs and adjustments to keep them



working. We recommend that this solution be observed for another winter or two since the only two likely alternatives is adding an additional gutter at the eave, which will likely need snow and ice melting wiring to work consistently.

- B-3 While visiting building, we heard several police officers and firemen express the desire to open a window. While we feel that this is very reasonable request, it is not very easy to accommodate with the fixed glazing system, which has recently been installed. We recommend that the request for natural ventilation be considered even if it changes the sight line of the white aluminum windows.

STRUCTURAL

Structural Description

The Public Service Building is a recent expansion of a modern-era single story building. The earlier structure is built of load-bearing brick clad concrete unit masonry with gables roof and a slab on grade. The addition has a structural steel and bar joist frame with metal-decked roof and a concrete slab on metal deck mezzanine over a slab on grade, with what appear to be both load-bearing and non-load-bearing masonry walls.

Structural Recommendation

Exterior

There were no structural deficiencies or issues noted on the exterior.

Interior/First Floor

- S-1 There are cracks in the concrete fire apparatus bay floor slab near the building’s northwest corner. These are most likely the result of some limited soil settlement below the slab and/or curing shrinkage in the concrete and are not a safety concern. The crack should be cleaned and injected with adhesive.



No other structural deficiencies were noted at the first floor level.

Interior/Mezzanine

- S-2 There are several straight and almost regularly occurring cracks crossing the concrete floor slab. Some of these correspond to high points in the floor slab. The cracks have apparently been observed to become wider with time. The most likely cause of these cracks is the typical “negative” bending of the floor slab that occurs over supporting beams and girders. The widening of the crack can occur as the floor is swept, or when sand fills the cracks and jacks them into a wider condition as the floor bends up and down, opening and closing the cracks. The cracks should be vacuumed out and patched with a flexible material such as sealant to stop the ratcheting effect

No other structural deficiencies were noted at the mezzanine level.

ACCESSIBILITY AND CODE COMPLIANCE

There were no accessibility or public safety deficiencies observed at the Public Safety Building.

MECHANICAL

The existing mechanical system is described as followed:

- There are two (2) Weil McLain gas fired hot water heating boilers 218.0 MBH output each approximately 8 years old that serve the unit heaters in the fire truck room only. The boilers were converted from oil fired to gas fired seven (7) years ago when they were moved from another building. The system includes a new expansion tank and pressure relief valves.
- The remainder of the building HVAC system includes four (4) single zone packaged rooftop HVAC units, gas heating and electric cooling. A single space thermostat controls each unit. Low velocity supply air ductwork is installed from the discharge of rooftop units to perforated type ceiling diffusers. The hung ceiling space is utilized as a return air

plenum.

- The existing rooftop units are AAON units and even though they are only seven (7) years old, one of the units was already removed and replaced with a Lennox unit. It appears that the AAON units are compact type rooftop units, which are very difficult to maintain. We recommend that the three remaining original units be replaced.
- The boiler room includes high and low combustion air intakes per code requirements.
- There are two (2) gas fired Lochinvar domestic hot water heaters in good condition.
- The exhaust duct and fan system for the fire truck room is not used; too small. A new exhaust pipe exhaust system is now utilized.

Mechanical Recommendations

- M-1 Replace the three remaining AAON roof top units with Lennox unit or other manufacturer, which can be readily serviced.
- M-2 In general, the existing HVAC system appears to have many problems with faulty rooftop units, poor air distribution, faulty exhaust system, etc. As previously stated, the rooftop units will need to be removed and replaced one at a time. We recommend that the services of an air balancing engineering firm be obtained to air balance all supplies as well as return and exhaust air systems. Rooftop unit motor sizes may need to be increased and revisions may be needed in fan belts and sheaves to provide the required air capacities. The results of the air balancing will need to be analyzed by a consulting engineering firm. Additionally, there is concern for the potential spread of airborne disease from the prisoner holding cells. The cells should have their own dedicated system, and the cells should be kept under negative pressure.

ELECTRICAL

Electrical System Description

The electrical system is in good condition. System is described as follows:

- Service-600 amp, 120/208V, 3 phase, 4 wire, installed in 1999.
- Emergency Lighting and Exit Signs-Existing and in good condition.
- General Lighting-Existing and in good condition.
- Fire Alarm System-Existing and in good condition.

Electrical Recommendations

There are no deficient items requiring upgrading. Required electrical work to support the upgrading of the rooftop units is in progress.

The Codman Farm

Codman Farm House

BUILDING ENVELOPE



The Farm House was built in the 1860's and consists of one residential unit (for use by the farmer hired by the Codman farm trust) and one apartment unit. The main house dimensions are 34'6" x 38'10" with 2 floors of 1459 sq ft each. The apartment was created 26 years ago and is 14' x 24'.

- B-1 There are several loose clapboards and areas where the paint is peeling. Some additional routine maintenance is apparently needed.
- B-2 There is some obvious water damage at the roof pitch change on the south side of the structure that correlates to water staining and plaster damage at the interior.
- B-3 There may be some loose bricks on the chimney that must be re-set.
- B-4 The exterior wood deck at the rear of the house needs replacement and the roof under it should be replaced at the same time.
- B-5 Occupants indicate there is infiltration at the foundation in the winter. Foundation should be insulated.

STRUCTURAL

Description



The Codman Farm house wood-framed, "Carpenter Gothic"-style home with two floors and a full basement. The floor framing consists of dimensional lumber joists supported at the first floor by the house's stone foundation walls and steel pipe column-supported timber beams. The second floor is supported by the wood stud-framed interior and exterior walls and the roof is constructed in typical tied gable fashion

of dimensional lumber rafters with several dormers and roof slopes.

Structural Conditions

- S-1 The basement apparently still floods and can be very damp. Additional measures must be taken to eliminate water infiltration.

Interior/First and Second Floors-Front Apartment

- The ceiling plaster is cracked at the northeast valley of the roof and at the southeast valley where water is apparently wetting and damaging the plaster. There is also water leakage at the rear gable. The roof and/or flashing leaks must be investigated and eliminated to prevent further damage to the interior or structure of the house.

MECHANICAL

The farm house (2 family residence) includes a Burnham oil fired hot water heating boiler, 120.0 MBH with Weil McLain Gold side arm domestic hot water heater. The hot water heating system includes seven (7) pumped zones. The system includes a 275-gallon capacity indoor fuel oil storage tank. All bathrooms include ceiling type exhaust fans. The system is approximately two (2) years old and in excellent condition.

Codman Farm Office

STRUCTURAL

Structural Description

- The Codman Farm Office is a modern, single –story residential-type structure with tied gable roof and slab on grade

Structural Condition

- No structural damage or deficiencies were noted on the exterior.
- Other than a strong cat urine smell that has impregnated the floor slab, there were no noted structural concerns on the interior.

MECHANICAL

The office section includes a split system type heating and air conditioning system with outdoor condensing unit on grade and indoor air handling unit in the attic space, supply and return air ductwork to air distribution outlets. The system is a 3-ton nominal capacity system with electric heating. The system appears to be in good operating condition.

Codman Farm Barn A



BUILDING ENVELOPE

Noted Conditions and Recommendations

Exterior

- B-1 There are several loose clapboards on the barn’s south elevation and a rotted hole on one of the clapboards on the north elevation which should be replaced.

STRUCTURAL

Structural Description

The Codman Farm Barn A is a three-bay, first period timber framed structure with a gabled roof, formed by two interior two-posted framing bents running in the east-west direction and north and south gable end wall.





No other structural deficiencies were noted at the first floor level.

Barn A's main level sits atop a raised beam and is constructed with north-south running timber joists spanning between east-west running timber beams. These are supported on the foundation at the east end and on post at the west. The lower level is bounded by fieldstone foundation walls on its north and east sides and wood-framed walls on its south and west sides.

Structural Conditions

- S-1 There are also missing trim boards along the base of the north and east elevations which continues around to the south elevation and expose rotted and severely weathered sheathing and rotted, insect-eaten portion of the sill. The damaged sheathing and portions of the sill should be exposed, removed, and replaced. According to our resistograph, the sills are mostly only partially rotted and might be salvageable for most of their length with some clever Dutchman work.
- S-2 The exposed stone foundation below the east side of the structure is in poor condition with deteriorated, crumbling mortar joints and many loose and shifted stones. This is apparent both at the exterior and the interior. Significant portions of this wall will need to be reconstructed. Elsewhere, and at the north wall (interior), localized some re-setting and deep repointing will be needed.

Interior/Main Level and Above

- The main level and roof structure appeared to be in good condition with no obvious defects.

Interior/Lower Level

- The east foundation wall and parts of the north foundation wall are in need of repair, as noted above.

- S-3 There are a numerous beetle holes and discoloration in the west end of the south main floor girt as seen from below.

This girt rests upon a pressure-treated wooden post and may be remnant of damage that has already been addressed. This condition should, however, be investigated.

- S-4 The north ends of many of the north framing bay's joist are rotted, and it appears that the sill into which they pocket has at one time been replaced. The rotted joist ends should be removed and the joists sistered or replaced. The north end of the west wall girt at the same level also appears to be rotted and should be removed and re-supported.

MECHANICAL

Barn A, the goat barn, includes a louvered vent at the peak of the roof to provide natural ventilation.

Codman Farm Barn B (Hay Barn)

BUILDING ENVELOPE

Building Exterior



- B-1 There are several areas of concern on the exterior woodwork. These are as follow:
 - o Rotten vertical trim boards and sheathing at two interior bent locations on the north elevation and at the northwest corner. Our resistograph found the structural members to be sound behind these areas. All rotten woodwork should be replaced.
 - o There are two holes in the east elevation where clapboards are broken or missing. The holes should be patched.
 - o The lower extent of the west elevation wood siding is in physical contact with the grade and should be protected or the ground lowered or moved away.



STRUCTURAL

Structural Description

The Codman Farm Barn B is a traditional timber framed barn, oriented in the east-west direction with five north-south running interior, four-posted timber bents between its east and west walls. The southwest corner of the barn touches the

northeast corner of the Barn C.

Barn B's drive bay level, at grade, is constructed with east-west running dimensional lumber joist spanning between steel column-supported timber beams that align with the primary framing bents, over a lower level that is open along its south side and nested into grade with fieldstone foundations along its north, east, and west sides.

There are five intermittent lofts above the drive bay, these were constructed in two alternating elevations, presumable to facilitate the loading and unloading of hay. The roof structure is framed with dimensional lumber rafters and timber purlins supported by the end walls and interior bents.

Structural Conditions

Exterior

- S-1 The barn has an overall eastward drift that is apparent by its east titling parallelogram shape that is visible from the exterior. While straightening the barn is infeasible, additional diagonal bracing should be provided within the north and south walls.
- S-2 The mortar joints in the exposed portion of the north foundation wall are eroded and cracked and must be repointed.
- A large portion of the south walls' framing, sheathing and siding was lost in a hay fire. Some of this was from direct combustion and some was from the fire company's attempts to remove the burning contents from the interior through the wall into the courtyard. The wall has been reconstructed to match the surrounding construction (with new purlins, sheathing and siding). Three charred, partially consumed columns have been Dutchman repaired and sistered with "strong-backs."
- S-3 Many of the roof purlins sag between the trusses, appearing rather small for the loads that are placed upon them. The most radically sagging purlins should be sistered with new members.

- One of the paired retaining rods at the eave level chord connections of main trusses are missing or were never installed. The roof structure appears to be performing in a satisfactory manner without them.
- S-4 An eave level brace is missing from within the plane of the south wall. Given the in-plane shearing movements that have allowed this building to drift eastward, not only should brace be replaced but additional bracing should be applied as well.
- Another eave level brace is missing but from the southernmost interior bent, and has been replaced with surface-nailed dimensional lumber, which has also been added to supplement the interior bents at the upper and lower loft levels. The entire southern lower loft has been removed in its entirety, presumably a result of the fire.
- S-5 The four longitudinal girts have been removed from both of the upper loft level's second interior spans and should be replaced.
- The bases of nearly all of the interior drive bay posts have been replaced with fitted Dutchmen. Two of the posts have been raised, causing a misalignment of the loft framing mortises. Several other timbers have also been Dutchman repaired.

Interior/Lower Level

- S-6 The exposed stone foundation has cracking and eroded mortar joints and some loose stones. The foundation should be restored with deep repointing and localized resetting of stones.
- S-7 The column cap plates seem small and are compressing into the undersides of the drive bay timber at several locations. Detail measurement should be taken of these conditions and monitored every two years. Alternative to this, the column cap plates can be increased in size.

MECHANICAL

Barn B includes louvered vents at the peak of the roof to provide natural ventilation

Codman Farm Barn C

BUILDING ENVELOPE



B-1 There are rotted trim boards at the northwest and southeast corners and a rotted hole with a bird living in it at the south elevation's loft-level windowsill. The rotten wood should be replaced.

STRUCTURAL

Structural Description

The Codman Farm Barn C is a traditional timber framed barn, oriented in the north-south direction with east-west running interior, four-posted timber bents between its north and south walls. The north side of the barn touches the southwest corner of Barn B.

Barn B's drive bay level, at grade, is constructed with north-south dimensional lumber joist spanning between timber post-supported timber beams that align with the primary framing bents, over a lower level that is open along its east side and nested into grade with fieldstone foundations along part of its north and all of its south and west sides.

There is a continuous north-south running loft at each side of drive bay. The roof structure is framed with dimensional lumber rafters and timber purlins supported by the end walls and interior bents

Structural Condition

Exterior

S-1 Barn C has an overall eastward drift at the center and north end, which is apparent by the inward sweep of the west roof eave and the outward sweep of the east. While straightening the barn is infeasible, additional diagonal bracing should be

provided within the interior framing bents to prevent further drift.

- S-2 There is an abrupt dip at the very center of the east wall. The foundation and post support below the dip should be investigated.
- S-3 We were told that water has been actively percolating into the ground along the base of the west wall and causing problems with the foundation below. A collector drain should be installed to collect and direct water to another location.

Interior/ Drive Bay and Above

- There have been many alterations and repairs made to the structure, such as steel angle brackets to support the loft girts, replacement of all of the drive bay posts' lower halves (spliced at the loft), full-height replacement of the east wall's middle post (which may relate to the dip there) and the southeast corner post, and added scabs and sisters to support framing members.
- S-4 The fact that the drive bay posts are spliced at the loft level reduces the lateral load capacity of the structure. Some additional lateral load capacity should be discretely created at both the drive bay and loft levels within the lateral framing bents. This may be in the form of rods or rigid connections and should be hidden from view wherever possible.
- There is a small amount of char visible at the barn's north end from the fire that occurred in Barn B.
- S-5 One of the framing bents east wall knee braces is missing and another is missing its upper pin. These should be installed.

Interior/ Lower Level

- S-6 The stone foundation of the west wall has cracking and eroded mortar joints, loose stones and appears to be bulging outward. There are signs of water scouring and erosion, presumably caused by the surface water percolation along this wall as noted above. After the surface water has been re

-directed, portions of this foundation wall will need to be taken apart and re-set. Otherwise, the exposed stonework can be restored with deep repointing and localized re-setting of stones. There are also similar conditions, though of a lesser extent in the north and south foundation walls, and some selective repointing has already been done.

S-7 A portion of the sill at the south end of the barn is rotted, along with the ends of joists that frame into it. The sill should be replaced and the joists sintered, and ends repaired.

S-8 Several of the drive bay level joists have what appears to be wood-bee damage. This should be investigated to determine whether they are active, and the extent of damage.



ACCESSIBILITY AND CODE COMPLIANCE

A-1 Some minor re-grading is needed to eliminate minor step and make main entry fully accessible

MECHANICAL

Barn C includes louvered vents at the peak of the roof to provide natural ventilation

Codman Farm Barn D

STRUCTURAL

Structural Description

The Codman Farm “D-Barn” is an almost new recreation of a typical American Rural barn, constructed with a traditional timber frame, but with updated joinery.

Structural Condition

Exterior

- No structural damage or deficiencies were noted on the exterior.

Interior

- No structural damage or deficiencies were noted on the interior.

MECHANICAL

Barn D includes window openings for natural ventilation (no louvered vent on roof).

Codman Farm Barn E (Chicken Coop)

STRUCTURAL

Structural Description

The Codman Farm “E-Barn” is almost new, Rural French-style wood-framed structure that serves as a chicken coop and has a compound slope gabled roof, a main grade level, and a partial loft.



Structural Conditions

- No structural damage or deficiencies were notes on the exterior

S-1 The loft floor joists serve as collar ties to restrain the roof and are connected to the rafters with long nails that protrude from their far sides. The protruding nails should be clinched.



MECHANICAL

Barn E, the chicken barn, includes screened wall openings for natural ventilation (no louvered vent on roof).

Department of Public-Works Garage

Description



The DPW Garage is a single-level, somewhat sprawling facility that was constructed in multiple phases. The first phase, which was the largest, is a six-bay, north-facing garage constructed with concrete block masonry (CMU) walls and piers on cast-in-place concrete foundations, and long-span steel joists running in the north-south direction with industrial wooden decking spanning between them. The second phase is a three-bay, north- and south-facing garage addition built against the west side of the original facility. It is constructed with CMU walls on the cast-in-place concrete foundations with a bar joist and metal roof system that spans from the addition's west wall to the first phase's west wall.

Three subsequent appendages have been added, these being the CMU wall and wood-framed tire storage room against the second phase's west wall and emergency generator room against the original south wall, and the wood-framed scale house against the east wall.

This assessment reviewed the building and the building's mechanical and electrical systems. This assessment did not review the specialized equipment in the building such as vehicle lift system, vehicle exhaust system, fuel pumps, or the freestanding structures.

The DPW garage is very utilitarian and should continue to be very serviceable. It is not a very energy efficient structure. Although new garages are more energy efficient, any structure with large doors that regularly open is not going to be very energy efficient.

BUILDING ENVELOPE

The DPW garage has a quite new EPDM (rubber) roof that is well pitched to exterior downspouts. The roof should be serviceable for many years.

B-1 The T-111 fascia panel above one of the overhead doors has been damaged by tall equipment or a truck. This T-111 siding needs to be replaced as well as the associated metal soffit at the overhead door. The T-111 siding should be painted for the entire elevation.

B-2 At the rear of the main equipment bays, windows, which were high on the wall, were removed and the openings infilled with wood studs and plywood, the plywood panels have never been painted or their perimeters caulked. Unless the plywood panels are going to be replaced with windows, they should be caulked and painted.

ACCESSIBILITY AND CODE COMPLIANCE



A-1 There is only one passage door that leads directly outside from the truck and equipment bays. Overhead doors are not considered an acceptable means of egress in case of fire or other emergencies. At least two new fire doors need to be added.

A-2 Neither of the restrooms is fully accessible. It is probably less expensive to construct a fully accessible unisex restroom rather than to renovate the two existing restrooms so that they are fully accessible.

A-3 The office area of the building is approximately 6" lower than the entry/ garage level. An accessible transition with landing, railings and ramp should be made to provide better access to the public and potential employees.

A-4 The level of finishes in the office areas, lunchrooms, and restrooms/ locker rooms are both worn and outdated. An appropriate up dating of these areas will make the spaces more functional and enjoyable for both the staff and the public



STRUCTURAL

Noted Conditions and Recommendations

Exterior

- S-1 One of the CMU piers in the south wall of the first phase section has been punched outward from the surrounding construction, presumably by vehicular impact. The displaced masonry should be reconstructed.
- S-2 There is an open hole in the CMU east wall of the first phase section that should be patched.
- S-3 The soil has eroded from below the north wall of the tire storage room, leaving the wall, which appears to lack a proper foundation, partially unsupported. The wall should be underpinned to provide a concrete footing below grade.
- S-4 The small concrete apron at the tire storage room's entrance tilts in the southerly direction and there are sink holes adjacent to it. The apron should be removed, the building wall underpinned, and the apron replaced on a compacted gravel or crushed stone sub-base.

Interior

- S-5 The interior of the tire storage room was cold and very damp at the time of our visit. If this was indicative of ambient conditions, the interior environment should be ventilated before the wooden roof framing begins to rot.
- S-6 There appears to be wood bees or termites in the emergency generator room.
- S-7 The south end of the former west wall of the first phase section is sinking as indicated by a northerly downward-running diagonal crack. Metal tie plates have been added to the adjacent southward-running west wall. The sinking end of the wall should be investigated via test pit and underpinned if conditions warrant.

S-8 There is a large mass of stored materials on top the mezzanine at the east end of the first phase portion of the garage (over restrooms and offices). The structure of this mezzanine should be analyzed as to its appropriateness for this and future loads.

MECHANICAL

Mechanical System Description

- There are two (2) gas fired unit heaters serving the garage area. The units are double units connected to a single flue pipe, which extends through the wall and up above the roofline. The units are approximately 15 years old and appear to be in good condition. The normal life expectancy for these types of units is approximately 20 years.
- A second garage section includes one (1) gas fired unit heater (single type) installed as described above.
- The offices include electric baseboard radiation.
- The lunchroom includes a gas fired cabinet heater wall mounted with combustion air vent through the wall.
- Gas fired domestic hot water heater with combustion air vent through the wall.
- The toilet rooms are perimeter located with no mechanical ventilation.
- The offices include through wall air conditioning units.

Mechanical Recommendations

M-1 Since the gas fired unit heaters serving the garage areas are nearing the end of their life expectancy, replace them with new gas fired unit heaters and related flue connections.

M-2 Install a new gas fired hot water heating boiler with booster pump, hot water piping and cast iron baseboard radiation for the office areas. The boiler may include a tank-less domestic hot water heater. The existing electric baseboard radiation, gas fired cabinet heater, and domestic hot water heater will be eliminated.

M-3 Install new roof mounted packaged HVAC unit to serve the office area. This will provide an all air heating and air

conditioning system for the office area. The need for a new boiler and radiation as described in M-2 will be deleted. A new domestic hot water heater will be installed. Pricing includes electrical work.

M-4 Install ceiling type exhaust fans for the toilet rooms. Pricing includes electrical work.

ELECTRICAL

Electrical System Description

The existing electrical system is old but functional and serves the maintenance requirements. The existing system is described as follows:

- Service #1- 200A, 240 volt, 3 phase
- Service #2- 200A, 120/240 volt, 1 phase
- Onan Generator- 300kw, 120/240 volt, 1 phase, 156 amps
- Energy Lighting and Exit Signs- No system is existing. However, generator power does provide emergency lighting.
- General Lighting- The general lighting is made up of mostly fluorescent lighting. Lighting fixtures are in good condition.
- Fire Alarm System- There is an existing fire alarm system, generally in good condition, connected to the fire department with master box connection.

Electrical Recommendations

- E-1 Replace office button type heat detectors with smoke detectors.
- E-2 Verify generator operation with emergency lighting. Add exit signs.
- E-3 Add security system if desired.
- E-4 Add GFI receptacle above kitchen countertops.



