ALDRICH PUBLIC LIBRARY

FEASIBILITY STUDY

Issued: October 21, 2021

PREPARED FOR

Aldrich Free Public Library
Town of Plainfield
8 Community Ave.
Plainfield, CT 06374

PREPARED BY

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EXECUTIVE SUMMARY

The Aldrich Public Library Board of Directors (Board), in collaboration with the Town of Plainfield (Town), received a Survey and Planning Grant from the State Historic Preservation Office (SHPO) to hire a 36 CFR-qualified firm or individual to provide architectural services to develop a conditions assessment report for the Aldrich Free Public Library (Library). As a result of the Request for Proposal process, Crosskey Architects, LLC was selected by the Board to conduct a comprehensive conditions assessment of both the interior and exterior of the Library. The conditions assessment will help the Board and Town identify any major issues with the building, prioritize work, and set the groundwork for developing a full-scale preservation plan.

The conditions assessment provides a list of prioritized work required for the immediate and long-term preservation of the Library. This report provides a building analysis broken down by features and appropriate treatment recommendations for deficiencies. As a management tool, the report identifies deficiencies that require immediate repair and is intended to assist the Board and Town with the acquisitions of funds necessary to undertake the recommended work.

The components of the assessment included: an initial kick-off meeting, walk-through site study, document review, and a visual condition assessment. The initial kick-off meeting was held at the Library at 299 Main Street, Moosup, CT on July 20, 2021 and was attended by Jordan Lumpkins, Grant Writer/Economic Development Support, David Tran and Nina Caruso, Director of Historic Preservation, of Crosskey Architects LLC. James K. Grant, Structural Engineer, of James K. Grant Associates attended on August 31, 2021, and W. Mark Gendron, P.E., of Acorn Consulting Engineers, attended on August 5, 2021. In addition to the Architectural Conditions Assessment, the Structural Assessment and Mechanical, Electrical and Plumbing (MEP) Systems Assessment have been completed and are summarized in this report.

The survey utilized visual and photography methods to investigate potential problem areas to identify the existing building conditions. The visual overview was obtained from vantage points at grade and floor levels. Areas of concern were inspected visually and documented via digital images included at the end of this report. A brief overview of the project teams' findings is outlined below.

Site Assessment

Based on the visual assessment, the site is in fair condition. The primary concern is the vegetation growing against the south foundation wall of the Library and east foundation wall of the porch. The vegetation has tendrils, threadlike appendages used for climbing, that attach to the surface of the brick causing mortar deterioration. The vegetation also traps moisture leading to other failures like paint deterioration. Consideration should be given to sealing the bituminous parking area and restriping. As a rule of thumb, all plantings should be pulled back a minimum of 3' from the foundation walls. Remove large shrubs and replace with smaller scale plantings. If removal isn't desired, cut back or relocate overgrown shrubs. Install new planting fabric, dirt and mulch at planting beds. Clean gutters, leaders and underground drainage to ensure the system is maintained and in good working order. If the deciduous tree is located on the property, considering regular pruning to maintain the tree's health.

Architectural Assessment

Based on the visual assessment of the building, the exterior envelope is in fair condition.

The cross-gabled roof construction typifies the Queen Anne style. The primary (south) elevation consists of a left justified gable end and a right justified gable end that merges into a conical roof that tops a polygonal tower, and there are gable ends at the north, east and west elevations. The eaves have integrated gutters that are lined/flashed with metal. The roof is finished with 3-tab asphalt shingles installed in 2014. The soffit boards

directly below the integrated gutters are in particularly poor condition with large sections of paint missing. The roof was not accessible for inspection, but based on the feedback from Jordan Lumpkins, the gutters were not addressed during the roof replacement in 2014. Therefore, it is likely that the metal flashing/lining has failed which is allowing water to breach the gutters and saturate the soffits which is leading to paint failure and rot. The gutters need to be carefully inspected, relined and flashed as required. After gutter repairs are made, rotted soffit boards should be replaced, and all other areas should be scraped and repainted.

The windows are an important character defining feature and their design and craftmanship make them worthy of preservation. The window schedule included toward the end of this report is intended to provide a general overview of the various window conditions at the time of survey. Before undertaking window restoration, a more comprehensive survey should be conducted by a reputable window restoration company to provide an accurate scope of work and cost estimate of repairs.

The windows fall within the three repair classes outlined by the National Park Service: (1) Routine Maintenance; (2) Structural Stabilization; and (3) Parts Replacement. Some windows are limited to broken sash chords while others have cracked and missing glazing putty and/ or wood deterioration at the bottom rail and sill. The Palladian window in the west gabled end has a broken sash, missing trim and is in poor condition. The exterior storm windows are in poor condition and should be removed. Consideration should be given to installing interior storm windows. Historic New England, the oldest and largest regional heritage organization in the nation, has published white papers on exterior and interior storm windows and they are appended to this report for reference.

Based on the visual inspection of the interior of the building, the condition of the interior finishes is generally in fair condition. Plaster cracks were observed on the walls but appear to be stable. The condition of the plaster ceilings is not known due to the installation of glue up acoustic tiles. The carpets are stained and worn from normal wear-and-tear and should be replaced. Wood door casing, paneling and other trim components show normal signs of wear-and-tear including nicks and scuff marks. All surfaces, including window sash and trim, should be tested for lead before undertaking any restoration work and an abatement plan should be prepared by an environmental consultant to deal with lead hazard reduction in accordance with the guidance in Preservation Brief 37: Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing.

An accessible parking space and ramp are available at the rear (north) of the building for patron use. The ramp provides access to the first-floor only, and there is no interior elevator that accesses the basement or second-floors. There is a bathroom located in the basement that is framed up off the concrete slab and is accessed by a single step; therefore, the bathroom is not accessible or ADA compliant. Consideration was given to suggesting that the bathroom could be made accessible; however, there is not enough clearance between the original exterior door and the vestibule door. A 7' clearance is required between doors and the current space measures 5'-3". Additionally, it is not ideal for a patron to have to go outside, down a ramp, along a sidewalk, through a vestibule and across the basement to access the bathroom. Therefore, it is recommended to provide a bathroom at the first floor. A summary of accessibility requirements is outlined below.

- An accessible route must be provided throughout site and into building (parking and walks).
- Accessibility must be provided throughout all floors serviced by an elevator to the fullest extent possible for all public spaces.
- An accessible bathroom (plumbing fixtures and associated grab bars) must be provided on the first floor. This can be for both public and private use.
- Private spaces (staff offices) must provide reasonable accommodations to provide accessibility. Not all private areas need to be made accessible.

- If providing accessibility is technically infeasible, a handicap exception waiver could be request from the State Building Official in lieu of full compliance.

Structural Condition Assessment

Based on the visual assessment conducted by the Structural Engineer, the primary structural concern is the brick walls in the basement. The exposed walls that were observed are in poor condition. The west side of the brick bearing wall in storage area (104) has efflorescence and significant erosion as evidenced by the missing mortar joints and pile of mortar and brick dust on the floor below. The brick has lost its shape and is crumbling. These conditions are also present on the south wall in the mechanical room (105). According to the Structural Assessment, the bricks are absorbing moisture from contact with the soil though a process called rising damp. The report recommends cutting away a portion of the slab to expose the brick, making repairs and applying a membrane or damp proofing over the brick to keep moisture out. Additionally, the bituminous swale should be removed and replaced with a concrete slab similar to the slab along the west wall, and the adjacent wall surfaces should be repointed. Exterior repairs are limited to localized pointing of mortar joints on both brick and granite masonry walls and the chimneys.

Building Systems Assessment

The Building Systems Assessments recommends the following:

- Replacement of the furnace in the next five years.
- Replacement of the air conditioning condensing unit.
- Retention of the ductwork systems is possible and should be cleaned.
- Installation of an exhaust fan in the bathroom.
- Consideration should be given to providing cooling and/or dehumidification at the second-floor/attic.
- Inspection of the existing oil tank.
- Adding receptacles to limit the use of extension cords.
- Replacement of the existing lighting fixtures with energy efficient LED lamped fixtures.
- Replacement of the emergency battery wall pack fixtures.
- Extend smoke detection to the second-floor/attic.
- Provide exit sign above main entrance.
- Provide accessible bathroom and associated fixtures and grab bars.
- Provide a potable bottled water cooler.

PROJECT OVERVIEW

Resource Orientation Information

Location:	299 Main Street
City:	Plainfield
County:	Windham
Resource name:	Aldrich Free Public Library
Year Constructed:	1895
Owner/Manager:	Town of Plainfield
Current Use:	Occupied
Open to Public:	Yes
National Register Status:	Listed

Scope of Project and Objectives

The Conditions Assessment determines, in a comprehensive way, the current condition of the various structural and architectural elements, and features of the building. In addition, it indicates maintenance deficiencies that could lead to further damage. Conditions rated as Good, Fair, or Poor describe the actual condition of the features that are evaluated. The feature is also rated as Critical, Serious, or Minor to indicate the significance of the deficiency of the features.

The following standard condition assessment ratings are based on those outlined by the National Park Service Facility Management Division's Asset Management Process (AMP) under the Facility Condition Index Rating Scale.

Condition Ratings

Good - This rating indicates that:

(a) routine maintenance should be sufficient to maintain the current condition.

Fair - This rating indicates that:

(b) the feature requires more than routine maintenance to maintain the current condition, and

(c) this rating also indicates that maintenance or repair / rehabilitation work may be required in the near future.

Poor - This rating indicates that:

(a) the feature is in need of immediate attention, and

(b) maintenance should be scheduled for the current year, and / or

(c) immediate repair / rehabilitation should be undertaken.

Maintenance Deficiency Priority Ratings

Listed as "Priority Ratings" on the *Building Features Tables,* these priority ratings are based on the condition rating of each feature. These priority ratings indicate either a ***critical***, ***serious***, or ***minor*** deficiency priority rating.

Critical – (Emergency / Immediate)

- This rating defines an advanced state of deterioration which has resulted in the failure of a feature or will result in the failure of a feature if not corrected within *1 year;* or
- There is accelerated deterioration of adjacent or related materials or systems as a result of the feature's deficiencies if not corrected within *1 year;* or
- There is an immediate threat to the health and / or safety of the user.

Serious – (Immediate / Short Term)

- This rating defines a deteriorated condition that if not corrected within *1 to 3 years* will result in the failure of the feature; or
- A threat to the health and / or safety of the user may occur within *1 to 3 years* if the ongoing deterioration is not corrected; or
- There is ongoing deterioration of adjacent or related materials and / or features as a result of the feature's deficiency.

Minor – (Short Term / Long Term)

- This rating indicates standard preventative maintenance practices and preservation methods have not been followed; or
- There is reduced life expectancy of affected adjacent or related materials and / or systems within *3 to 5 years* and beyond; or
- There is a condition with a long-term impact within 3 *to 5 years* and beyond.

Aldrich Free Public Library - Building Features List

Site

Structure
Foundation
Floor Structure
Wall Structure
Roof Structure
Chimneys

Exterior Envelope
Wall Surface Covering
Roof Surface Covering
Roof Flashing

Penetrations
Windows
Doors

Interior Envelope
Floor & Ceiling Coverings
Wall Coverings
Architectural Trim

Building Systems
Appended

Structural Condition Assessment
Appended

BUILDING INVESTIGATION AND ANALYSIS

Site

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Landscape	Earthen material		Fair	Minor

Feature Description – The Library is located on a 0.27-acre lot at the southwest corner of the intersection of Main Street and High Street. The site slopes gently toward the east for an approximate grade change of four feet. The library is set back approximately fifty feet from Main Street and twenty feet from High Street at its shortest distance. Concrete sidewalks parallel Main and High Streets and two walkway extensions connect to the front entry steps. The Main Street walkway extension has a short step before the sidewalk narrows and continues to the front entry steps, and the walkway off High Street provides access to the basement entry vestibule before continuing around the south elevation, and connecting with the Main Street walkway extension.

At the north side of the site, there is a bituminous paved parking area that has ten parking spaces. A concrete sidewalk at the southwest corner of the parking area leads to a wooden ramp structure that provides access to the rear entry at the north elevation. The ramp structure is supported by wooden posts set on concrete footings and has guardrails and handrails. The area beneath the ramp is covered with landscape gravel for low maintenance.

A concrete walkway parallels the west foundation wall and wraps the northwest and southwest corners terminating a short distance beyond each corner. At the south elevation, the walkway terminates into the west foundation wall of the porch. The purpose of the sidewalk is not fully understood but may have been installed to shed water away from the foundation wall, as it does not connect with the other sidewalks and appears to slope away from the foundation wall.

The leaders are connected to underground drainage.

The remaining portion of the site has a grass lawn with landscaping consisting of low ground cover along the south elevation. There is a sign with surrounding plantings located approximately half way between the front entry steps and the sidewalk. A metal bike rack is located to the southwest of the front entry steps.

There is a grass verge with ornamental grasses that parallels the northern property line, and a large deciduous tree near the northwest corner. It is unknow if the grass verge and tree are located on the property or the adjacent properties.

Feature Condition – The site is in fair condition; however, the are a few areas of vegetation near the foundation walls that require attention. Ferns and other vegetation are growing against the east foundation wall of the porch, and a portion of the south foundation wall. The vegetation has tendrils, threadlike appendages used for climbing, that attach to the surface of the brick causing mortar deterioration. The vegetation also traps moisture leading to other failures like paint deterioration.

The bituminous parking has numerous surface cracks and is in fair condition.

The underground draining pipes should be inspected and cleaned of debris to ensure good drainage.

Treatment Recommendations –

- If the deciduous tree is located on the property, considering regular pruning to maintain the tree's health.
- Consideration should be given to sealing the bituminous parking area and restriping.
- As a rule of thumb, all plantings should be pulled back a minimum of 3' from the foundation walls. Remove large shrubs and replace with smaller scale plantings. If removal isn't desired, cut back or relocate overgrown shrubs.
- Install new planting fabric, dirt and mulch.
- Clean gutters, leaders and underground drainage to ensure the system is maintained and in good working order.

Photo Numbers: 1, 3, 4, 14, 25, 45, 61, 69, 71

Structure

Foundation

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Foundation	Granite, stone and brick walls Concrete floor slab	Square-cut ashlar with natural face	Poor	Critical

Feature Description –The foundation walls are constructed of load bearing rubble, uncut cut stone and brick at the interior with exposed square-cut ashlar laid in regular courses at the east elevation and the eastern portions of the north and south elevations. Brick bearing walls divide the basement interior and two steel lally columns support carrying beams across the southern-middle portion of the basement. The basement floor consists of a concrete slab.

Refer to the Structural Assessment for more information.

Feature Condition – Only the exposed portions of the exterior and interior foundation walls were observed. At the interior, the majority of the basement walls are furred-out obscuring the condition of the foundation walls. The exposed walls that were observed are in poor condition.

The west side of the brick bearing wall in storage area #1 has efflorescence and significant erosion as evidenced by the missing mortar joints and pile of mortar and brick dust on the floor below. The brick has lost its shape and is crumbling. These conditions are likely caused by the presence of water, a masonry deterioration problem known as rising damp, and are also present on the south wall in the mechanical room. There were no noticeable signs of water infiltration through the concrete slab but some conditions may be obscured by objects, carpeting or other finishes. Moisture infiltration can travel through the slab and along the walls.

Foil-faced polyiso foam sheathing is installed on some of the foundation walls within the storage areas. The reason for its installation is unknown, but it is suspected that those areas may be concealing deteriorated conditions.

Points of water infiltration were examined at the exterior and there may be several conditions that are leading to the degradation and failure of these interior masonry bearing walls.

At the north elevation, the concrete walkway terminates before the concrete pad for the condensing unit. A pipe is embedded into the concrete which directs runoff from the sidewalk through the pad to a bituminous paved swale that abuts the foundation wall and expels water onto the sidewalk. The paved swale is cracked and the joint between the brick and stone is open. Sections of the joint have been patched with mortar but those patches are deteriorated, and there is a significant amount of bio growth and staining on the brick wall above. The areas of brick with bio growth have brick deterioration and mortar loss. The mortar joint between the brick and granite is also deteriorated, and the vertical joints between the granite blocks are missing mortar. Furthermore, the layer(s) of paint on the brick surface are likely trapping moisture. Refer to the Structural Assessment for more information.

Treatment Recommendations – Refer to Structural Assessment report for detailed treatment recommendations.

- Remove the polyiso foam sheathing from select areas to assess the condition of the foundation wall. If damage (missing/damaged mortar and/or parging) is found, the walls should be repaired.
- Remove the wall furring/wood paneling from select areas to assess the condition of the foundation wall. If damage (missing/damaged mortar and/or parging) is found, the walls should be repaired.
- Portions of the visible brick bearing walls are significantly deteriorated and may require rebuilding sections. Refer to the Structural Conditions Assessment for detailed treatment recommendations.
- Remove the paint from the exterior brick walls via chemical stripping methods.
- Once the paint is removed, spalled or damage bricks should be replaced and the areas with missing mortar should be repointed. During this work, the joints between the brick and granite should also be repointed.
- Remove the bituminous paved swale and provide concrete swale.

Photo Numbers: 14, 15, 16, 17, 25, 33, 41, 42, 43, 45, 47, 48, 49, 52, 67, 190, 196

Floor Structure

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Floor Structure	Wood	None observed	Good	Minor

Feature Description –

First- and Second-Floor – Floor framing consists of wood joists running north to south supported by the masonry load bearing foundation walls.

Second-Floor – Floor framing consists of wood joints running east-west and wood decking running north-south.

Refer to the Structural Assessment for more information.

Feature Condition –

First Floor – The underside of the first-floor framing is obscured by an acoustic drop ceiling, drywall and/or plaster ceiling and surface mount/glue-up acoustic ceiling; therefore, the first-floor framing was not fully accessible or inspected. Second Floor – Second/attic floor framing was observed in the storage areas under the rafters within the eaves. Refer to the Structural Assessment for more information.
Treatment Recommendations – There are no treatment recommendations at this time.
Photo Numbers:

Wall Structure

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Wall Structure	Wood	None Observed	Good	Minor
Feature Description – The exterior walls are constructed of wood studs finished with lath and plaster at the interior and clad with clapboards at the exterior.				
Feature Condition – The wall structure was not visible but is expected to be in good condition. Refer to the Structural Assessment for more information.				
Treatment Recommendations – There are no treatment recommendations at this time.				
Photo Numbers:				

Roof Structure

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Roof Structure	Wood	Circular Sawn	Fair	Minor
Feature Description – The roof structure consists of cross-gabled roof construction which typifies the Queen Anne style. The primary (south) elevation consists of a left justified gable end and a right justified gable end that merges into a conical roof that tops a polygonal tower. The portion of the roof between the two ridges is flat. There are gable ends at the north, east and west elevations.				
Feature Condition – The roof framing was obscured by faux wood paneling and therefore was not visible for inspection. Warping of the faux wood paneling that is attached to the rafters at the north side of the roof was observed and likely indicates water infiltration which may have been corrected with the installation of the new asphalt shingles. Refer to the Structural Assessment for more information.				

Treatment Recommendations - Refer to the Structural Assessment report for more information.

- Remove sections of faux wood panel at damaged or warped areas and inspect the roof framing.

Photo Numbers: 152, 153

Chimneys

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Chimneys	Brick		Poor	Critical

Feature Description – This building has two asymmetrically placed brick chimneys with corbeled brick at the top. The east chimney is topped with an ornate chimney cap of an unknown material. The bases of the chimneys are flashed with metal.

Feature Condition – The chimneys were photographed from the ground and visual observations were based off photographs. The east chimney has missing mortar joints and bio growth. The northeast chimney appears to be in fair condition at the exterior. However, as observed from the interior, the parge coat on the exposed portion of the northeast chimney has cracked and failed. The faux wood paneling attached to the adjacent roof joists is warping, and has white mold indicating the presence of water. These conditions indicate that water is penetrating the chimney cap or compromised mortar joints. At the north side of the chimney, a piece of the parge coat has separated from the face of the brick, but is still in place, and efflorescence was observed between the brick and parge coat.

Refer to the Structural Assessment for more information.

Treatment Recommendations – Refer to the Structural Assessment for more information.

- Inspect the chimney cap for cracks, missing mortar or other noticeable deterioration problems.
- Inspect areas of bio growth for mortar deterioration.
- Inspect interior of chimney. Is it wet/saturated?
- Remove the faux wood paneling from the surrounding roof structure and wall structure, and conduct additional inspections.
- Inspect the flashing for leaks. If leaks are found, take immediate action to make corrections.
- Repoint where required.
- Repair or install new flashing as required.

New mortar should match the strength, color and texture of the existing mortar. A test patch of the proposed mortar and brick replacement samples should be made available to the SHPO for review and approval before undertaking any work.

Photo Numbers: 25, 35, 153

Exterior Envelope

Wall Cladding

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Wall Cladding	Wood	Sawn and planed	Fair	Serious

Feature Description – The Queen Anne style uses wall surfaces as the primary decorative elements. The exterior of the library avoids plain flat walls through use of bays, overhangs, porches and wall projections, and uses several wall materials of differing textures.

The walls are clad in wood clapboards and accented with paneled corner pilasters with Composite capitals. The pilasters support a wide entablature with frieze accented at the corners with leafy scroll carvings, and brackets that extend out from the cornice, giving the appearance of exposed beam ends. The commonest clapboard width appears to be about four inches, and the "weather," or exposed surface, about three inches, so that the lap is about an inch. Water table boards or laps delineate the transition between the brick foundation and the clapboards. The clapboards are terminated with water table boards extending the length of the foundation.

The southwest corner is chamfered and the portion of the second-floor that extends out beyond the wall surface is falsely supported by sunburst-carved brackets.

The gables ends are finished with shakes.

Feature Condition – The wood clapboards appear to have been well maintained over the years with routine maintenance (scrapping and painting) and are in fair condition. The boards exhibit allegatoring and peeling paint. The top trim piece of the water table has peeling paint and exposed wood, and the horizontal boards are faded and generally in fair condition.

The bases of the pilasters including the trim are rotted and in poor condition. Some of the quarter round has been replaced with new pieces that are primed white. The pilasters, frieze boards and associated trim also exhibit allegatoring and peeling paint. The frieze boards are faded and have water stain marks from failure/breaches of the gutter system above.

The shakes exhibit the same paint conditions described above. Some of the shakes are warped and some of the ends have splintered, but generally they appear to be in fair condition.

The boards and trim that make up the entablature on the tower section are warped, have peeling paint and are in poor condition. Similarly, the components that make up the wood bulkhead below the windows at the first floor have peeling paint, exposed wood and are in poor condition. The openings on the basement story of the tower have pseudo three-center arches separated by slender engaged Corinthian columns that support an entablature. The entablature and cornice with dentil molding are in fair to poor condition. The northwestern most column base is missing, and the majority of the wood components have peeling paint.

Contributing factors to deterioration includes the thinness of the clapboard, the durability of the wood species used, the exposure to the sun, the presence of lichens or moss, poor ventilation levels, the presence of overhanging tree limbs, the installation method, and the history of maintenance. Erosion of the softer wood within the growth rings is caused by rainwater, wind, dirt, fungus and the breakdown of cells by ultraviolet rays in sunlight. If the clapboards don't adequately dry between rains, or if moss and lichens are

allowed to grow, moisture will be held in the wood and accelerate deterioration. Moisture trapped under the shingle or condensation will also accelerate deterioration.

Treatment Recommendations –

Clapboards –

- Replace clapboards where necessary to match the existing in dimensions and profiles.

Shakes –

- Prep the shakes by scraping and sanding, then check the wood with a moisture meter. If it reads 15% or less, it is safe to paint. Given the susceptibility of the shingles to the elements, it is likely that peeling with persist. Given the texture and profile of the shingle, effort should be given to ensuring that all surfaces are adequately covered. Replacement within 10-15 years is likely inevitable. At the time of replacement, it is recommended to stain the shingles in lieu of painting. Hand dipping to ensure penetration of the stain into the cell structure is recommended.

Architectural Trim and Wood Components –

- Continue to regularly maintain all wood components.
- Repair/replace any deteriorated frieze boards.
- Scape lose paint from deteriorated wood trim components, and prep, prime and repaint as required.
- Closely inspect the areas of concern that were specifically identified under Feature Condition.
- Repair/replace deteriorated wood components with Dutchman and/or epoxy repair.
- If replacement is necessary due to a component being damaged beyond repair or missing entirely, new trim should be milled to match the dimensions and profile of existing trim components.

Paint Deterioration:
Please refer to Preservation Brief 10: Exterior Paint Problems on Historic Woodwork for a discussion on causes of condition and recommended treatment.

Photo Numbers – 9, 13, 34, 36, 37, 38, 51, 55, 57, 58, 62, 65, 66, 68

Roof Surface Covering

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Roof Surface Covering	Asphalt Shingles		Good	Minor

Feature Description – The cross-gabled roof is finished with 3-tab asphalt shingles installed in 2014.

Feature Condition – The shingles are in good condition.

Treatment Recommendations –

- There are no treatment recommendations at this time.

Photo Numbers: 1, 25, 46, 54, 55, 60, 70, 71

Roof-Wall Junction/Cornice

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Roof-Wall Junction/Cornice	Wood		Poor	Critical
Feature Description – The roof-wall junction known as a boxed eve consists of several elements: shingle molding/drip edge, fascia board/trim, soffit, and brackets. The eve has an integrated gutter system that is lined/flashed with metal. The gable ends have pent roofs enclosing the gables finished with metal flashing.				
Feature Condition – The wood fascia and soffit boards are generally in fair condition with areas that have peeling paint. The soffit boards directly below the integrated gutters are in particularly poor condition with large sections of paint missing. The roof was not accessible for inspection, but based on feedback from Jordan Lumpkins, the gutters were not addressed during the roof replacement in 2014. Therefore, it is likely that the metal flashing/lining has failed which is allowing water to breach the gutters and is saturating the wood which is causing the paint on the soffits to fail. The soffits on the tower are particularly noteworthy and likely have rot.				
Treatment Recommendations – • Inspect the gutter flashing/lining. • If cracks and breakage are observed, replace the flashing/lining with new metal. • Probe the soffit boards for rot. Repair/replace any deteriorated soffit boards. • Scape lose paint from deteriorated wood trim components, and prep, prime and repaint as required. • Closely inspect the areas of concern that were specifically identified under Feature Condition. • Repair/replace deteriorated wood components with Dutchman and/or epoxy repair. • If replacement is necessary due to a component being damaged beyond repair or missing entirely, new trim should be milled to match the dimensions and profile of existing trim components. • Continue to regularly maintain all wood components.				
Photo Numbers: 9, 19, 24, 34, 36, 37, 38, 40, 44, 53, 59, 60, 62, 70				

Penetrations

Windows

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Windows	Wood		Poor	Critical
Feature Description – The window configurations in the structure vary. At the second-floor, each gabled end features a Palladian window topped with a wood keystone. The majority of the windows at the first-floor consist of 1/1 double-hung wood sash. At the south elevation, there is a large round-arched window to the				

right (east) of the main entry. On the west and north (rear) elevations, there are bands of windows high on the wall; these have hopper sash with small border panes. Aluminum storm windows have been installed on the exterior of windows. The majority of the basement windows with the exception of three windows on the south tower have been infilled with novelty (drop) clapboard siding.

See Window Schedule

Feature Condition – The windows are in varying conditions and degrees of failure. Some windows are limited to broken sash chords while others have cracked and missing glazing putty and/ or wood deterioration at the bottom rail and sill. The majority of the trim is intact with the exception the Palladian windows at the south and west elevations. The sills are showing signs of rot, hardware components are missing or non-functioning and the paint system has failed.

See Window Schedule

Treatment Recommendations –

Good Condition – Routine Maintenance

- Some degree of interior and exterior paint removal.
- Removal and repair of sash (including reglazing where necessary).
- Repairs to the frame/
- Weatherstripping and reinstallation of the sash, and repainting.
- Conduct regular maintenance of sound frames to achieve the longest life possible.

Fair Condition – Stabilization

- Dry the wood, and then treat decayed areas with a fungicide.
- Waterproof with two or three applications of boiled linseed oil (applications every 24 hours).
- Fill cracks and holes with epoxy.
- Apply all guidance under Routine Maintenance.

Poor Condition – Splices and Parts Replacement

- Make necessary repairs in place, wherever possible, using stabilization and splicing techniques, and; if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.
- Repair/replace deteriorated components with Dutchman and/or epoxy repair.
- Replace missing trim components to match existing in dimensions and profiles.
- Replace broken and missing panes of glass with historic glass, if possible.
- Reglaze all of the sash.
- Remove existing paint, prep, prime and paint all sash.
- Refurbish hardware.
- Replace deteriorated sills.

Please refer to the guidance provided in Preservation Brief 9: The Repair of Historic Wooden Windows

Photo Numbers: 8, 11, 13, 20, 21, 22, 23, 24, 27, 34, 36, 40, 46, 55, 62, 63, 66, 97, 105, 106, 107, 108, 109, 110, 130, 134, 136, 137, 138, 139, 140, 145, 147, 162, 168, 169, 182

Doors

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Doors	Wood and Metal		Good	Minor

Feature Description –

North Elevation: The easternmost window opening was removed and the opening was converted to a door to provide an accessible entry. The opening was fitted with a transom panel with trim and a raised metal panel door with push bar and automatic door opener.

South Elevation: The library's main entry door consists of an oak paneled door with glass vision panel protected by an aluminum screen door. The panel below the glass has been modified to accommodate a return book chute opening. The book drop box is mounted to the inside of the door. The entry door is sheltered by a portico with pedimented roof supported by modern post, a replacement for the original, which were clustered columns set on high pedestals, similar to the single engaged columns still in place at the back wall of the porch. The portico is accessed by six granite steps with check blocks accented with filleted corners.

East Elevation: At the basement, there is a small enclosed entry porch that provides accesses to the basement. The entry portico has a shallow-pitched gable roof finished with particle board. The walls are finished with wood clapboard and wood trim. The portico has a wood entry door with a cross-braced panel below a nine-light vision panel. The portico walls are finished with wood paneling. At the interior, the main entrance consists of an oak panel door with a nine-light vision panel with push bar and door closer hardware.

Feature Condition –

North Elevation: The metal door is operable and is in good condition.

South Elevation: The oak door and aluminum screen door are operable and in fair condition. The porch components are in fair condition requiring scraping and repointing. The floor boards are splintering and warping and should be replaced within 3 to 5 years.

East Elevation: The portico door and original oak door are in good condition.

Treatment Recommendations – Primarily for wood doors.

Good Condition – Routine Maintenance

- Interior and exterior cleaning required.
- Some degree of interior and exterior paint removal and repainting required.
- Weatherstripping may be required and/or desired.
- Conduct regular maintenance to achieve the longest life possible.
- Inspect door closer hardware for safe and functional operability

Fair Condition – Stabilization

- Dry areas of wood with moisture and treat decayed areas with a fungicide.
- Waterproof with two or three applications of boiled linseed oil (applications every 24 hours.
- Fill cracks and holes with putty, and after a "skin" forms on the putty, paint the surface.
- Remove existing paint, prep, prime and paint.
- Apply all guidance under Routine Maintenance

Poor Condition – Splices and Parts Replacement • Make necessary repairs in place, wherever possible, using stabilization and splicing techniques, and if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation. • Repair/replace deteriorated components with Dutchman and/or epoxy repair. • Replace missing components to match existing in dimensions and profiles. • Replace broken and missing panes of glass with historic glass, if possible. • Reglaze lights. • Remove existing paint, prep, prime and paint. • Refurbish hardware or install new as required for accessibility requirements.
Photo Numbers: 3, 4, 5, 6, 7, 26, 27, 28, 29, 30, 51, 74, 119, 181

Interior Envelope

First- Third Floors

Feature	Material Type	Joinery/Tool Marks	Conditions Rating	Priority Rating
Interior Finishes	Various		Fair	Minor
Feature Description – See interior finishes worksheet				
Feature Condition – See interior finishes worksheet				
Treatment Recommendations – See interior finishes worksheet				
Photo Numbers: 72-197				

Window Schedule

Window Schedule Assessment performed clockwise (north, east, south, west)				
Basement				
Unit	**Location**	**Description**	**Condition**	**Recommendations**
101	South Elevation Tower	Missing. Opening infilled with clapboards.	N/A	N/A
101A	South Elevation Tower	Missing. Opening infilled with clapboards.	N/A	N/A
101B	South Elevation Tower	1/1 double-hung, wood replacement windows with exterior storms. Original windows consist of single pane with glass transom above.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
101C	South Elevation Tower	1/1 double-hung, wood replacement windows with exterior storms. Original windows consist of single pane with glass transom above.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
101D	South Elevation Tower	1/1 double-hung, wood replacement windows with exterior storms. Original windows consist of single pane with glass transom above.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
101E	South Elevation Tower	Missing. Opening infilled with clapboards.	N/A	N/A
101F	South Elevation Tower	Missing. Opening infilled with clapboards.	N/A	N/A
First Floor				
Unit	**Location**	**Description**	**Condition**	**Recommendations**
201	South Elevation Tower	1/1 double-hung, wood window with exterior storms.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201A	South Elevation Tower	1/1 double-hung, wood window with exterior storms.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the	Repair/replace components as required

			bottom rail and sill have early signs of rot.	
Unit	Location	Description	Condition	Recommendations
201B	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201C	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201D	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201E	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201F	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
201G	South Elevation Tower	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
202	South Elevation	6/5 double-hung, wood sash with exterior storm	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
203	South Elevation	1/1 double-hung, wood window with exterior storm window.	Poor – the paint system on sash, trim, and sill has failed; putty has failed; the bottom rail and sill have early signs of rot.	Repair/replace components as required
S1	West Elevation	Four light awning window fixed in place and covered over with	Fair/Poor – the glass has been removed and the	Repair/replace components as required

		clapboards at the exterior	window has been painted shut.	
S2	West Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – the paint system on sash, trim, and sill has failed; putty has failed.	Repair/replace components as required
204	West Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204A	West Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204B	West Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204C	South Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204D	South Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204E	South Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.
204F	South Elevation	Two-pane surround by eight smaller panes with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair components as required.

205	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
205A	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
205B	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
205C	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
205D	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
205E	East Elevation	1/1 double-hung, wood window with exterior storm window.	Fair – The windows were only observable from the interior. Early paint failure, and cracking and failure of glazing putty is expected at the exterior.	Repair/replace components as required
Second Floor				
Unit	Location	Description	Condition	Recommendations
301	South Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
301A	South Elevation	1/1 double-hung, wood sash with; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the	Repair/replace components as required

			sill is likely rotted and in poor condition.	
Unit	Location	Description	Condition	Recommendations
301B	South Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
301C	West Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
301D	West Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition; broken sash and sash cords.	Repair/replace components as required
303E	West Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
303F	North Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
303G	North Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
303H	North Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
303I	East Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required

Unit	Location	Description	Condition	Recommendations
303J	East Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required
303K	East Elevation	1/1 double-hung, wood sash; wood trim, and wood sill	Fair/Poor – the paint system on sash, trim, and sill has failed; putty has failed; the sill is likely rotted and in poor condition.	Repair/replace components as required

Door Schedule

Doors – First Floor Assessment performed clockwise (north, east, south, west)				
Unit	Location	Description	Condition	Recommendations
101A	East Elevation	Glazed, three paneled door with wood casing	Fair – Some deterioration of finishes observed.	Inspect wood components for rot; reglaze windows; scrape, prep, prime and paint; repair/replace components as required;
101B	East Elevation	Glazed, cross-braced paneled wood door below a nine-light vision panel.	Fair – Some deterioration of finishes observed.	Inspect wood components for rot; reglaze windows; scrape, prep, prime and paint; repair/replace components as required; strip paint from door hinges
203	South Elevation	Six paneled door with vision panel; the door has a original escutcheon plate with knob.	Fair – Some deterioration of finishes observed.	Inspect bottom of wood components for rot; reglaze windows; scrape, prep, prime and paint; repair/replace components as required; strip paint from door hinges
205	North Elevation	Raised panel metal door.	Fair – The door is working order.	Clean and maintain.

Interior Finishes Worksheet

BASEMENT						
Room		Floors	Walls	Ceiling	Trim	Features
101 Children's Library	Description	Carpet over concrete slab.	Modern furred wall assembly finished with painted wood paneling.	Acoustic drop ceilings with troffer lights and surface mounted fluorescent strip lights. The original ceiling finish above the drop ceiling is not known.	Flatstock window and door casing, baseboard.	
	Condition/ Recommendation	Poor: Remove carpet, assess condition of concrete slab and install new flooring system with vapor barrier.	Good: The walls are in good condition; however, select holes should be made in the walls to assess the condition of original wall finish, and whether or not it exists, and the foundation walls. The systems currently behind the furred walls should be assessed to better understand if there is a more efficient design layout that would allow for the removal of the furred walls in order to gain additional square footage.	Fair: The acoustic drop ceiling assembly is in fair condition.	Fair – The wood and door trim and baseboard are in fair condition.	
	Photos	171-182	171-182	171-182	171-182	
Room		Floors	Walls	Ceiling	Trim	Features

102 Storage #1	Description	Exposed concrete slab.	The walls are clad in foil-faced polyiso foam sheathing. The wall finish is unknown.	The ceiling is finished with foil-faced polyiso foam sheathing. The ceiling finish is unknown	Flat stock door casing	
	Condition/ Recommendation	Fair: There are no treatment recommendations at this time.	Fair: The reason for the installation of the foil-faced polyiso foam sheathing is unknown. A section should be removed to assess the condition of the wall below.	Fair: The reason for the installation of the foil-faced polyiso foam sheathing is unknown. A section should be removed to assess the condition of the ceiling above.	Good: There are no treatment recommendations at this time.	
	Photos					
Room		Floors	Walls	Ceiling	Trim	Features
103 Corridor	Description	Carpet over concrete slab.	The walls are finished with painted wood paneling.	The ceiling is finished with sheetrock with flushed-mounted ceiling lights.	Flat stock door casing and baseboard with quarter round; simple crown molding.	
	Condition/ Recommendation	Poor: Remove carpet, assess condition of concrete slab and install new flooring system with vapor barrier.	Good: The walls are in good condition. There are no treatment recommendations at this time.	Good: There are no treatment recommendations at this time.	Good: There are no treatment recommendations at this time.	
	Photos	188	188	188	188	
Room		Floors	Walls	Ceiling	Trim	Features
Stair #1 Basement to First-floor	Description	Carpet over concrete slab.	The walls are finished with lath and plaster; however, the bottom half of the wall, from the first-floor level and	The underside of the stair (first to second-floor) is finished with lath and plaster, and the ceiling at above	Flat stock trim.	Stair: The stair is constructed of wood and the risers and treads are covered in carpet. A simple wood handrail is

			below, has been furred out and finished with wood paneling and trim. The west wall is furred out significantly more than the east wall. The reason for furring out the lower portion of the walls is unknown.	the landing is finished with sheetrock.		mounted on the east wall. Stair door: Five-panel door with original escutcheon plate and knob surrounded by original wood trim
	Condition/ Recommendation	Poor: Remove carpet, assess condition of concrete slab and install new flooring system with vapor barrier.	Fair: Several settlement cracks were observed as well as previous crack repairs. Regularly monitor cracks for movement before making repairs. There are no noticeable deficiencies on the finish materials against the foundation walls; however, it is recommended to make select holes in the furred walls to assess the condition of the finishes and foundation walls.	Fair: Several settlement cracks were observed as well as previous crack repairs. Regularly monitor cracks for movement before making repairs.	Good: There are no treatment recommendations at this time.	Stair – Fair: Remove carpet and assess condition of wood riser and treads before installing new carpeting. Verify the handrail is 34-38" in height above the stair nosing. 36" is standard. Stair Door – Fair: The door is operable and in fair condition. The finish is wearing along the bottom rail.
	Photos	162-167	162-167	162-167	162-167	162-167
Room		Floors	Walls	Ceiling	Trim	Features
104 Storage #2	Description	Exposed concrete slab.	The walls are clad in foil-faced polyiso foam sheathing. The wall finish is unknown.	The ceiling is finished with foil-faced polyiso foam sheathing. The	Flat stock door casing.	Exposed brick bearing wall.

				ceiling finish is unknown.		
	Condition/ Recommendation	Fair: There are no treatment recommendations at this time.	Fair: The reason for the installation of the foil-faced polyiso foam sheathing is unknown. A section should be removed to assess the condition of the wall below.	Fair: The reason for the installation of the foil-faced polyiso foam sheathing is unknown. A section should be removed to assess the condition of the ceiling above.	Fair: There are no treatment recommendations at this time.	Please refer to Foundation section for a discussion on the deterioration of the exposed brick bearing wall.
	Photos	189-191	189-191	189-191	189-191	189-191
Room		Floors	Walls	Ceiling	Trim	Features
105 Mechanical Room	Description	Exposed concrete slab.	Exposed brick	The ceiling is finished with unfinished sheetrock.	Metal door frame with flat stock wood trim on the corridor side.	
	Condition/ Recommendation	Fair: A section of the slab has been cut away near the northeast corner; the reason is unknown. There are no treatment recommendations at this time.	Fair to poor: The brick walls appear to have been painted at one time; however, the majority of paint has flaked off. Eroded mortar joints were observed. The brick walls need to be cleaned and repointed.	Fair: There are no treatment recommendations at this time.	Fair: There are no treatment recommendations at this time.	Please refer to Foundation section for a discussion on the deterioration of the exposed brick bearing wall.
	Photos	192-196	192-196	192-196	192-196	192-196
Room		Floors	Walls	Ceiling	Trim	Features
106 Bathroom	Description	9x9 vinyl tile installed on a built-up floor.	Furred walls finished with painted wood paneling.	Glue up/surface mount acoustic ceiling tiles.	Flatstock trim and simple crown molding.	Inaccessible fixtures.

	Condition/ Recommendation	Poor: Loose tiles were observed. Remove existing floor system in order to provide an accessible bathroom and install new tile.	Fair: Remove wood paneling and install new sheetrock.	Fair: Remove glue up surface mount acoustic ceiling tiles and install new sheetrock.	Fair: Remove in preparation of new sheetrock walls and ceilings.	Poor: Replacing existing fixtures with accessible, low-flow, energy efficient fixtures.
	Photos	183-187	183-187	183-187	183-187	183-187
FIRST FLOOR						
Room		Floors	Walls	Ceiling	Trim	Features
201 Computer Room	Description	Carpet over wood flooring.	Plaster walls: the lower portion of the wall is finished with wainscot with raised panels mostly obscured by book shelves, cabinets, desks, etc.	Glue up/surface mount acoustic ceiling tiles with pendant mounted fluorescent strip lighting	Cornice, window and door casing, baseboard	Brick fireplace with oak surround and mantel. The hearth is tiled, but mostly obscured by a shelf. A section of the wood border has been cut out to accommodate an outlet. Painted mural on the north and northeast walls.
	Condition/ Recommendation	Poor: The carpet is stained and worn from normal wear-and-tear. Remove carpet and assess the condition of the wood flooring below. Consider refinishing the wood floors or install new carpet.	Poor: Numerous plaster cracks were visible on the south wall, particularly along the tower's vertices, and on the north and northeast walls. Additionally, water staining and failure of plaster were observed on the wall above the fireplace.	Fair: Remove glue up surface mount acoustic ceiling tiles and assess the condition of the plaster ceiling. It is suspected that the tiles were installed to cover failure of the plaster ceiling finish. If beyond repair, remove the lath and plaster ceiling finish and install new sheetrock.	Fair: Cleaning and maintain wood trim components. The window casing and wood paneling was difficult to observe due to bookshelves; however, some sun deterioration of the wood finish is likely. If desired, lightly sand	Fair: Regularly dust and clean. Remove the book shelf and assess the full condition of the mantel. Suggest removing the outlet and patching in a new piece of wood via dutchman repair.

			Regularly monitor cracks for movement before making repairs. Some of the wood paneling below the windows on the south wall have water staining. If desired, lightly sand and clean wood; and apply new coat of shellac or varnish.		and clean wood; and apply new coat of shellac or varnish.	
	Photos	89-101	89-101	89-101	89-101	89-101
Room		Floors	Walls	Ceiling	Trim	Features
202 Librarian's Office	Description	Carpet over wood flooring.	Plaster walls; shelves and countertops have been installed against the east and west walls.	Sheetrock; joints concealed with wood furring strips.	Simple, non-historic molding to conceal the edges of the sheetrock, and original window casing.	L-shaped desk finished with tongue and groove beadboard paneling and baseboard.
	Condition/ Recommendation	Poor: The carpet is stained and worn from normal wear-and-tear. Remove carpet and assess the condition of the wood flooring below. Consider refinishing the wood floors or install new carpet.	Fair: No visible cracks were observed, though some may be obscured by the bookshelves. If cracks are present, regularly monitor cracks for movement before making repairs.	Fair: Remove the ceiling finish and assess the condition of the plaster ceiling. It is suspected that the sheetrock was installed to cover failure of the plaster ceiling finish. If beyond repair, remove the lath and plaster ceiling finish and install new sheetrock.	Fair: Remove non-historic crown molding. Cleaning and maintain original wood trim components. The window casing was difficult to observe; however, some sun deterioration of the	Fair: The corner edges of the beadboard paneling are worn from normal wear-and-tear. Regularly dust and clean. If desired, lightly sand and clean wood; and apply new coat of shellac or varnish.

					wood finish is likely. If desired, lightly sand and clean wood; and apply new coat of shellac or varnish.	
	Photos	128-133	128-133	128-133	128-133	128-133
Room		Floors	Walls	Ceiling	Trim	Features
203 Vestibule	Description	Carpet over wood flooring.	Plaster walls; the lower portion of the wall is finished with wainscot with beadboard paneling.	Glue up/surface mount acoustic ceiling tiles with a flush mount ceiling light missing the light shade.	Simple cornice, door and window casing, chair rail, baseboard.	Vestibule entry door: This door is identical to the exterior door and consists of an oak paneled door with glass vision panel and retained its original escutcheon plate, knob and latch.
	Condition/ Recommendation	Poor: The carpet is stained and worn from normal wear-and-tear. Remove carpet and assess the condition of the wood flooring below. Consider refinishing the wood floors or install new carpet.	Fair: A few plaster cracks were observed. Regularly monitor cracks for movement before making repairs. The wood paneling is worn and nicked in areas. If desired, lightly sand and clean the wood; and apply new coat of shellac or varnish.	Fair: Remove glue up surface mount acoustic ceiling tiles and assess the condition of the plaster ceiling. It is suspected that the tiles were installed to cover failure of the plaster ceiling finish. If beyond repair, remove the lath and plaster ceiling finish and install new sheetrock.	Fair: Cleaning and maintain wood trim components. The window casing and wood paneling was difficult to observe; however, some sun deterioration of the wood finish is likely. If desired, lightly sand and clean wood; and apply new coat of shellac or varnish.	Fair: Remove the exit sign from the door and install an illuminated sign above. Consider moving the signage on the glass to other visible areas. The wood threshold is worn. Carefully sand, clean the wood and apply a new coat of shellac or varnish.
	Photos	119-126	119-126	119-126	119-126	119-126

Room		Floors	Walls	Ceiling	Trim	Features
Stair #1 First to second floor	Description	Carpet over wood flooring.	Plaster walls; the lower portion of the wall is finished with beadboard wainscot.	The ceiling is finished with lath and plaster.	Door and window casing, chair rail, baseboard	Stair door: five-panel oak door with newer door hardware. Stair: The stair is constructed of wood and the risers and treads are covered in carpet. A simple wood handrail is mounted on the east wall.
	Condition/ Recommendation	Fair: The carpet is in fair condition. There are no treatment recommendations at this time. If removal is desired, consider refinishing risers and treads.	Fair: Several settlement cracks were observed as well as previous crack repairs. Regularly monitor cracks for movement before making repairs.	Fair: Several settlement cracks were observed as well as previous crack repairs. Regularly monitor cracks for movement before making repairs.	Good: There are no treatment recommendations at this time.	Stair Door – Fair: The door is operable Stair – Fair: The handrail height was measured at 27" and 28" above the stair nosing. The handrail needs to be adjusted so that is 34-38" in height above the stair nosing. 36" is standard.
	Photos	134-140	134-140	134-140	134-140	134-140
Room		Floors	Walls	Ceiling	Trim	Features
204 Library	Description	Carpet over wood flooring.	Plaster walls; the lower portion of the wall is finished with beadboard wainscot installed vertically along the exposed walls and horizontally	Glue up/surface mount acoustic ceiling tiles with pendant mounted fluorescent strip lighting	Cornice, window and door casing, baseboard	

			behind the book shelves.			
	Condition/ Recommendation	Poor: The carpet is stained and worn from normal wear-and-tear. Remove carpet and assess the condition of the wood flooring below. Consider refinishing the wood floors or install new carpet.	Poor: A few plaster cracks were observed. Regularly monitor cracks for movement before making repairs.	Fair: Remove glue up surface mount acoustic ceiling tiles and assess the condition of the plaster ceiling. It is suspected that the tiles were installed to cover failure of the plaster ceiling finish. If beyond repair, remove the lath and plaster ceiling finish and install new sheetrock.	Fair: Cleaning and maintain wood trim components.	
	Photos	102-118, 127	102-118, 127	102-118, 127	102-118, 127	102-118, 127
Room		Floors	Walls	Ceiling	Trim	Features
205 Meeting Room	Description	Carpet over wood flooring.	Plaster walls; the lower portion of the wall is finished with wainscot with raised panels mostly obscured by book shelves.	Glue up/surface mount acoustic ceiling tiles.	Cornice and door casing	Brick fireplace with oak paneled ornamental and mantel. The original hearth has been covered over with a faux brick material that is surrounded by a wood boarder that has water damage.
	Condition/ Recommendation	Poor: The carpet is stained and worn from normal wear-and-tear. Remove carpet and assess the condition of the wood flooring below. Consider refinishing	Fair: No visible cracks were observed, though some may be obscured by the bookshelves. If cracks are present, regularly monitor cracks for movement before making repairs.	Fair: Remove glue up surface mount acoustic ceiling tiles and assess the condition of the plaster ceiling. It is suspected that the tiles were installed to cover failure of the plaster	Fair: Cleaning and maintain wood trim components. The window casing and wood paneling was difficult to observe due to	Fair: Regularly dust and clean. Remove the faux brick covering from the mantel, assess condition of finish below and consider installing an

		the wood floors or install new carpet.		ceiling finish. If beyond repair, remove the lath and plaster ceiling finish and install new sheetrock.	bookshelves; however, some sun deterioration of finishes is likely. If desired, lightly sand and clean wood; and apply new coat of shellac or varnish.	appropriate material like tile. Carefully sand the wood surround, clean and apply new coat of shellac or varnish.
	Photos	72-85	72-85	72-85	72-85	72-85
SECOND FLOOR						
Room		Floors	Walls	Ceiling	Trim	Features
301 Storage Area / Arts and Crafts	Description	Carpet over tongue and groove wood flooring.	Wood stud walls finished with faux wood paneling	Sheetrock painted white.	Flat stock door trim and baseboard, original window trim	
	Condition/ Recommendation	Fair: Consider installing new carpet.	Fair: There are no treatment recommendations at this time. Considering removing the faux wall paneling and installing sheetrock or paint the faux wood paneling for an updated or appearance.	Fair: There are no treatment recommendations at this time.	Touch up painting may be required.	
	Photos	141-161	141-161	141-161	141-161	

PRIORITIZED BUILDING FEATURES RATING TABLE

PRIORITIZED BUILDING FEATURES RATING TABLE				
FEATURE LOCATION	FEATURE NAME	MATERIAL TYPE	CONDITION RATING	PRIORITY RATING
Phase 1: Within 1 year				
Structure	Foundation	Stone	Fair to Poor	Critical
Structure	Chimneys	Brick	Poor	Critical
Exterior Envelope	Roof-Wall Junction/Cornice	Wood	Poor	Critical
Penetrations	Windows	Wood	Poor	Critical
Phase 2: 1 to 3 years				
Exterior Envelope	Wall Cladding	Wood	Fair	Serious
Building Systems	Mechanical Systems	Varies	Poor	Serious
Building Systems	Electrical	Varies	Poor	Serious
Building Systems	Plumbing	Varies	Poor	Serious
Phase 3: 1 to 3 years				
Site	Landscape	Earthen Material	Fair	Minor
Structure	Floor Structure	Wood	Good	Minor
Structure	Wall Structure	Wood	Good	Minor
Structure	Roof Structure	Wood	Good to fair	Minor
Exterior Envelope	Roof Surface Covering	Asphalt Shingles	Good	Minor
Penetrations	Doors	Wood/Aluminum	Fair	Minor
Interior Finishes	Basement	Varies	Refer to Finishes Worksheet	Minor
Interior Finishes	First Floor	Varies	Refer to Finishes Worksheet	Minor

Interior Finishes	Second Floor	Varies	Refer to Finishes Worksheet	Minor

Preventative Maintenance Discussion

Regular maintenance of the building is critical for the long-term preservation of the structure. Preventing future deterioration of materials by controlling environmental conditions of interiors, specifically climate control is key to protecting interior finishes. Climate controls can stabilize extreme temperature fluctuations, thus preserving interior finishes. Preventative maintenance describes maintenance work on a building, such as gutter cleaning, exterior painting, applying wood preservative, etc., that prevents deterioration of building fabric. After all, the best and most cost-effective way to preserve a building is to maintain it. Preventative maintenance is not discussed enough, as the subject is often deemed less critical than response to damaged or threatened properties, because it is ongoing and cyclical. Through preventative maintenance, successful stewards can educate caretakers (who are the front-line of defense against loss) about techniques, coupled with ongoing monitoring. Preventative maintenance plans are best placed in high-priority, institutional contexts by being included in long-term facilities management. Preventative maintenance standardizes tasks so that the managing institutions can be pro-active rather than reactive. Preventative maintenance is an important aspect of preservation that is often overlooked, but a necessary part of the process that is critical for superb site stewardship.

APPENDIX A: COST ESTIMATE

Crosskey Architects LLC
750 Main St Hartford, CT 06103
860 724 3000

Aldrich Free Public Library

October 21, 2021

Phase	Priority	Material	Cost	Contingency (10%)	Total	Remarks
Phase One		**Phase One - Within a year**				
	1.1	**Structure - Foundation**				
		Removal of polyiso foam sheathing and inspection of foundation walls			$ 2,500	Allowance
		Rising damp treatment of brick walls in basement	$ 5,000	$ 500.00	$ 5,500	Recommended work in Structural Assessment
		Repointing of mortar joints in basement walls	$ 7,000	$ 700.00	$ 7,700	Recommended work in Structural Assessment
		Repointing of exterior mortar joints	$ 15,000	$ 1,500.00	$ 16,500	Recommended work in Conditions and Structural Assessments
		Removal of bituminous swale and installation of drainage swale	$ 20,000	$ 2,000.00	$ 22,000	Recommended work in Structural Assessment
					$ 54,200	
	1.4	**Structure - Chimneys**				
		10% Repointing of chimneys	$ 3,000	$ 300	$ 3,300	Recommended work in Conditions Assessment
		Replacement of spalled brick			$ 500	Allowance
		Repair/replacement of caps			$ 500	Allowance
		Interior chimney inspection			$ 500	Allowance
					$ 4,800	
	1.2	**Exterior Envelope - Roof-Wall Junction/Cornice**				
		Inspection of gutter system			$ 2,500	Allowance
		Relining/flashing integrated gutter system	$ 10,000	$ 1,000	$ 11,000	Recommended work in Conditions Assessment
		Repair/replacement of soffit boards	$ 10,000	$ 1,000	$ 11,000	Recommended work in Conditions Assessment
		Trim (fascia, soffit) components	$ 5,000	$ 500	$ 5,500	Recommended work in Conditions Assessment
		Gutters and leaders			$ 1,500	Allowance
					$ 31,500	
	2.5	**Penetrations - Windows**				
		Window restoration	$ 35,000	$ 3,500	$ 38,500	Recommended work in Conditions Assessment
		Storm windows			$ 25,000	Allowance
					$ 63,500	
		PHASE TOTAL			**$ 154,000**	
Phase Two		**Phase Two: 1 to 3 years**				
	2.1	**Exterior Envelope - Wall Cladding**				
		Clapboard replacement including corner pilasters replacement components	$ 7,000	$ 700	$ 7,700	Recommended work in Conditions Assessment
		Scraping and painting (clapboards, entablature and trim)	$ 7,000	$ 700	$ 7,700	Recommended work in Conditions Assessment
					$ 15,400	
	2.2	**Structure - Wall**				
		Possible repairs during exterior work			$ 3,000	Allowance
					$ 3,000	
	2.3	**Accessibility**				
		New bathroom			$ 30,000	Allowance / Recommended work in Conditions Assessment
					$ 30,000	
	2.4	**Utilities - HVAC**				
		Replace 4 ton split system	$ 18,000	$ 1,800	$ 19,800	Recommended work in MEP Report
		Duct Cleaning	$ 1,200	$ 120	$ 1,320	Recommended work in MEP Report
		Bathroom fan	$ 400	$ 40	$ 440	Recommended work in MEP Report
		Mini split HVAC for attic	$ 12,500	$ 1,250	$ 13,750	Recommended work in MEP Report
		Tank inspection	$ 400	$ 40	$ 440	Recommended work in MEP Report
					$ 35,750	
	2.5	**Utilities - Electrical**				
		Lighting fixture replacement	$ 7,000	$ 700	$ 7,700	Recommended work in MEP Report
		Added receptacles	$ 1,500	$ 150	$ 1,650	Recommended work in MEP Report
		Emergency lighting and exit sign	$ 2,500	$ 250	$ 2,750	Recommended work in MEP Report
		Smoke or heat detectors to attic	$ 800	$ 80	$ 880	Recommended work in MEP Report
			$ 400	$ 40	$ 440	Recommended work in MEP Report
					$ 13,420	
	2.6	**Utilities - Plumbing (upgrades only)**				
		New ADA bathroom fixtures	$ 6,000	$ 600	$ 6,600	Recommended work in MEP Report
		Bottled water cooler	$ 400	$ 40	$ 440	Recommended work in MEP Report
					$ 7,040	
		PHASE TOTAL			**$ 104,610**	
		Phase Three: 3 to 5 years				
	3.1	**Landscape**				
		Tree trimming			$ 1,000	Allowance / Recommended work in Conditions Assessment
		Driveway sealing and striping			$ 2,500	Allowance / Recommended work in Conditions Assessment
		Landscaping and clean-up			$ 1,000	Allowance / Recommended work in Conditions Assessment
					$ 4,500	
	3.2	**Structure - Floor**				
		Possible repairs during floor refinishing			$ 3,000	Allowance
					$ 3,000	
	3.3	**Structure - Roof**				
		Possible repairs			$ 2,000	Allowance
					$ 2,000	
	3.3	**Penetrations - Doors**				
		Possible repairs			$ 2,000	Allowance

Crosskey Architects LLC
750 Main St Hartford, CT 06103
860 724 3000

Aldrich Free Public Library

October 21, 2021

Phase	Priority	Material	Cost	Contingency (10%)	Total	Remarks
Phase Three		Possible replacement of screen door and metal panel door			$ 4,000	Allowance
					$ 6,000	
	3.4	**Interior Envelope** (Per Room)				
		Children's Library (101)	$ 15,000	$ 1,500	$ 16,500	Recommended work in Conditions Assessment
		Storage (102)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Corridor (103)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Stair (basement to first)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Storage (104)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Mechanical Room (105)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Bathroom (106)	$ 6,000	$ 600	$ 6,600	Recommended work in Conditions Assessment
		Computer Room (201)	$ 10,000	$ 1,000	$ 11,000	Recommended work in Conditions Assessment
		Librarian's Office (202)	$ 5,000	$ 500	$ 5,500	Recommended work in Conditions Assessment
		Vestibule (203)	$ 3,000	$ 300	$ 3,300	Recommended work in Conditions Assessment
		Stair (first to second)	$ 2,000	$ 200	$ 2,200	Recommended work in Conditions Assessment
		Library (204)	$ 15,500	$ 1,550	$ 17,050	Recommended work in Conditions Assessment
		Meeting Room (205)	$ 10,000	$ 1,000	$ 11,000	Recommended work in Conditions Assessment
		Storage Area / Arts and Crafts (301)	$ 20,000	$ 2,000	$ 22,000	Recommended work in Conditions Assessment
					$ 106,150	
		PHASE TOTAL			**$ 121,650**	
		TOTAL			**$ 380,260**	
		General Conditions 12% (dumpsters, site management, etc.)			**$ 45,631**	
		GC/Cm Overhead and Profit: 10% of General Conditions +Total			**$ 42,589**	
		Permits, Utility fees and bonding			**$ 60,000**	
		GRAND TOTAL			**$ 528,480**	

*This cost does not take into account the volatility of today's market. Additional contingencies should be included to account for unforeseen items which commonly occur with rehabilitation projects, and for market volatility.

APPENDIX B: CONDITIONS ASSESSMENT PHOTOGRAPHS

1. South elevation, camera facing north.

2. South elevation, southwest corner, camera facing up and northeast.

3. South elevation, front entry steps, camera facing northeast.

4. South elevation, front entry steps, camera facing north.

5. South elevation, underside of portico roof, camera facing up and north.

6. South elevation, deteriorated porch boards, camera facing down and north.

7. South elevation, porch column, camera facing north.

8. South elevation, close-up of window with exterior storm.

9. South elevation, west elevation of tower, camera facing up and northeast. Note deterioration of soffit boards.

10. South elevation, west elevation of tower, camera facing up and northeast. Note deterioration of soffit boards.

11. South elevation, west elevation of tower, camera facing northeast.

12. South elevation, camera facing down and northeast. Note deterioration of water table boards.

13. South elevation, camera facing up and north. Note missing trim on window surround.

14. South elevation, vegetation growing against east elevation of stair.

15. South elevation, west elevation of tower, camera facing down and northeast. Note missing column base.

16. South elevation, vegetation growing against east elevation of stair. Note paint deterioration and missing mortar.

17. South elevation, infill of basement window, camera facing northwest.

18. South elevation, east elevation of porch guardrail and railing, camera facing west.

19. South elevation, tower roof and integrated gutter camera facing north.

20. South elevation, tower, camera facing north. Note deteriorated of bulkheads below first-floor windows.

21. South elevation, tower, camera facing down and north. Note deteriorated window sash and sill.

22. South elevation, tower, camera facing north. Note broken hardware.

23. South elevation, tower, camera facing up and north. Note deteriorated flashing at top of storm window and infilled transom above.

24. South elevation, tower, underside of cornice, camera facing up and north.

25. East elevation, camera facing west.

26. East elevation, exterior vestibule, camera facing west.

27. East elevation, gable end roof with particle board and light, camera facing west.

28. East elevation, exterior vestibule, bottom of door, camera facing west.

29. East elevation, interior of exterior vestibule, camera facing east.

30. Southeast building perspective, exterior vestibule, camera facing northwest.

31. East elevation, infilled windows, camera facing west.

32. East elevation, camera facing northwest.

33. East elevation, camera facing down and west.

34. East elevation, camera facing up and west. Note condition of clapboards.

35. East elevation, southeast perspective of chimney, camera facing up and northwest.

36. East elevation, camera facing northwest. Note condition of clapboards and corner pilasters.

37. East elevation, camera facing southwest. Note conditions of clapboards and cornice components.

38. East elevation, camera facing northwest.

39. East elevation, camera facing northwest.

40. East elevation, underside of integrated gutter, camera facing northwest.

41. East elevation, grade at foundation, camera facing west.

42. East elevation, grade at foundation, camera facing northwest.

43. East elevation, missing mortar joint, camera facing down and west.

44. East elevation, underside of roof, camera facing southwest.

45. Northeast building perspective, camera facing down and southwest.

46. North elevation, camera facing south.

47. North elevation, camera facing down and south.

48. North elevation, camera facing down and southwest. Note bio growth and missing mortar.

49. North elevation, camera facing southwest.

50. North elevation, camera facing southwest. Underside of deck, note bio growth.

51. North elevation, camera facing south.

52. North elevation, camera facing south.

53. North elevation, underside of soffit, camera facing up and south.

54. North elevation, camera facing up and south.

55. West elevation, camera facing northwest.

56. Northwest building corner, camera facing southeast.

57. West elevation, replacement trim, camera facing northeast.

58. Northwest building corner, replacement trim, camera facing southeast.

59. West elevation, underside of soffit below integrated gutter, camera facing up and southeast.

60. Northwest building perspective, camera facing southeast.

61. West elevation of ramp, camera facing east.

62. West elevation, windows, camera facing east.

63. West elevation, close-up of window, camera facing east.

64. West elevation, infilled window, camera facing down and east.

65. West elevation, clapboards, camera facing southeast.

66. West elevation, Palladian window, camera facing up and east.

67. West elevation, oil tank piping, camera facing down and east.

68. West elevation, wood trim at water table, camera facing northeast.

69. Site at west elevation, camera facing north.

70. Southwest building perspective, camera facing up and northeast.

71. Southwest building perspective, camera facing northeast.

72. First-floor, meeting room (205), camera facing northeast.

73. First-floor, meeting room (205), camera facing north.

74. First-floor, meeting room (205), camera facing north.

75. First-floor, meeting room (205), camera facing northeast.

76. First-floor, meeting room (205), camera facing west.

77. First-floor, meeting room (205), camera facing down and north.

78. First-floor, meeting room (205), camera facing southwest.

79. First-floor, meeting room (205), camera facing southwest.

80. First-floor, meeting room (205), camera facing southeast.

81. First-floor, meeting room (205), camera facing east.

82. First-floor, meeting room (205), camera facing up and southeast.

83. First-floor, meeting room (205), camera facing down and southwest.

84. First-floor, meeting room (205), camera facing north.

85. First-floor, meeting room (205), camera facing down and west.

86. First-floor, library (204), camera facing northeast.

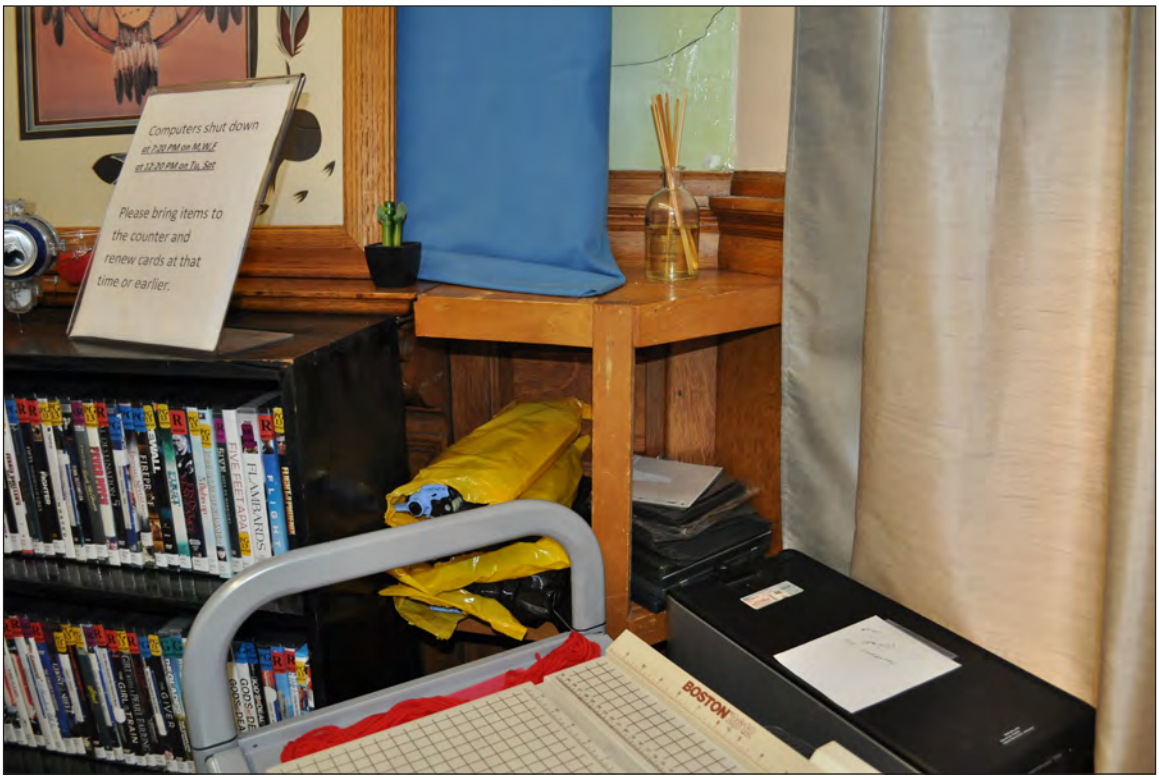
87. First-floor, library (204), camera facing east.

88. First-floor, library (204), camera facing southeast.

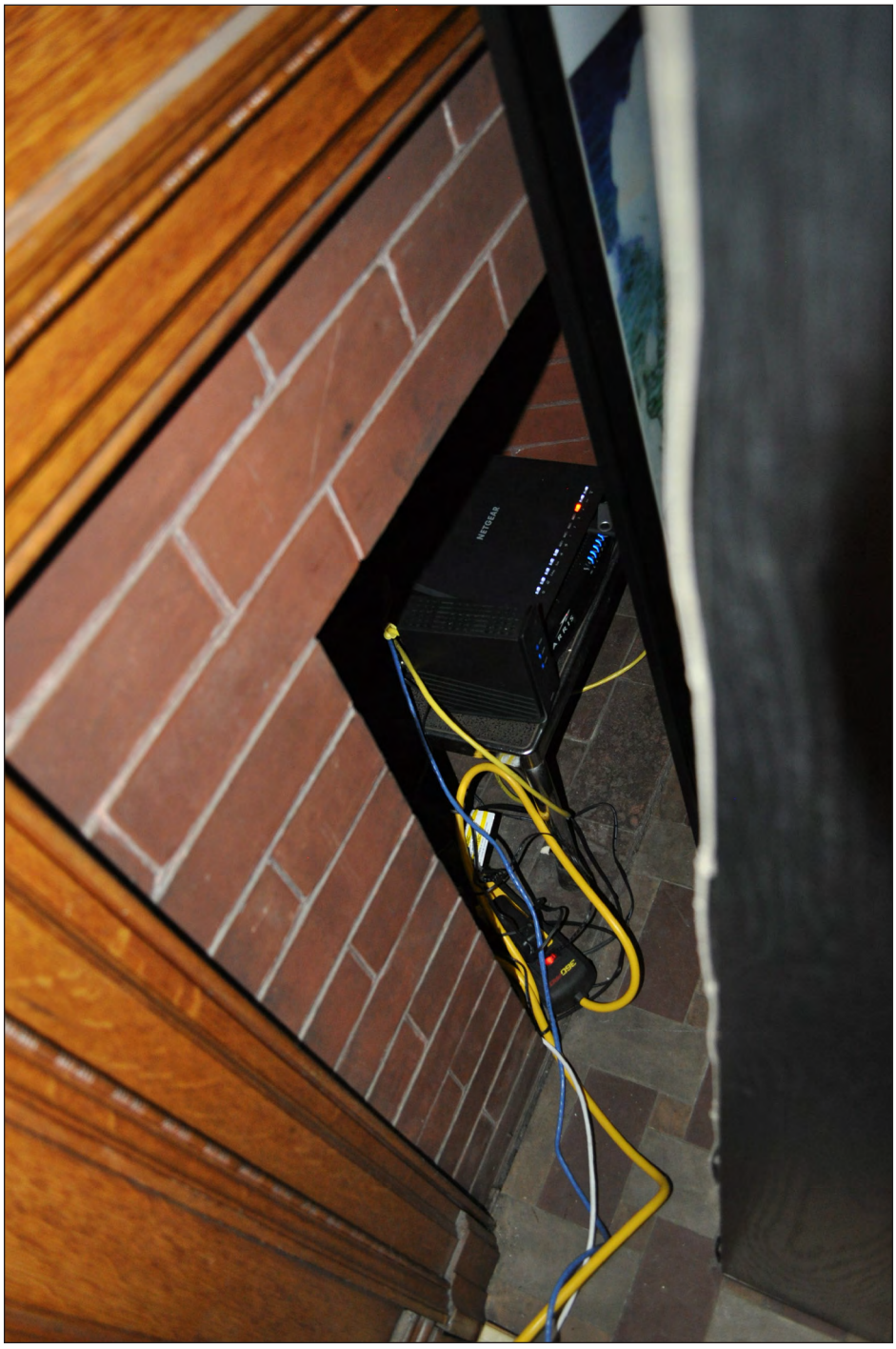
89. First-floor, computer room (201), camera facing southeast.

90. First-floor, computer room (201), camera facing north.

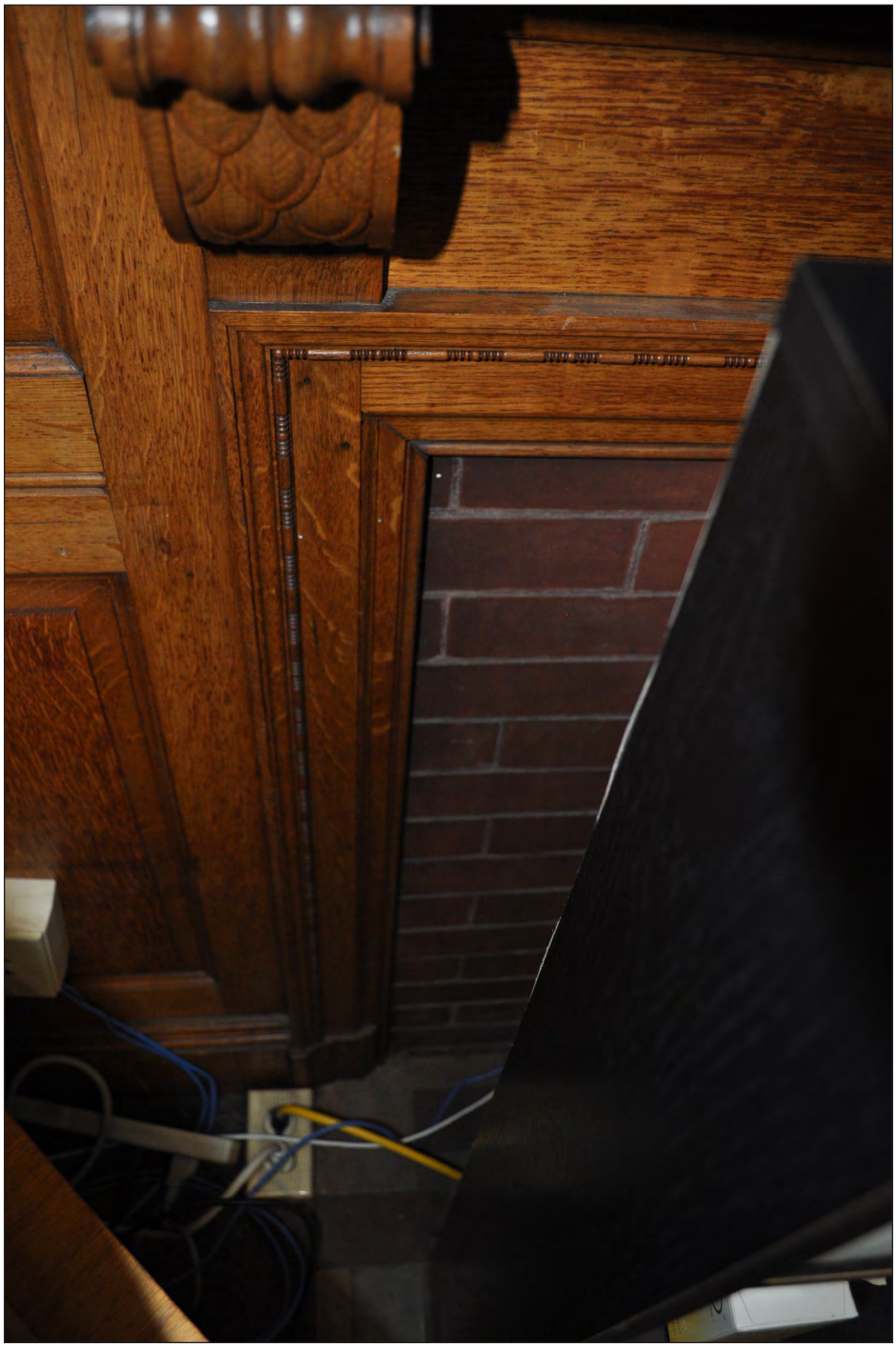
91. First-floor, computer room (201), camera facing up and west.



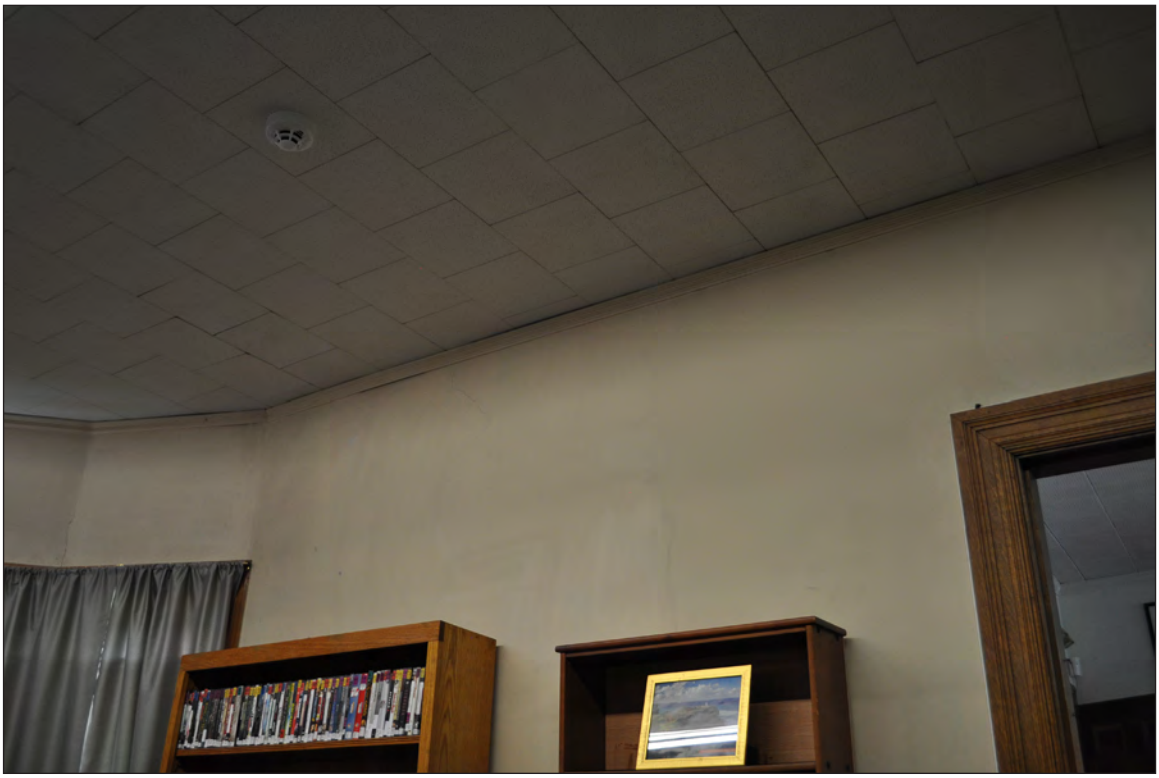
92. First-floor, computer room (201), camera facing down and northeast.



93. First-floor, computer room (201), camera facing down and southeast.



94. First-floor, computer room (201), camera facing east.



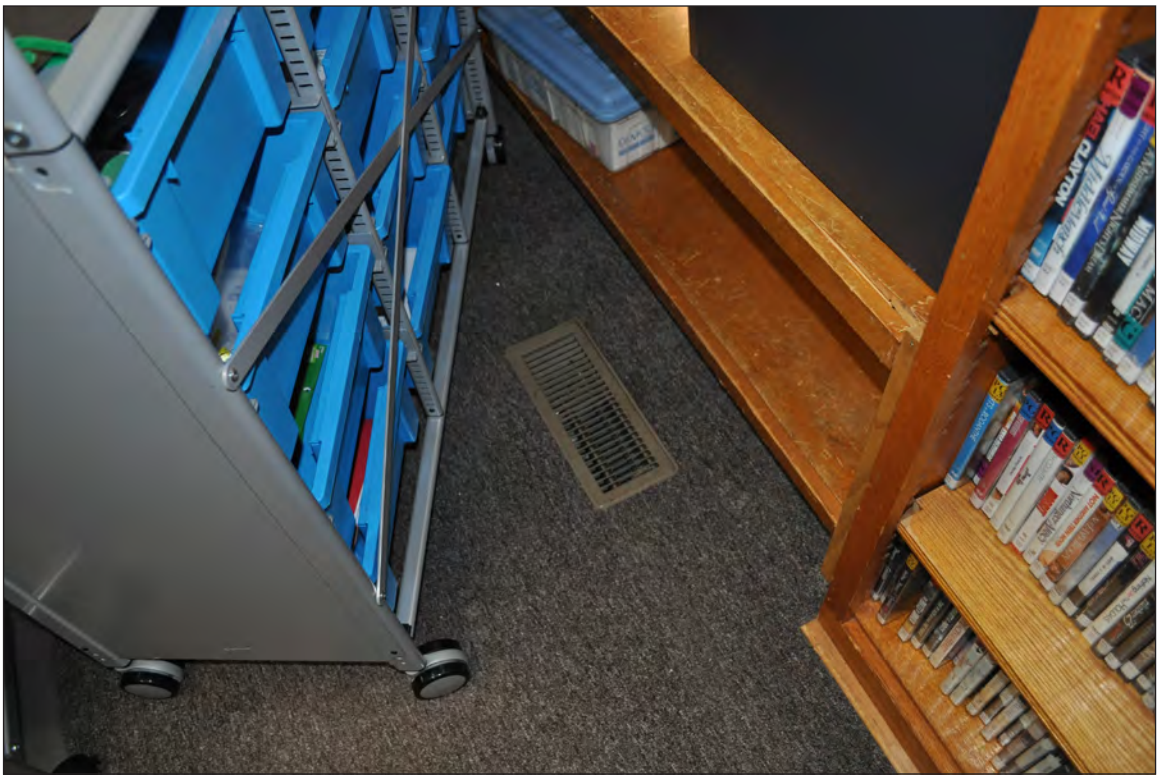
95. First-floor, computer room (201), camera facing up and southwest.

96. First-floor, computer room (201), camera facing south.

97. First-floor, computer room (201), example condition of bottom rail of window, camera facing south.

98. First-floor, computer room (201), camera facing southwest. Note staining on panel below window.

99. First-floor, computer room (201), camera facing up and southeast.



100. First-floor, computer room (201), camera facing northeast.

101. First-floor, computer room (201), camera facing northeast.

102. First-floor, library (204), camera facing northwest.

103. First-floor, library (204), camera facing up and northeast.

104. First-floor, library (204), camera facing up and northeast.

105. First-floor, library (204), camera facing up and north.

106. First-floor, library (204), camera facing up and north.

107. First-floor, library (204), camera facing up and north.

108. First-floor, library (204), camera facing up and north.

109. First-floor, library (204), camera facing up and west.

110. First-floor, library (204), camera facing up and west.

111. First-floor, library (204), camera facing down and northwest.

112. First-floor, library (204), camera facing down and northwest.

113. First-floor, library (204), camera facing down and south.

114. First-floor, library (204), camera facing down and south.

115. First-floor, library (204), camera facing down and south.

116. First-floor, library (204), camera facing down and south.

117. First-floor, library (204), camera facing south.

118. First-floor, library (204), camera facing southwest.

119. First-floor, vestibule 203, camera facing south.

120. First-floor, vestibule 203, camera facing down and south.

121. First-floor, vestibule 203, camera facing down and south.

122. First-floor, vestibule 203, camera facing east.

123. First-floor, vestibule 203, camera facing north.

124. First-floor, vestibule 203, camera facing northwest.

125. First-floor, vestibule 203, camera facing northwest.

126. First-floor, vestibule 203, camera facing up and east.

127. First-floor, library (204), camera facing northeast.

128. First-floor, Librarian's office (202), camera facing southwest.

129. First-floor, Librarian's office (202), camera facing south.

130. First-floor, Librarian's office (202), camera facing up and south.

131. First-floor, Librarian's office (202), camera facing south.

132. First-floor, Librarian's office (202), camera facing west.

133. First-floor, Librarian's office (202), camera facing northeast.

134. First-floor, vetibule (203), stair, camera facing up and north.

135. Second-floor, stair, camera facing down and south.

136. Second-floor, window in stair, camera facing southwest.

137. Second-floor, window in stair, camera facing southwest.

138. Second-floor, window in stair, camera facing west.

139. Second-floor, window in stair, camera facing southwest.

140. Second-floor, window in stair, camera facing southwest. Note broken sash and sash cord.

141. Second-floor, storage area and arts and crafts (301), camera facing south.

142. Second-floor, storage area and arts and crafts (301), camera facing east.

143. Second-floor, storage area and arts and crafts (301), camera facing northwest. Southwest storage area.

144. Second-floor, storage area and arts and crafts (301), camera facing northwest. Southwest storage area.

145. Second-floor, storage area and arts and crafts (301), camera facing east.

146. Second-floor, storage area and arts and crafts (301), camera facing east.

147. Second-floor, storage area and arts and crafts (301), camera facing east.

148. Second-floor, storage area and arts and crafts (301), camera facing northwest.

149. Second-floor, storage area and arts and crafts (301), camera facing down and east. Southern storage area.

150. Second-floor, storage area and arts and crafts (301), camera facing down and east. Southern storage area.

151. Second-floor, storage area and arts and crafts (301), camera facing west.

152. Second-floor, storage area and arts and crafts (301), camera facing northwest. Northern storage area.

153. Second-floor, storage area and arts and crafts (301), camera facing west. Northern storage area.

154. Second-floor, storage area and arts and crafts (301), camera facing north.

155. Second-floor, storage area and arts and crafts (301), camera facing northwest.

156. Second-floor, storage area and arts and crafts (301), camera facing north-east.

157. Second-floor, storage area and arts and crafts (301), camera facing north-east.

158. Second-floor, storage area and arts and crafts (301), camera facing north.

159. Second-floor, storage area and arts and crafts (301), camera facing south.

160. Second-floor, storage area and arts and crafts (301), camera facing south.

161. Second-floor, storage area and arts and crafts (301), camera facing southeast.

162. First-floor, stair to basement, camera facing southwest.

163. First-floor, stair to basement, camera facing south.

164. First-floor, stair to basement, camera facing up and south.

165. First-floor, stair to basement, camera facing up and south.

166. First-floor, stair to basement, camera facing southeast.

167. Basement, stair, camera facing up and north.

168. Basement, window in stair, camera facing west.

169. Basement, window in stair, camera facing southwest.

170. Basement, corridor (103), camera facing northeast.

171. Basement, children's library (101), camera facing east.

172. Basement, children's library (101), camera facing east.

173. Basement, children's library (101), camera facing north.

174. Basement, childern's library (101), camera facing north.

175. Basement, children's library (101), camera facing north.

176. Basement, children's library (101), camera facing east.

177. Basement, children's library (101), camera facing north.

178. Basement, children's library (101), camera facing up and southwest.

179. Basement, children's library (101), camera facing southwest.

180. Basement, children's library (101), camera facing south.

181. Basement, children's library (101), camera facing east.

182. Basement, children's library (101), camera facing southeast.

183. Basement, bathroom (106), camera facing northwest.

184. Basement, bathroom (106), camera facing northwest.

185. Basement, bathroom (106), camera facing southwest.

186. Basement, bathroom (106), camera facing down and southeast.

187. Basement, bathroom (106), camera facing down and northwest.

188. Basement, corridor (103), camera facing south.

189. Basement, storage (104), camera facing south.

190. Basement, storage (104), camera facing south.

191. Basement, storage (104), camera facing north.

192. Basement, mechanical room (105), camera facing northeast.

193. Basement, mechanical room (105), camera facing northeast.

194. Basement, mechanical room (105), camera facing northeast.

195. Basement, mechanical room (105), camera facing north.

196. Basement, mechanical room (105), camera facing south.

197. Basement, corridor (103), camera facing southeast toward mechanical room door.

APPENDIX C: STRUCTURAL ASSESSMENT

ALDRICH FREE PUBLIC LIBRARY

299 Main Street
Moosup , CT

Structural Condition Assessment

Submitted by:

James K. Grant Associates
P.O. Box 235
Collinsville, CT 06022

STATE OF CONNECTICUT
JAMES K. GRANT
No. 6897
LICENSED
PROFESSIONAL ENGINEER

James K. Grant

October 4, 2021

Background

James K. Grant Associates was engaged by Crosskey Architects, LLC to conduct a structural condition assessment of the Aldrich Free Public Library. The purpose of the assessment was to identify structural deficiencies which may compromise the structural performance of the house and require remedial work. The evaluation is based solely on visual observations. No probe holes into hidden spaces were made, no structural calculations were made and no material or load testing was done. A site visit was made on August 31, 2021.

Description

Built in 1895, the Aldrich Free Public Library is a Queen Ann style, wood framed building on a sloping site. It has stone foundation walls supporting brick walls above grade. On the west side there is a concrete apron at grade level, presumably to prevent erosion and provide protection of the foundation from surface runoff. The apron extends around the north corner where it transitions to bituminous swale along the sloped north side to the east corner. The brick wall extends below grade where the concrete apron exists. On the east side of the building, and stepping up along the north and south sides, the base of the wall starts with large granite quarry blocks with carved top edges and mortared joints. There is a narrow, sloped wash on the top edge of the block, directing water away from the base of the brick wall that continues up to the first floor level. Thr blocks are presumed to be 6-8" thick with rubble stone on the interior face making up the rest of the undetermined foundation thickness. The brick wall is assumed to be 8 inches thick and is laid in common running bond without headers. The basement has a concrete floor slab and is covered with carpeting or tile except for the furnace and storage rooms. The interior walls in the basement are brick but most are concealed by finishes on at least one face.

The floor framing is concealed by ceiling finishes throughout the building and no probes were made to view the framing but is assumed to consist of closely spaced, probably 16" o.c., wood joists supported on bearing walls. There are two columns in the Childrens Library that support beams above the suspended ceiling (not viewed) in line with bearing walls on the first floor. The second floor and roof framing was not visible, although there is a hatch on the second floor ceiling that would have permitted inspection of the roof framing if a ladder were available. It is reasonble to assume that the cross gabled roof is framed with wood rafters at a spacing of 24" o.c. or less. Exterior wall framing at the first and second floor levels is assumed to be wood studs.

Observations

The presence of ceiling and wall finishes in most areas of the building limited direct inspection of floor, roof and wall framing, leaving observed performance as the primary factor in judging the structural conditions. This means looking for such signs as cracks, deflections, moisture, stains and any other indication that a hidden problem could be present.

Foundations and Masonry Walls

A small portion of the north stone foundation wall is exposed in the furnace room and shows a very irregular rubble stone wall supporting the brick wall above. There is a very small crack in the brick field that appears to be inactive. The south, east and west brick walls of the furnace room are all interior walls and the brickwork is very non-uniform in appearance. All areas of the basement were dry at the time of inspection but the bottoms of the brick walls are buried below the floor slab and have been absorbing moisture from contact with the soil. In some areas, this has led to deterioration of the brick and mortar through capillary rise of the moisture in the brick ("rising damp"). This will cause a gradual loss in strength and should be addressed by removing the moisture source by creating a barrier to rising damp and repointing the mortar joints. In addition, it may be necessary to cut back the slab to expose the buried brick to apply a membrane or damproofing over the brick to keep moisture out. If badly deteriorated, it may be necessary to replace some bricks. This condition also affects the brick wall in front of the oil tank under the stairs. This is a slow moving condition and is not urgent but repair should be planned for within the next five years..

On the exterior, the granite base wall and the brick wall above are in very good condition. No settlement cracks were detected in the brick walls and there is no movement of the granite blocks. The brick walls are all painted, making it difficult to assess the condition of mortar joints but, aside from some small areas which do appear to have some erosion, the joints are generally in good condition. There are some open joints between granite blocks that require repointing. There is a horizontal crack in the block below the bay window at the southeast corner that I believe is a fault in the stone and not related to settlement. Window and door openings in the brick walls have granite lintels which are all in very good condition. The granite steps are also in very good condition but the cheek walls have spread slightly, opening joints which allow water intrusion. Sealing the joints is recommended.

At the exterior of the north wall, a bituminous swale, intended to direct runoff away from the wall, is badly deteriorated and should be replaced. There is damage to a portion of the brick wall that extends below grade. Removal of the swale will allow examination of the hidden conditions but some repairs will likely be required.

Both chimneys are in good condition but there are some open and eroded joints that need some repointing, especially near the tops of the chimneys. No spalling bricks were observed from the vantage points available.

Floor, Roof and and Wall Framing

Floor framing, while not visible, is judged to be in very good condition. Floors are very firm and level, which would be expected for a building that was originally designed to support library loading. There are no signs of deflection in the roofs or spreading of walls that might indicate deficiencies in the roof framing. Many of the interior wall surfaces are paneled, concealing defects that may exist, but there were some painted walls that displayed cracking. The segmented

wall above the windows in the first floor has some minor cracks, as does the opposing wall in the same room. The ceiling of the stairwell to the basement has signs of cracks that have been painted over and the stairwell from first to second floor has many cracks on walls and ceiling. Painted walls and ceilings on the second floor were crack-free. The cracks observed are not structurally significant and could be attributed to seasonal variations in temperature and humidity. The interior, north wall of the computer room rests on the first floor framing with no supporting wall below and could have cracked from a slight, long term deflection of the first floor under the weight of the wall. Based on observations made on walls that are exposed, it is reasonable to assume that cracks do exist on other hidden wall surfaces as well. The walls and ceilings should be monitored periodically but unless the existing exposed cracks begin to grow or new cracks appear, no corrective action is needed for any of these wall conditions.

The wood framed handicap ramp at the rear of the building appears to be relatively new and is in very good condition.

Conclusions

The only areas of structural concern in the building are the brick walls in the basement. There is a significant degree of brick and mortar deterioration caused by rising damp that has taken place over the past 126 years and the condition will continue to slowly worsen into the future. There are treatments available to create a barrier at the base of the wall to stop the rising damp and allow the wall to dry out. After a period of months, the mortar joints can be repointed. There are no other structural repairs needed on the interior of the building. The wall cracks do not need structural repair but can be patched and painted cosmetically if desired. Exterior repairs are limited to localized pointing of mortar joints on masonry walls and chimneys to prevent water intrusion.

On the exterior, the conditions along the north wall require removal of the bituminous swale, repair and repointing of tthe brick wall as needed and replacement of the swale with a concrete slab similar to the slab along the west wall. There is also some mortar joint repointing needed on the granite blocks, brick walls and chimneys.

Cost Estimate

The following estimates should be regarded as reasonable order of magnitude costs for planning purposes only and should be updated after further development of scope of work and estimates by qualified contractors.

Rising damp treatment of brick walls in basement:	$5000.
Repointing of mortar joints in basement walls:	$7000.
Repointing of exterior mortar joints:	$15000.
Replacement of swale and repairs to north brick wall	$20000.

1. South wall of Furnace Room showing irregular brickwork and deterioration due to rising damp. Treatment is required to arrest the damp. Replacement of damaged brick units and repointing of mortar joints is also needed.

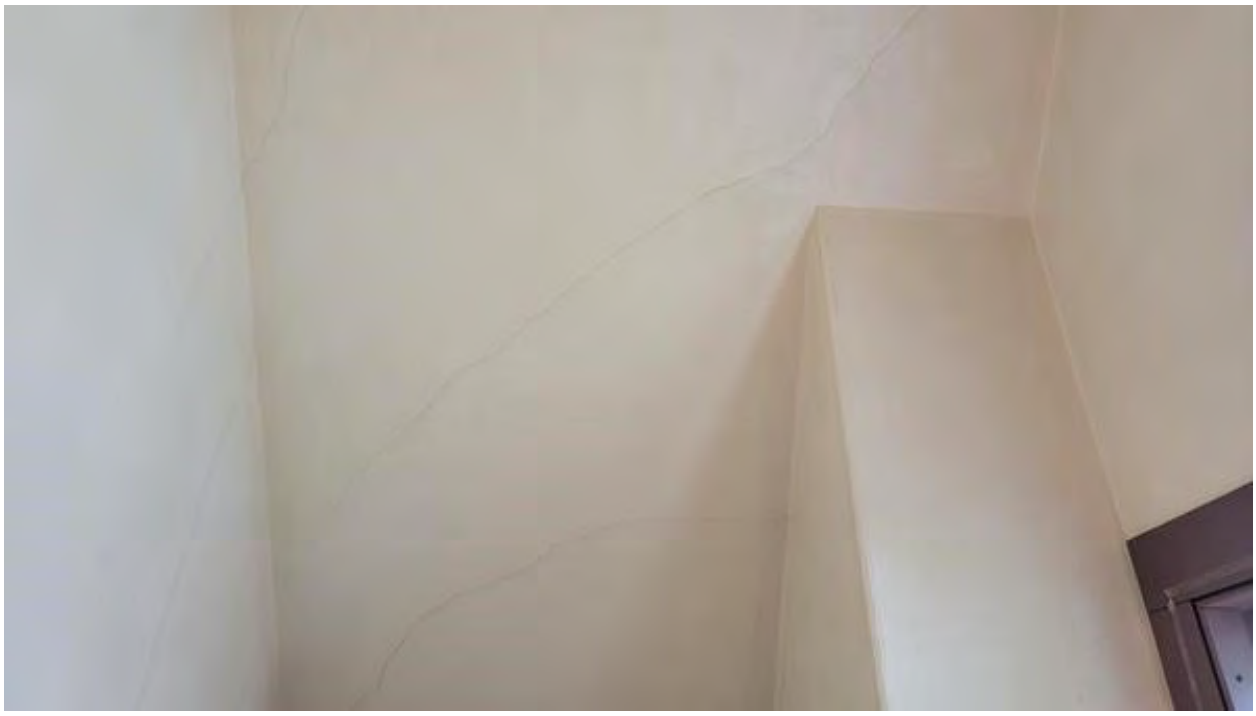
2. East wall of Furnace Room. Hole into inactive chimney should be properly sealed with brick.

3. Interior face of north foundation wall with hairline crack in brick wall.

4. Brick wall next to fuel oil tank showing effects of rising damp. Inaccessible for treatment from this side but could be treated from corridor side if conditions worsen.

5. Slight cracking in corners of the south wall of the Computer Room. Not of structural concern.

6. Diagonal cracking in north wall of Computer Room. Probable cause is slight deflection of the floor supporting the wall. Not a structural concern.



7. Ceiling cracks in stairwell to second floor. Probable cause is change in temperature and humidity during seasonal cycles but could also be slight settlements. Not a structural concern.

8. Additional stairwell ceiling and wall cracks and localized damage from leak. Not a structural concern.

9. Conditions along the north wall. Signs of excessive moisture in the brick wall, brick spalling and mortar loss. The bituminous swale should be replaced and repairs made to the hidden brick wall as needed.

10. Ramp at north side of building in very good condition.

11. Typical granite quarry blocks at north, east and south walls. No sign of movement but vertical mortar joints require repointing.

12. Concrete slabs along west wall protect wall from runoff. Concrete slabs should replace the bituminous swale to the northeast corner of the bujilding.

13. Horizontal crack in granite blocks at southeast corner bay window appears to be a fault in the stone. No repair necessary.

14. Cheekwalls at front steps are spreading slightly. Joints should be sealed to prevent water intrusion and freeze-thaw action.

15. North chimney in good condition but needs repointing at top.

16. East chimney also in good condition but in need of some repointing.

Both chimneys should also be inspected internally.

APPENDIX D: MECHANICAL, ELECTICAL AND PLUMBING (MEP) ASSESSMENT

- Mechanical • Electrical Engineering for Building Systems -

P.O. Box 311 • Farms Village Plaza • 244 Farms Village Road
West Simsbury, CT 06092 • (860)651-1949 •fax (860)651-1957

Aldrich Public Library
MEP Systems Assessment
Moosup, CT

By: W. Mark Gendron, P.E.
Date: 9/22/2021

HVAC Systems

The first floor and basement is served by a ducted split system using an oil fired forced air furnace. The furnace is manufactured by Metzger Machine Corp and has a rating of 140,000 BTU/hr input, or 1.0 gallon per hour #2 heating oil. The furnace was manufactured in 1996 and is in fair to poor condition. The furnace is beyond its useful life and should be replaced in the next five years.

Figure 1 - Air Furnace

Figure 2 - Basement Mini Split

The furnace has a DX refrigerant coil rated at 4 tons, or about 1,600 CFM. The refrigerant lines are copper and in fair condition and could be cleaned, re-insulated and used in conjunction with new equipment. The air conditioning condensing unit is of "York" manufacturer and in fair condition. It is assumed this unit was also installed around 1996 and is recommended to be replaced as well as the DX coil. The basement has a dedicated mini split heat pump unit recently installed for additional zoning and comfort.

The ductwork system appears in good condition and may remain. The duct system is located on the ceiling plenum space in the basement and feeds ceiling diffusers for the basement and floor diffusers for the first floor. We recommend duct cleaning be performed. The diffusers

on the main level are decorative type and may remain. The duct system does not have ducted fresh air and relies on natural ventilation. Due to the age of the building, this may be maintained. We do recommend a continuous run exhaust fan for basement bathroom as this room does not have any exhaust or an operable window.

The attic storage area has electric baseboard heater and does not have cooling. This may remain if the space stays as storgae space. Cooling or a de-humidifier may be considered to lower summer humidity levels in such a storage space.

The oil tank (275 gallon) appears in fair to poor condition. It would be very difficult to replace. A tank specialist should be hired to inspect the inside of the tank.

Electrical Systems

The building has a 100 Amp, single phase 120/240 volt service. The 20-circuit breaker panel appears to be about 15-20 years old and in good condition. All wiring observed is NM type (Romex) and in good condition. Additional receptacles may be required to limit the use of extension cords.

Figure 3 - Electrical Panel

Figure 4 - Pendant Light Fixture

The lighting is primary florescent lamp pendant type on the first floor and recessed 2x4 in the basement. Lighting levels appear inadequate for recommended library lighting levels. There is a high level of ambient light and many windows. We recommend a complete fixture replacement using more energy efficient LED lamped fixtures. Emergency lighting is achieved by using battery wall pack fixtures. These fixtures are antiquated and recommended to be replaced.

The building has a fire alarm system using smoke detection on the first floor and lower level. We were not able to locate the fire alarm control panel. The system should be maintained and we recommend adding smoke detection coverage be expanded into the attic. The

building main entrance is missing an exit sign as the second means of egress. Architect to verify egress paths for proposed emergency lighting and exit signage.

Plumbing Systems

The building is fed by a well on site with a "Wellxtrol" buffer tank in the basement. Piping appears in fair condition and may remain. The one bathroom lavatory is located in the basement and is not ADA accessible. The fixtures should be replaced with low flow fixtures at minimum. If the architectural seciton recommend and ADA accessible bathroom, accessible fixtures will be required. The lavatory hot water is generated by a point-of-use electric heater below the lav. This is in good condition and may remain.

Figure 5 - Bathroom Fixtures

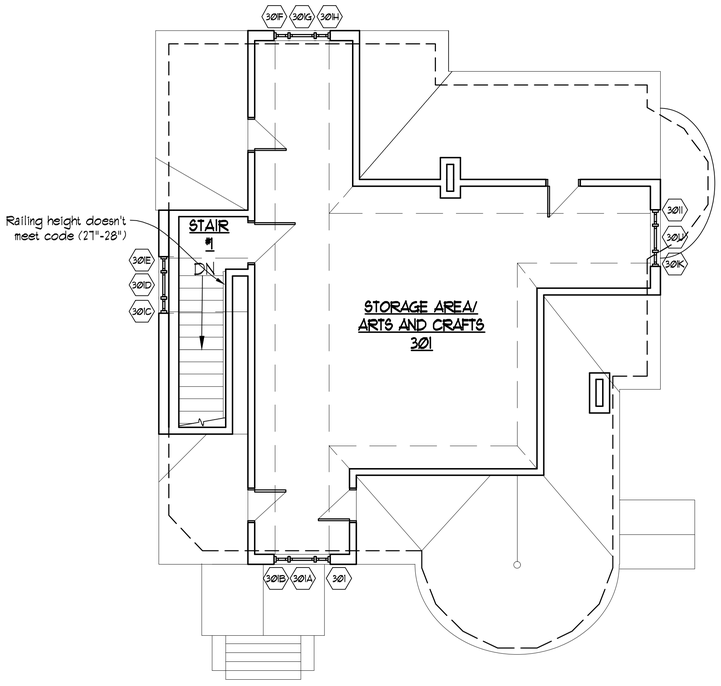
Figure 6 - Well-X-Trol Tank

The building lacks a water cooler as required by code. A potable bottled water cooler may be substituted.

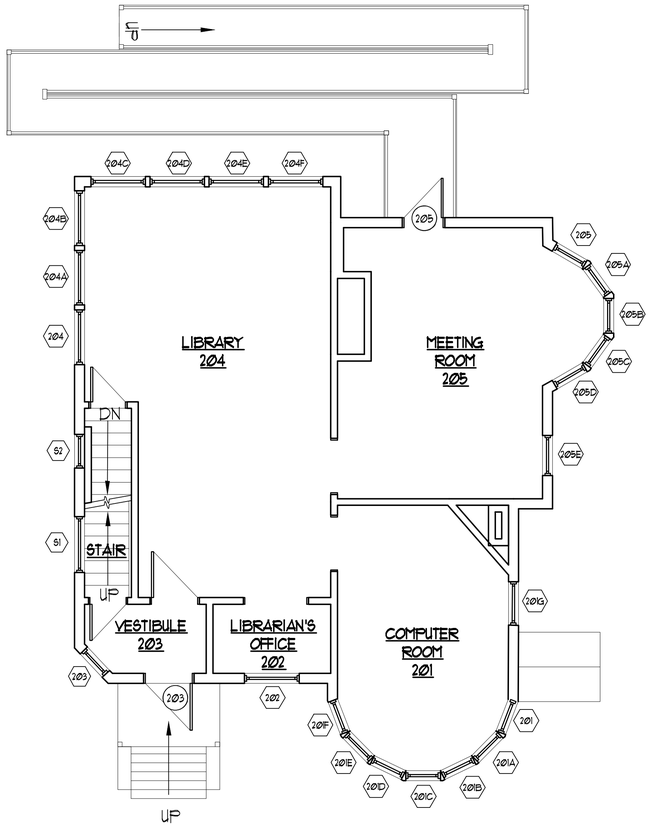
The building does not have a fire sprinkler system.

End of Assessment Report

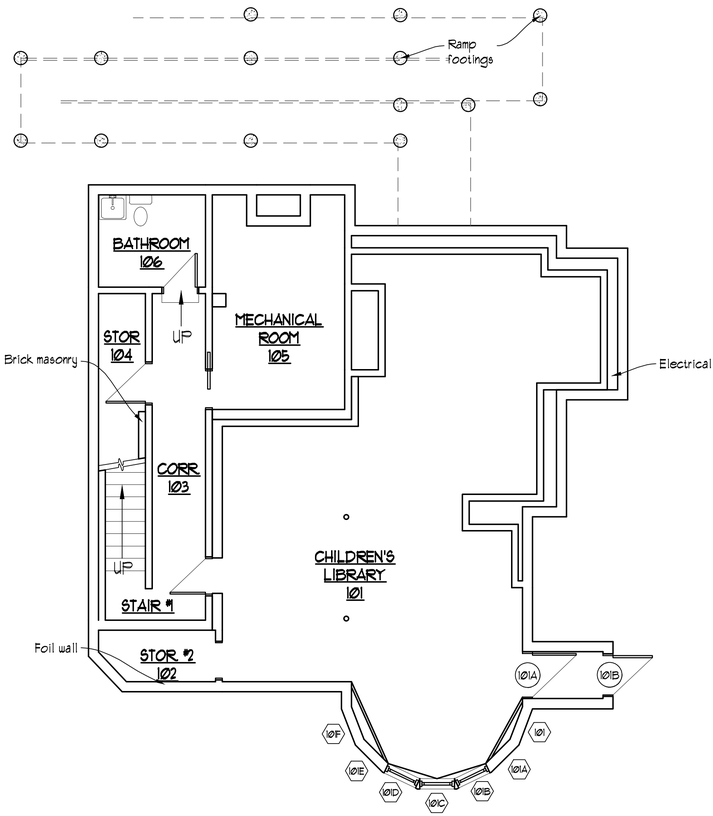
APPENDIX E: EXISTING DRAWINGS



3 SECOND FLOOR PLAN
SCALE: 3/16"=1'-0"



2 FIRST FLOOR PLAN
SCALE: 3/16"=1'-0"



1 BASEMENT
SCALE: 3/16"=1'-0"

Crosskey Architects LLC
Architecture Preservation Planning
750 Main Street, Hartford, CT 06103
T: (860)724-3000 F: (860)724-3013

Aldrich Free Public Library
2990Main Street, Mossup, CT, 06354

NOT FOR CONSTRUCTION

Drawn: NC, DT
Date: 2021
Revisions

EXISTING PLANS

A-100

4 SOUTH ELEVATION
SCALE: 1/4"=1'-0"

3 WEST ELEVATION
SCALE: 1/4"=1'-0"

2 NORTH ELEVATION
SCALE: 1/4"=1'-0"

1 EAST ELEVATION
SCALE: 1/4"=1'-0"

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Revisions	

EXISTING ELEVATIONS

A-200

APPENDIX F: MISC.

9 Preservation Briefs
Technical Preservation Services
National Park Service
U.S. Department of the Interior

The Repair of Historic Wooden Windows

John H. Myers

A NOTE TO OUR USERS: The web versions of the **Preservation Briefs** differ somewhat from the printed versions. Many illustrations are new, captions are simplified, illustrations are typically in color rather than black and white, and some complex charts have been omitted.

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building. Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. *The Secretary of the Interior's Standards for Rehabilitation* and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This Brief is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.

Much of the technical section presents repair techniques as an instructional guide for the do-it-yourselfer. The information will be useful, however, for the architect, contractor, or developer on large-scale projects. It presents a methodology for approaching the evaluation and repair of existing windows, and considerations for replacement, from which the professional can develop alternatives and specify appropriate materials and procedures.

Architectural or Historical Significance

Evaluating the architectural or historical significance of windows is the first step in planning for window treatments, and a general understanding of the function and history of windows is vital to making a proper evaluation. As a part of this evaluation, one must consider four basic window functions: admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. No single factor can be disregarded when planning window treatments; for example, attempting to conserve energy by closing up or reducing the size of window openings may result in the use of *more* energy by increasing electric lighting loads and decreasing passive solar heat gains.

Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows with larger panes could dramatically alter the appearance of the building. Photo: NPS files.

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element.

After all of the factors have been evaluated, **windows should be considered significant to a building if they: 1)** are original, **2)** reflect the original design intent for the building, **3)** reflect period or regional styles or building practices, **4)** reflect changes to the building resulting from major periods or events, or **5)** are examples of exceptional craftsmanship or design. Once this evaluation of significance has been completed, it is possible to proceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum:

- **1)** window location
- **2)** condition of the paint
- **3)** condition of the frame and sill
- **4)** condition of the sash (rails, stiles and muntins)
- **5)** glazing problems
- **6)** hardware, and
- **7)** the overall condition of the window (excellent, fair, poor, and so forth)

Many factors such as poor design, moisture, vandalism, insect attack, and lack of maintenance can contribute to window deterioration, but moisture is the primary contributing factor in wooden window decay. All window units should be inspected to see if water is entering around the edges of the frame and, if so, the joints or seams should be caulked to eliminate this danger. The glazing putty should be checked for cracked, loose, or missing sections which allow water to saturate the wood, especially at the joints. The back putty on the interior side of the pane should also be inspected, because it creates a seal which prevents condensation from running down into the joinery. The sill should be examined to insure that it slopes downward away from the building and allows water to drain off. In addition, it may be advisable to cut a dripline along the underside of the sill. This almost invisible treatment will insure proper water runoff, particularly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

One clue to the location of areas of excessive moisture is the condition of the paint; therefore, each window should be examined for areas of paint failure. Since excessive moisture is detrimental to the paint bond, areas of paint blistering, cracking, flaking, and peeling usually identify points of water penetration, moisture saturation, and potential deterioration. Failure of the paint should not, however, be mistakenly interpreted as a sign that the wood is in poor condition and hence, irreparable. Wood is frequently in sound physical condition beneath unsightly paint. After noting areas of paint failure, the next step is to inspect the condition of the wood, particularly at the points identified during the paint examination.

Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints, where water can collect and saturate the wood. Photo: NPS files.

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins. The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the endgrain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small section of the

wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

Another method of testing for soundness consists of pushing a sharp object into the wood, perpendicular to the surface. If deterioration has begun from the hidden side of a member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on the probe can force it through an apparently sound skin to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

Following the inspection and analysis of the results, the scope of the necessary repairs will be evident and a plan for the rehabilitation can be formulated. Generally the actions necessary to return a window to "like new" condition will fall into three broad categories: ***1) routine maintenance procedures***, ***2) structural stabilization***, and ***3) parts replacement***. These categories will be discussed in the following sections and will be referred to respectively as **Repair Class I**, **Repair Class II**, and **Repair Class III.** Each successive repair class represents an increasing level of difficulty, expense, and work time. Note that most of the points mentioned in Repair Class I are routine maintenance items and should be provided in a regular maintenance program for any building. The neglect of these routine items can contribute to many common window problems.

Before undertaking any of the repairs mentioned in the following sections all sources of moisture penetration should be identified and eliminated, and all existing decay fungi destroyed in order to arrest the deterioration process. Many commercially available fungicides and wood preservatives are toxic, so it is extremely important to follow the manufacturer's recommendations for application, and store all chemical materials away from children and animals. After fungicidal and preservative treatment the windows may be stabilized, retained, and restored with every expectation for a long service life.

Repair Class I: Routine Maintenance

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this allows the do-it-yourselfer to save money by repairing all or part of the windows. On larger projects it presents the opportunity for time and money which might otherwise be spent on the removal and replacement of existing windows, to be spent on repairs, subsequently saving all or part of the material cost of new window units. Regardless of the actual costs, or who performs the work, the evaluation process described earlier will provide the knowledge from which to specify an appropriate work program, establish the work element priorities, and identify the level of skill needed by the labor force.

This historic double-hung window has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: NPS files.

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of

After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. Photo: NPS files.

sash (including reglazing where necessary), 3) repairs to the frame, 4) weatherstripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical double-hung wooden window, but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed.

Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun. Photo: NPS files.

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments. With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

Removal of the upper sash on double-hung units is similar but the parting bead which holds it in place is set into a groove in the center of the stile and is thinner and more delicate than the interior stop. After removing any paint along the seam, the parting bead should be carefully pried out and worked free in the same manner as the interior stop. The upper sash can be removed in the same manner as the lower one and both sash taken to a convenient work area (in order to remove the sash the interior stop and parting bead need only be removed from one side of the window). Window openings can be covered with polyethylene sheets or plywood sheathing while the sash are out for repair.

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used, the glass should be removed or protected from the sudden temperature change which can cause breakage. An overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and

reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane.

The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weather-tight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains. The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

Following the relatively simple repairs, the window is weathertight, like new in appearance, and serviceable for many years to come.Photo: NPS files.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition. The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire process took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

Repair Class II: Stabilization

The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

One established technique for repairing wood which is split, checked or shows signs of rot, is to: **1)** dry the wood, **2)** treat decayed areas with a fungicide, **3)** waterproof with two or three applications of boiled linseed oil (applications every 24 hours), **4)** fill cracks and holes with putty, and **5)** after a "skin" forms on the putty, paint the surface. Care should be taken with the use of fungicide which is toxic. Follow the manufacturers' directions and use only on areas which will be painted. When using any technique of building up or patching a flat surface, the finished surface should be sloped slightly to carry water away from the window and not allow it to puddle. Caulking of the joints between the sill and the jamb will help reduce further water penetration.

This illustrates a two-part expoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: NPS files.

When sills or other members exhibit surface weathering they may also be built-up using wood putties or homemade mixtures such as sawdust and resorcinol glue, or whiting and varnish. These mixtures can be built up in successive layers, then sanded, primed, and painted. The same caution about proper slope for flat surfaces applies to this technique.

Wood may also be strengthened and stabilized by consolidation, using semirigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semirigid epoxy patching compound, sanded and painted. Epoxy patching compounds can be used to build up missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair. More information on epoxies can be found in the publication "Epoxies for Wood Repairs in Historic Buildings," cited in the bibliography.

Any of the three techniques discussed can stabilize and restore the appearance of the window unit. There are times, however, when the degree of deterioration is so advanced that stabilization is impractical, and the only way to retain some of the original fabric is to replace damaged parts.

Repair Class III: Splices and Parts Replacement

When parts of the frame or sash are so badly deteriorated that they cannot be stabilized there are methods which permit the retention of some of the existing or original fabric. These methods involve replacing the deteriorated parts with new matching pieces, or splicing new wood into existing members. The techniques require more skill and are more expensive than any of the previously discussed alternatives. It is necessary to remove the sash and/or the affected parts of the frame and have a carpenter or woodworking mill reproduce the damaged or missing parts. Most millwork firms can duplicate parts, such as muntins, bottom rails, or sills, which can then be incorporated into the existing window, but it may be necessary to shop around because there are several factors controlling the practicality of this approach. Some woodworking mills do not like to repair old sash because nails or other foreign objects in the sash can damage expensive knives (which cost far more than their profits on small repair jobs); others do not have cutting knives to duplicate muntin profiles. Some firms prefer to concentrate on larger jobs with more profit potential, and some may not have a craftsman who can duplicate the parts. A little searching should locate a firm which will do the job, and at a reasonable price. If such a firm does not exist locally, there are firms which undertake this kind of repair and ship nationwide. It is possible, however, for the advanced do-it-yourselfer or craftsman with a table saw to duplicate moulding profiles using techniques discussed by Gordie Whittington in "Simplified Methods for Reproducing Wood Mouldings," *Bulletin* of the Association for Preservation Technology, Vol. III, No. 4, 1971, or illustrated more recently in *The Old House*, Time-Life Books, Alexandria, Virginia, 1979.

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: **1)** conduct regular maintenance of sound frames to achieve the longest life possible, **2)** make necessary repairs in place, wherever possible, using stabilization and splicing techniques, and **3)** if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

Another alternative may be considered if parts replacement is required, and that is sash replacement. If extensive replacement of parts is necessary and the job becomes prohibitively expensive it may be more practical to purchase new sash which can be installed into the existing frames. Such sash are available as exact custom reproductions, reasonable facsimiles (custom windows with similar profiles), and contemporary wooden sash which are similar in appearance. There are companies which still manufacture high quality wooden sash which would duplicate most historic sash. A few calls to local building suppliers may provide a source of appropriate replacement sash, but if not, check with local historical associations, the state historic preservation office, or preservation related magazines and supply catalogs for information.

If a rehabilitation project has a large number of windows such as a commercial building or an industrial complex, there may be less of a problem arriving at a solution. Once the evaluation of the windows is completed and the scope of the work is known, there may be a potential economy of scale. Woodworking mills may be interested in the work from a large project; new sash in volume may be considerably less expensive per unit; crews can be assembled and trained on site to perform all of the window repairs; and a few

extensive repairs can be absorbed (without undue burden) into the total budget for a large number of sound windows. While it may be expensive for the average historic home owner to pay seventy dollars or more for a mill to grind a custom knife to duplicate four or five bad muntins, that cost becomes negligible on large commercial projects which may have several hundred windows.

Most windows should not require the extensive repairs discussed in this section. The ones which do are usually in buildings which have been abandoned for long periods or have totally lacked maintenance for years. It is necessary to thoroughly investigate the alternatives for windows which do require extensive repairs to arrive at a solution which retains historic significance and is also economically feasible. Even for projects requiring repairs identified in this section, if the percentage of parts replacement per window is low, or the number of windows requiring repair is small, repair can still be a cost effective solution.

Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

Many styles of storm windows are available to improve the thermal performance of existing windows. The use of exterior storm windows should be investigated whenever feasible because they are thermally efficient, cost-effective, reversible, and allow the retention of original windows (see "Preservation Briefs: 3"). Storm window frames may be made of wood, aluminum, vinyl, or plastic; however, the use of unfinished aluminum storms should be avoided. The visual impact of storms may be minimized by selecting colors which match existing trim color. Arched top storms are available for windows with special shapes. Although interior storm windows appear to offer an attractive option for achieving double glazing with minimal visual impact, the potential for damaging condensation problems must be addressed. Moisture which becomes trapped between the layers of glazing can condense on the colder, outer prime window, potentially leading to deterioration. The correct approach to using interior storms is to create a seal on the interior storm while allowing some ventilation around the prime window. In actual practice, the creation of such a durable, airtight seal is difficult.

Window Replacement

Although the retention of original or existing windows is always desirable and this Brief

is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should not begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: **1)** the pattern of the openings and their size; **2)** proportions of the frame and sash; **3)** configuration of window panes; **4)** muntin profiles; **5)** type of wood; **6)** paint color; **7)** characteristics of the glass; and **8)** associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

Armed with an awareness of the significance of the existing window, begin to search for a replacement which retains as much of the character of the historic window as possible. There are many sources of suitable new windows. Continue looking until an acceptable replacement can be found. Check building supply firms, local woodworking mills, carpenters, preservation oriented magazines, or catalogs or suppliers of old building materials, for product information. Local historical associations and state historic preservation offices may be good sources of information on products which have been used successfully in preservation projects.

Consider energy efficiency as one of the factors for replacements, but do not let it dominate the issue. Energy conservation is no excuse for the wholesale destruction of historic windows which can be made thermally efficient by historically and aesthetically acceptable means. In fact, a historic wooden window with a high quality storm window added should thermally outperform a new double-glazed metal window which does not have thermal breaks (insulation between the inner and outer frames intended to break the path of heat flow). This occurs because the wood has far better insulating value than the metal, and in addition many historic windows have high ratios of wood to glass, thus reducing the area of highest heat transfer. One measure of heat transfer is the U-value, the number of Btu's per hour transferred through a square foot of material. When comparing thermal performance, the lower the U-value the better the performance. According to ASHRAE 1977 Fundamentals, the U-values for single glazed wooden windows range from 0.88 to 0.99. The addition of a storm window should reduce these figures to a range of 0.44 to 0.49. A non-thermal break, double-glazed metal window has a U-value of about 0.6.

Conclusion

Technical Preservation Services recommends the retention and repair of original windows whenever possible. We believe that the repair and weatherization of existing wooden windows is more practical than most people realize, and that many windows are unfortunately replaced because of a lack of awareness of techniques for evaluation, repair, and weatherization. Wooden windows which are repaired and properly maintained will have greatly extended service lives while contributing to the historic character of the building. Thus, an important element of a building's significance will have been preserved for the future.

Additional Reading

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"Fixing Double-hung Windows." *Old House Journal* (no. 12, 1979): 135.

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Phillips, Morgan, and Selwyn, Judith. *Epoxies for Wood Repairs in Historic Buildings.* Washington, DC: Technical Preservation Services, U.S. Department of the Interior (Government Printing Office, Stock No. 024016000951), 1978.

Rehab Right. Oakland, California: City of Oakland Planning Department, 1978 (pp. 7883).

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Smith, Baird M. "Preservation Briefs: 3 Conserving Energy in Historic Buildings." Washington, DC: Technical Preservation Services, U.S. Department of the Interior, 1978.

Weeks, Kay D. and David W. Look, "Preservation Briefs: 10 Exterior Paint Problems on Historic Woodwork." Washington, DC: Technical Preservation Services, U.S. Department of the Interior, 1982.

Washington, D.C. 1981

Home page logo: Historic six-over-six windows--preserved. Photo: NPS files.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical Preservation Services (TPS), Heritage Preservation Services Division, National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.

Questions

Some of the web versions of the Preservation Briefs differ somewhat from the printed versions. Many illustrations are new and in color; Captions are simplified and some complex charts are omitted. To order hard copies of the Briefs, see Printed Publications.

PRESERVATION BRIEFS

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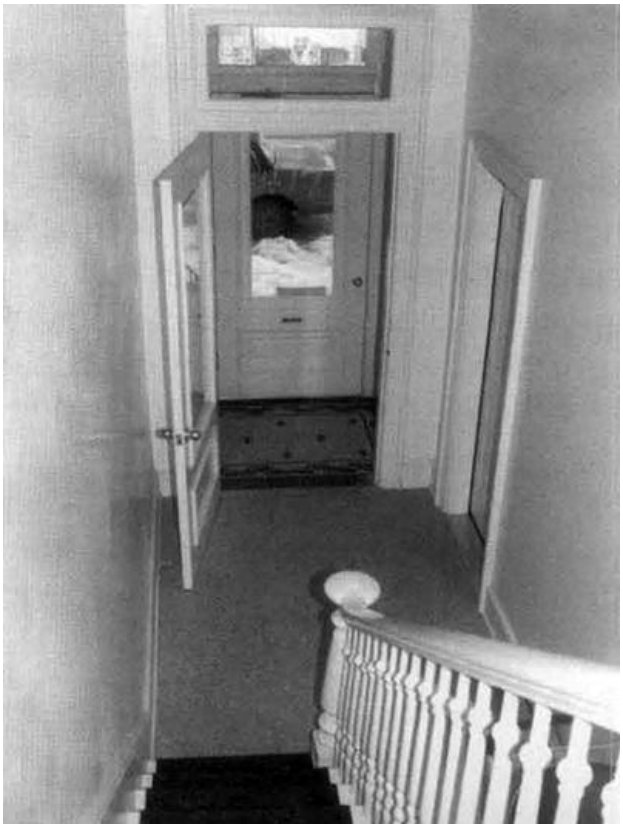
Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing

Sharon C. Park, FAIA, and Douglas C. Hicks

This Preservation Brief is under revision to reflect current Federal laws and regulations concerning lead-based paint. This excerpt from the 2006 revision of the Brief provides general background and evaluation information. For additional information on current laws and regulations, contact or visit the websites of the Environmental Protection Agency and your state's environmental and housing agencies.



Most residences painted prior to 1978 will contain some lead-based paint. It was widely used on exterior woodwork, siding, and windows as well as interior finishes. This apartment stairhall retains its historic character after a successful rehabilitation project that included work to control lead-based paint hazards. Photo: Crispus Attucks Community Development Corporation.

Lead-based paint, a toxic material, was widely used in North America on both the exteriors and interiors of buildings until well into the second half of the twentieth century. If a "historic" place is broadly defined in terms of time as having attained an age of fifty years, this means that almost every historic house contains some lead-based paint. In its deteriorated form, it produces paint chips and lead-laden dust particles that are a known health hazard to both children and adults. Children are particularly at risk when they ingest lead paint dust through direct hand-to-mouth contact and from toys or pacifiers. They are also at risk when they chew lead-painted surfaces in accessible locations. In addition to its presence in houses, leaded paint chips, lead dust, or lead-contaminated soil in play areas can elevate a child's blood lead level to a degree that measures to reduce and control the hazard should be undertake.

The premise of this Preservation Brief is that historic housing can be made lead-safe for children without removing significant decorative features and finishes, or architectural trimwork that may contribute to the building's historic character. *Historic housing*—encompassing private dwellings and all types of rental units—is necessarily the focus of this Brief because federal and state laws primarily address the hazards of lead and lead-based paint in housing and day-care centers to

protect the health of children under six years of age. Rarely are there mandated requirements for the removal of lead-based paint from non-residential buildings.

Lead in Historic Paints

Lead compounds were an important component of many historic paints. Lead, in the forms of lead carbonate and lead oxides, had excellent adhesion, drying, and covering abilities. White lead, linseed oil, and inorganic pigments were the basic components for paint in the 18th, 19th, and early 20th centuries. Lead-based paint was used extensively on wooden exteriors and interior trimwork, window sash, window frames, baseboards, wainscoting, doors, frames, and high gloss wall surfaces such as those found in kitchens and bathrooms. Almost all painted metals were primed with red lead or painted with lead based paints. Even milk (casein) and water-based paints (distemper and calcimines) could contain some lead, usually in the form of hiding agents or pigments. Varnishes sometimes contained lead. Lead compounds were also used as driers in paint and window glazing putty.

In 1978, the use of lead-based paint in residential housing was banned by the federal government. Because the hazards have been known for some time, many lead components of paint were replaced by titanium and other less toxic elements earlier in the 20th century. Since houses are periodically repainted, the most recent layer of paint will most likely not contain lead, but the older layers underneath probably will. Therefore, the only way to accurately determine the amount of lead present in older paint is to have it analyzed.

A large-scale historic rehabilitation project incorporated sensitive lead-hazard reduction measures. Interior walls and woodwork were cleaned, repaired, and repainted and compatible new floor coverings added. The total project was economically sound and undertaken in a careful manner that preserved the building's historic character. Before:left, after:right. Photos: Landmarks Design Associates.

It is important that owners of historic properties be aware that layers of older paint can reveal a great deal about the history of a building and that paint chronology is often used to date alterations or to document decorative period colors. Highly significant decorative finishes, such as graining, marbleizing, stenciling, polychrome decoration, and murals should be evaluated by a painting conservator to develop the appropriate preservation treatment that will stabilize the paint and eliminate the need to remove it. If such finishes must be removed in the process of controlling lead hazards, then research, paint analysis, and documentation are advisable as a record for future research and treatment.

Planning for Lead Hazard Reduction in Historic Housing

Typical health department guidelines call for removing as much of the surfaces that contain lead-based paint as possible. This results in extensive loss or modification of architectural features and finishes and is not appropriate for most historic properties. A great number of federally assisted housing programs are moving away from this approach as too expensive and too dangerous to the immediate work environment. A preferred approach, consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, calls for removing, controlling, or managing the hazards rather than wholesale-or even partial-removal of the historic features and finishes. This is generally achieved through careful cleaning and treatment of deteriorating paint, friction surfaces, surfaces accessible to young children, and lead in soil. Lead-based paint that it not causing a hazard is thus permitted to remain, and, in consequence, the amount of historic finishes, features, and trimwork removed from a property is minimized.

Because the hazard of lead poisoning is tied to the risk of ingesting lead, careful planning can help to determine how much risk is present and how best to allocate available financial resources. An owner, with professional assistance, can protect a historic resource and make it lead-safe using this three-step planning process:

1. Identify the historical significance of the building and architectural character of its features and finishes;
2. Undertake a risk assessment of interior and exterior surfaces to determine the hazards from lead and lead based paint; and,
3. Evaluate the options for lead hazard control in the context of historic preservation standards.

1. Identify the historical significance of the building and architectural character of its features and finishes

The historical significance, integrity, and architectural character of the building always need to be assessed before work is undertaken that might adversely affect them. An owner may need to enlist the help of a preservation architect, building conservator or historian. The State Historic Preservation Office (SHPO) may be able to provide a list of knowledgeable preservation professionals who could assist with this evaluation.

Features and finishes of a historic building that exhibit distinctive characteristics of an architectural style; represent work by specialized craftsmen; or possess high artistic value should be identified so they can be protected and preserved during treatment. When it is absolutely necessary to remove a significant architectural feature or finish-as noted in the first two priorities listed below-it should be replaced with a new feature and finish that matches in design, detail, color, texture, and, in most cases, material.

Finally, features and finishes that characterize simple, vernacular buildings should be retained and preserved; in the process of removing hazards, there are usually reasonable options for their protection. Wholesale removal of historic trim and other seemingly less important historic material, undermines a building's overall character and integrity and, thus, is never recommended.

For each historic property, features will vary in significance. As part of a survey of each historic property, a list of priorities should be made, in this order:

- Highly significant features and finishes that should always be protected and preserved;
- Significant features and finishes that should be carefully repaired or, if necessary, replaced in-kind or to match all visual qualities; and
- Non-significant or altered areas where removal, rigid enclosure, or replacement could occur.

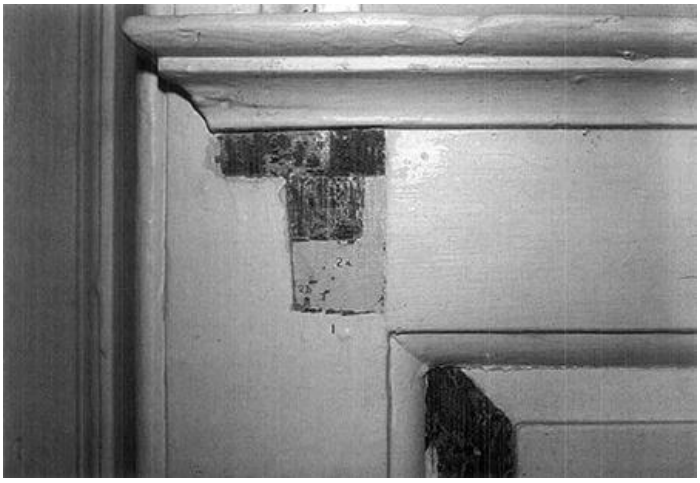
This hierarchy gives an owner a working guide for making decisions about appropriate methods of removing lead paint.

2. Undertake a risk assessment of interior and exterior surfaces to determine hazards from lead and lead-based paint.

While it can be assumed that most historic housing contains lead-based paint, it cannot be assumed that it is causing a health risk and should be removed. The purpose of a risk assessment is to determine, through testing and evaluation, where hazards from lead warrant remedial action. Testing by a specialist can be done on paint, soil, or lead dust either on-site or in a laboratory using methods such as x-ray fluorescence (XRF) analyzers, chemicals, dust wipe tests, and atomic absorption spectroscopy. Risk assessments can be fairly low cost investigations of the location, condition, and severity of lead hazards found in house dust, soil, water, and deteriorating paint. Risk assessments will also address other sources of lead from hobbies, crockery, water, and the parents' work environment. A public health office should be able to provide names of certified risk assessors, paint inspectors, and testing laboratories. These services are critical when owners are seeking to implement measures to reduce suspected lead hazards in housing, day-care centers, or when extensive rehabilitations are planned.

The risk assessment should record:

- the paint's location
- the paint's condition lead content of paint and soil
- the type of surface (friction; accessible to children for chewing; impact)
- how much lead dust is actively present
- how the family uses and cares for the house
- the age of the occupants who might come into contact with lead paint.



The paint chronology of this mantel, seen in the exposed paint layers in the left corner, proved it had been relocated from another room of the house. To remove a significant feature's paint history and the evidence of its original sequence of color by stripping off all the paint is inappropriate - and unnecessary - as part of a lead

It is important from a health standpoint that future tenants, painters, and construction workers know that lead-based paint is present, even under treated surfaces, in order to take precautions when work is undertaken in areas that will generate lead dust. Whenever mitigation work is completed, it is important to have a clearance test using the dust wipe method to

hazard reduction project. Careful surface preparation and repainting with lead-free top coats is recommended. Photo: NPS Files.

ensure that lead-laden dust generated during the work does not remain at levels above those established by the Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD). A building file should be maintained and updated whenever any additional lead hazard control work is completed.

Hazards should be removed, mitigated, or managed in the order of their health threat, as identified in a risk assessment (with 1. the greatest risk and 8. the least dangerous):

1. Peeling, chipping, flaking, and chewed interior lead based paint and surfaces
2. Lead dust on interior surfaces
3. High lead in soil levels around the house and in play areas (check state requirements)
4. Deteriorated exterior painted surfaces and features
5. Friction surfaces subject to abrasion (windows, doors, painted floors)
6. Accessible, chewable surfaces (sills, rails) if small children are present
7. Impact surfaces (baseboards and door jambs)
8. Other interior surfaces showing age or deterioration (walls and ceilings)

3. Evaluate options for hazard control in the context of historic preservation standards.

The Secretary of the Interior's Standards for the Treatment of Historic Properties -established principles used to evaluate work that may impact the integrity and significance of National Register properties--can help guide suitable health control methods. The *preservation standards* call for the protection of historic materials and historic character of buildings through stabilization, conservation, maintenance, and repair. The *rehabilitation standards* call for the repair of historic materials with replacement of a character-defining feature appropriate only when its deterioration or damage is so extensive that repair is infeasible. From a preservation standpoint, selecting a hazard control method that removes *only* the deteriorating paint, or that involves some degree of repair, is always preferable to the total replacement of a historic feature.

By tying the remedial work to the areas of risk, it is possible to limit the amount of intrusive work on delicate or aging features of a building without jeopardizing the health and safety of the occupants. To make historic housing lead-safe, the gentlest method possible should be used to remove the offending substance-lead-laden dust, visible paint chips, lead in soil, or extensively deteriorated paint. Overly aggressive abatement may damage or destroy much more historic material than is necessary to remove lead paint, such as abrading historic surfaces. Another reason for targeting paint removal is to limit the amount of lead dust on the work site. This, in turn, helps avoid expensive worker protection, cleanup, and disposal of larger amounts of hazardous waste.

Whenever extensive amounts of lead must be removed from a property, or when methods of removing toxic substances will impact the environment, it is extremely important that the owner be aware of the issues surrounding worker safety, environmental controls, and proper disposal. Appropriate architectural, engineering and environmental professionals should be consulted when lead hazard projects are complex. Within the context of the historic preservation standards, the most appropriate method will always be the least invasive.

Summary and References

Reducing and controlling lead hazards can be successfully accomplished without destroying the character-defining features and finishes of historic buildings. Federal and state laws generally support the reasonable control of lead-based paint hazards through a variety of treatments. The key to protecting children, workers, and the environment is to be informed about the hazards of lead, to control exposure to lead dust and lead in soil, and to follow existing regulations. In all cases, methods that control lead hazards should be selected that minimize the impact to historic resources while ensuring that housing is lead-safe for children.

Acknowledgements

Sharon C. Park, FAIA, is the former Chief, Technical Preservation Services, National Park Service. **Douglas C. Hicks** is the former Deputy Superintendent, Historic Preservation Training Center, National Park Service. Both authors served on the National Park Service Housing Task Force addressing lead-safe employee housing and on various national panels to discuss combining lead-safe housing with historic preservation concerns.

Revised October 2006

nps.gov

EXPERIENCE YOUR AMERICA™

Case Study in Exterior Storm Windows
Lyman House Weatherization Project: Exterior Storm Windows
A Component of Energy Retrofit project supported by Massachusetts Department of Energy Resources

Work completed August 2011-December 2011

Pre-Work
Statement of Condition
Exterior storm windows were extant on the west wing of the mansion house. The date of installation of these storm windows is unknown. The existing aluminum storm windows were white ñtriple trackò storm windows in varying degrees of functionality. In some cases, the screen and / or glass panels were missing. In other cases, the panels were no longer movable. Where screen and glass panels existed and were functional, there was no seasonal plan to appropriately set the panels.

Example of existing exterior storm window prior to 2011 work

Treatment Plan (scope of work)
The DOER funded retrofit project provided for the installation of new exterior storm windows as one component to air sealing. As the project was geared towards identifying and measuring sensitive alterations to the building, it was decided to install two types of exterior storm windows ï aluminum and wooden.

Philosophical Approach
As storm windows were extant, it was in keeping with Historic New Englandôs philosophy to replace the existing exterior storm windows with new exterior storm windows. Technically, the new windows were not replacing in kind as there was the opportunity to upgrade the quality and functionality as well as the aesthetic component.

Work

Work Performed

It was recommended and approved by Historic New Englandôs interpretive that those windows on the front of the house and the loading dock area were to be treated with wooden storm windows while those windows the rear of the house were to be treated with aluminum storm windows.

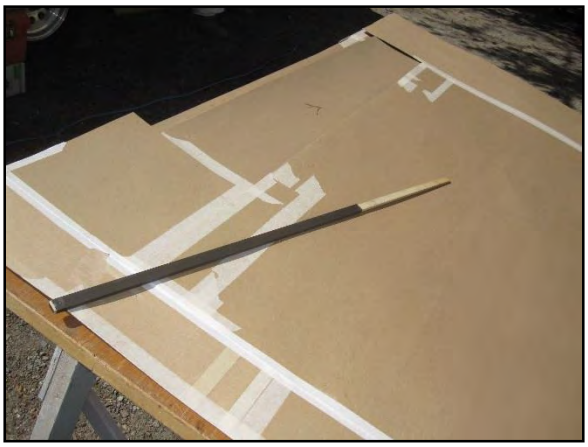
Exterior Wooden Storm Window Treatment

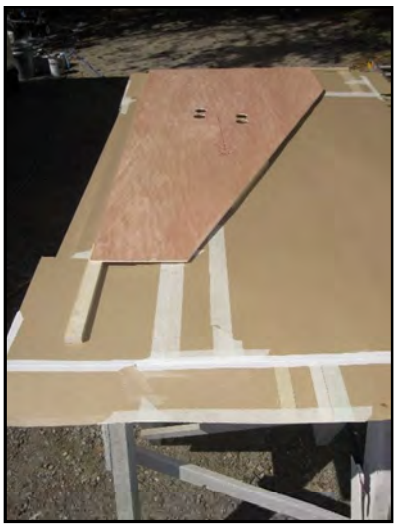
South elevation, 2nd floor office windows

West elevation, 2nd floor office windows and 1st floor kitchen

Note that the three windows not highlighted did not have exterior storm windows and thus were treated with

The wooden storm windows were custom made by Architectural Detail in Wood, based in Shirley, MA. After templating each opening for precise fit of the storm window, the windows were crafted from Honduran Mahogany using traditional pegged mortise and tenon joinery with a middle rail that aligns with the meeting rail of the double hung sash. Modern float glass of 1/8ò thickness was used.





Template development for each opening

The upper light is fixed and ñreverse glazedò meaning a beveled profile similar to that provided by standard glazing putty is milled into the exterior face of the storm window. The light is secured from the inside with silicone and held in place with a wooden stop. This results in the appearance of a traditionally glazed window without the need to periodically re-glaze the unit. The window was weather stripped with a silicone bulb at the sill. The lower light is an aluminum framed glass panel that is held in place with two brass clips. This light can be replaced seasonally with an aluminum framed screen.

Storm window frames ready for dry fit to each opening

Silicone weather stripping

Brass hardware for securing lower light removable panel

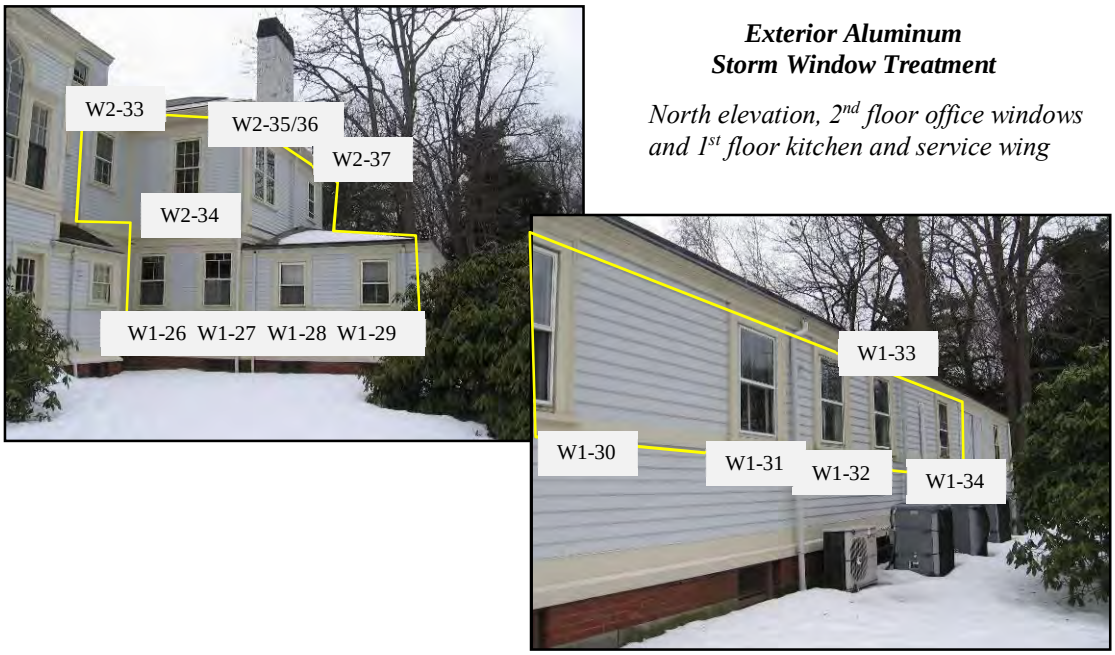
Brass pins to set in head casing

This wooden storm window fits flush in the window opening, seated against the blind stop. Two brass pins poke into the head casing and the window is held tightly to the blind stops with brass hardware installed from the inside. This installation differs from a more traditional wooden storm window installation where the window hangs over the face of the window opening. As there was no photographic evidence of such an exterior storm window for the Lyman House, there was no intent to install that type. As such these storm windows present a minimal visual impact when viewed from the outside.

Installation

Completed installation

Hardware



Exterior Aluminum
Storm Window Treatment

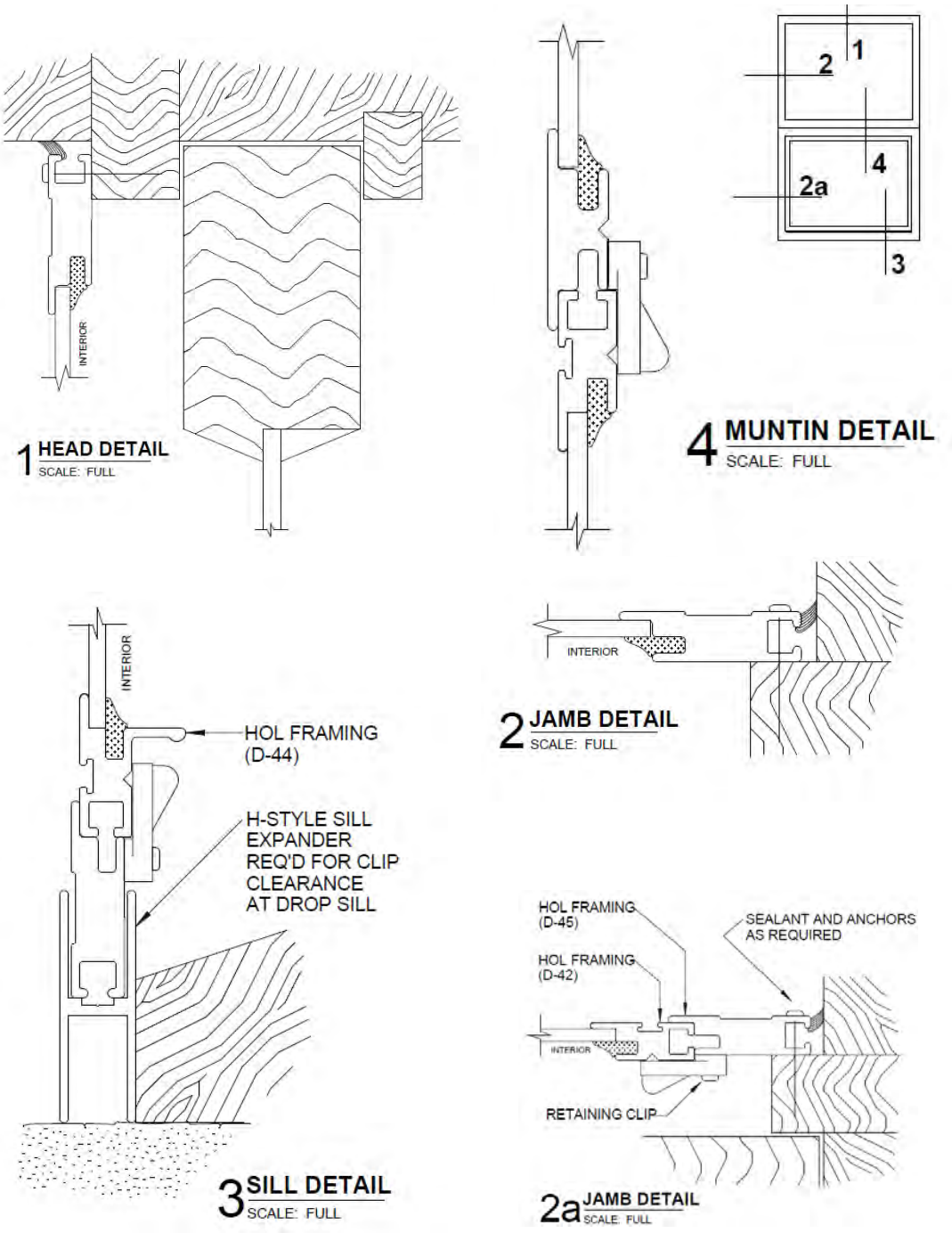
North elevation, 2nd floor office windows and 1st floor kitchen and service wing

Historic New Englandôs experience with exterior storm windows has been limited over the years, although many properties have some form of exterior storm window. Where installed, most appear to be a common, mass-marketed ñtriple trackò storm window of a stock color. These ñtriple trackò storm windows have two glass panels and one screen panel, with each panel sliding independently in its own track to allow varying options for sealing. Some properties have single ñdead lightò storm panels installed as a seasonal maintenance task; in some cases, only the frames remain as the lights have been damaged or otherwise lost to time. Effectiveness of blocking air infiltration has never been measured and documented.

During the review of interior storm window options, one player was also seen as a quality exterior product providing a low profile option that would minimally impact the visual aesthetic of the property. Allied Windowôs Historic One Lite with removable bottom pane was selected for the rear facing windows.

The top is fixed and the bottom panel is removable to the interior. An interchangeable screen for this bottom panel was included in the purchase. The horizontal divider for the master frame of the (HOL) is aligned with the meeting rail on the existing window.

Drawing details of Allied HOL exterior storm window



The Allied storm windows were installed by Heritage Restoration of Providence, RI.

L-bracket secured to window's blind stop at both sides and top

Storm window is slipped into bottom expander

L-bracket is caulked

Storm window is seated into bracket and screwed to L-bracket

Bottom expander is adjusted for fit against

Energy Efficiency Metrics

After installation of the exterior storm windows, various blower door tests were performed on rooms with these storm windows. These rooms are three offices on the second floor of the west wing. Infiltration measurements found that there was an overall decrease in infiltration by 20% in each room tested. With the storm windows uninstalled, approximately 10% of the reduction could be attributed to the sash conservation and weatherization efforts. The interior storm windows performed about 10% better with respect to stopping air infiltration. However, there was no performance difference between the wooden and aluminum storm windows.

Maintenance Requirements

Both types of exterior storm windows have been designed and installed such that their removal should be a rare event, done only in conjunction with painting maintenance. Removal of the wooden storm windows requires someone on the inside to release the hardware and someone on the outside to ñcatchò the window upon its release. Removal of the aluminum storm windows requires unscrewing the window unit from the L-bracket frame.

Both types have been built to allow for the seasonal removal of the lower glass panel and the use of a screen panel. The unused panels are stored on the 3rd floor of the house and are numbered to correspond with the window schedule numbering.

For the venting of food preparation smells, three of the four windows in the kitchen area will likely always have the screen panel installed.

The wooden storm windows will require paint maintenance at the same time as schedule exterior paint maintenance. The aluminum storm windows should require no maintenance although it is important that the weep holes at the bottom are never painted or caulked shut.

Cost

Work Performed	Company	Amount
Exterior Aluminum Storm Windows (quantity 14)	Heritage Restoration	$ 10,777.82
Exterior Wooden Storm Windows (quantity 12)	Architectural Detail in Wood	$ 9,673.00
Total Exterior Storm Windows		**$20,450.82**

Case Study - Interior Storm Windows
Lyman House Weatherization Project: Interior Storm Windows
A Component of Energy Retrofit project supported by Massachusetts Department of Energy Resources

Work completed June 2011-February 2012

Pre-Work
Statement of Condition
Interior storm windows did not exist prior to this project. The implementation of interior storm windows was a component of a Department of Energy Resources energy retrofit project.

Treatment Plan (scope of work)
Install in a minimally invasive manner interior storm windows to the basement, first and second floor openings where no exterior storm windows currently existed.

Philosophical Approach
Historic New Englandôs philosophy steers away from implementing architectural components that didnôt exist at the time of the acquisition of the property or are not readily visible in historic images of the period of interpretation.

Over the past 30 years the basic institutional philosophy when installing non-historic elements such as storm windows or, more commonly, UV protection in the museum buildings was to install these elements in the interior as opposed to the exterior. This approach stems from the concept that guests rarely notice an interior sheet of UV or storm window but on the exterior of the building these additions are very noticeable ï specifically in the aesthetic quality of how light is reflected off of the individual panes of the historic window compared to light reflecting off of a single storm pane. Historic New Englandôs interpretative group confirmed this approach was still in keeping with our interpretive goals at the site.

The Massachusetts Historical Commission holds a preservation restriction on the property. As that restriction governs exterior changes to the building, the implementation of the interior storm windows was not reviewed. The implementation of exterior storm windows where they did not currently exist was not allowed.

In order to accommodate the interior storm windows, the round head brass wood screws that secured the window stops had to be exchanged for flat head brass wood screws to provide a flush mounting surface. All round head brass screws have been retained if future direction calls for the removal of the interior storm windows.

Work

Work Performed

Interior storm window options were researched and evaluated along four key measures:

- Effectiveness of blocking air infiltration at the window opening
- Infringement on historic fabric
- Reversibility
- Cost

Historic New Englandôs experience with interior storm windows has been limited over the years. Some properties have had such storm windows installed. These products have typically been single panes of glass in an aluminum or vinyl frame. The unit is then secured to the window opening through a magnetic strip or brackets screwed to the window frame.

Effectiveness of blocking air infiltration has never been measured and documented. Further, it appeared that the sealing of the opening has been compromised such that warm interior air has penetrated and condensed on the interior surface of the primary sash. This condensation has then resulted in water damage and deterioration of the interior surfaces. A similar effect has been seen where the organization has hung or secured UV rated Plexiglas® panels to the windows. Typically, this installation was done to help protect interior finishes from UV degradation and not as an energy efficiency technique. However, the same type of condensation damage has become increasingly prevalent. It was important for this project that the interior storm window selected provide a sufficient seal so as to avoid the condensation issue.

Three products were evaluated: Innerglass Storm Windows; Allied Storm Windows; ClimateSeal Storm Windows

Brand	**Frame**	**Glass**	**Attachment**	**Color**
Innerglass	Vinyl	Low E	Compression into opening + U channel at head	3 standard options
Allied	Aluminum	Various options (annealed, laminated, tempered, low E, tinted, polycarbonate, acrylic)	Aluminum tracks with magnetic tape strip installed into opening	Custom match
Climate Seal	Vinyl	Acrylic	Aluminum tracks with magnetic tape strip installed into opening	Custom match

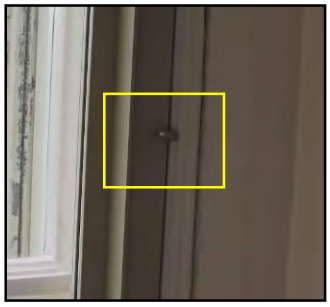
The Innerglass and Climate Seal products were comparable on price when comparing the standard offering. However, the Innerglass product uses Low E glass as its standard offering whereas Climate Sealôs standard offering is acrylic with a 10 year guarantee for

yellowing. UV Plexiglas® would be an upgrade to the standard acrylic offering, but Low E glass was not an option. Allied Storm Windows were available in Low E glass and the frames would be custom color matched. However, the price per opening was approximately 50% greater than the Innerglass offering. All three products claimed to provide a tight seal and thus guard against any condensation issues. All three have significant install bases and happy customers. Innerglass was the chosen provider for the Lyman project due to the minimal impact on existing fabric and its price point.

A total of 79 interior storm windows were purchased and installed.

The typical installation involves the securing of a U channel at the top of the window opening. This U-channel is secured with two #8 wood screws. The storm window is then inserted into the opening by compressing its sides and sliding the unit into the U-channel. The storm window unit has a silicone gasket at the top and bottom and a fiber gasket along the side spring loaded compression jambs. Once the unit is installed in the opening, two rivet pins are inserted about 1/3 of the way up the unit to provide final security. These pins require the drilling of two 3/32ò holes.

Left: Installation of U-channel at top of window casing

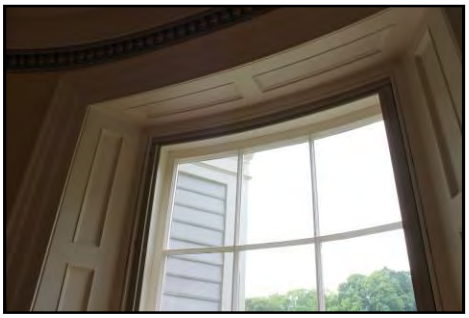


Above: Rivet pin installed to help secure side of storm window

In order to accommodate the interior storm windows, the round head brass wood screws that secured the window stops had to be exchanged for flat head brass wood screws to provide a flush mounting surface. All round head brass screws have been retained if future direction calls for the removal of the interior storm windows.

The standard interior storm window is a single unit of low E glass. Fourteen of the window openings were treated with a UV Plexiglas® unit due to either size of opening or curved feature of opening. These openings were the ballroom (W1-15, W1-16, W1-17, W1-18, W1-19, W1-20), the Bow Parlor (W1-22, W1-23), the Ballroom Chamber (W2-18, W2-25), the Oval Chamber (W2-28, W2-29, W2-30) and the Palladian window (W2-31a, b, c).

The installation for the Bow Parlor and Oval Chamber required that the units curve to accommodate the opening. This can only be accomplished with the use of UV Plexiglas®. For these curved openings, the U-channel at the top was molded to follow the curve of the opening. These openings also require the use of a third pin, located at the bottom sash stop. This pin serves to hold the curve at the bottom of the unit. Note that each of the 5 openings was found to have a different radius. This is likely attributed to the hand construction of this room as part of the 1793 construction period.



Left: curved U-channel to fit curve of opening

Above: additional rivet pin at bottom to hold curve of storm window

Above: Curved opening in Bow Parlor

Interior storm windows have the advantage of being minimally visible from the exterior, but they also prevent the routine opening/closing of the window. From a Functions perspective, it was desirable to retain some level of functionality for some windows. This desire was based on past experience with the air conditioning system and the general use of the ballroom where the windows are often left open during an event to take advantage of prevailing breezes.

Sixteen windows were provided with a screen option ï Ballroom (W1-15, W1-16, W1-17, W1-18, W1-19, W1-20), Dining Room (W1-06, W1-09), East Parlor (W1-10, W1-

13), Brideôs Room (W2-07, W2-10), Groomôs Room (W2-13, W2-16) and Ballroom Chamber (W2-18, W2-25).

In the case of the Dining Room, East Parlor, Brideôs Room and Groomôs Room, a decision was made by the PPIP sub-committee formed to oversee all 2011/2012 work at the Lyman Estate that allowed for a screen option in the side facing bay windows of these rooms. Functions desired this option as previous experience with the air condition system suggested that having an open window option was a good ñjust in caseò practice. The new HVAC system has thus far eliminated the need for implementing the screen option, although all components are on site (stored in the attic) should this need evolve. In order to accommodate a screen opening for the lower sash an intermediate rail at the level of the meeting rail had to be installed. In the case of the Ballroom and Ballroom Chamber, this rail holds an upper and lower storm window during the winter. It also provides a mounting location for the U-channel for the lower storm window. During the spring/summer/fall, the two storm units can be removed for storage and the screen unit installed in the bottom location. In order to open the window, the screen must be removed, the lower sash lifted, and the screen reinstalled.

For the other windows with a screen option, the intermediate rail must be installed when the decision to go with a screen is required. Thus, more advanced planning is required in this situation as a full size storm window is a standard installation for these openings.

These intermediate rails have been installed so as to minimize impact on the window stops. The rail location was aligned with two sash stop screw locations. A brass threaded insert replaced each of the existing screws. The intermediate rail was then screwed into these inserts with the use of pocket screws. The use of a threaded insert will allow the intermediate rail to be removed and reinstalled repeatedly without gradually stripping out and deteriorating the sash stop.

Above: screen insert installed in ballroom

Above: Added support rail for screen / lower storm in ballroom

In order to establish the curve at the top of the Palladian window, a pattern was created. In the shop, a piece of curved wooden molding was fashioned to match the pattern. A piece of UV Plexiglas® was then cut to fit into this molding profile. The top section of the Palladian window has been screwed into the jambs to prevent the falling of this component. The bottom section is easily removable and installed in the same manner as the other interior storm windows.

Installation of Palladian storm window

Palladian storm window installed

Interior storm windows were also installed in the basement openings where windows were currently installed. Some openings had previously been blocked up over the years and had no windows. These openings were left blocked. As the basement windows were mounted flush with the basement walls, a wooden frame had to be built to hold the storm window. These frames were fabricated on site from poplar and painted grey to match the existing grey sash. The new storm window units were then secured to these frames. This installation process allows can be easily reversed by simply unscrewing the storm window frames.

During the HVAC installation, it was determined that two window openings (WB-16 and WB-23) were needed for the routing of exhaust and intake piping. These storm windows are labeled and stored with the associated sash on the 3rd floor of the mansion house.

Basement window installation of storm window sash.

Interior storm windows were also installed at the front entry for the fan light and the side lights. For this application, the storm window solution from Allied was used. This decision was based on the size of these openings, the desire for as thin of a profile as available, and the need for a tempered glass solution to meet code requirements. For this instance, aluminum L brackets were installed with a minimum of screw penetrations to the surrounding window frames. This aluminum L bracket is faced with a magnetic strip that interfaces with the magnetic strip on the edges of the storm window. While this magnet creates a positive seal, two screws per unit provide additional security as vibrations from the repeated door closing may loosen the seal. In this case, the default cream color of the Allied product provides a near match to the existing paint treatment.

Issues
The key issue with the interior storm windows is that the color for the frames was not matched to the paint color of the interior. An alternative product could have been selected that would have been color matched, but the expense of that would have resulted in cuts in other energy efficient strategies. As most windows have (or will have) interior textile treatments this color difference is somewhat minimized.

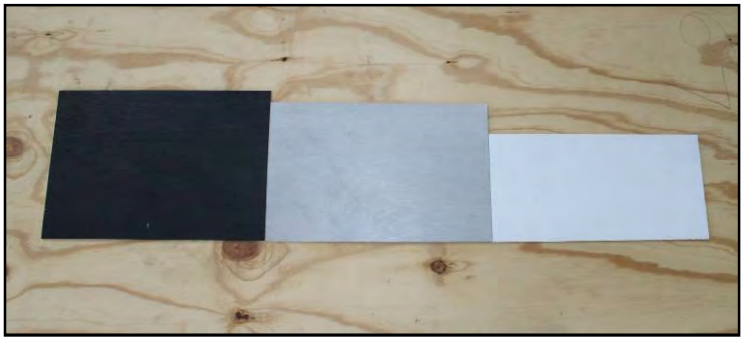
It should also be noted that while the interior storm windows are invisible when viewed from the exterior, they do have a reflective component such that when viewed closely one can see the reflection of the muntins. One would have to be very sensitive to this detail to truly observe it, but it is there.


Interior storm windows installed


Interior storm windows installed
Note muntin reflection in top sash

Energy Efficiency Metrics

After installation of the storm windows, various blower door tests were performed on rooms with the storm windows. These rooms are the East Parlor, Dining Room, and Brideôs Room. Infiltration measurements found that there was an overall decrease in infiltration by 30% in each room tested. With the storm windows uninstalled, approximately 10% of the reduction could be attributed to the sash conservation and weatherization efforts.

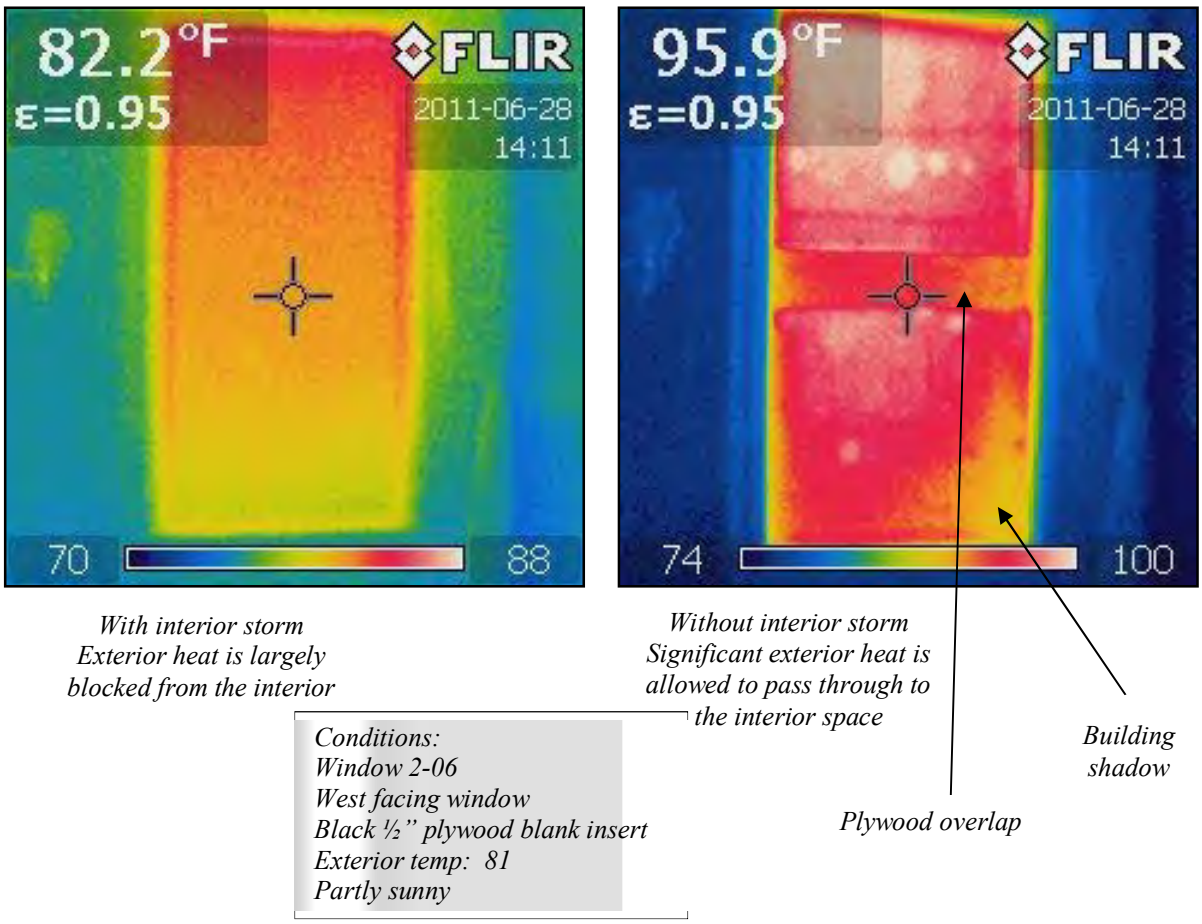


Relative affect on air infiltration of sash conservation/weatherization and implementation of interior storm windows.

- *Black represents net room "opening" before intervention*
- *Grey represents sash conservation / weatherization contribution (~10%)*
- *White represents net opening after interior storm window installation. (additional 20%)*

In addition to the impact on air infiltration, the low E glass is an important component for energy efficiency. Low E glass is glass that has been treated with a thin film coating that reflects heat, but allows visible light to pass through. The result is that in winter conditions, heat is reflected back into the room and in summer conditions, solar heat is reflected back to the exterior.

The following images using infrared imaging demonstrate the impact of this feature.



With interior storm
Exterior heat is largely blocked from the interior

Without interior storm
Significant exterior heat is allowed to pass through to the interior space

Conditions:
Window 2-06
West facing window
Black ½" plywood blank insert
Exterior temp: 81
Partly sunny

Plywood overlap

Building shadow

Installation Guidelines

The size and weight of the storm windows can lead to challenges in their installation. Following these steps will help lead to successful installation / removal.

- Set the storm window on the floor and compress the sides so that the storm window is set in the opening along the stops
- Keeping the storm window compressed in the opening formed by the window stops, slowly raise the window from the bottom corners
- Raise the window into the U-channel at the top of the opening
- Press in one lower corner and then the other lower corner
- Set the rivet pins in the existing holes
- To remove storm windows, simply reverse the process being careful to have full control of the window as you lower it down.

While most storm windows can be installed by one person, success with the 5 curved openings in the Bow Parlor and Oval Chamber comes with the aid of a second person to help keep the curve as the sash is slid up to the U-channel.

Maintenance Requirements
The interior storm windows should require no significant maintenance. However, they should be routinely monitored to note the appearance of any condensation buildup that may suggest a leak in the seal. They should probably also be removed at least annually so that any dirt or bugs that have entered from the outside can be removed and cleaned. While the glass storm windows can be cleaned with a mild window cleaning product (vinegar / water mixture), the UV Plexiglas windows must be cleaned with an approved plastic cleaner. A supply of Brillianize plastic cleaner and static free cloths has been provided for routine cleaning of these windows.

Storm windows are only to be removed by Property Care staff. Property Care staff shall be responsible for the removal and reinstallation of the storm windows in the ballroom on a seasonal basis. The storm windows would be installed from approximately October 15 through April 15.

Cost

Work Performed	Company	Amount
Interior Storm Windows	Innerglass Storm Windows	$ 28,313.66
Brass flat head screws for stops	Jamestown Distributors	$ 212.82
Interior Storm Windows ï Front Door	Heritage Restoration	$ 2,357.18
Total Interior Storm Windows		**$30,883.66**
Average Cost per Window Opening		**$ 390.93**