

Flint Public Library

Middleton, Massachusetts



Conditions Assessment

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Prepared For

Town of Middleton
48 South Street
Middleton, MA 01949

Prepared By

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INTRODUCTION

Building Conservation Associates, Inc. (BCA) was hired by the Town of Middleton to conduct a conditions assessment of the Flint Public Library. Two site visits were conducted in August and September 2024 to tour the buildings, take photographs and note the materials and conditions. Loretta Swift Johnson, Flint Public Library Director and Justin Sultzback, Middleton Town Administrator met with Lisa Howe on site in August. Documents related to the 2006 addition were reviewed, and Loretta gave a tour of the leaks, cracks and concerns observed around the building. BCA conducted a follow up visit in September to complete a more in depth review of the conditions.

The original library building was constructed in 1891, designed by architects Loring and Phipps, and built by contractors Smith and Meany. The building was designed in the Romanesque Revival style and constructed of brick walls with sandstone trim, a terra cotta block base, granite foundation, and a slate roof with copper flashings, gutters and downspouts. Stained glass windows were installed in the openings on the main façade. The front elevation is accented with a square tower that houses an operational original weight-driven Howard clock. Interior intact features include decorative woodwork and bookcases, large arches spanning the entrance, and wood bookcases in the balcony.

A large expansion, renovation and restoration project was undertaken in 2006. It included the construction of a large addition to the rear, or south, of the original building. The building was designed by Durland Van Voorhis Architects using design elements and materials to emulate the original building, including the use of brick jack arches over the windows and a large cast stone arch at the west entrance. The materials used were very good quality, including a slate roof with copper gutters and downspouts.

The work in 2006 also incorporated restoration work on the original building that included repointing the tower and east gable 100%, selective repointing on the rest of the building, and slate roof repairs.

The library is listed individually in the National Register of Historic Places (6/14/2002), listed as a Historic Resource within the Middleton Square – South Main Street (MDL.A) and Lake Street – Will's Hill (MDL.B). When the building was listed in the NRHP 2002, the addition had not been built.

EXISTING CONDITIONS

1891 Building

Exterior

Red brick walls

In general, the brick is in very good condition. Some of the mortar used to repoint selective areas is not the best color or texture match to the original mortar, but it all seems to be performing well. There are some step cracks that run through the brick and in some cases the sandstone on the east and north (Fig. 1) elevations. These cracks indicate past or ongoing movement, and they should be monitored to determine if they are still moving. The shifting opened the mortar joints around the step crack, allowing water infiltration at the open joints. Ongoing water infiltration will accelerate the deterioration of the

mortar and surrounding bricks. The movement and step cracks on the east elevation could be related to the excavation for the new addition in 2006.

The flashing around the chimney on the southeast roof slope is in poor condition and could be resulting in the leaks observed on the attic stair wall and roof framing. (Fig. 2)

Nova Scotia Sandstone

Nova Scotia Sandstone from the Wallace quarries was used for the beltcourses, arch over the main door, cornice, inscription panel and eave. The stone has been coated using a film forming material. It appears to be a non-breathable coating which is leading to it peeling from the stone in sheets. Moisture from the stone tries to evaporate through the exterior surface. When a non-breathable coating is applied, it creates a barrier to the moisture evaporation. The water and moisture build up below the surface of the coating and eventually causes the coating to bubble and peel. It is most evident at the gable stones and the beltcourses. (Figs. 3-4) The peeling will continue as the coating ages. It is not good practice to have a non-breathable coating on stone. It inhibits the natural movement of moisture through the stone and may cause the stone to deteriorate under the coating due to trapped water vapor in the stone pores. The trapped water can freeze in the winter and spall the surface of the stone. The coating is significantly lighter in color than the underlying sandstone, changing the appearance of the building quite dramatically.

Rusticated Base

The base of the building, from the ground to the first floor window sill height, is red rusticated block. At a glance, it looks like stone. The National Register nomination form identifies the building base as “rusticated brownstone ashlar”. The material is actually a manufactured product, not natural stone. It could either be fired clay terra cotta or pressed cement blocks. Both products were manufactured during the time period of the building’s construction and would have been a less expensive material than cut stone. The material composition is visible at the basement entry where the blocks were cut around the new basement door opening. Sand and aggregate within a matrix are a clear indication that it is a man-made product. (Fig. 5) There are also duplicate patterns visible when one looks closely. (Fig. 6) The material is in excellent condition and is not experiencing any deterioration, other than some step cracks that are contained within the mortar joints. (Fig. 7) The blocks themselves are not eroding, spalling or deteriorating.

Granite rubble foundation

The granite rubble foundation was intended to be below grade and only exposed on the interior basement walls. The rubble foundation is now exposed on the east elevation where the grade was lowered in 2006 to introduce a basement door. The rubble wall was repointed and appears to be in good condition (Fig. 8).

Slate Roof and Copper Flashings

The slate roof appears to be the original slate from 1890. The slate shingles are in good condition. Based on the condition of the slate, and its non-fading black color, it is most likely from Monson, Maine. Slate quarries in Monson were fully operational from the 1870s through the 1940s and supplied most of the good quality black slate found throughout New England. This slate can last for 200 years and if

maintained properly it could have another 50 years of useful life. Aside from a few missing, loose and slipped slate, the roof is in good condition. (Fig. 9)

All of the slate roofs have a small percentage of broken, missing or loose tiles. This is typical of slate roofs and the percentage of breakage is well within the acceptable range to be considered a maintenance issue, versus a replacement issue. The tiles are stone and are brittle and can break or crack due to the impact of snow from higher roofs, uplift caused by wind or uplift caused by ice dams.

The copper flashings and gutters have a 30-50 year life span and typically require replacement before the slate roofing materials. Water runoff wears holes in the gutters and the flashing, which often directs water to the interior of the masonry walls or wood trim. These elements are in varying conditions around the building, from good to poor. Some have been replaced as they have worn out, others are nearing the end of their lifespan and require replacement in the near future. The copper hip flashing was called for replacement in 2006 documents, but it looks like it was not replaced. The step flashing around the north gable, tower and chimneys appears to be in very good condition, indicating that it may have been replaced in 2006. (Fig. 10) It is unclear what the age of the gutters and downspouts are, but they appear to be functioning properly and not exhibiting signs of wear.

Windows and Doors

The original wood windows are intact and appear to be in good condition. (Fig. 11) There are stained glass windows in the two north openings. Aluminum storm windows were installed over the wood windows and the stained glass windows, possibly as part of the 2006 work. They help to protect the original wood and stained glass windows and appear to be functioning properly. The presence of the storm windows made review of the wood trim and exterior surface of the windows difficult. (Fig. 12) The wood windows appear to be in good condition, except as noted below. There was no obvious bowing or sagging of the lead observed at the stained glass windows. (Fig. 13)

The attic wood window on the north elevation is in poor condition, with significant deterioration of the bottom rail. (Fig. 14) The wood trim around the stained glass window on the north elevation, first floor, is in poor condition with deterioration of the trim around the stained glass. (See Fig. 12)



Fig. 1. Step crack through brick joints and sandstone trim.



Fig. 2. Flashing around southeast chimney could be causing leaks below.



Fig. 3. Paint coating peeling from sandstone trim at gable.



Fig. 4. Paint peeling from sandstone trim at beltcourse.



Fig. 5. Cut rusticated base showing clay or cement and aggregate matrix.



Fig. 6. Rusticated base showing duplicate cast patterns.

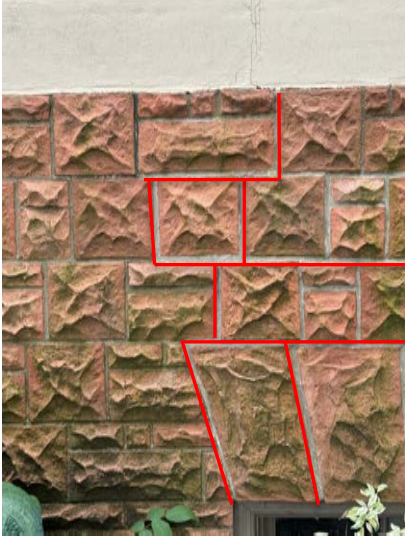


Fig. 7. Step crack through mortar joints. Red lines show locations of open or cracked joints.



Fig. 8. Exposed granite rubble foundation wall on east elevation.



Fig. 9. Slate roof around west chimney showing loose and missing slate.



Fig. 10. Copper gutters, downspouts, valleys and hips.



Fig. 11. Original double hung wood window.



Fig. 12. Wood window trim is in poor condition, especially at the base of the mullions. Note storm windows on exterior.



Fig. 13. Stained glass window in parlor.



Fig. 14. Double hung wood window in attic in poor condition.

Interior

The interior of the building contains much of the original finishes, including strip wood floors, wood wainscot, wood molding and trim, wood bookcases and stairs to the balcony. (Figs. 15-16) The finishes have been well maintained and are in good condition overall.

There is evidence of water infiltration around the ceiling lights on the balcony level. (Fig. 17) The ceiling around the fixtures is water stained. It was not possible to view the area above the water stains from the attic due to spray foam insulation and mechanical equipment in the location of the light fixtures. There is no obvious breach in the roof above the light fixtures that would indicate a roof leak. The water or moisture may be related to the mechanical equipment or plumbing lines in the attic.

There is a wide gap between the floorboards near the window openings on the north and south walls of the balcony. This gap indicates past or present movement of the wall outward. (Fig. 18)

A small crack in the plaster at the central arch over the reading room area was observed. (Fig. 19) This is a large expanse of wall surface. The crack could be caused by seasonal expansion and contraction, or it could be indicative of ongoing structural movement. Due to the small size of the crack, seasonal movement is more likely the cause.

There is a water leak along stair wall to the attic that leaves a small pool of water on the stairs during rainstorms. The leak is located on the wall that abuts the chimney and is most likely related to the chimney flashing. (Figs. 20-21 interior; Fig. 2 exterior)

The attic roof and roof framing members were spray foamed, probably as part of the 2006 work. The spray foam makes it difficult to see if or where there is water infiltration. The area of the attic that is over the balcony was not visible, so it is unclear if the water infiltration around the lights is from the roof, or from mechanical or plumbing pipes. (Figs. 22-23)

There are exposed brick and rubble stone walls in some areas of the basement. There are small areas of minor mortar deterioration, but the walls are mostly intact and do not require any immediate attention. (Fig. 24)

There are some dark mortar stains in the rubble stone walls that are likely caused by minerals leaching from the soil. This is a typical condition in below grade walls and is not a concern, unless increased water infiltration is observed at these locations in the future. (Fig. 25)



Fig. 15. Interior looking north.



Fig. 16. Interior looking south.



Fig. 17. Water staining around light fixtures in balcony.



Fig. 18. Wide gap between floor boards along east and west walls in balcony.



Fig. 19. Small crack in plaster over arch.



Fig. 20. Location of water infiltration.



Fig. 21. Location of water infiltration at attic stairs.

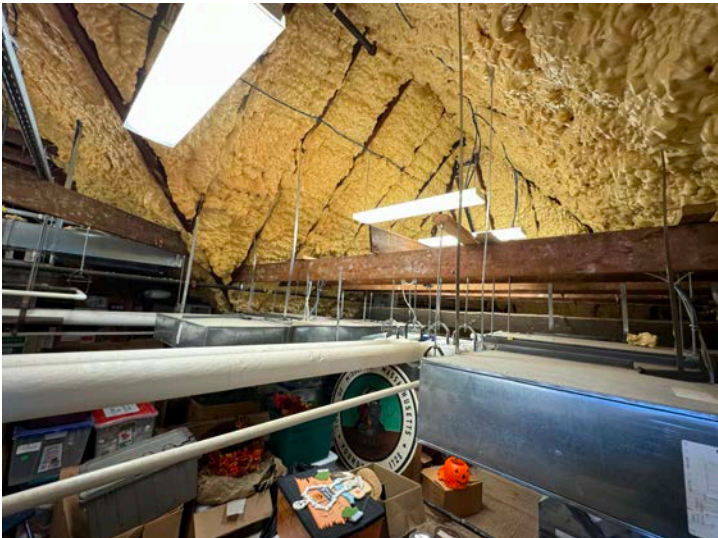


Fig. 22. Spray foam insulation installed at underside of roof.



Fig. 23. Attic area above balcony light fixtures, inaccessible for leak investigation.



Fig. 24. Basement walls – brick and rubble stone.



Fig. 25. Dark staining at mortar joints, possible mineral leaching from soil.

2006 Addition

Exterior

Brick

Red brick was used for the walls of the addition with jack arches built over the windows to replicate the detail of the original building. The brick and mortar joints are in good condition overall.

There is some dark soiling to the left and right of the south entrance. Water runoff from the gable capstones is depositing atmospheric soiling on the corners of the entrance. This is unsightly and is causing deterioration of the mortar joints due to ongoing saturation of the brick. (Fig. 26)

Cast Stone

Cast stone was used for the rusticated base, beltcourses and gable stones. A large arch with an inscription panel above creates the south entrance. This entrance is accessible and off of the parking lot. The color of the cast stone is more yellow than the sandstone on the original building. Either the cast stone was colored to replicate the coated sandstone, or the sandstone was coated to match the cast stone on the addition. Through wall flashing was installed under the gable stones to provide an additional layer of protection to the underlying brick walls. (Fig. 27) While the installation of through wall flashing protects the brick wall from water saturation through the cap, the gable cap stones are flat on the top. In heavy rains, water runs down the gable slope and down the face of the brick surrounding the entrance.

There are some open or missing mortar joints, especially at the projecting belt course (Fig. 28), in the rusticated base, and at the large entrance arch (Fig. 29). There are isolated cracks through cast stone units. (Fig. 30) This tends to occur on long walls and is most likely due to expansion and contraction of the materials over time, and not indicative of ongoing settlement or movement of the walls.

Sealant was used at the control joints in the base. The sealant is starting to dry up, shrink and pull away from the cast stone. (Figs. 31-32) Sealant typically requires removal and reinstallation every 20-25 years. The sealant installed in 2006 is nearing the end of its lifespan.

The capstones on the stairwell walls that lead up to the flat roof on the east end of the addition are shifting. The capstones do not appear to be pinned in place and are shifting out of plane due to water infiltration and lifting due to freeze/thaw action on the saturated bed mortar joints. Fortunately, through wall flashing was installed between the brick wall and the capstones so that the brick wall is protected. The mortar joints between the capstones are failing and the bed joints are getting saturated and failing, leading to the shifting of the capstones out of plane with the wall and biological growth in the mortar joints. (Figs. 33-35)

Slate Roof and Flashings

The roof is non fading black slate with copper hips, valleys, gutters and downspouts. The slate and associated flashings are in good condition. Although documentation could not be found, the slate appears to be North Country Unfading Black from a quarry in Quebec, Canada. If that is the case, it has a life expectancy of at least 150 years. There are some missing and loose slate that require repairs. (Fig. 36)

The gutters and downspouts are in good condition, with one exception. There appears to be a broken solder seam at a gutter on the west elevation. The open gutter seam is causing water to run down the face of the masonry, saturating it and leaving copper stains. (Fig. 37) Copper elements have a life span of 30-40 years for valleys, gutters and downspouts (they experience more wear from running water), and 50-75 years for hip flashings.

Membrane Roof and Flashing

The membrane roof over the eastern end of the children's library appears to be in good condition. If it is the roof that was installed in 2006, it likely has another 15 years of life remaining before it needs to be replaced. There have been ongoing issues with the counterflashing from the roof to the brick wall. This is the location of the water staining on the drop ceiling tiles below. (Fig. 38)

Interior

Water leaks have stained the drop ceiling in the children's library, directly below the exterior wall and flat roof flashing above. (Fig. 39)



Fig. 26. Dark soiling from gable runoff.



Fig. 27. Cast stone gable with through wall flashing between cast stone and brick.



Fig. 28. Open mortar joints at the belt course and base.



Fig. 29. Open mortar joints in arch.



Fig. 30. Isolated cracks in cast stone.



Fig. 31. Sealant material at expansion joints dried and shrinking.

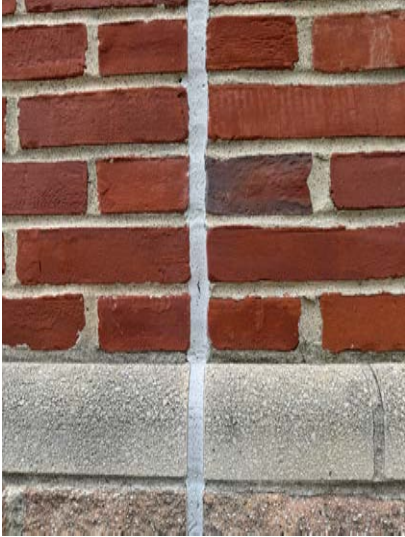


Fig. 32. Sealant material at expansion joints dried and shrinking.



Fig. 33. Capstones at east stairs are shifting.



Fig. 34. Gaps at joints between shifting capstones.



Fig. 35. Biological growth at stair capstone joints.

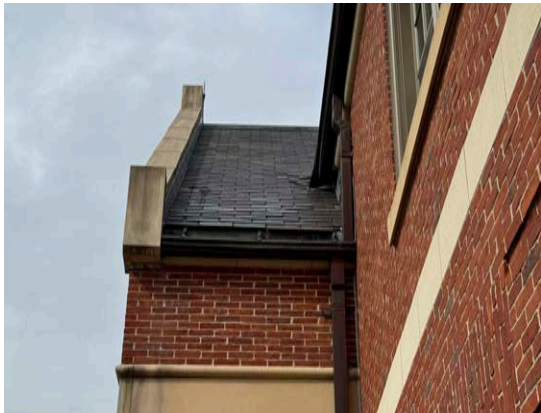


Fig. 36. Missing and loose slate.



Fig. 37. Open seam on copper gutter causing copper staining below.



Fig. 38. Defective flashing above water leaks in Children's Library ceiling tile.



Fig. 39. Water leaks below defective flashing at flat roof above.

TREATMENT RECOMMENDATIONS

1891 Building

Exterior

The exterior is in relatively good condition. With cyclical maintenance including minor, targeted repairs, the envelope should remain sound for another 20-25 years. Open joints should be filled and cracks should be repaired. A review of the building should happen every 5 years to identify minor repairs to be addressed. A comprehensive restoration project including cleaning, repointing, stone repair, and window restoration should be planned for 2045-2050.

There are some cracks in masonry and separation of wood flooring from the sills. These conditions indicate that movement has occurred. Monitoring of these locations to determine if the movement is ongoing, or if the locations are stable, is described below. If monitoring reveals that the cracks are active, engage a structural engineer well versed in historic buildings to determine the source of the movement.

Red brick walls

- When the building is restored, remove poorly matched mortar and repoint using mortar that matches in color, texture and composition.
- Repoint open joints with mortar matching in color, texture, joint profile and composition.
- If the cracks reappear after repointing, monitor cracks with photographs and measurements biannually. Record the crack width in the summer and the winter due to potential seasonal changes in the joint width due to expansion and contraction of materials. Evaluate the measurements over multiple years to see if the crack is getting progressively larger.
- Inspect the flashing at the southeast chimney to determine if there is any breach in the flashing that is allowing water infiltration. Repair any defects and monitor the attic stairwell during and after rainstorms to determine if the flashing repairs addressed the problem.

Nova Scotia Sandstone

- Monitor areas of coating delamination from the sandstone. Remove any bubbled coating that may be trapping water. The areas of delamination will continue to expand and will become increasingly unsightly.
- Plan for the removal of the coating from the sandstone within the next 10 years. The removal of the coating and exposure of the underlying sandstone will reveal a color variation between the existing sandstone and the cast stone used for the addition. BCA recommends accepting this variation and keeping the sandstone uncoated.

Rusticated Base

- Point open joints at step cracks using mortar to match the existing in color, texture, joint profile and composition.

Granite rubble foundation

- No work required at this time. Monitor the condition and include any open joints in future maintenance cycles.

Slate Roof and Copper Flashings

- Enter into a maintenance contract with a roofing contractor to inspect the roofs and replace all cracked and broken slate each spring and fall to ensure that the roof remains weather tight. The contractor would also point out areas that are beginning to wear and that may be of concern in the coming years.
- Repairs would include replacing loose, missing or cracked slate; patch holes in flashing; reattach lifted or bent flashing, gutters or downspouts; reattached any detached downspouts, etc. With these repairs, the roof could last another 50 years.
- Make sure that slate used for repairs and replacement of individual shingles matches the color, texture, thickness, sheen and quality of the original.
- Monitor the condition of the hip flashing that was not replaced in 2006. Have the slate roofing contractor inspect the flashing for pin holes and pits. If the flashing starts developing holes, pits, or tears, it may have to be replaced before the full roof replacement recommended below.
- Assume a full slate and flashing replacement on the original building in 50 years.

Windows and Doors

- Maintain the operation and repairs to the existing windows.
- Maintain the storm windows to ensure that they continue to protect the wood and stained glass windows.
- Restore the attic windows, including wood consolidation, reglazing and scraping and painting.

Interior

The interior finishes are in very good condition and there is no immediate work required.

- Continue current approach to maintaining the interior finishes.
- Develop a way to access the attic above the balcony to determine if the water staining around the light fixture is from a breach in the roof or is the result of a water leak or condensation from the mechanical or plumbing system. Once the sources if found, repair the source and repair the plaster finishes around the light fixtures.
- Monitor the gap between the balcony floor boards to determine if the gap is getting larger, or if it is stable. Document the gap with photographs and measurements biannually. Record the gap width in the summer and the winter due to potential seasonal changes in the gap width due to expansion and contraction of the wood flooring and framing. Evaluate the measurements over multiple years to see if the gap is getting progressively larger. If the gap is progressively expanding, engage a structural engineer well versed in historic buildings to develop a repair for the movement.

2006 Addition

Overall, the addition is in very good condition, except in the few minor observations below.

Exterior

Brick

- Repoint all open joints using mortar to match the surrounding in color, texture, joint profile and composition.
- Clean the dark soiling from the brick and cast stone on either side of the south entrance after water diversion at the gable is installed. Repoint any deteriorated joints at this location.

Cast Stone

- Install a water diverter on the top of the gable stones to keep the water from running down the gable stones and onto the face of the brick at the entrance. The roofing maintenance contractor can construct a diverter for this location.
- Repoint all open mortar joints at the belt course projection and at step cracks in the rusticated base and cornice. Use mortar that matches the surrounding in color, texture, joint profile and composition.
- Patch cracks in cast stone using a cementitious patching material that matches the color and texture of the cast stone.
- If repaired cast stone cracks or open mortar joints reappear after repointing, monitor cracks with photographs and measurements biannually. Record the crack width in the summer and the winter due to potential seasonal changes in the joint width due to expansion and contraction of materials. Evaluate the measurements over multiple years to see if the crack is getting progressively larger. If the cracks are getting progressively wider over time, engage a structural engineer well versed in historic buildings to evaluate the source of the movement.
- Remove the sealant at the control joints and reinstall. Choose a color that matches the surrounding brick or cast stone.
- Remove and reset the east stairwell capstones. Install stainless steel pins in the brick wall below to hold the capstones from moving. Properly flash the pins to ensure there is no water infiltration around the pins, into the wall below.

Slate Roof and Flashings

- Hire a slate roofing company to do annual inspections and minor repairs. They would come in once or twice a year to inspect the roof and perform minor repairs to the slate and flashing. Repairs would include replacing loose, missing, or cracked slate; patch holes in flashing; reattach lifted or bent flashing, gutters or downspouts; reattached any detached downspouts, etc. With these repairs, the slate could last another 150 years and the flashings could last another 25 years.

- Make sure that slate used for repairs and replacement of individual shingles matches the color, texture, thickness, sheen, and quality of the original.
- Repair the solder seam at the west elevation gutter. Inspect and clean out all gutters and downspouts as part of the annual roof maintenance.

Membrane Roof and Flashing

- Monitor the condition of the membrane roof over the eastern and western ends of the building. The roofs will need to be replaced in 10-15 years.
- Replace the counterflashing at where the eastern flat roof meets the brick wall. Make sure that the flashing is properly installed to rectify the ongoing leak to the children's library below.

MAINTENANCE PLAN

Maintenance is defined in this report as cyclical, preventative work that is performed on a scheduled and routine basis. The benefit of a cyclical maintenance program is to inspect the building regularly and methodically so that small issues are caught before they cause widespread damage. For instance, a pin hole in a piece of copper flashing, if left unrepaired, would allow water to saturate the masonry wall and wood framing below. Left for any period of time, the repeated saturation of the masonry and wood would start to spall the stone and the interior plaster wall would start to delaminate. It then becomes a major restoration project to repoint the masonry, repair the spalled stone and repair the soaked and delaminated plaster, not to mention potential water damage to other interior finishes and books. In a routine inspection scenario, the pin hole would be identified and repaired soon after it formed, stopping any damage to the underlying building fabric. It is critical that adequate money be carried in the annual operating budget to allow for maintenance inspection and repairs. Even a perfect maintenance program will not eliminate the need for restoration work to occur over the life of a building. All building materials have a projected life span and deteriorate over time, requiring restoration or replacement to ensure the integrity of the entire system.

This section of the report is intended to lay out an approach to institute cyclical inspections and maintenance repairs to the building over time. The spreadsheet provides guidelines for frequency of inspection, who should perform the inspection, time frame for replacement of materials, who should perform the repairs and the restoration work, and when there are special requirements. All of the building elements have been listed with the above information detailed. This type of maintenance program will ensure that minor repairs do not go unattended.

The key to a successful maintenance program is consistency. It is helpful if the same person inspects the building each year. They will have a familiarity with the building and will more likely recognize something that is out of the ordinary. Another key to a successful maintenance program is to perform the minor work as it is identified. Work that is deferred invariably translates into a larger, more costly, restoration project. The annual or bi-annual inspections can be performed by library staff. A preservation professional should be engaged if conditions change, or new conditions are discovered.

Maintenance contracts can be entered into for inspection and repair of the roof, similar to contracts that the library or town probably have for the mechanical systems. Contractors can give the library a price to inspect the system once or twice a year. The inspection should include minor repairs that are encountered during the inspection. Any larger problems identified during the inspection should be priced by the contractor for repair, or the repair should become part of a larger restoration work plan.

FLINT PUBLIC LIBRARY MAINTENANCE LOG	PERSONNEL				TIME FRAME				OTHER		
	To be completed by preservation craftspeople	To be completed by skilled tradespeople	To be completed by town's maintenance crew	Special skill and training required	Inspection frequency denoted in times per year	Yearly maintenance work	Maintenance work frequency denoted in years	Life of replacement material denoted in years	Special equipment and material required	Scaffolding or lift required	Potential hazardous materials involved
EXTERIOR - ROOFING											
Slate Shingle Inspection & Repair					2x						
Slate Shingle Roof Replacement							50/100				
EPDM Roof Inspection & Repair					2x						
EPDM Roof Replacement								30			
Gutter Inspection & Repair					2x						
Gutter Cleaning					2x						
Gutter Replacement								50			
Downspout Inspection & Repair					2x						
Downspout Cleaning					2x						
Downspout Replacement								50			
Flashing Inspection & Repair					2x						
Flashing Cleaning - debris					2x						
Flashing Replacement								50			
EXTERIOR - MASONRY											
Brick Masonry Inspection & Repair					1x		5				
Stone Masonry Restoration & Repointing								25			
Stone Masonry Inspection & Repair					1x		5				
Stone Masonry Restoration & Repointing								25			
Cast Stone Inspection & Repair					1x		5				
Cast Stone Repointing								25			
EXTERIOR - WOODWORK											
Wood Door and Trim Inspection & Repair					1x						
Wood Window and Trim Inspection & Repair					1x						
Wood Window and Trim Repainting							5				
Wood Window Glazing							5				
Wood Window Restoration							25				
Wood Trim Caulking							15				

