LANDSCAPE ASSESSMENT

Executive Summary

Northbridge Elementary is centrally located within the downtown area, and occupies an approximately 3 acre site that it shares with the School District offices building whose campus comprises approximately 1 acre. Because much of the school consists of a 1 story addition, the school building itself occupies the majority of the site so outdoor space is limited. The last major construction on site was done in 1983, and since that time the majority of the site has seen a significant amount of wear and is generally in fair to poor condition. The exception to this is the playground which appears to have been built within the last 10 years and is in good condition.

Terminology

Building Condition scale of terms used throughout this report are as follows:

- "Excellent": new or nearly new condition with few or no blemishes or compromises of quality or function.
- "Very Good": highly functional condition with slight wear and tear and/or minor compromises of quality or function.
- "Good": median functional condition with noticeable wear and tear and/or compromises of quality or function.
- "Fair": below median functional condition with significant wear and tear and/or major compromises of quality or function. Seriously worn parts or elements, minor structural compromise. Possible near-future safety hazard.
- "Poor": nearly– or completely non-functional condition with major wear and tear and/or serious compromises of quality or usability. Missing parts or elements, major structural damage or condition. Immediate safety hazard or danger.

Vegetation and Topography

The original school building was constructed at the highest point of a steep hill, which is typical of period construction but presents accessibility challenges and problems for students navigating the site. The urban setting, in conjunction with the sprawling single-story construction on site, both contribute to reduced outdoor spaces for students and faculty. The schoolyard and playground are accessible by vehicle drop-off, but for pedestrians entering from offsite it must be accessed via steep walkways that do not conform to ADA standards. The site features a fair amount large, mature trees that are in various conditions of health .

Specific Issues	*Recommendations*
Lawn and open spaces on site are severely limited, with no space available for sports or ball fields. There are two small open areas of grass lawn, to the west and north of the school building. These areas contain healthy stands of turfgrass in good condition, but currently lack proper maintenance and contain a significant amount of weeds. (Figure 5.)	Aerate and slice seed lawn areas, and treat for weed growth. Provide regular maintenance.
There is a fair amount of ornamental plantings at the drop-off area of the school which are for the most part healthy and in good condition. There was a significant amount of weed growth among them but for the most part they appear cared for and appreciated. The plants serve to soften the harsh exterior of the drop-off area, reduce heat island effect, improve air quality, and provide aesthetic value and opportunities for learning (Figure 1.)	Expand ornamental plantings to other parts of campus, provide regular maintenance.
There are a number of large shade trees on site; Elm, Oak, Maple and Beech were observed. These trees provide a great deal of shade in the outdoor areas and also offer historic value for the entire community. At least one of these trees was observed to be in declining condition, but most appear to be in good health. (Figure 2., Figure 3.)	Have trees evaluated by a certified arborist and follow the recommendations provided. Likely maintenance will include edging and mulching, and airspading at base of tree, pruning of dead and dying limbs, and fertilization as needed.
The original school building is constructed on a steep hill, with the rest of the school occupying a relatively flat site beneath it. Topography is generally not a factor except where access is impeded by steep slopes at the original school building. (Figure 4., Figure 6.).	See Sidewalks and Pedestrian Routes section for specific recommendations.

Figure 1—Ornamental plantings at entrance

Figure 2—Historic shade tree on site

Figure 3—Mature trees on site

Figure 4-School and playground at top of steep slope

Figure 5—Limited lawn areas on site

Figure 6—Original building sited atop steep hill

STRUCTURES

External structures on site are limited to the school district offices (Figure 10), a storage shed at the playground (Figure 12), and a clothing and shoes donation storage shed (Figure 11)

Specific Issues	*Recommendations*
The school does not currently have any structured spaces for outdoor learning, such as seating or gathering areas for an outdoor classroom or a vegetable garden (Figure 7, 8, 9)	The school should explore expanding educational programs to include outdoor learning opportunities and provide the necessary structures required to support those programs.

Figure 7—Original building with two additions

Figure 8—Original school building

Figure 9—1983 school addition.

Figure 10-School district offices building

Figure 11—Clothing donation storage.

Figure 12—Storage shed at playground

SITE FURNISHINGS

Overall, there is a general shortage of furnishings on site, and the school would benefit from a greater distribution of furnishings like bicycle racks, trash receptacles, benches, water fountains, etc. Most furnishings are in poor to fair quality and in need of replacement. There is a lack of cohesive style and quality among site furnishings which detract from their visual impression on the site. Some common furnishings, such as water fountains, are missing altogether.

Specific Issues	*Recommendations*
There is a fair amount of galvanized chain link fencing around the school property, most of it is in fair to good condition. There is securely enclosed fencing around the rear schoolyard perimeter, which is common in similarly urban settings. There were instances of rusting fabric, bent rails, and missing hardware components. None of the chain link fencing was black-vinyl coated (Figure 17.)	Replace all missing or broken fence components to match existing galvanized construction. Consider replacing all fencing with black vinyl coated for greater longevity.
Only one trash receptacle and no recycling receptacles were observed at the school site. The single trash receptacle was not of suitable quality for permanent exterior use. Trash and litter has accumulated in some areas . (Figure 18.)	Furnish and install more trash and recycling receptacles of suitable quality for exterior use and of a uniform style and performance standards.
Benches are worn and in fair condition, and represent a variety of styles and designs. There is a lack of diversity in outdoor seating opportunities such as picnic tables or individual chairs. (Figures 13, 14, 15)	Remove old benches. Furnish and install new benches and picnic tables. Provide better distribution around site and at waiting areas.
One bicycle rack was observed and was in poor condition, and was located in an unsuitable location for proper access. The bicycle rack did not present sufficient capacity for the number of students. No bicycle racks were observed at other entrances. (Figure 16.)	Provide more high quality bicycle racks to encourage student to bike to school and sports. Place bicycle racks on level, undamaged concrete pads for safety and accessibility. Provide bike racks at appropriate areas.

Figure 13 Bench at play area

Figure 14—Benches at schoolyard

Figure 15—Bench at play area

Figure 16-Bicycle rack at drop-off area

Figure 17—Chain link fencing at school.

Figure 18—Waste barrel at schoolyard

Recreational elements

Because of the relatively small area surrounding the school, the number of recreational elements are limited. The primary recreational space is in the schoolyard between the original school building and the School District Offices. The area consists of a paved asphalt area with painted games, a wood-chip surfaced playground, a swing set, and some seating areas. There is a small lawn area next to the playground and paved area for free form play. The area receives adequate shade and is in a good location, though access from the street is limited due to steep walkways.

Specific Issues	*Recommendations*
Playground equipment is generally in good condition; it appears to have been constructed within the last 10 years. There are fencing and edging in close proximity to the play equipment, which should be reviewed for compliance with equipment setback requirements. This should be conducted as part of a comprehensive playground safety inspection by a certified CPSI. The area itself is relatively small for the number of students it serves and would benefit from expansion (Figures 20, 21) No Accessible playground equipment was noted.	Perform a playground safety inspection by a certified CPSI. Refurbish and repaint all properly functioning equipment displaying visual wear. Provide accessible play equipment.
The surfacing at the playground is constructed of wood chips, and appears to be of fairly recent installation. The chips themselves appear to be in good condition, but migration and lack of maintenance has left some bare areas in the play area and some chips out on the paved area. (Figure 24.)	Provide regular maintenance of wood chip surfacing. Rake chips to avoid bare areas and prevent excessive mounding. Consider replacing wood chips with poured in place rubberized safety surfacing for increased safety and visual appeal, and reduced maintenance.
The is a single swing set with two swings, both designed for toddlers. It is in very good condition. The wood chip surface below has eroded and no longer provides any impact attenuation. (Figure 22)	Provide additional swing sets to allow more and older children to use them simultaneously. Provide adequate safety surfacing in fall zones surrounding all swing sets.
Although there is an abundance of paved surface in the play area, there are very few painted games. There is a single four square court, an unidentified painted game, and a painted line around the perimeter of the area which may be a bigwheel racetrack. (Figures 19, 23)	Provide more painted games and graphics for a range of ages and levels of skill, such as four square, hopscotch, maps, and other games or graphics.

Figure 19—Schoolyard and School District Office.

Figure 20—Play equipment at schoolyard.

Figure 21—Play equipment at schoolyard.

Figure 22-Swingset at schoolyard.

Figure 23—Painted games at schoolyard.

Figure 24—Play equipment and mulch surfacing

Vehicular circulation and parking, service and deliveries

Parking on site is extremely limited. There is a lot on the north side of the school for 21 vehicles. There is additional parking for 14 vehicles at the school district offices building, accessed from Linwood Ave. There is a drop-off loop at the front of the school at Cross St., but there does not appear to be separate drop-off areas for buses and parents which is problematic. Service and deliveries occur at this area as well

Specific Issues	*Recommendations*
A lack of separation for parent, bus, and delivery drop-off is a safety concern. (Figure 25.)	Explore options for providing better separation for these various access needs.
Bituminous concrete surfaces are in poor condition, with significant cracking and patchwork. This contributes to issues with vehicular and pedestrian accessibility and safety, as well as drainage and erosion. Painted lines and markings like crosswalks are faded and difficult to read, creating safety concerns (Figure 27.)	Repair and repave all vehicular bituminous concrete surfaces. Repaint and restripe traffic markings.
Parking is limited to 21 vehicles for the school administration, staff, and visitors. This is insufficient for a school of this size. It is likely that a lot of people are utilizing parking at the Pleasant St Church located across Cross St. (Figure 29.).	Explore options for increasing parking and expanding existing parking lot areas on site.
One catch basin in the school drop-off area was observed to be failing and a large puddle was observed during a dry period of no rain, suggesting it is clogged. The degree of cracking and erosion in the immediate area suggests that this is a serious problem and must be addressed. (Figure 28.)	Consult with a Civil Engineer to examine the catch basin and other drainage structures, and develop a repair or replacement plan.

Figure 25—Entrance at school drop-off

Figure 26—Entrance at school district offices

Figure 27—Poor condition of bituminous concrete

Figure 28—Catch basin at drop-off loop

Figure 29—Parking at school.

Figure 30—Parking at school district offices

SIDEWALKS AND PEDESTRIAN ROUTES

Nearly all of the sidewalks and pedestrian route areas are in poor condition and need to be replaced. The number of accessible routes are scarce and are further impacted by the poor quality of the surfaces. A single accessible ramp exists at the entrance by the drop-off area, but many entrances to the building do not provide accessible access points.

Specific Issues	*Recommendations*
Concrete sidewalks are in poor condition-spalling, heaving, cracking and crumbling were all observed. In many instances the damage has resulted in cracks or gaps in excess of 1/2", rendering the routes unacceptable for MAAB or ADA access. Additionally, displacement from frost heaving has created irregularly sloped surfaces that do not meet accessibility regulations. (Figures 32, 33, 35, 36.)	Repair or replace all damaged concrete sidewalks. Provide accessible routes where necessary.
Bituminous concrete sidewalks and portions of sidewalks have been similarly damaged over time, particularly at the intersection of dissimilar surfaces, creating significant gaps. There is a portion of new bituminous concrete walkway from the parking lot to the north side of the school but it lacks an accessible entrance. (Figure 34.).	Repair or replace all damaged bituminous concrete sidewalks. Provide accessible routes to all building entrances and site amenities intended for use by the public.
There does not appear to be an ADA accessible route to access the schoolyard, which is currently accessed through the building with a step, or from the street below by way of a steep bituminous concrete walkway (Figure 35.)	Explore various design options for provide access to the upper schoolyard by way of an ADA accessible walkway.

Figure 31—Pedestrian crosswalk at school

Figure 32—Excessive gap at crosswalk and sidewalk

Figure 33—Damaged pedestrian surfaces

Figure 34-Gap at union of sidewalk materials

Figure 35—Steep slope at schoolyard access walkway

Figure 36—Poor quality of paved materials

ARCHITECTURAL ASSESSMENT

Northbridge Elementary School consists of an original three-story 1952 structure with two additions . In 1983 an addition was added to the existing building which consists of a single story core educational space with a 2 story classroom wing. In 2000 a group of modular classrooms were attached to the 1983 addition.

Overall the building is in fair condition however it is starting to show its age. Surfaces and equipment are showing signs of damage and wear. The roof is at or beyond the end of it's warranty period and serviceable life, and is due for replacement. Exterior window and curtainwall assemblies are not energy efficient and are beginning to show damage and signs of age. The building envelope is likely not thermally efficient, given the era in which the building was constructed. There are many significant accessibility issues present; which are not compliant with the current accessibility code and the ADA guidelines, which expose the school and District to risk of civil action. Generally, there are no significant hazards to life present.

TERMINOLOGY

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EXTERIOR

FOUNDATION

Northbridge Elementary School has two sections: the 1952 original school, and the addition built in 1983. The foundations of both areas are of similar cast-in-place concrete construction with spread footings, and both sections are rubbed and parged with an architectural finish. Both sections are, overall, in similar, fair condition, with some cracking at louver penetrations, and considerable staining of the concrete surface.

The concrete foundation extends considerable above grade to the height of the window sills. This section of wall is likely not insulated or is under-insulated, and offers inadequate thermal resistance insulation value.

Specific Issues	*Recommendations*
On the ’83 wing, there is a recurring crack pattern at unit vent grille openings, at the upper corners of the opening. The cracks allow moisture to enter the wall thickness, where freeze-thaw cycles cause the moisture to deteriorate the concrete further, spalling the face and exposing deeper layers of concrete to moisture penetration. Evidence of past repair attempts are visible on the largest and deepest cracks. There are similar cracks on the ’52 building, however they are much less severe. (Figures 1, 2, 3)	Undertake a concrete restoration program at all unit vent louvers where cracking exists. Remove all loose and unstable concrete material, and install new concrete repair mortar or patching cement. Consider applying an elastomeric coating or water repellant sealer to all exposed concrete to prevent further damage due to exposure to the elements.
The concrete parging has become significantly dirty due to years of accumulated weathering and grime. At some locations, mildew, mold, or lichens growth is apparent. (Figures 4, 5)	Either as part of the concrete repairs, or as a separate project, clean the concrete surface with a masonry cleaning product. Consider including application of an elastomeric coating or a water repellent sealer..

Figure 1—Cracking at unit vent grille

Figure 2—Cracking at unit vent grille

Figure 3—Cracking at unit vent grille

Figure 4-Discolored and dirty foundation wall

Figure 5—Discolored and dirty foundation wall

WALLS

The building exterior walls are clad in a combination of brick veneer, with an area of natural stone which appears to be installed as veneer, all of which is generally in good condition. Mortar joints are also generally in good condition, with a few areas of minor deterioration. Brick is laid up in a Flemish Stretcher Bond pattern on both buildings.

Based on original drawings of the building, the wall assembly appears to be brick veneer cavity wall construction most likely consisting of brick veneer, 1/2" air space, 1 1/2" insulation and concrete masonry unit (CMU) back up, which is exposed and painted for the interior wall finish. There are no weeps in the brick at the top of the concrete foundation or at lintels at heads of openings, suggesting that the brick is monolithic with the CMU back up wall; the Flemish bond pattern is likely used to "bond" the brick veneer directly to the CMU backup wall, using the turned brick to span the air space and bond into the CMU layer. If constructed as a cavity condition, there does not appear to be any provisions to manage or drain any moisture that manages to enter the cavity.

Specific Issues	*Recommendations*
There are a few cracked bricks, most notably a section at the NW corner of the 1983 wing where brick are displaced from the corner. Directly above that location, there is a vertical crack at the building corner, possibly indicative of stress due to temperature expansion of the large field of west-facing brick with no relief joints (Figures 6, 7)	Remove and repair damaged brick; tooth-in areas of repair. Repoint or repair crack above displaced brick. Assume 30 SF.
The concrete at the sill of several windows is cracked, which will allow water to penetrate and cause further spalling and breakup of the concrete if left untreated (Figure 8)	Remove loose and spalling material and seal with elastomeric concrete crack repair product or sealant. Consider cleaning and coating all concrete at the foundation with an elastomeric coating..
Some mortar joints are deteriorated, which may allow water to enter the wall and cause further damage. (Figure 9)	Undertake a building-wide masonry repointing program to identify and repoint all deteriorated joints. Assume XX SF.
The "garage" attached to the original building is in poor condition. The base of the painted exposed CMU block walls are showing signs deterioration due to exposure to moisture. The gutter at the front edge of the roof does not include a downspout; and discharges collected water to the pavement at the corner with the worst deterioration. (Figure 10)	Repaint the CMU with an elastomeric paint. Install a downspout to control the gutter discharge to grade and direct the water away so as to limit splashing. Alternatively, remove the existing garage in its entirety and replace with new construction with brick veneer to match the adjacent school building.
The soffit above the overhead door is rotted and is missing a section adjacent to the original building, suggesting a leak at the roof or roof edge. (Figures 10, 11)	Inspect the roof and gutter mounting detail to verify if any leaks are present, and make repairs as necessary.

Figure 6—Cracked and displaced brick NW corner

Figure 7– Cracked and displaced brick NW corner

Figure 8—Crack at precast concrete window sill

Figure 9– Degrading mortar joints typical

Figure 10—Garage attached to '52 building

Figure 11—Rotted soffit at garage

WALLS (CONTINUED)

Specific Issues	*Recommendations*
The modular classrooms are in fair to poor condition. There are a few areas where the T-111 wall paneling has rotted, exposing the inner wall to the elements. There are also areas where large sections of trim board have fallen off or are hanging from the walls (Figures 12, 13, 14).	Remove entire section of T-111 siding board that is rotten and replace with new siding; paint to match existing. Reinstall loose trim, and replace missing, sealing all joints between trim and siding with a durable exterior caulking..
The downspout at the corner of the modular building stops a foot or more above grade, allowing effluent to splash on the stone below and deteriorate the siding at the skirting. (Figure 12)	Replace the downspout to extend it to grade, with a neck angled to direct water away from the skirting.
The caulking at a control joint in the 1983 building is drying out and losing its elasticity, and losing its bond to the brick. This will potentially allow water to penetrate the wall system. (Figure 15).	Remove old caulking and completely clean out the joint. Install new caulking with a bond breaker or backer rod within the joint.

Figure 12—Rot at exterior wall of modular classrooms

Figure 13– Rot at exterior wall of modular classrooms

Figure 14—Trim board fallen of side of modulars

Figure 15—Dried out expansion joint caulking

Windows and Curtain Wall

The windows in the 1952 building are the original wood sashes with single-pane glazing, and are very inefficient thermally. The wood windows are substantially deteriorated, with glazing compound loose or missing at glass, and peeling or missing paint on the sashes and framing. Aluminum storm windows have been installed over most of the original wood windows, which is evidence of unsatisfactory performance of the windows.

The windows and curtainwall framing systems in the 1983 addition are aluminum construction with insulated glazing, and are in fair to good condition. Framing is likely not thermally broken, so the thermal performance of these windows is likely not consistent with current energy codes and expectations. Screens at the aluminum windows are in deteriorated condition at multiple locations, with loose or missing splines and sagging loose screen fabric.

Specific Issues	*Recommendations*
Given the era they were installed, aluminum window and curtainwall framing is likely not very energy efficient, and glazing likely does not perform very well to prevent heat gain. (Figure 16, 17, 18, 19))	Replace all aluminum window and curtainwall systems with new thermally broken, high-performance window and curtainwall systems with insulated Low-E glazing.
External screens at aluminum windows are deteriorated with loose screen fabric and splining. (Figure 20)	If not replaced with new windows, perform maintenance on screens by installing new fabric and splines.
Wood windows at the 1952 building are in poor condition, with significant deterioration of glazing compound caulking. Wood sashes and framing in poor condition with peeling or missing paint and rot in some places. The general condition is causing significant air leakage and creating significant heat loss in winter months. (Figure 21).	Replace all wood window with new thermally broken, high-performance window and curtainwall systems with insulated Low-E glazing.
Interior sills and trim at the wood windows in the 1952 building have deteriorating finishes; trim in general needs refinishing or replacement.	With any window replacement project, include replacement of interior wood sills and casing trim with new clear finish oak trim to match or approximate existing.
Significant staining is evident on the face of brick below some windows, suggesting that the caulking at the window or at joints in the precast sill is deteriorating, and water is washing the chemicals in the sealant down the wall. (Figure 20)	Undertake a building-wide maintenance program for all exterior caulking; replace all sealants that have been in place for 5 or more years, or which show failure.

Figure 16—Non Low-E coated window glazing

Figure 17—Non thermally broken windows

Figure 18—Non thermally broken windows

Figure 19—Loose screening and splines

Figure 20—Failing sealant stains on brick

Figure 21—Deteriorating wood windows '52 bldg.

Exterior Doors

The exterior door openings consist mostly of painted hollow metal doors and frames. It is unclear if these doors are insulated. Some doors include glass transom panels, which do not appear to be insulating glass. There is one aluminum entrance door on the '52 original building; it's unclear when this door was upgraded. There is one wooden overhead door installed on a garage addition on the 1952 building.

The majority of the hollow metal doors and frames are in fair to poor condition, with failing paint finishes that have become chalky, and corrosion along the bottom edges of most doors.. Vision panels in these doors is wired glass, which is a significant safety concern .

The aluminum entry door is in fair condition, however the lower half of the glazing has been replaced with an opaque aluminum panel, which appears to be retrofit. Hardware on this door is not well-matched to the door.

The wood overhead door is in poor condition, with damage to the face of the door, and peeling or non-existent paint along the bottom edge at grade. The wood at the bottom of the door is showing deterioration from exposure to moisture and the elements. The operation of this door was not verified during the site visit.

Specific Issues	*Recommendations*
The exterior aluminum storefront door is in fair condition, however it is not thermally efficient and appears to have required maintenance. The framing and glazing do not appear to be very thermally efficient. The door is missing portions of the bottom sweep and weather stripping (Figures 22, 23).	Replace this door and frame with a new, thermally broken door and frame, with insulating safety glass in transom and vision panels
The hollow metal doors are generally in fair to poor condition with failing paint finish and corrosion along the bottom edges. It is unclear if the doors are insulated. Some doors are missing weather stripping. Vision panels include wired glass, which is a significant danger in cases of glass breakage, and is not allowed under present building code: The wire decreases the performance of the glass, increasing the likelihood of breakage; once broken the wire represents a significant cutting or finger amputation risk. The vision panels do not comply with accessibility codes. (Figures 24, 25).	Replace all exterior hollow metal doors and frames with new thermally broken frames and insulated door panels, with insulating safety glass in transom and vision panels..
The wood overhead door is in poor condition, with damage to the finish and peeling paint. The bottom of the door has no paint finish left on it and is being damaged and weathered by exposure to the elements. The door hardware is in poor condition. (Figure 26).	Replace overhead door with new steel or aluminum door assembly with corrosion resistant construction and finish.

Figure 22—Storefront door at '52 building

Figure 23—Storefront door at '52 building

Figure 24—Exterior hollow metal doors

Figure 25—Exterior hollow metal doors

Figure 26—Wood overhead door

Louvers and Other Openings

Louvers on this building consist of two general types: horizontal blade intake/exhaust louvers, and vertical blade louvers in frames at unit ventilators. Louvers at the original building have been field painted, while those at the newer addition appear to be factory finished.

Louvers are generally in fair condition, with those near grade (serving unit ventilators) exhibiting some damage to vertical blades. Vertical blade louvers tend to not perform as well as horizontal blade louvers at preventing water infiltration.

Specific Issues	*Recommendations*
Some of the vertical blade louvers at grade for unit ventilators have bent or broken fins. Some fins are actually disconnected at the bottom and are hanging free. Vertical blade louvers do not perform well at preventing moisture from entering the building. (Figure 27).	Replace vertical blade louvers with prefinished horizontal blade louvers that are resistant to wind-driven rain..
The paint on the louvers at the ’52 building is visibly deteriorated, and the substrate metal is showing through the paint at some locations. (Figure 28).	Replace vertical blade louvers with prefinished horizontal blade louvers that are resistant to wind-driven rain. Alternatively, scrape and repaint existing louvers with a durable exterior grade paint.
Various louvers have degraded and cracking caulk around the perimeter of the louver frame and staining on the face of the brick below. (Figure 29).	Undertake a building-wide maintenance program for all exterior caulking; replace all sealants that have been in place for 5 or more years, or which show failure.
Glass block above the storefront entrance door is showing signs of sealant failure at the perimeter. While the block appears to be in good condition, glass block performs very poorly thermally. (Figure 30)	Replace glass block with a new high performance thermally broken window system with insulated glazing.

Figure 27—Damage at '83 addition.

Figure 28—Degraded paint on louvers @ '52 building

Figure 29—Degraded caulking around louver typical

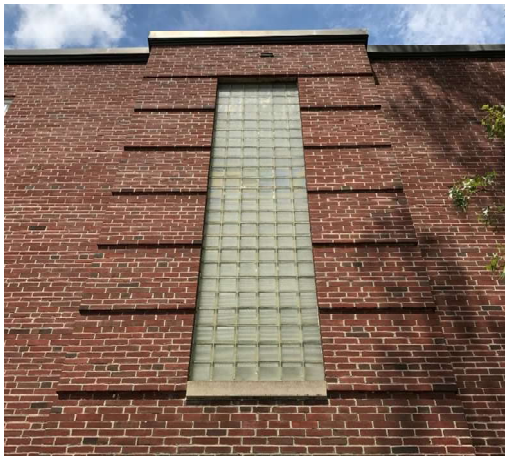

Figure 30—Glass Block Fenestration

Roof

The roofing systems vary between the original building and the 1983 addition. The roof at the original building is a gray membrane system (likely PVC or TPO) that is heavily worn (to the point of exposing the fiber reinforcing within the membrane), and has required multiple patches. The roof drains reasonably well, and no significant ponding was observed. Continuous walk pads have been installed to all rooftop fans and equipment.

The roofing on the '1983 portion is a white PVC Sarnafil membrane, which also exhibits some patches. The maintenance manager reports that there are typically limited leaks that he is able to track down and repair, but their frequency has accelerated somewhat in recent years. The winter of 2015 saw great snowfalls, and reportedly volunteers who were removing snow from the roof may have caused punctures of the membrane during shoveling. Patches of these holes are evident.

The thickness of existing roof insulation could not be confirmed from the existing drawings or at the time of the visit. It's likely that the thickness of insulation throughout both buildings does not provide sufficient insulation value that would be consistent with current energy conservation goals and standards, or the current energy code.

Both roofs appear to be at or beyond their serviceable life spans. If original to the 1983 wing, the PVC membrane roofing there will almost certainly be beyond warranty.

Specific Issues	*Recommendations*
The roof at the 1952 roof is beyond its serviceable life, heavily worn to the point of exposing inner layers of the membrane, and patched in multiple locations. (Figures 31, 32).	Replace this roof with a new roofing system, with new insulation board meeting or exceeding Stretch Energy Code requirements and meeting the intent of the Town's Green Community initiatives. A recommended R value for insulation is R-50.
The roof of the 1983 addition features multiple areas of poor drainage and ponding, and several areas of "soft insulation" under the membrane. This could be indicative of insulation board being damaged by leaks. Water damage compromises the insulating value of insulation. There are several insulation fasteners poking through or nearly penetrating the membrane from below. (Figure 33, 35)	Replace this roof with a new roofing system, with new insulation board meeting or exceeding Stretch Energy Code requirements and meeting the intent of the Town's Green Community initiatives. A recommended R value for insulation is R-50. At the time of the replacement, verify the integrity of underlying roof decking, which appears to be wood fiber or gypsum based. Increase slope of tapered insulation to 1/4" per foot or more to resolve ponding issues. With reroofing, replace existing skylight units with energy efficient high performance units.
The flashing where the 1983 roof meets higher walls appears to be at the end of its serviceable life. Joints do not appear to be tight, and the flashing does not appear to be consistently tight to the vertical wall. Limited areas of flashing are damaged. (Figure 34).	At the time of roof replacement, consider installation of new through-wall flashing at the high walls, to extend to the face of the CMU backup wall. Include removal of brick in sections, shoring of the brick above, and reinstallation of brick after placement of the new flashing .
On the link that attaches the two buildings there is evidence of poor drainage on the roof this is apparent from the abundance of staining on the surface of the roof membrane (Figure 36).	See comments above regarding replacement of the roofing at the 1983 addition. If total replacement of the roofing is only considered long term, consider reroofing this section and increasing the taper of the insulation to resolve ponding.

Figure 31– Visible scrim layer on '52 building roof

Figure 32– Patches on '52 building roof

Figure 33– Areas of minor ponding on '83 roof

Figure 34– Undulating flashing on '83 addition roof

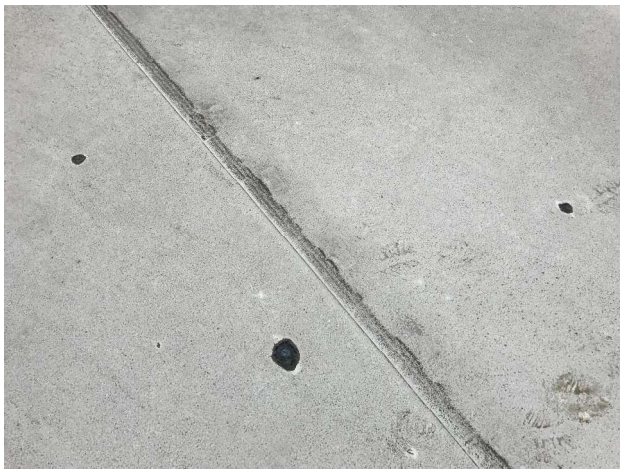

Figure 35– '83 roof fasteners torn through membrane

Figure 36– Poor drainage at link to '52 building

INTERIOR

FLOORING

The flooring material in the building is predominantly 12x12 vinyl composition tile (VCT), which is generally in fair to good condition, however at high traffic areas the tile is noticeably worn. There are some isolated areas of cracking and chipping. Joints in tile at slab on grade suggest there could be some issue with moisture vapor under the tile. Deteriorated and worn finishes and components in the building do not promote a sense of well-being for occupants, and can invite a general lack of respect for the building and its functions.

The tile and mastic in many areas of the 1983 building are known to contain asbestos—refer to the Hazardous Materials Survey portion of this report.

The gymnasium floor is painted concrete, which is chipping in some areas. Concrete is not a desirable athletic floor surface as it offers no resilience and can contribute to sports injuries, especially in children.

The gang bathrooms feature mosaic tile with tile cove base. The floor tile is of dated appearance and exhibits scars from relocated toilet partitions, areas of broken or missing tile, and multiple patches with tile of a different color. We could not determine if floors with drains provided positive slope.

The stage in the Cafetorium features a wood floor, which is in fair condition, however the finish is showing its age. Due to stored materials on the stage at the time of the site visit, we could not provide a thorough evaluation of the entire floor area.

In the mechanical, storage, and janitorial spaces the concrete slab on grade appears to be sound, however numerous areas of patching, filler, and considerable staining is evident. While issues are mainly aesthetic, application of a concrete topping could help prolong the service life of the concrete.

The sealed concrete floors in storage and janitorial spaces are in poor condition.

Specific Issues	*Recommendations*
Vinyl composition tile (VCT) is stained, worn, and chipped at high traffic areas. Many types and colors of floor tile are used throughout the building. VCT at many areas of the 1983 building is known to contain asbestos. (Figures 37, 38, 39).	Replace worn areas of VCT in high traffic areas such as entrance lobbies and corridors with new resilient flooring, abating any asbestos-containing flooring; especially broken and chipped tile. A low maintenance product such as sheet linoleum is recommended. Prior to covering slab, determine slab humidity and moisture emissivity levels. Remediate any moisture vapor drive issues by applying a moisture remediation topping compound to the slab prior to installation of the sports floor. Consider replacement of flooring building-wide in order to abate all asbestos-containing flooring.
The gymnasium floor is painted concrete which is badly worn. Concrete does not provide resiliency suitable for athletic type activities. (Figures 40, 41).	Install a sheet or poured resilient athletic sports floor system. Prior to covering slab, determine slab humidity and moisture emissivity levels. Remediate any moisture vapor drive issues by applying a moisture remediation topping compound to the slab prior to installation of the sports floor.

Figure 37—Delaminated & damaged VCT

Figure 38—Stained & delaminated tile at '83 bldg.

Figure 39—Worn down VCT tile at door '83 bldg.

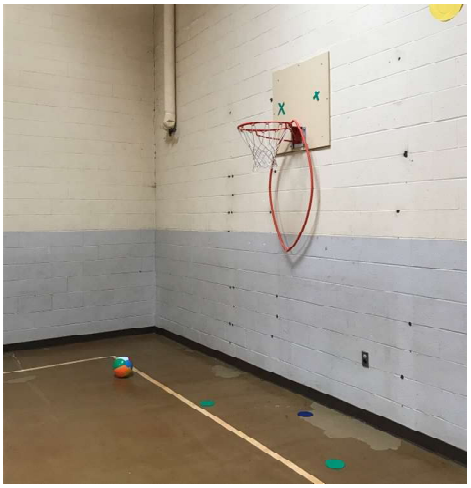

Figure 40—Worn down paint on Gymnasium floor

Figure 41—Worn down paint on Gymnasium floor

INTERIOR

FLOORING (CONTINUED)

Specific Issues	*Recommendations*
Mosaic floor tile in bathrooms in the original building is of very dated appearance, and all floors exhibit evidence of patching with tile of different color. Scars are visible where toilet partitions have been relocated. Tile base is frequently damaged, misaligned, or an inconsistent type. Grout joints are soiled and stained. Generally this contributes to an appearance that the toilet rooms are old and in disrepair. (Figures 42, 43)	Replace all ceramic tile flooring and base in the original building. At the 1983 addition, replacement of tile in rooms with patched or damaged tile. Consider updating the tile in all toilet rooms with a consistent appearance. In rooms with floor drains, if flooring replacement is warranted, install new flooring sloped to provide positive drainage to the floor drains.
In most of the areas that have sealed or painted concrete floors the surface coating has worn off in areas, exposing the concrete to increased moisture absorption, tracking of snow melt salt and chemicals by feet, and other staining. Some floors show moderate cracks and evidence of previous patching. (Figures 44, 45)	Repair and fill significant cracks in floors with an appropriate crack remediating grout or sealant. Apply new sealer or floor coating, bead-blasting the surface of the floor to remove existing applied coatings. Test slabs for humidity and moisture vapor emissivity and if warranted, include a moisture vapor reducing coating to limit vapor drive.
The stage floor is structurally performing well, however the finish is in poor condition with scuffs, gouges, and remnants of old tape or paint lines on the floor. (Figures 46, 47).	Strip and refinish the wood flooring and steps to the stage. Note that some alterations of the stage front will be required to provide either a ramp or a vertical wheel chair lift to access the stage. Refer to the Accessibility portion of Regulatory Assessment for discussion.
Wall base in most areas is resilient base or wood. There are multiple locations of missing base in both buildings. Wood base in the original building is in poor condition with staining from years of floor cleaning, splattered paint, and surface damage.. (Figure 47)	Replace missing sections of base. As part of any major flooring replacement, consider replacing all damaged base throughout both buildings.

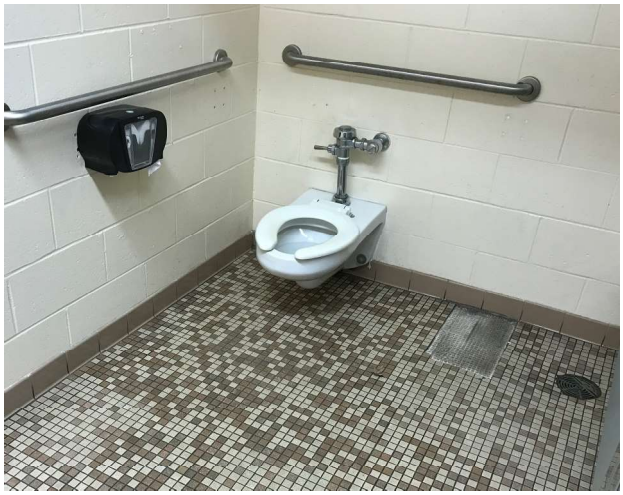

Figure 42— Area of missing mosaic tile

Figure 43—Large area of mismatched tile

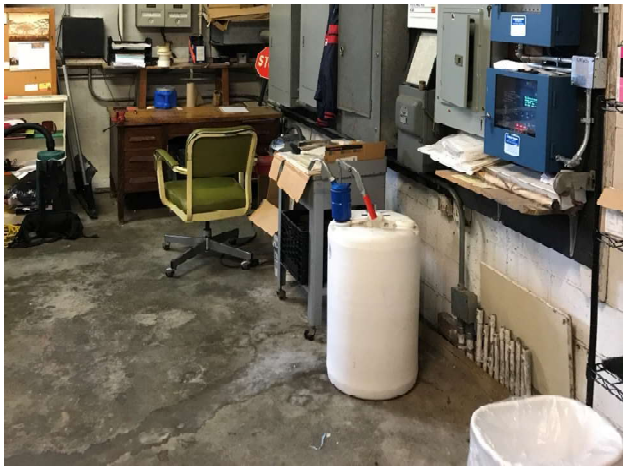

Figure 44—Concrete floor sealer worn

Figure 45—Sealed concrete floor worn away typical

Figure 46—scuffed and gouged stage floor

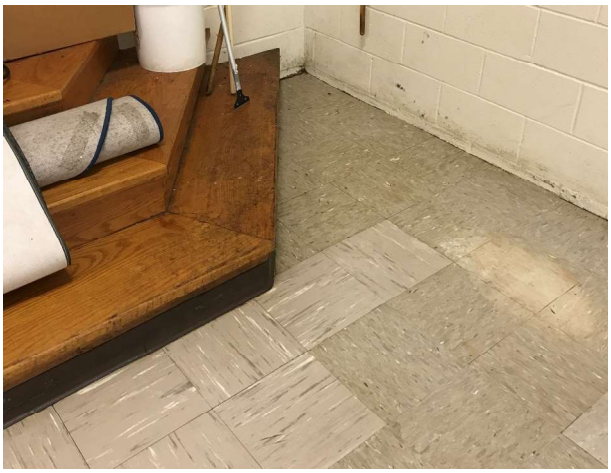

Figure 47—Various floor and base issues

Walls and Partitions

The interior walls at the 1952 building appear to be lath and plaster, which is consistent with the age of the building. These walls are in fair to good condition, but require repainting in several places. The walls in the 1983 addition are all concrete masonry unit (CMU) construction. Isolated cracking of CMU is evident especially in the gym, and this appears to be minor settlement cracking—refer to the structural section of this report for more discussion. Similar to the 1952 wing, most walls in the 1983 wing are in need of repainting.

Specific Issues	*Recommendations*
There are several superficial cracks in the CMU walls at various locations throughout the school; with multiple cracks at the gym. Most of the cracks follow the mortar joints vertically up the height of the wall, and some cracks traverse the face of some CMU blocks. (Figures 48, 49, 50).	Repair cracks with grout or sealant as part of building-wide painting program. Monitor cracks on a periodic basis to determine if cracks are worsening.
Paint finishes at walls throughout the building are in soiled and generally in need of refreshing. There are several areas where paint is peeling from the walls, apparently from lack of proper adhesion to the substrate (previously painted surface). (Figures 51, 52, 53).	Repaint walls throughout the building, removing all loose paint that is not properly adhered to the substrate.

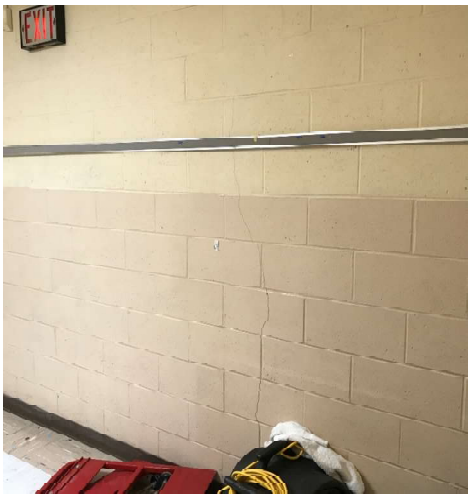

Figure 48—Crack in corridor of '83 addition

Figure 49—Crack in Gymnasium wall

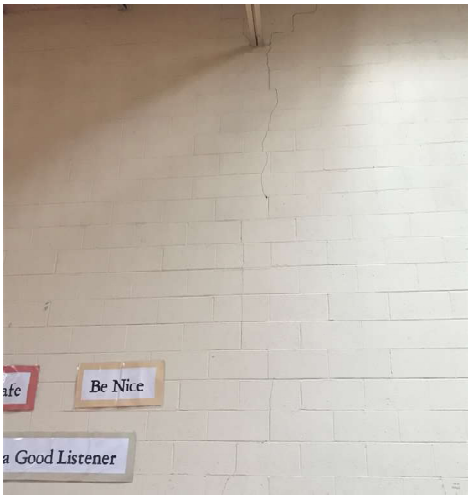

Figure 50—Crack in Gymnasium wall

Figure 51—Paint pealing of plaster and lath wall

Figure 52—Paint peeling at plaster and lath wall

Figure 53—Paint pealing of plaster and lath wall

CEILINGS

The ceilings in the 1952 building are predominantly plaster, with 2' x4' acoustic ceiling panels (ACP) systems at some spaces on the lowest level. The ceilings in the 1983 addition are 2' x 4' ACP systems. The gymnasium and stage area feature exposed painted metal deck.

The plaster ceilings in the 1952 building are generally in good condition, however at isolated areas there is significant damage from leaks.

ACP ceilings throughout the school are generally in poor condition, with stains, general soiling, and visible sag of the panels, which is due to the age of the panels and the effects of humidity over a long period of time. . The exposed roof deck in the gymnasium is in good condition.

Specific Issues	*Recommendations*
There are areas of significant water damage to the plaster in the original 1952 building. The paint is blistering, and plaster is partly dislodged and missing in sections. Adjacent wall surfaces also exhibit water damage. (Figures 53, 54, 55)	Verify that the sources of leaks are resolved. Remove all loose and damaged plaster and lath. Patch underlying materials and plaster or install new gypsum wall board patches with veneer plaster to match appearance of adjacent ceiling. Repaint ceilings in their entirety (and adjacent damaged walls) to provide a consistent "like new" appearance.
ACP ceiling panels are stained, soiled, and visibly sagging within the support framing throughout the school. In some locations, edges of tiles are not supported by the framing system, or are not laying flat in the grids. Grids are showing signs of corrosion in many locations. Ceilings have generally surpassed their expected life spans. (Figure 56, 57, 58).	Verify the sources of all leaks are resolved. Replace all acoustic panel ceiling systems in the building. Humidity-resistant ceiling panels are recommended. Utilize grid types that are compatible with existing light fixtures.

Figure 54 —Flaking ceiling paint & water damage

Figure 55—Flaking ceiling paint & water damage

Figure 56—Water damaged ceiling 1st floor.

Figure 57—Sagging & stained ceiling panels.

Figure 58—Stained ceiling panels in Cafetorium

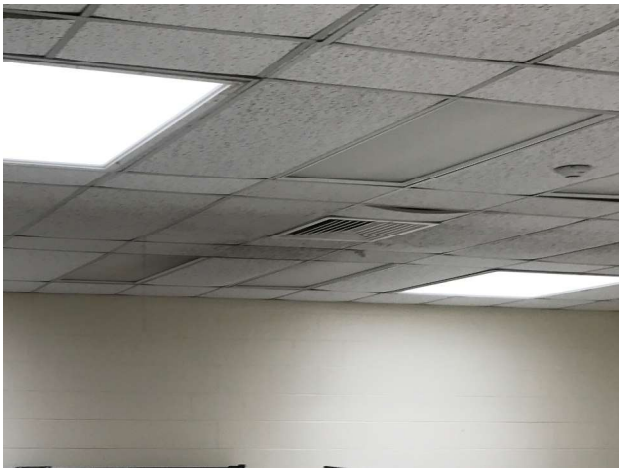

Figure 59—Soiled ceiling panels at return grilles

Interior Doors

Interior doors vary between the 1952 and 1983 wings. Doors in the 1952 original building are generally steel or hollow metal at the corridors and stairs, and solid core wood at other locations. Doors in the 1983 wing are generally flush wood at public spaces and classrooms, and hollow metal doors at service and mechanical spaces. Wood doors are typically natural stain finish. Frames for all doors are typically painted hollow metal.

Although corridor and stair doors in the building appear to be substantial and self-closing, no labels were visible that would indicate these are fire rated as required by current code.

Vision panels and sidelight glazing generally include wired glass. Wired glass has been shown to represent a significant life safety hazard, as the presence of the wire within the glazing has been shown to reduce the fire and impact performance of the glass, and to represent a significant cutting hazard if located in pedestrian impact areas when the glass is broken.

Wood doors are generally in good condition. Hollow metal doors are in fair to poor condition. Hollow metal frames at doors and borrowed lites and corridor doors are in fair to good condition, however most locations need repainting.

Refer to the Regulatory Assessment section for additional discussion of code and accessibility related issues.

Specific Issues	*Recommendations*
The wood doors throughout the building are in fair to good condition, however finishes are often scratched or chipped, and door faces that don't feature mop plates have stains at the floor level from floor cleaning procedures. (Figures 60, 61).	Replace visibly damaged doors. With any significant renovations, include replacement of doors and frames where fire ratings are required. See Regulatory Assessment for code discussions.
Hollow metal doors—especially those at the 1952 wing—are approaching or at the end of their service life. Some doors show visible damage and warping of the door face. Doors in the 1952 wing are of antiquated appearance. Fire rating labels could not be found on any doors. (Figure 62)	Replace visibly damaged doors. With any significant renovations, include replacement of doors and frames where fire ratings are required. See Regulatory Assessment for code discussions.
Vision panels and sidelights commonly include wired glass. Wired glass has been shown by the Consumer Products Safety Commission to represent a significant safety concern and is no longer permitted for use in pedestrian impact zones (such as vision panels and sidelights). Wired glass reduces the strength and fire performance of the glass, and if the glass is broken represents a significant cutting or finger amputation danger.. (Figure 63)	Regardless of any planned renovations, consider replacement of all vision panels and glazing in the building with tempered or laminated safety glass. Provide fire rated safety glazing in vision panels and glazed openings at corridors and stairs.
Metal frames at doors and borrowed lights often feature chipped or soiled paint finish. (Figures 61, 62).	Glazing needs to be replaced in the borrowed lite systems to tempered glazing.

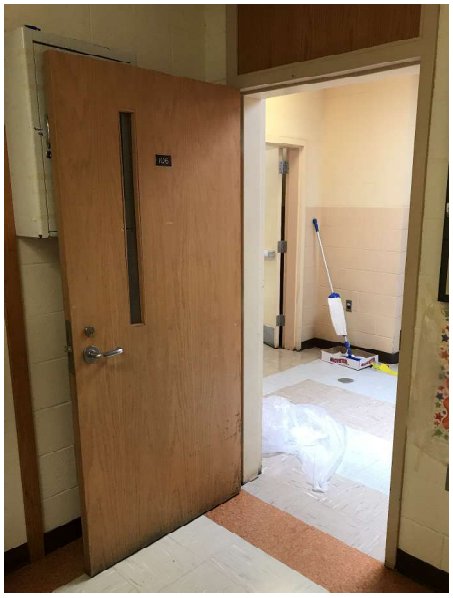

Figure 60—Typical natural finish wood door

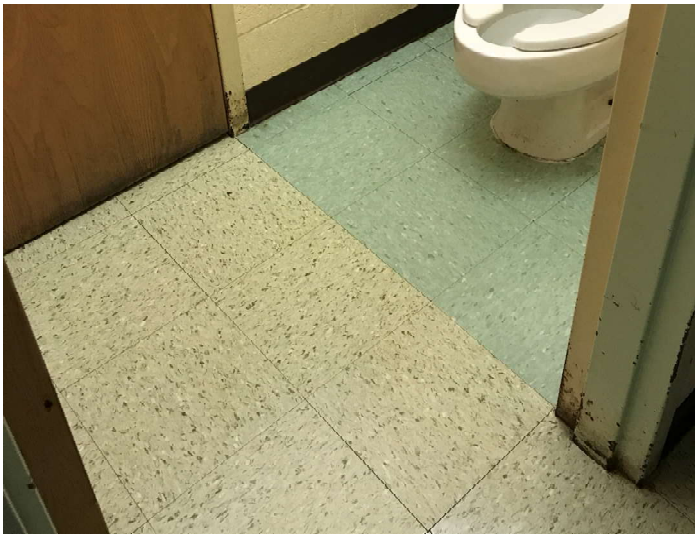

Figure 61—Soiled bottom edge of door and frame

Figure 62—Damaged face of HM door

Figure 63—Wired glass vision panel

Fixtures and Equipment

Storage in classrooms and in the building appears to be inadequate. In classrooms the tops of cabinets and shelving have been used for high-stacked storage, which can represent a hazard, however it appeared that most classrooms were in the midst of deep cleaning, so it was unclear if the storage in classrooms was "typical" for the school year.. Other rooms used for storage don't appear to be utilized efficiently. A "makeshift" partition was constructed some time ago to create general supply storage in a toilet room.

Obsolete fixtures such as board-mounted coat hooks are located in corridors; at some locations are not usable.

Classroom casework is a variety of types and quality, a mix of metal and wood, and is in varied condition given the varying age of the casework items. Original components are approaching the end of their service life and have damaged finishes.

Classrooms in the original building feature obsolete chalk boards throughout the rooms, which are no longer utilized. Marker and smart boards have been installed on top of these at many locations.

Specific Issues	*Recommendations*
Storage in the building appears to be inadequate for current needs. Classroom storage is piled high and densely on shelving; existing storage accommodations may not be efficient for current needs. (Figures 64, 65)	Undertake a storage needs study for classrooms, to identify the types of storage needed for typical classrooms. Replace storage casework in classrooms with modern storage cabinets that better meet classroom needs.
Classroom casework is nearing or at the end of its useful life. In many places, laminates are chipped or delaminating from substrate, countertop edges are delaminating, some drawer glides no longer operate smoothly. Sink cabinets do not meet accessibility requirements. (Figure 66)	. Undertake a casework replacement program to provide a consistent approach and appearance school-wide.
Classroom wall surfaces commonly feature chalk boards that are no longer used and create inefficient surfaces that are not compatible with modern teaching methods. The area of marker board surfaces is limited, and the current boards are mounted too high for smaller children to use effectively, which is limited by the existing chalk board trim (Figure 67).	Remove existing chalk and cork boards and related trim from walls; provide new marker and tack boards following repair of scars at wall surfaces. Assume two new 8' marker boards and two new 6' tack boards per classroom. Mount marker boards in grades PK thru3 at 24" AFF to bottom of board.
The 1983 lobby and some classroom wall surfaces in the 1952 building include cork tack boards and paper display within 5 feet of door openings. 527 CMR 10.09 prohibits the display of paper within 5 feet of exit doors.	Undertake a building-wide assessment and education program for faculty to verify that display of paper materials on walls meets the requirement of 527 CMR 10.09. With any classroom renovations, remove cork tack boards adjacent to door openings.
There do not appear to be a sufficient number of fire extinguishers in the 1952 building for the floor area of the building. Fire extinguishers do not appear to be mounted at the correct height per code. Extinguishers are bracket mounted in public areas, which could invite tampering or accidental damage (Figure 68).	Undertake a code analysis of fire extinguisher sizes and quantities building wide to confirm that sufficient extinguishers are provided. Verify all are mounted at code-compliant mounting height for size. Consider providing cabinet enclosures for extinguishers in high-traffic public spaces.

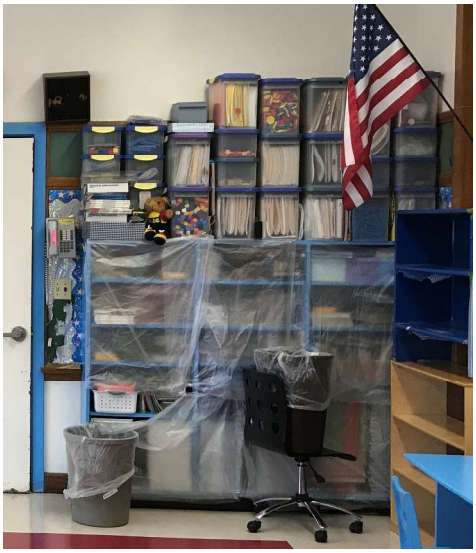

Figure 64—High piled classroom storage

Figure 65—High Piled Storage

Figure 66—Classroom casework sink base

Figure 67—Inefficient use of teaching walls

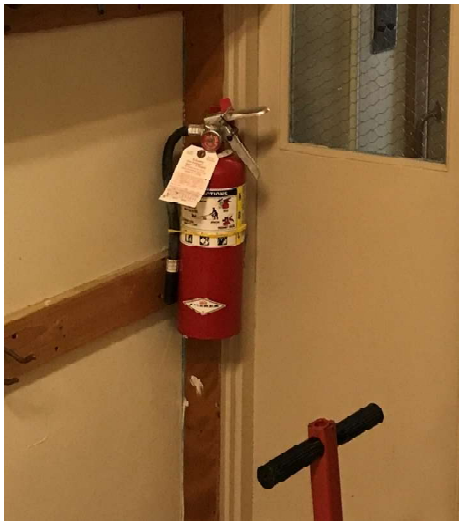

Figure 68—Fire Extinguisher

Fixtures and Equipment (Continued)

Specific Issues	*Recommendations*
Toilet partitions appear to have been replaced in the recent past, with solid plastic partitions. Not all partitions appear to be in compliance with ADA/ MAAB accessibility rules. Partitions are in good condition, however require some cleaning and maintenance. (Figure 69).	Perform maintenance on all toilet partitions; perform cleaning of surfaces, and replace missing and damaged components such as shoes, wall anchors, etc., to keep partitions in peak operating condition. Refer to Accessibility portion of Regulatory Compliance section of this report.
In the Gymnasium, there is no wall padding present It appears at one time there was padding on the walls at one time because the mounting hardware and Velcro tape are still visible on the walls, but the padding has been removed. (Figure 70)	Provide new wall padding from 4" above floor to approximately 6 feet above floor at each wall of the gymnasium to increase the safety of all users.
In the corridors of the second and third floor of the 1952 building there are rows of storage shelves and coat hooks. The coat hooks create a potential hazard if no coats are on them, as the sides are open and young children can easily run into them. These shelves and hooks are in poor condition. (Figure 71)	Remove old shelf and coat hook system in their entirety, and patch the walls. Install new casework "cubby" units that include enclosed coat hanging spaces.
At the Stage / Platform, portions of the performance lighting appears to have been replaced with general flood lighting bulbs. Curtains include one traveling main curtain at the proscenium, and a traveler at the back, upstage. The lighting batten is permanently attached to the roof joists making maintenance more difficult. There is no provision for projection surfaces on the stage. (Figure 72)	Replace flood lights with theatrical fixtures, or replace all stage lighting with up-to-date energy efficient theatrical fixtures with matching controls, suitable for elementary school use. Consider mounting the lighting on a batten to allow for manual lowering to facilitate aiming and maintenance of fixtures. Professionally clean and re-hang stage curtains, and adjust travelers for smooth operation. Consider providing a large-format motorized projection screen near the front of the stage.

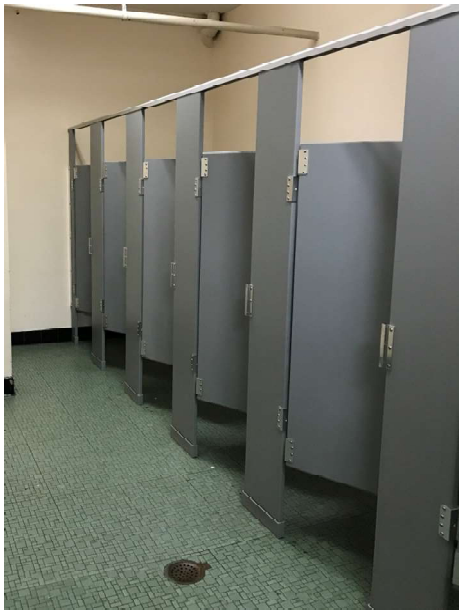

Figure 69—Toilet Partitions

Figure 70—Lack of wall pads at gymnasium

Figure 71—Shelves and coat hooks at corridor

Figure 72—Stage / Platform rigging

REGULATORY OVERVIEW FOR MASSACHUSETTS

Applicable Regulations

Buildings undergoing repairs, alterations, additions, changes in use, or relocation will be permitted under the 9th edition of the Massachusetts State Building Code (780 CMR).The base code for the 9th Edition is comprised of the following 2015 International Code Council family of codes with Massachusetts amendments:

- International Building Code (IBC)
- International Energy Conservation Code (IECC)
- International Existing Building Code(IEBC)
- International Mechanical Code (IMC)

Additional building regulations, included by reference in the base code or enforceable under Massachusetts General Law include:

- Massachusetts Fire Code (527CMR)
- Massachusetts Elevator Code (524 CMR)
- Massachusetts Plumbing Code (248 CMR)
- Massachusetts Electrical Code (NFPA 70 – NEC)

Accessibility regulations applicable to the project are the Massachusetts Architectural Access Board Rules (MAAB) (521 CMR), and the 2010 Americans with Disabilities Act Architectural Guidelines. Where these two regulations are in conflict, the regulation that provides the greater accessibility should be provided.

Finally, in addition to the sprinkler protection requirement found in the building codes, certain Massachusetts General Laws (M.G.L.s) require sprinkler protection in certain types of new and existing non-residential buildings over 7,500 gross square feet.

Scoping Requirements and Thresholds for Compliance

Of the regulations described above, three of them require special consideration since they contain specific thresholds for full compliance with the regulation. These threshold-defining regulations are:

- The International Existing Building Code (IEBC)
- 521 CMR , or the Architectural Access Board (MAAB)
- M.G.L. c.148 s.26G, or the Automatic Sprinkler System Requirements

Compliance thresholds are based on either the area or cost of proposed work in comparison to the existing building area or building value and are defined in greater detail under each specific regulation description below. Generally, when the proposed scope of work does not exceed a defined threshold, only the work being performed is required to comply with the current edition of the codes. The Americans with Disabilities Act (ADA) also contains requirements for incorporating improvements to an accessible path to Primary Function areas where alterations to that area are undertaken.

International Existing Building Code (IEBC)

When considering changes to an existing building, the principal guiding regulation is the International Existing Building Code (IEBC), which is enforced by the local building official. The IEBC requires that any proposed work on an existing building or portion thereof first undergo an evaluation to determine the effect of the proposed work on at least the following systems: structural, means of egress, fire protection, energy conservation, lighting, hazardous materials, accessibility, and ventilation for the space under consideration. Because no specific scope of work is being proposed as part of an existing conditions survey, this report includes a Regulatory Assessment for each building under consideration in order to determine to what degree the existing building[s] and systems comply with current regulations. It should be understood that non-compliance with current regulations does not compel corrective action. Only when a scope of work is defined can the Existing Building Code be applied to determine the applicable requirements.

Following completion of an evaluation for a proposed scope of work, a *compliance path* needs to be selected for the application of building code requirements. Owners must choose either the Prescriptive, Work Area, or Performance Compliance path and apply only the provisions of the chosen compliance path to the project.

The *Prescriptive Compliance Path* provides a broad-brush approach to existing buildings. While it may be beneficial for small renovation projects, for significant renovations it could result in requiring additional work that may not be necessary under the other compliance paths, and will not be employed for this assessment.

The *Performance Compliance Path* uses a calculation based methodology to determine the general level of life safety of a building. This path assigns numeric values to various life safety features of a building to arrive at an overall building "score". Different building types require different scores to determine compliance or non-compliance with this path. This numeric value approach can be useful to evaluate the general life safety performance of an existing building as compared to current building regulations; because of this the Performance Compliance Path will be used to evaluate the general life safety condition of the existing facilities. Again, it should be noted that a non-compliant score does not compel corrective action – this methodology will be used to convey only how the existing building compares to current regulations.

The *Work Area Compliance* path typically offers the most advantageous approach to defining the code requirements for each portion of a building undergoing a significant renovation scope of work because it most closely correlates the required upgrades to building systems and components to that specific defined scope of work; for this reason, the Work Area compliance path will be the assumed compliance path for sake of any proposed work on the facilities, should they be pursued.

Work Area Compliance relies on identifying the type of work that is occurring throughout the building, and then applying the requirements for that type of work to the *Work Area*. The *Work Area*, as defined by the IEBC is:

> *That portion or portions of a building consisting of all reconfigured spaces as indicated in the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed...*

Using the definitions provided in the Code, the scope of work identified for existing buildings or portions thereof is categorized as follows:

Repairs:"...include the patching or restoration or replacement of damaged materials, elements, equipment, or fixtures for the purpose of maintaining such components in good or sound conditions with respect to loads or performance requirements..."(IEBC s. 502.1) Examples of repair would be repair or replacement of damaged plaster finishes, tiled or wood floors, replacement of wood trim, replacement of door hardware, replacement of any plumbing, heating, electrical ventilating, air conditioning, refrigerating, and fire protection equipment as well as the repair of any exterior masonry or roofing system, and repair of damaged structural elements with "in kind" elements or equipment. Chapter 6 of the IEBC is applicable to all Repairs.

Level 1 Alterations: "...include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose." This classification could be described as replacement with different systems, materials, or equipment, but providing the same function. Replacing wood flooring with a tile floor system, or proving all new kitchen equipment to replace outdated equipment would be considered Level 1 Alterations. (IEBC s. 503.1). Chapter 7 of the IEBC is applicable to all Level 1 alterations.

Level 2 Alterations: "...include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment." (IEBC s. 503.1). Chapter 7 and Chapter 8 of the IEBC is applicable to all Level 2alterations.

Level 3 Alterations: "...apply where the work area exceeds 50 percent of the *building area*."

Change of Occupancy: "A change in the use of the building or a portion of the building. A change of occupancy shall include any change of occupancy classification, any change from one group to another group within an occupancy classification or any change in use within a group for a specific occupancy classification."

Additions: "An extension or increase in floor area, number of stories, or height of a building structure."

Under the work area compliance path, each of the classifications of work described above require increasing levels of compliance with the building code. Repairs have the least restrictive requirements, essentially permitting replacement-in-kind for any repaired elements. Additions require the highest level of compliance and require that the addition comply with the building code as for new construction. The other classifications require increasing compliance and, for each classification, define prescriptive requirements for specific systems and elements such as means of egress, mechanical, electrical and fire protection systems, building materials, fire resistance ratings, and structural systems.

Work Areas, including Level 2 Alterations and Additions would be required to be identified on the construction documents. Repairs and Level 1 alterations, because they do not include reconfigured spaces, are not considered part of the "Work Area" defined by the code. Although there may be substantial repairs and Level 1 alterations throughout the building, this distinction is important; when the Work Area exceeds 50% of the floor area, the provisions for Level 3 alterations become applicable.

In addition to alterations that affect the building spaces and areas, it is necessary to understand how alterations affect the building structural system and elements. Where alterations change individual gravity or lateral load resisting elements, each element requires evaluation to determine if the alteration will result in additional loads and, if so, the element must be altered or replaced. For buildings with concrete or unreinforced masonry walls, when the work area exceeds 50 percent of the floor area, than all of the structural concrete or masonry walls (both gravity and lateral load resisting walls) are required to be secured to the floor or roof deck above.

Sprinkler Protection Requirements

There are two separate regulations that govern the requirements for sprinkler protection: the IEBC and M.G.L. c.148 s.26G.

In many occupancy types including schools, IEBC requirements—enforced by the building official— would require sprinklers where the *work area* (defined previously) exceeds 50 percent of the floor area and the work area is required to be provided with sprinklers in accordance with the International Building Code, Chapter 9 (provided there is sufficient water available to supply the system).

M.G.L. c.148 s.26G, which is enforced by the fire official, requires enhanced sprinkler protection in certain buildings which total more than 7,500 gross square feet in aggregate (adding all stories) floor area. This requirement is applicable when "major" alterations or modifications are occurring to a building. Because the statue is not specific about the definition of a "major" alteration, a memo issued on October 14, 2009 by the Fire Safety Commission's Automatic Sprinkler Appeals Board provides additional guidance on this subject.

This memo indicates two factors that are used to determine whether "major" alterations are taking place: a Nature of Work factor and a Scope of Work factor.

If the **Nature of the Work** is such that the effort to install sprinklers is substantially less than if the building was intact, or is the nature of work merely minor repairs and cosmetic work, or is the Nature of the Work "major" in its scope. There is no specific definition of "major", but the memo offers examples including: the demolition of existing ceiling or installation of suspended ceilings; the removal and installation of subflooring, exposing the building framing (not merely the replacement of finished flooring); the reconstruction or repositioning of walls; and the removal or relocation of a significant portion of the buildings HVAC, plumbing, or electrical systems involving penetrations of walls, floors, or ceilings.

If the **Scope of Work** affects a substantial portion of the building, or the cost of work is moderate in comparison to the total cost of work, than the Scope of Work criteria would be applicable to a project. The Scope of Work Thresholds defined in the memo are as follows:

1. Alterations or modifications are reasonably considered major when the work affects ***33 percent or more of the total gross square footage of the building*** (all floor levels combined). Again, no specific definition of alterations or modifications is provided, but we can infer from other codes and definitions that alterations relate specifically to the reconfiguration of spaces, or the "major" Nature of Work examples above.
2. Alterations or modifications are reasonably considered major when the total cost of the work (excluding costs related to sprinkler expenditure) is equal to or greater than ***33 percent of the assessed value of the subject building.***

The memo then indicates that if the Nature and Scope of work criteria and the Scope of Work (either 1 or 2) is satisfied, than the Board would consider the alterations "major" and thus require the installation of a sprinkler system.

ACCESSIBILITY

In Massachusetts, the state developed Architectural Access Board Regulations (521 CMR) replace the accessibility provisions of the building code. Like the other sections of the building code, the accessibility regulations are enforced by the building official. However, waivers or variances to 521 CMR cannot be granted by the building official. Rather, any such appeal or variance request needs to be reviewed and accepted by the Architectural Access Board.

Chapter 3 of the Architectural Access Board Regulations outlines the scoping thresholds for the applicability of accessibility guidelines for a project. Specifically, section 3.3 describes three different dollar value thresholds for any proposed *additions to, reconstruction, remodeling*, and *alterations* or *repairs* to existing buildings as compared to the buildings “full and fair cash value”. The full and fair cash value is generally the assessed value of the building as recorded with the town assessor’s office. This section then lists the applicability requirements for each dollar value threshold:

- For work costing less than $100,000, only the work being performed is required to comply with Accessibility regulations.
- A scope of work that is more than $100,000, but less than 30% of the full and fair cash value requires the incorporation of an accessible public entrance, toilet, telephone, and drinking fountain.
- When a scope of work costing more than 30% of the full and fair cash value is proposed, the entire facility is required to be brought into compliance with the accessibility guidelines. This threshold also clarifies that additions costing more than 30% of the current building value would require the entire existing facility to be brought into compliance.

Two additional sections in Chapter 3 require special consideration. Section 3.4 requires that when a building undergoes a change from a private use to a public use, an accessible entrance must be provided, even if no work is being performed. This is significant because it is the *only compulsory requirement* found in the building or accessibility codes when no other work is proposed or anticipated.

Finally, 521 CMR section 3.9 allows for variances to the accessibility guidelines for Historic Structures listed on the State or National Register of historic places. The process of documenting and being granted variances for a broad range of accessibility requirements based on historic status is a complicated and nuanced process that requires careful coordination with the Access Board. The Board reviews the proposed variances to ensure that people with disabilities are granted dignified access to the primary function spaces of the building with as little influence on the historic fabric of the building as is feasible.

The Americans with Disabilities Act Architectural Guidelines (ADAAG 2010) is part of a federal civil rights regulation that is also applicable to work on existing buildings depending on their intended users. ADA applicability would be under Title II for any state or local government entity, program, service, or facility whereas Title III is applicable for any places of public accommodation or commercial facilities that fall into specifically defined categories. The requirements for buildings under the ADA are enforced by the US Department of Justice, and enforcement is typically through investigations or civil lawsuits resulting from complaints filed by individuals or organizations for perceived violations of the Act. These actions can be brought against a building Owner at any time, as opposed to building codes which are typically enforced when an building permit is granted for a proposed scope of work.

Title II (State and Local Governments) of the ADA requires that all services, programs, and activities provided by state and local government entities be accessible to people with disabilities. This does not require that all existing facilities be brought into compliance, but that barriers be removed in existing buildings such that all public services or programs, when viewed in their entirety, are accessible. Any proposed work on an existing building under Title II would be required to comply with ADA guidelines to the maximum extent feasible and new facilities would be required to comply completely with the guidelines. Additionally, when work is proposed that affects a primary function of an existing facility, the path of travel to that area, including the bathrooms, drinking fountain, and telephones on that path would need be made accessible as well. There are exceptions in Title II for structural impracticability, historic buildings, certain types of spaces, and disproportionality of cost for alterations to an accessible path serving a primary function area which all require close consideration for each scope of work in each building under consideration.

Title III facilities are privately owned buildings that are either defined as places of public accommodation (business open to the public and fall into one of 12 categories listed in the ADA) or as commercial facilities (non-residential facilities that are not defined as places of public accommodation). The requirements for alterations to these facilities are similar to those as for Title II facilities, including the provisions for an accessible path serving a space that is considered a primary function. The most significant difference is that Title III existing facilities are not held to the same "removal of existing barriers" standard or program and service access standards as Title II facilities. Still, any proposed work in a Title III building would be required to comply to the maximum extent feasible, taking all of the applicable exceptions into consideration.

Energy Conservation

The 2015 International Energy Conservation Code (IECC) replaces the Chapter 13 requirements of the building code. This specialized code, also enforced by the building official, is intended to regulate the design and construction of facilities with respect to the use and conservation of energy over the life of the building. Chapter 5 of the IECC controls the alteration, repair, addition, and change of occupancy of existing buildings and has no authority to require the removal, alteration, or prevent the continued use of any existing buildings. For communities that have adopted the Massachusetts STRETCH Code, increased reductions in energy consumption beyond the baseline thresholds established in the 2009 IECC would be required for new buildings and additions to existing buildings only. Alterations to existing buildings in these communities would be subject to the requirements of Chapter 5 of the 2015 IECC, described below.

Section C501.6, states that no provisions of the code relating to the repair, alteration, restoration or change of occupancy shall be mandatory for historic structures provided a report is submitted to the building official demonstrating that compliance with the provision would threaten, degrade, or destroy the historic fabric function of the building. While this is not a categorical exemption to the energy conservation code, it does place a high degree of value on the historic fabric of the building.

Proposed additions to existing structures would be required to comply with the IECC as for new construction. Alterations to existing buildings also need to comply with the IECC as for new construction and cannot make the existing building less conforming to the code than it was prior to the alteration. In general, this means that when a building envelope or mechanical system or piece of equipment is modified as part of a scope of work, the replacement elements or systems are required to comply with the IECC for new construction. There is no provision, based on the work area or dollar value of alterations, which would require an existing facility to be brought into full compliance with the energy code.

Certain specific scopes of work that may be limited to one portion of the building, whether considered as additions or alterations to existing facilities, are required to consider the effect on the entire facility. The addition of windows or other fenestration, including skylights, needs to incorporate all of the building fenestration areas in the total allowable fenestration area. Alternatively, a project could pursue the Total Building Performance method, requiring energy modeling, but would then need to demonstrate full compliance with the IECC as for new construction. Otherwise, alteration and addition compliance requirements are limited to the work performed.

Although not part of the energy conservation code, it is important to note that in Massachusetts, M.G.L. chapter 7C, section 29 requires that for any new construction or renovation of a public facility where the cost exceeds $25,000 and includes systems or elements that affect energy or water consumption, a life-cycle cost analysis (LCCA) would be required to be performed. This analysis is required to determine the short and long term costs and feasibility of different technologies or systems considered as part of the scope of work. These systems and components would include both energy consuming equipment as well as building envelope elements or systems, since all of these elements affect energy consumption.

Fire Safety Code

In addition to the building code (780 CMR), there is also a Massachusetts Comprehensive Fire Safety Code (527) which is enforced by the local Fire Official. The Fire Code is generally enforced as a safety maintenance code, intended to prevent or remedy any conditions that may be fire hazards and to provide safety requirements to protect the public in the event of a fire. This code also regulates the installation and maintenance of fire safety equipment such as sprinkler systems and fire detection systems.

The Fire Code does apply to both new and existing conditions, but this code states that all installations of equipment completed prior to the adoption of the code are deemed to be in compliance. However, the fire official still has the authority to require compliance with the code for any condition which constitutes an imminent danger.

For the purposes of this report, it is important to note that the Fire Code also states that any provision related to the construction, alteration, movement, enlargement, replacement, repair, equipment, use, occupancy, removal, or demolition of buildings shall effectively be regulated by the building code and is subject to the jurisdiction of the Building Official. As such, this report contains minimal references to the Fire Code and will rely on the IEBC requirements outlines above for evaluation and consideration of existing conditions and any proposed scope of work.

Historic Structures

Massachusetts General Laws require that any project that requires funding, licensing, or permitting from a state agency to be reviewed by the Massachusetts Historical Commission (MHC). This review and the regulations that guide the review are designed to identify historic properties, evaluate the impact of a proposed project, and consult with the invested parties to avoid, minimize, or mitigate any adverse effects of the project. Once a general scope of work is defined, a Project Notification Form should be filed with the MHC to determine if any historical or archeological considerations will need to be addressed as part of the project.

Beyond the State of Massachusetts regulations, the US Department of the Interior has developed a set of standards and guidelines related to the maintenance, repair, replacement of historic materials, and the design of alterations or additions to historic structures. The *Standards* are a set of concepts related to these different treatments, whereas the Guidelines offer design and technical recommendations in applying the Standards.

In order to determine which Standards and Guidelines are applicable, it is necessary to determine which treatment of a historic structure would be pursued for a given facility. A proposed scope of work outlined in a Capital Improvements Plan generally falls into work that could be classified as one of the following Treatments:

- **Preservation**: the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time.
- **Rehabilitation**: recognizing the need to alter or add to a historic property to meet continuing or changing uses while retaining the properties historic character.

In working to develop a defined scope of work as well as a sustainable capital improvement plan for the future, the Standards for Preservation and Rehabilitation as well as the Guidelines for the Treatment of Historic Properties will serve as guiding documents in the development of such plans. Compliance with the Guidelines is not obligatory, but will provide the best practice approach to both maintaining the building and allowing for alterations to serve the intended end use. It also serves to demonstrate that the Owner values and wishes to maintain the historic integrity of a building, reinforcing the appropriate application of any historic structure exceptions to accessibility and building code regulations.

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INTRODUCTION

This Regulatory Assessment will seek to convey to what degree the Northbridge Elementary School, in its current condition, complies with current building codes and regulations. The Assessment does not attempt to define a scope of work, but rather highlight specific non-complying conditions and identify which conditions would require correction if a repair, alteration, addition, or change of use were to be proposed for the facility.

It is important to note that a building or a portion of a building does not require correction simply because it does not comply with current codes; any building that is legally occupied and adequately maintained can remain so without bringing the building into full compliance with codes and regulations. This *principal of non-conforming rights* (that a newly adopted regulation cannot impose the undue burden of compliance on legally existing occupancies) is reflected in how the codes identify to what degree existing buildings must be brought into compliance when a scope of work is proposed. The greater the scope of work, the greater the burden of compliance with a given code or regulation will be required.

For some regulations, such as 521 CMR Accessibility Rules or the Massachusetts special sprinkler provisions of MGL c.148 s.26G, these compliance thresholds are “hard lines” comprised of specific dollar value thresholds. When determining the dollar value thresholds for compliance, the cash value of the building is used as the basis for the determining the requirements for compliance. The full and fair cash value of the *building*, as determined from the Town Assessor's online database is calculated as follows:

Total Assessment (Land + Improvements)	$4,500,100
Land	-$ 267,300
Detached Improvements	-$ 396,900
Building Only—Full and Fair Cash Value	**$3,835,900**

This value will be used later in this Assessment to calculate the applicable compliance thresholds.

The gross floor area (GFA) of the building is 50,688 SF.

The Existing Building Code uses the type of work and the affected area to determine when increasing levels of compliance are required. When considering a proposed scope of work for the building, a careful consideration of the various degrees of compliance will need to be considered. Refer to the Regulatory Overview section of this report for a more detailed description of the various compliance paths outlined in the Existing Building Code.

The International Existing Building Code (IEBC)

The Performance Compliance path described in the IEBC provides a simple yet comprehensive overview of the general life safety aspects of a building. Although designed as a building code compliance path, it can also be used as an assessment tool. This assessment will utilize the value and scoring based method of the Performance Compliance path to assign a score to the building as it is currently configured and maintained. The systems and basis for scoring are based on the building code for new construction (the International Building Code or IBC) and scores are determined by the degree of compliance with the IBC for various systems. Similar to previous comments, a failing score in any category as part of an assessment does not compel any corrective action - it simply indicates how the building would be viewed under current codes. It is intended to illustrated the relative general and life safety performance of the existing building.

The original 1952 building features loadbearing masonry interior and exterior walls, with limited steel framing, and combustible roof decking. None of the structure is protected with fireproofing. This portion of the building is best described as Type III-B per the code. The 1983 addition similarly includes load-bearing masonry, steel roof framing, and is generally non-combustible construction. None of the structure is protected with fireproofing. This is best described as Type II-B per the code. The modular classrooms are a combination of steel and wood frame construction with no fireproofing; this is best described as Type V-B construction. Given these varying construction types, it is not appropriate to apply the worst condition to all three areas. This assessment considers each area separately, and applies a weighted average to the building as a whole.

The resulting scores for Northbridge Elementary (Refer to Table 1401.9 on the following pages) are typical of buildings of that time period. The modular classroom units generally performed slightly better than the remainder of the building due to the relative building size, even though they're a lesser construction type.

The overall configuration of the means of egress systems and components (doors, corridors, stairs) is generally in compliance with the code. The most significant improvement that would increase the general life-safety of the building would be to provide fire sprinkler protection throughout the building.

Sprinkler Protection Requirements

The building is not equipped with fully automatic sprinkler systems in compliance with M.G.L. c.148 s.26G. All public schools larger than 7500 Gross Square Feet (GSF) would require a sprinkler system to be installed throughout the facility if any major alterations or any additions are planned. In Massachusetts, a building's fire area includes all portions of the building enclosed by the exterior walls regardless of interior sub-division with fire walls or fire barriers. This is important to understand because the sub-division of a building into separate fire areas (with fire walls and fire barriers, for example) would not be considered a strategy to avoid inclusion of fire sprinklers in Massachusetts.

In consideration of any future alterations or additions to the building: to be considered a "major alteration" the scope of work would have to meet both the "nature of work" and "scope of work" criteria.

For the scope of work criterion, the Division of Fire Services provides two separate thresholds - if the project exceeds one of these thresholds, then the project is considered "major" in scope. For Northbridge Elementary School, if the work area exceeds 16,727 square feet (33% of the total building area of 50,688 square feet) ***or*** if the cost of work exceeds $1,265,847 (33% of the value of the building, calculated previously), the project *scope* would be considered "major". These thresholds should be

Table 1401.7 Summary Sheet - Building code - *1952 ORIGINAL CONSTRUCTION*

Existing Occupancy	E	Proposed Occupancy	E		
Year building was constructed	1952	Number of Stories	3	Height in feet	32' - 6"
Type of construction	IIIB	Construction Type Factor (IEBC)	3.5		
Percentage of open perimeter increase	80%	Area per floor	5,810 / 5,810 / 5,810		
Completely Supressed	No	Corridor wall rating	0 hour		
		Type	N/A		
Compartmentation	No	Required door closers	Yes		
Fire resistance rating of vertical opening enclosures	No				
Type of HVAC system	Unit vents	, serving number of floors	3		
Automatic fire detection	Yes	Type and location			
Fire alarm system	Yes	Type	Mircomm 10000		
Smoke control	No	Type			
Adequate exit routes	Yes	Dead ends	Yes	Length in feet	39
Maximum exit access travel distance	85 feet	Elevatory controls	No		
Means of egress lighting	Yes	Mixed Occupancies	No		
Standpipes	No	Patient abilty for self preservation	N/A		
Incidental use	Yes	patient concentration	N/A		
Smoke compartment less than 22,500 sq. ft.	No	Attendant-to-patient ratio	N/A		

Safety Parameters	Fire Safety (FS)	Means of Egress (ME)	General Safety (GS)
1401.6.1 Building Height	-1	-1	-1
1401.6.2 Building Area	13	13	13
1401.6.3 Compartmentation	0	0	0
1401.6.4 Tenant and Dwelling Unit Separations	0	0	0
1401.6.5 Corridor Walls	-5	-5	-5
1401.6.6 Vertical Openings	-21	-21	-21
1401.6.7 HVAC Systems	-5	-5	-5
1401.6.8 Automatic Fire Detection	-4	-4	-4
1401.6.9 Fire Alarm System	-5	-5	-5
1401.6.10 Smoke Control	****	0	0
1401.6.11 Means of Egress	****	2	2
1401.6.12 Dead Ends	****	-2	-2
1401.6.13 Maximum Exit Access Travel Distance	****	11	11
1401.6.14 Elevator Control	-4	-4	-4
1401.6.15 Means of Egress Emergency Lighting	****	****	0
1401.6.16 Mixed Occupancies	0	0	0
1401.6.17 Automatic Sprinklers	-12	-6	-12
1401.6.18 Standpipes	0	0	0
1401.6.19 Incidental Use	0	0	0
1401.6.20 Smoke Compartmentation	0	0	0
1401.6.21.1 Patient Ability for Self-preservation	****	0	0
1401.6.21.2 Patient Concentration	****	0	0
1401.6.21.3 Attendant-to-patient Ratio	****	0	0
Building Score - total value	-44	-27	-33

kept in mind as one considers any future alterations to this building.

The "nature of work" criterion is less specific, but essentially if any work is being done that would not make the installation of sprinklers substantially more difficult, it would be considered “major” in nature. Examples include the demolition of ceilings, walls, or floor decking exposing the structural framing.

International Energy Conservation Code

The Town of Northbridge has adopted the Massachusetts STRETCH Energy Code. As such, any alterations to the energy consuming systems or building envelope would be required to comply with the International Energy Conservation Code (IECC), 2015 Edition. The IECC requires that any alteration, renovations, or repairs to an existing building conform to the provisions of the code, but does not require that unaltered portions to comply. Essentially this means that any system or portion of a system that is altered would be designed in compliance with the energy code, but there is no provision

Table 1401.7 Summary Sheet - Building code - *1983 Addition*

Existing Occupancy	E	Proposed Occupancy	E		
Year building was constructed	1983	Number of Stories	1	Height in feet	21'-10"
Type of construction	IIB	Construction Type Factor (IEBC)	3.5		
Percentage of open perimeter increase	75%	Area per floor	31,089		
Completely Supressed	NO	Corridor wall rating	0 hours (doors have closers)		
		Type	CMU		
Compartmentation	No	Required door closers	Yes		
Fire resistance rating of vertical opening enclosures	No vertical openings				
Type of HVAC system	Unit vent	, serving number of floors	1		
Automatic fire detection	Yes	Type and location			
Fire alarm system	Yes	Type	Mircomm 10000		
Smoke control	No	Type			
Adequate exit routes	Yes	Dead ends	No	Length in feet	
Maximum exit access travel distance	130 feet	Elevatory controls	No		
Means of egress lighting	Yes	Mixed Occupancies	No		
Standpipes	No	Patient abilty for self preservation	N/A		
Incidental use	Yes	patient concentration	N/A		
Smoke compartment less than 22,500 sq. ft.	No	Attendant-to-patient ratic	N/A		

Safety Parameters	Fire Safety (FS)	Means of Egress (ME)	General Safety (GS)
1401.6.1 Building Height	1	1	1
1401.6.2 Building Area	-9	-9	-9
1401.6.3 Compartmentation	0	0	0
1401.6.4 Tenant and Dwelling Unit Separations	0	0	0
1401.6.5 Corridor Walls	-5	-5	-5
1401.6.6 Vertical Openings	2	2	2
1401.6.7 HVAC Systems	-5	-5	-5
1401.6.8 Automatic Fire Detection	-4	-4	-4
1401.6.9 Fire Alarm System	-5	-5	-5
1401.6.10 Smoke Control	****	0	0
1401.6.11 Means of Egress	****	10	10
1401.6.12 Dead Ends	****	2	2
1401.6.13 Maximum Exit Access Travel Distance	****	7	7
1401.6.14 Elevator Control	0	0	0
1401.6.15 Means of Egress Emergency Lighting	****	****	0
1401.6.16 Mixed Occupancies	0	0	0
1401.6.17 Automatic Sprinklers	-12	-6	-12
1401.6.18 Standpipes	0	0	0
1401.6.19 Incidental Use	0	0	0
1401.6.20 Smoke Compartmentation	0	0	0
1401.6.21.1 Patient Ability for Self-preservation	****	0	0
1401.6.21.2 Patient Concentration	****	0	0
1401.6.21.3 Attendant-to-patient Ratic	****	0	0
Building Score - total value	-37	-12	-18

that the entire facility be brought into full compliance. The project may incorporate additional energy performance improvements beyond those required by the code.

A Life Cycle Cost Analysis (LCCA) would be required to be conducted for any alterations to an Energy System in accordance with M.G.L. c. 149 s. 44m.

Standards for the Treatment of Historic Structures

The building and property is not listed on, nor is it eligible for listing on the National or State Registry of Historic Places.

Table 1401.7 Summary Sheet - Building code - *2000 Modular Classrooms Addition*

Existing Occupancy	E	Proposed Occupancy	E		
Year building was constructed	2000	Number of Stories	1	Height in feet	12' - 8"
Type of construction	VB	Construction Type Factor (IEBC)	7		
Percentage of open perimeter increase	75%	Area per floor	8,422		
Completely Supressed	NO	Corridor wall rating	0 hours (doors do not have closers)		
		Type	Wood studs (panel finish)		
Compartmentation	No	Required door closers	No		
Fire resistance rating of vertical opening enclosures	No vertical openings				
Type of HVAC system	Roof top air handling	, serving number of floors	1		
Automatic fire detection	No	Type and location			
Fire alarm system	Yes	Type	Mircomm 10000		
Smoke control	No	Type			
Adequate exit routes	Yes	Dead ends	No	Length in feet	
Maximum exit access travel distance	94'-0" feet	Elevatory controls	No		
Means of egress lighting	Yes	Mixed Occupancies	No		
Standpipes	No	Patient abilty for self preservation	N/A		
Incidental use	Yes	patient concentration	N/A		
Smoke compartment less than 22,500 sq. ft.	No	Attendant-to-patient ratio	N/A		

Safety Parameters	Fire Safety (FS)	Means of Egress (ME)	General Safety (GS)
1401.6.1 Building Height	0	0	0
1401.6.2 Building Area	4	4	4
1401.6.3 Compartmentation	0	0	0
1401.6.4 Tenant and Dwelling Unit Separations	0	0	0
1401.6.5 Corridor Walls	-5	-5	-5
1401.6.6 Vertical Openings	2	2	2
1401.6.7 HVAC Systems	5	5	5
1401.6.8 Automatic Fire Detection	-4	-4	-4
1401.6.9 Fire Alarm System	-5	-5	-5
1401.6.10 Smoke Control	****	0	0
1401.6.11 Means of Egress	****	10	10
1401.6.12 Dead Ends	****	2	2
1401.6.13 Maximum Exit Access Travel Distance	****	10	10
1401.6.14 Elevator Control	0	0	0
1401.6.15 Means of Egress Emergency Lighting	****	****	0
1401.6.16 Mixed Occupancies	0	0	0
1401.6.17 Automatic Sprinklers	-12	-6	-12
1401.6.18 Standpipes	0	0	0
1401.6.19 Incidental Use	0	0	0
1401.6.20 Smoke Compartmentation	0	0	0
1401.6.21.1 Patient Ability for Self-preservation	****	0	0
1401.6.21.2 Patient Concentration	****	0	0
1401.6.21.3 Attendant-to-patient Ratio	****	0	0
Building Score - total value	-15	13	7

Table 1401.9 Final Evaluation Formula

1952 Original Construction Evaluation:							
					Score	Pass	Fail
-44 (FS)	-	*29*	(MFS)	=	-73		X
-27 (MS)	-	*40*	(MMS)	=	-67		X
-33 (GS)	-	*40*	(MGS)	=	-73		X
1983 Addition Evaluation:							
					Score	Pass	Fail
-37 (FS)	-	*29*	(MFS)	=	-66		X
-12 (MS)	-	*40*	(MMS)	=	-52		X
-18 (GS)	-	*40*	(MGS)	=	-58		X
2000 Addition Evaluation:							
					Score	Pass	Fail
-15 (FS)	-	*29*	(MFS)	=	-44		X
13 (MS)	-	*40*	(MMS)	=	-27		X
7 (GS)	-	*40*	(MGS)	=	-33		X
Area Weighted Average Evaluation:							
					Score	Pass	Fail
-34 (FS)	-	*29*	(MFS)	=	-63		X
-9 (MS)	-	*40*	(MMS)	=	-49		X
-15 (GS)	-	*40*	(MGS)	=	-55		X

ACCESSIBILITY

The original portion of Northbridge Elementary School has remained relatively untouched since the original construction in 1952, prior to the adoption of the ADA and the MAAB rules. The building, including the addition in 1983 and the modular classroom addition in 2000, is generally in poor compliance with the accessibility requirements of 521 CMR—The Massachusetts Architectural Access Board or MAAB Rules, or the 2010 Americans with Disabilities Act standards. Any proposed alterations or additions will likely require alterations to the existing building to increase accessibility.

If the cost of any proposed work exceeds $100,000, the code requires that an accessible entrance, toilet room, drinking fountain, and telephone (if drinking fountains and telephones are provided) be provided, in addition to the compliance requirements of the proposed work. When the cost of work exceeds 30% of the full and fair cash value (calculated previously), then the entire facility will be required to comply with the MAAB Rules. For Northbridge Elementary School, this 30% threshold value would be $1,150,770.

Because the building is a public school, owned and operated by the local municipality, it is considered a Title II facility under the Americans with Disabilities Act (ADA). As such, any proposed work to the facility would be required to comply to the maximum extent feasible with the ADA Architectural Guidelines (the ADAAG) except where it would be structurally impractical. The ADA does not have a threshold for requiring full facility compliance, but does require that when there are alterations to an area of "primary function" (including classrooms, gymnasium, cafeteria, and administration areas), than the path of travel as well as the restrooms, telephones, and drinking fountains serving the areas of primary function are also accessible.

Several accessibility deficiencies or non-compliant conditions were noted at Northbridge. If a major alteration exceeding the 30% threshold were undertaken, these items would require correction to comply with MAAB.

Specific Issues	*Recommendations*
There is no accessible route provided from the vehicular drop-off zone to the main entrance; there are no curb ramps to allow wheel chair access to the main doors. (Figures 1, 2).	A curb cut ramp should be created at the main drop off loop in front of the main entry doors.
There are 36 parking spaces on the property, 21 of which serve the school building. There are no handicapped designated parking spaces serving the school, and there is no accessible route from the parking area to a building entrance.	Restripe the parking lot to create a van accessible parking space with required signage to comply with ADA. Provide a concrete walkway from the parking lot to connect to the sidewalk at the drop-off area.
The main entrance includes three pairs of doors, each with 36” wide leaves. A call button/ intercom is provided at accessible height, however no motorized operators are provided on any exterior door (Figure 3). All secondary entrance doors also have two 36” wide leaves (Figure 4). Concrete walks are in good condition.	Provide a motorized operator on one of the doors at the main entry to guarantee that the door will comply with opening force requirements.

Figure 1—Non-accessible entrance no curb cut ramp

Figure 2—Non-accessible entrance no curb cut ramp

Figure 3—Main entry doors

Figure 4—Typical non-accessible side door

Figure 5—Playground surface and equipment issues

ACCESSIBILITY (CONTINUED)

Specific Issues	*Recommendations*
There is a playground in between the school and the district offices. The play surface under the equipment is wood chips, which does not comply with MAAB accessible path requirements, (Figure 5, previous page).	Refer to Site Assessment section of this report for discussion of replacing playground surfacing.
Nearly all of the required egress doors feature a frost pad with a step down to grade. All doors intended to be used as entrances should be accessible from the exterior. A percentage of doors are required to provide an accessible means of egress from the building to a public way. (Figure 6).	Adjust grading of sidewalks and adjacent landscaped areas leading up to exterior frost pads at doors to provide an accessible path. Ideally, slopes should be maintained at less than 1:20. See Site Assessment section for additional discussion
There is no elevator to provide access to the second and third floor of the original classroom wing. There are no other means to reach the upper levels except stairs.	Install an elevator in a hoistway constructed exterior to the existing building to provide access to the second floor classroom wing.
The vestibule for the connector corridor at the modular classrooms has ample room 27'-0" +/- there is also one classroom door entering / exiting into this vestibule. This configuration is acceptable per current IBC code requirements (Figure 7).	None.
There is no accessible path from the Cafetorium floor to the stage platform. The only way to access the stage is by the stairs at the front of the stage or the stairway accessed from outside the Cafetorium space. (Figure 8, 9,10).	Install an enclosed vertical wheelchair lift to access the platform stage.

Figure 6—Exit stair discharge door with step

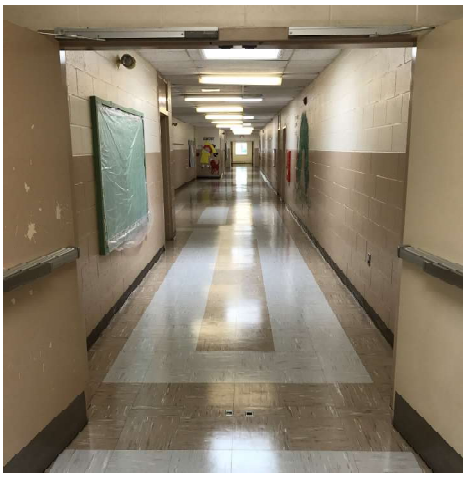

Figure 7—Vestibule entry for modular connector

Figure 8—Stair at side of stage / platform

Figure 8—Stair at side of stage / platform

Figure 9—Stairs at the front of cafetorium stage

ACCESSIBILITY (CONTINUED)

Specific Issues	*Recommendations*
Single-user toilet rooms are not in compliance with current regulations, and in most if not all cases lack the needed floor clearances for the fixtures and door. Grab bars are not provided at the toilets. Sinks are located too close to toilets. Accessory mounting heights and locations are not in compliance with code. (Figure 10).	Demolish inaccessible toilet rooms entirety including doors, frames, and walls. Construct new toilet rooms meeting current MAAB and ADA requirements.
The boy's gang toilet rooms feature floor mounted urinals, which are not compliant with current rules. Sinks in the boy's toilet room appear to lack proper floor clearance due to location of the urinal on the perpendicular wall. Sinks generally do not include insulation on the supply and drain piping in the knee-space. There are no paper towel dispensers within reach of the sinks. There is no compliant toilet stall; grab bars were added to a standard-size stall as an attempt at compliance. The gang bathrooms are not in compliance with current MAAB regulations (Figure 11).	Reconfigure toilet rooms to provide accessible toilet stalls, possibly including reduction in total fixture count. This would include demolition and replacement of floor slabs to facilitate relocation of underground piping.
The faculty toilet rooms and the toilet in the Nurse's suite is not accessible; the configuration of walls does not provide the required floor clearance for any fixture or door openings. At the nurse's office the sink is located outside of the toilet room. (Figures 12, 13).	Demolish inaccessible toilet room in its entirety including doors, frames, and cmu walls. Provide new toilet room layout that is in compliance with current MAAB regulations.
Drinking fountains in the building are not the high/ low configuration required by ADA, and do not provide knee space for forward approach. Also in some cases there are electrical panels mounted above the drinking fountains (Figure 15).	Remove all non compliant drinking fountains and replace them with the high / low configuration that is compliant with the current MAAB regulations. Refer to Electrical Assessment for discussion of replacement and relocation of electrical panels.

Figure 10—Non accessible toilet room.

Figure 11—Non accessible gang bathroom typical

Figure 12—Non-accessible toilet in nurses suite

Figure 13—Non-accessible toilet in nurses suite

Figure 14—Typ. non accessible single user toilet room.

Figure 15—Non-accessible drinking fountains

ACCESSIBILITY (CONTINUED)

Specific Issues	*Recommendations*
None of the casework at the sinks in the classrooms is accessible; there is no knee-space provided for forward approach. (Figure 16).	Refer to the Architectural assessment for discussion of replacement of casework. Provide sinks with compliant kneespace and piping insulation as appropriate to the age of the intended users..
The toilet room at a Pre-K or Kindergarten classroom is not compliant. A child size toilet is provided, however the side clearance to the adjacent wall exceeds the limit for children of this age. Side clearance to the sink is not provided. Makeshift grab bars are included, however they do not meet dimensional requirements. The toilet paper dispenser is mounted above the grab bar, and is not within reach ranges; MAAB does not permit installation of accessories above grab bars.. Piping below the sink is not insulated or guarded, and the faucets on the sink are not compliant.There was an attempt made to make it accessible by adding grab bars at the toilet. However it still does not meet MAAB current regulations. is our interpretation that the occupants in these classrooms are not covered by accessible gang facilities on the floor; if these facilities are provided for a specific use such as pre-K or Kindergarten-only, in-class use, they should be accessible. (Figure 17).	Demolish inaccessible toilet room in its entirety and provide an accessible toilet room meeting the reach ranges and dimensional requirements for the age of the intended users..
Handrails at stairs in the 1953 building do not feature required top or bottom extensions, especially at sidewall handrails. (Figure 18).	Replace handrails with types that include top and bottom extensions at walls. Provide handrails at kneewall betwee flights that are continuous around the end of the kneewall guard and between flights.
Some doors are located in narrow recesses and do not provide the required 18" pull side clearance. The doors do feature lever-type door hardware and closers in the '52 building & '83 addition (Figure 19).	Conduct a building-wide survey to identify accessible route to each space. Confirm that all doors required to be accessible comply with floor approach clearance requirements. At non-compliant doors, renovate adjacent walls to provide required clearances at each side of doors.
Some doors in the building feature round knob hardware trim, which is not compliant. Lever trim is required. (Figure 20)	Conduct a building-wide survey and replace all knob-type hardware with latch or locksets that feature lever style trim.

Figure 16—Typical non-accessible sink in classroom

Figure 17—Non-accessible classroom toilet

Figure 18—Typical egress stairwell handrails

Figure 19—C.R. door lacking pull side clearance

Figure 20 —Knob type door handles

STRUCTURAL ASSESSMENT

The purpose of this report is to describe, in broad terms, the structure of the existing building; to comment on the condition of the existing building; and on the feasibility of renovations and expansion of the school

SCOPE

- Description of existing structure
- Comments on the existing condition
- Comments on the feasibility of renovation and expansion.

BASIS OF REPORT

This report is based on our visual observations during our site visit on July 10, 2017 and our review of the available existing drawings of the Renovations and Additions prepared by J. Williams Beal Sons & Pokus Architects dated October 19, 1981. No architectural or structural drawings from this set were available to us. Drawings of the original construction were also not available to us at the time of this study.

During our site visit, we did not remove any permanent finishes or take measurements. Our understanding of the structure is limited to the available drawings and our observations of the structure.

BUILDING DESCRIPTION

The building is located on Cross Street in Northbridge, Massachusetts. The original structure is a three story structure. We were not able to identify the structure of the school; but, it is likely similar to the Balmer Elementary School structure, with steel joists supporting thin metal form deck slab at the floor and wood fiber on gypsum panels at the roof, with the joists supported on unreinforced load-bearing masonry walls. The original school was constructed in 1952.

The addition is a single story structure, built in 1983. The roof is metal deck supported on open web steel joists spanning between load bearing masonry walls.

The lowest floor level of the original structure and the addition is a concrete slab-on-grade. The foundations are traditional reinforced concrete strip footings.

The modular classrooms are single story and are constructed of light steel members and wood joists.

EXISTING CONDITIONS

Based on our observations, the school structure is functioning well based on the age of the school.

- We observed signs of past water leakage at a few locations.
- Cracks in the interior masonry walls were evident at some locations, and in the exterior masonry façade where evidence of past repairs was also observed.
- Minor spalling of concrete at the corners of the foundations was also observed.
- We did not observe any signs of foundation settlement, or any cracking of slabs due to vibrations from footfall and traffic on the supported floor slab.

PROPOSED SCHEMES

Based on our observations and analysis of the existing drawings, no structural upgrades are required for any proposed renovations of limited scope that do not invoke any required structural modifications. The extent of the code required structural upgrades is dependent on the extents of the proposed renovations. The following is a description of the compliance methods that may be triggered depending on the extents of the proposed schemes as dictated by other disciplines.

GENERAL CODE CONSIDERATIONS

If any repairs, renovations, additions or change of occupancy or use are made to the existing structure, an evaluation of the structure is required to demonstrate compliance with 780 CMR, Chapter 34 "Existing Building Code" (Massachusetts Amendments to The International Existing Building Code 2015). The intent of the IEBC and the related Massachusetts Amendments to IEBC is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The IEBC provides three compliance methods for the repair, alteration, change of use, or additions to an existing structure. The three compliance methods are as follows:

1. Prescription Compliance Method.
2. Work Area Compliance Method.
3. Performance Compliance Method.

For more information on these compliance methods, refer to the Regulatory Overview section of this report. A summary of the structural implications of the various compliance methods follows.

Prescriptive Compliance Method

In this method, compliance with Chapter 4 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of this chapter.

Alterations

- If the proposed alterations of the structures increase the demand-capacity ratio of any lateral load resisting element by more than 10 percent, the structure of the altered building or structure shall meet the requirements for the code for new construction.
- Where alterations increase the design gravity loads by more than 5 percent on any structural members, those members would have to be strengthened, supplemented, or replaced.

Additions

Additions can be designed to be structurally separate or structurally connected to the existing building. Based on the project scope, the following structural issues must be addressed: The requirements applicable to the existing structure for connected additions are similar to those for altered structures.

- All construction of all addition areas must comply with the code requirements for new construction in the IBC.
- For additions that are not structurally independent of an existing structure, the following rules apply to the existing building:
    - The existing structure and its addition - acting as a single structure - must meet the requirements of the code for new construction for resisting lateral loads. Exceptions allow

that structural elements that only resist lateral forces whose demand-capacity ratio is not increased by more than 10 percent may remain unaltered.

- Any load-bearing structural element for which the addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced. This may invoke or cause additional renovation work to access the structure.

In order to avoid invoking required structural modifications to the existing building, any planned additions should be designed as structurally separate buildings.

Work Area Compliance Method

In this method, compliance with Chapter 5 through 13 of the IEBC is required. the extent of alterations has to be classified into LEVELS OF WORK based on the scope and extent of the alterations to the existing building. Refer to the Regulatory Overview section of this report for an explanation of the Levels of Work.

This report assumes that planned renovation schemes would affect more than 50 percent of the floor area and invoke Level 3 Alteration requirements, and the following analysis is based on that assumption. In addition, there are requirements that have to be satisfied for additions to the existing structure.

Level 3 Alterations

- Any existing load-bearing structural element for which an alteration causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- If the proposed structural alterations of an existing structure exceed 30 percent of the total floor and roof areas of an existing structure, we have to demonstrate that the altered structure complies with the IBC for wind loading and with reduced IBC level seismic forces.
- Existing anchorage of all unreinforced masonry walls to the structure have to be evaluated. If the existing anchorage of the walls to the structure is deficient, the tops of the masonry walls will require new connections to the structure.
- If the proposed structural alterations of an existing structure are less than 30 percent of the total floor and roof areas of the existing structure, the project must demonstrate that the altered structure complies with the loads applicable at the time of the original construction (or the most recent major renovation) and that the seismic demand-capacity ratio is not increased by more than 10 percent on any existing structural element. Those structural elements whose seismic demand-capacity ratio is increased by more than 10 percent must be strengthened, supplemented, or replaced in order to comply with reduced IBC level seismic forces.
- Anchorage of all unreinforced masonry walls to the structure have to be evaluated.

Additions

- All additions shall comply with the requirements for the code for new construction in the IBC.
- Any existing gravity, load-carrying structural element for which an addition or its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For additions that are not structurally independent of any existing structures, the existing structure and its additions, acting as a single structure, shall meet the requirements of the code for new construction in the IBC for resisting wind loads and IBC Level Seismic Forces (may be lower than loads from the Code for New Construction in the IBC), except for small additions that would not

increase the lateral force story shear in any story by more than 10 percent cumulative. In this case, the existing lateral load resisting system can remain unaltered.

Performance Compliance Method

Following the requirements of this method for the alterations and additions may be onerous on the project because this method requires that the altered existing structure and the additions meet the requirements for the code for new construction in the IBC.

SUMMARY

The existing school structure appears to be performing well. All of the structural components that are visible appear to be in sound condition. The cracks in the interior masonry walls and the minor spalling of concrete that was observed are not a structural concern. We would recommend that these cracks in the masonry walls and spalls in the concrete foundation walls be repaired as part of the regular maintenance program.

The compliance requirements of the two Prescriptive and Work Area Compliance methods are very similar in most respects for a major renovation. The Prescriptive Compliance Method would be more restrictive, as it would likely require that the existing lateral load resisting systems of the existing building meet the requirements of the code for new construction of the IBC, even for small increases of design lateral loads. Based on this, we would recommend the Work Area Compliance Method for the project.

Any major proposed renovations and additions would likely require that the structure be updated to meet the requirements for the Code for New Construction. This may require addition of some shear walls, connecting the floor and roof diaphragms to the existing masonry walls and the clipping of non-structural walls to the structure. All of the existing masonry walls would have to be adequately connected to the roof and floor structure.

HEATING, VENTILATING, & AIR CONDITIONING (HVAC) ASSESSMENT

Executive Summary

Presently, the HVAC Systems serving the building are as follows:

- Gas-fired Heating Hot Water Boiler
- Gas-fired Steam Boiler
- Unit Ventilators with Hot Water and Steam Heating Coils
- Both General and Dedicated Exhaust Systems
- Terminal Hot Water and Steam Heating Units
- Roof and Inline Mounted Exhaust Fan Systems
- Pneumatic Control System
- Destratification Ceiling Fans

The steam heating system serves the original 1952 building and the hot water boiler serves portions of the original building as well as the 1983 addition. More recently, a modular building was added and connected to the existing school and is provided with dedicated packaged rooftop air-handling units.

In general, the HVAC systems of the original and 1983 buildings are far beyond their expected service lives and require updating. The current installations comply with code, and are adequately sized to support the existing building layout. All proposed renovation/new construction options will require the installation of new HVAC equipment dedicated to serve the new areas.

Hot Water Heating Plant

The building hot water heating plant is located in the main level boiler room in the original building and consists of two (2) gas-fired cast iron sectional boilers; one that produces heating hot water and is manufactured by "HB Smith" with 8 sections (approx. 1342 MBH Input) and one that produces steam and is manufactured by "Burnham" model V912A (2367 MBH Input). (Figure 1) The boilers appear to be provided with all code-required safety controls and the general boiler installation appears to be code compliant. The boilers were originally fed with heating oil but have since been converted to natural gas.

Base-mounted oil pumps are abandoned in the space and communicate to an abandoned underground oil storage tank. Assuming this fuel oil system is original to the building, the underground tank should be removed and inspected to avoid/determine any potential pollution concerns.

Heating hot water is circulated throughout the building within a fiberglass- insulated combination copper and schedule 40 steel piping system. Steam and condensate are circulated throughout the original building within an insulated schedule 40 steel piping system. The steam piping system insulation appears to have been installed recently, but was not included on any of the elbows or fittings. (Figure 2) The 1982 addition is served heating hot water from two (2) base-mounted circulator pumps piped in parallel for redundancy; these pumps have 3 HP motors with wall-mounted variable frequency drives for varying the pump speeds to match the zone heating load. (Figure 3)

Flue gases from each boiler are vented to the outdoors via a common insulated breeching system that communicates with a masonry chimney for termination above the roof. The insulation on this breeching system may contain asbestos and should be tested/abated. This common vent breeching system includes a barometric damper within the boiler room to enhance the stack effect in the vertical masonry chimney.

Combustion air is provided to the boiler room via two (2) outdoor intake louvers that are each ducted to grilles located high and low within the space; this condition is in compliance with the building code and is sufficiently sized for the equipment within the room.

All components of the heating plant are antiquated and beyond their expected service life.

Specific Issues	*Recommendations*
Insulation associated with the Heating Plant breeching system may contain asbestos.	Test and abate all insulation as required for removal of toxins within the educational environment.
Abandoned fuel-oil system may be a cause for pollution concerns beneath the ground.	Remove/ test fuel-oil system as required to alleviate all pollution concerns.
Damaged and missing hot water and steam piping insulation within boiler room and likely throughout building.	Add and replace with new insulation as required for complete system coverage.

Figure 1

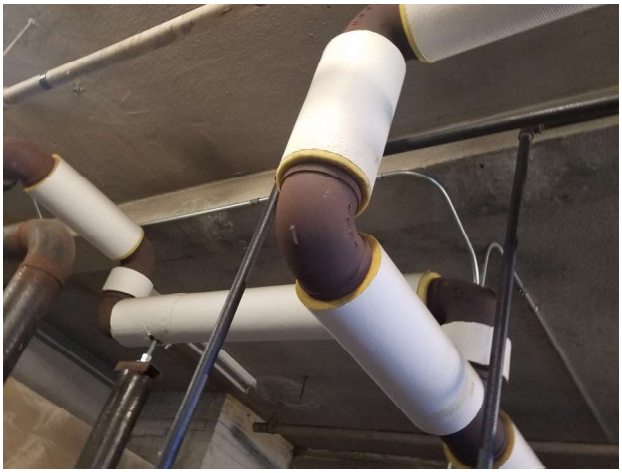

Figure 2

Figure 3

Classroom, Admin, & Media Center HVAC:

Generally, all regularly occupied spaces within the building are provided with heating and ventilation from unit ventilators within each space. Many of the unit ventilators are floor-mounted along an exterior wall with outdoor air and exhaust louvers and a hot water heating coils; the remaining units are horizontal unit ventilators with hot water heating coils that are ducted to fresh air intake hoods on the roof. All regularly occupied spaces are also tied into a general exhaust system to maintain a neutral building pressure by means of roof-mounted exhaust fans and duct distribution systems. The unit ventilators have all surpassed their expected service lives and operate at efficiencies significantly lower than that of current technologies. (Figures 4, 5, 6)

Specific Issues	*Recommendations*
Existing unit ventilator systems do not utilize demand control ventilation to limit the amount of Outdoor Air introduced based on space CO2 levels for energy conservation and current code compliance.	Replace existing unit ventilators and associated control systems with current technologies for compliance with the current building code and general energy efficiency.
No supplemental Hot water heating units are installed for maintenance of unoccupied heating space temperature set-points to avoid running the unit ventilators when unnecessary	Provide supplemental hot water heating terminal units within the space as the primary occupied and unoccupied heating source.

Gymnasium:

The Gym space is provided with two (2) horizontal unit ventilators with hot water coils ducted to roof-mounted fresh air intake hoods. These unit ventilators deliver air high in the space for heating and ventilating purposes while low-wall exhaust grilles communicate to roof-mounted exhaust fans for maintenance of a neutral building pressure. Although these systems are not provided with cooling capabilities, they appear to be adequate for heating and ventilating the space. De-stratification fans are installed at the ceiling to enhance the mixing of air within the tall space. All HVAC equipment serving the gymnasium has exceeded its anticipated service life and operates at efficiencies significantly lower than that of current technologies. (Figure 7)

Specific Issues	*Recommendations*
Existing systems do not utilize demand control ventilation to limit the amount of Outdoor Air introduced based on space CO2 levels for energy conservation and current code compliance.	Replace existing air-handling and control systems with current technologies for compliance with the current building code and general energy efficiency.
No supplemental hot water heating units are installed for maintenance of unoccupied heating space temperature set-points to avoid running the unit ventilators when unnecessary.	Provide supplemental hot water heating terminal units within the space as the primary occupied and unoccupied heating source.

Figure 4

Figure 5

Figure 6

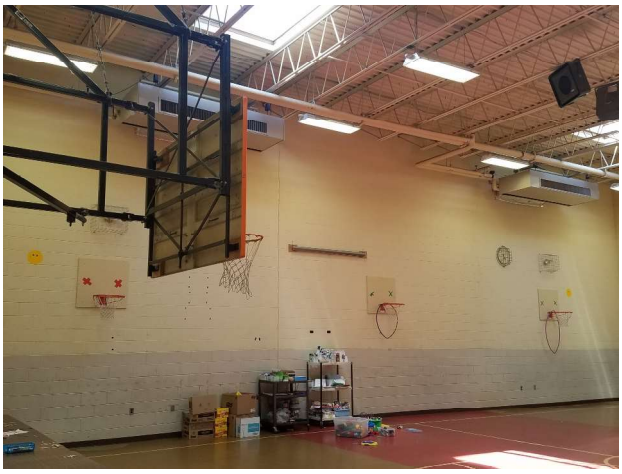

Figure 7

CAFETORIUM:

The Cafetorium space is provided with heating and ventilation from three (3) horizontal unit ventilators with hot water heating coils mounted high in the space. Roof-mounted exhaust fans provide general exhaust to the space via high space grilles above the stage and low-wall grilles in the cafetorium space for maintenance of a neutral pressure within the space. These units appear to be original to the building and have surpassed their expected service lives.

Specific Issues	*Recommendations*
Existing unit ventilator systems do not utilize demand control ventilation to limit the amount of Outdoor Air introduced based on space CO2 levels for energy conservation and current code compliance.	Replace existing unit ventilators and associated control systems with current technologies for compliance with the current building code and general energy efficiency.
No supplemental hot water heating units are installed for maintenance of unoccupied heating space temperature set-points to avoid running the unit ventilators when unnecessary.	Provide supplemental hot water heating terminal units within the space as the primary occupied and unoccupied heating source.

PUBLIC AND PRIVATE TOILET ROOMS:

All toilet rooms within the building are provided with hot water or steam terminal heating unit for space heating. All toilet rooms are also provided with general exhaust systems connected to roof-mounted exhaust fans. All systems have surpassed their expected service lives. (Figure 8)

Specific Issues	*Recommendations*
None.	None.

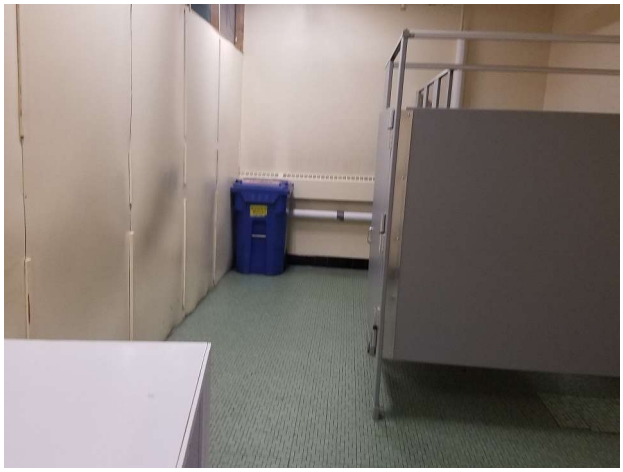

Figure 8

Corridors, Entryways, and Stairwells:

All Corridors, Entryways, and Stairwells are provided with hot water heating or steam heating terminal units such as: cabinet unit heaters, convectors, and baseboard radiators. There did not appear to be any means of ventilation within the corridors. All systems have surpassed their expected service lives. (Figures 9, 10)

Specific Issues	*Recommendations*
Code-required ventilation for Corridors is not provided.	Add a mechanical means of ventilation to the corridors.

Automatic Temperature Controls:

A pneumatic control system is utilized in the Northbridge Elementary School. An air compressor is installed in the boiler room and provides compressed air to the central control panel and individual components throughout the building. (Figure 11) Many spaces are provided with two (2) pneumatic temperature sensors; one for use during occupied building schedule periods and one for unoccupied building set-back temperatures. (Figure 12) In general, the controllability and dependability of pneumatic control systems are lacking and do not compare to current electronic communication technologies.

Specific Issues	*Recommendations*
Pneumatic Control System air leaks were noted in various spaces throughout the building and at the boiler room control panel.	Replace control system entirely with Direct Digital Control System.

Figure 9

Figure 10

Figure 11

Figure 12

ELECTRICAL ASSESSMENT

Executive Summary

Presently, the majority of the systems are original vintage and although most are functioning, they are beyond the end of their serviceable life. There are two services to the building. One that serves the main structure and a second that serves the modular classrooms that have been added.

The power distribution system is in poor condition. Most of the lighting systems have been upgraded to fluorescent, however, the lighting is not in good condition.

The fire alarm system is obsolete and in poor condition, and there is no emergency generator. Emergency lighting is accomplished with battery units.

It is our recommendation, taking into consideration the age and general condition of the existing equipment, that all electrical systems be replaced with new energy efficient, code compliant systems, including fire alarm, emergency standby power, lighting, and power distribution.

Power Distribution System

There are two services to the Northbridge Elementary School, one for the main building which is fed underground from a pole riser on a utility pole rated at 1000 amperes, 120/208 volt, 3 phase, 4 wire (Figure 1) and one that serves the modular classroom addition which is fed overhead from a utility pole rated at 400 amperes, 120/240 volt, 1 phase (Figure 2).

Receptacles in kitchen are generally not GFI protected.

Typical classrooms have minimal receptacles resulting in the use of extension cords and plug strips.

GFI protection of receptacles is not compliant.

Specific Issues	*Recommendations*
Main building switchgear is beyond its serviceable life, and in poor condition.	Upgrade service equipment and provide with transient voltage surge suppression and replace all panelboards with exception to the modular classrooms throughout the facility. Extend and reconnect existing branch circuits to new panelboards.
GFI protection is non-compliant.	Add GFI outlets/breakers for devices within 6' of a water source and protect all 15A and 20A devices in the kitchen.
Lack of receptacles.	Add receptacles for computer equipment and A/V that has been added over the years.

Emergency Stand-By System

The facility does not contain an emergency stand-by generator. Emergency lighting is accomplished using battery units with either integral heads or remote heads. (Figure 3) Existing signs are provided with integral batteries and self diagnostics. (Figure 4) The condition of the emergency lighting varies from poor to good condition. The lack of generator means there is no ability to provide freeze protection in the case of a power outage, leaving the facility vulnerable to freezing pipes and potential water damage.

Specific Issues	*Recommendations*
Battery units and exit sign condition vary and require maintenance on each unit. There is no generator at the facility.	Provide a new emergency stand-by generator and a normal/emergency distribution system that will serve emergency lighting, life safety loads, and optional stand-by loads. The existing battery units can be eliminated and maintenance will be limited to the generator and transfer equipment only.

Figure 1

Figure 2

Figure 3

Figure 4

Interior Lighting

The corridor lighting consists of 1x4 surface wraparound fixtures with (2) T8 lamps controlled with local switches. (Figure 5)

The typical classroom has three rows of pendant wraparound fixtures with (2) T8 lamps controlled by row with (3) local switches. A ceiling occupancy sensor also controls lights. (Figure 6)

The cafetorium lighting consists of recessed 2x4 acrylic troffers. The platform has incandescent track lighting. All lighting is switched controlled, with dimmer switches for the platform fixtures. (Figure 7)

The kitchen has recessed 2x4 lensed troffers with acrylic lens and (2) T8 lamps controlled with (2) local switches. The hood has incandescent globes without guard with compact fluorescent lamps.

The gym has 2x4 suspended fluorescent high bay with (3) T5HO lamps on local switches. (Figure 8)

The media center and offices have recessed 2x4 fixtures with (2) T8 lamps on local switches.

The modular classroom consists of 2x4 acrylic recessed troffers with fluorescent lamps and occupancy sensor control.

The lighting consists of utility grade fixtures added or retrofitted over the years and is generally in fair condition. However, the wiring and switches are original, with the addition of occupancy sensors in some locations.

Specific Issues	*Recommendations*
Lighting fixtures are not energy efficient.	Replace existing lighting throughout the building with LED fixtures and provide an automated lighting control system with occupancy sensors and daylight dimming sensors to reduce energy usage and comply with the latest energy code.

Figure 5

Figure 6

Figure 7

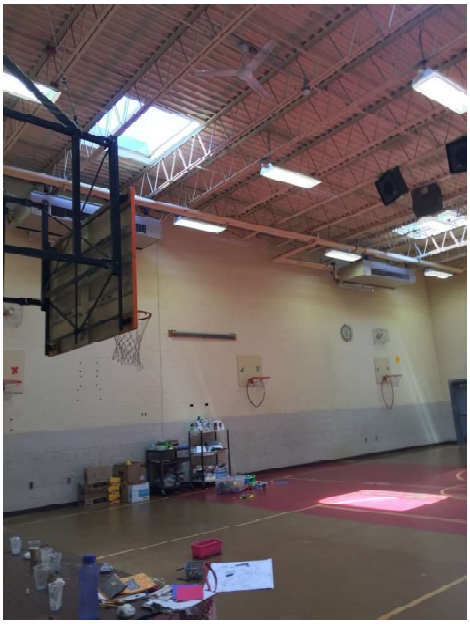

Figure 8

Exterior Lighting

HID wall packs exist on the main building (Figure 9) and fluorescent wall packs existing on the modular building (Figure 10). However, some exterior doors do not have a light fixture.

Exterior fixtures are in poor condition.

The exterior lights are controlled with time clocks.

Specific Issues	*Recommendations*
Lighting fixtures are lacking in Parking Areas.	Provide LED cut-off fixtures for roadway and parking areas.
Lighting fixtures are not energy efficient, and in poor condition.	Provide building mounted LED sconces over all exterior doors. Connect to emergency power or provide remote battery backup.

Fire Alarm System

The fire alarm system consists of a Mircomm 10000 non-addressable control panel located in the Electric Room (Figure 11). An exterior pull station and strobe is located at the main entrance. The form of alarm transmission is via a AES Intellinet radio master box with exterior antenna (Figure 12). The exterior master box with pull lever is still in place with a red beacon above.

The audible/visual signal devices consist of horns and strobes. The strobes are not ADA compliant and there were some that were not compliant with NFPA72. (Figure 13)

Detection coverage is minimal. An educational use group with no sprinklers should be provided with full coverage.

Heat detectors exist in the boiler room, media center, gym, cafetorium, platform, kitchen and toilet rooms. The building does not have a sprinkler system.

Pull stations exist at exterior exit discharge doors.

The fire alarm system, has poor coverage and it does not comply with current codes which require voice evacuation throughout the school. The system should be replaced under a renovation program.

Specific Issues	*Recommendations*
Fire alarm system is non-addressable and in poor condition. Voice evacuation is required in E-use group.	The fire alarm system should be replaced.

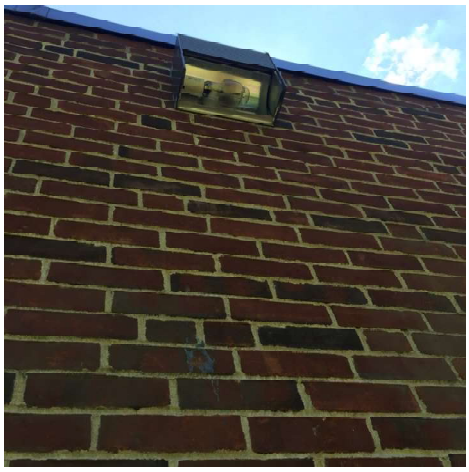

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

TECHNOLOGY AND COMMUNICATIONS ASSESSMENT

Executive Summary

The technology and communication systems within the Northbridge Elementary School reflect a similar strategy to the Balmer Elementary School. Investments in a wide area network strategically connecting all the district schools to the High School, enhancements to the wireless network, cloud based computing using Google Chromebooks, and upgraded security systems are all notable achievements. These initiatives have been correctly identified as essential elements to any and all future technology plans.

The structured cabling system throughout the building, which is the system that supports wireless, computer networks, printing, etc. is doing an adequate job of supporting these systems currently, but is in poor condition. Many of the wiring centers are located in shared storage rooms, copy centers, etc. This is typical of schools where technology has evolved within a building structure that was never originally designed to support technology. The technology infrastructures, including network cabling and the power required to support technology and communication systems, should all be upgraded.

The school's distributed communication equipment, which includes the public address and clock systems, are in fair condition, but have reached their functional end of life similar to the Balmer School.

The Use of interactive instructional technologies in the classroom are consistent with Balmer Elementary School and are based on Smart Technology Smartboards and are in fair condition, but are showing age and should be refreshed and updated.

Network switching and wide area network design are in good condition. Progress into upgrading the wireless network by adding access points and increasing the district's ISP bandwidth will produce an infrastructure that will better support additional mobile computing devices and greater Cloud based resources, both of which are excellent guiding strategies for the future.

Personal printing is being minimized with reliance on larger and more cost effective copier/printers.

Recent initiatives into "state of the art" security systems similar to Balmer Elementary School, including video surveillance, access control and intrusion detection have resulted in security systems that are in good condition and should be maintained and expanded.

Infrastructure Cabling

The Northbridge Elementary School has at least two Category 5 data cable and jacks to support two desktop computers in each classroom. Data jacks are also located in office and administrative rooms. Power is insufficient to support the technology (Figure 1). The computer lab has multiple jacks in surface mount raceway (Figure 14). Cabling is from the late 80's and early 90's, with most originated from volunteer during Netday events back in the mid 1990's . The MDF and IDF's are connected with Category 6 copper cabling. One of the IDF's is a free standing equipment cabinet in a shared utility closet. The MDF is currently a wall mount rack in a shared closet space (Figure 2). Both spaces do not have adequate power or air conditioning.

Specific Issues	*Recommendations*
Network Cabling is older and needs to be updated	Install all new data cabling with multiple drops per room to accommodate future wireless, instructional AV, and other network services. Cable should be Category 6A to future proof the school.
Lack of dedicated and secure MDF and IDF rooms for terminations and equipment.	Create new MDF and IDF's rooms that are dedicated and secure spaces, which can be equipped with adequate power and air conditioning.
Fiber optic cabling is limited or not used between IDF's and MDF	Upgrade to fiber OM4 50 micron multimode as well as single mode between IDF's and MDF, to support future bandwidth demands.

Network Switches

Currently the school district is standardized on HP Procure network switches, utilizing a 5406zl series chassis in the MDF and IDF racks. All of the current network switches are state of the art and in good working condition, but they have recently been discontinued and are no longer supported by the manufacturer.

Specific Issues	*Recommendations*
The 5400zl series chassis have reached end of life with HP as of December of 2015.	Upgrade and replace the 5400zl series with the newer 5400R series of chassis switches. Existing Switches can be redeployed elsewhere as long as they are working condition. Chassis switches should be equipped with SFP+ fiber optic modules, GbE and Gb PoE network ports and management modules. Minimum backbone optics between MDF and IDF should be based on 20GbE.

Figure 1-IDF showing insufficient power distribution for equipment

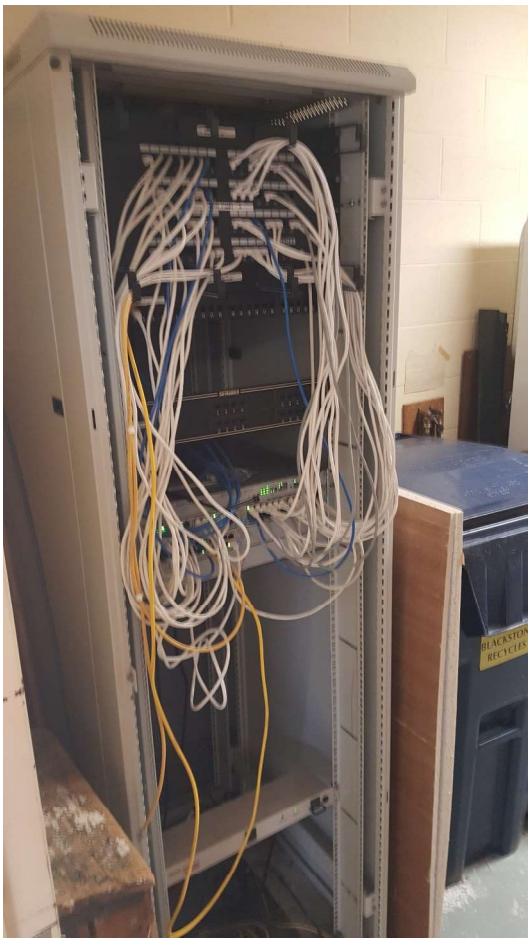

Figure 2 -MDF

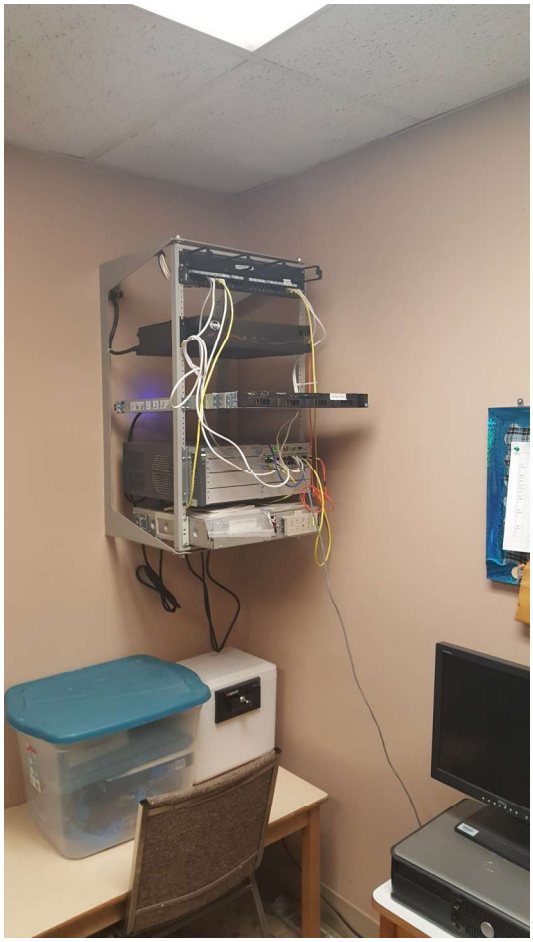

Figure 3 - IDF in shared space

Public Address and Clock System

The Distributed Communication System, (public address system) including the master clock system is in poor condition, and is based on an older version of the Rauland Telecenter system (Figure 4). Not all of the secondary analog clocks in classrooms (Figure 5) are synchronized with the master clock. Announcements are not heard in all spaces or rooms. Classroom telephone handsets are dedicated to the public address system and not part of the schools telephone system.

Specific Issues	*Recommendations*
Public address system cabling and speakers are original and in poor condition. The system's main equipment is older and outdated.	Replace with a new public address system, with new main equipment and speakers throughout. Move main equipment to the MDF room.
Master and secondary analog clock system is not working properly in all areas.	Replace existing clock system with new equipment that provides for synchronized secondary clocks throughout the school.
Public address system handsets (Figure 5) in all rooms tie back to the main office, but do not provide outside dialing capability.	Utilize telephone handsets that connect to the public address system to provide both internal and external communications. Add call switches to the rooms for separate independent calling capability.
Main System Equipment is located in main office area	Move main equipment and connections to the MDF.

Telephone System

The Telephone System is an older hybrid digital/VoIP Vodavi System that is in fair condition and provides office and administrative spaces with telephone system capability for making and receiving outside calls. (Figure 6). Classroom telephone handsets are not part of this system. The telephone handsets in classrooms are dedicated to only the public address system and do not provide outside calling capability.

Specific Issues	*Recommendations*
Older system provides only administrative offices with telephone capability. It is linked to the Public Address system so that announcements can be initiated at any administrative telephone handset.	Telephone system should be expanded or upgraded to provide telephone handsets that are distributed throughout the school with voicemail capability provided for all teachers and staff in addition to administrators. Voicemail should also be integrated with email, so that messages are received through both the telephone system and the district's email system.

Figure 4 - Public Address System

Figure 5 -Clock/Speaker/PA Handset

Figure 6 - Telephone System

Figure 7- UPS Rack for PA System

Classroom Instructional Audio-Visual

Instructional audio-visual equipment is in good condition and is currently installed in most of the teaching spaces throughout the school. It is based on standard throw, short throw, and ultra-short throw projection technology, depending on when it was purchased and deployed (figures 8 and 9). SMART Technology Smartboards of varying vintages are also deployed in various locations. The equipment deployed ranges in age from 5-10 years old to a few months. There are no standards for this equipment as it has been obtained through multiple procurement cycles. Audio systems integrated with the Smartboards for program playback purposes were observed in some but not all cases. Voice lift or speech reinforcement systems were not observed to be installed.

Specific Issues	*Recommendations*
Older projection technology with multiple manufacturers.	Newer and standardized ultrashort projection technology should be deployed.
Older interactive electronic smartboard technology is deployed. This technology is electronic and therefore will fail at some point.	Update to newer interactive projection technology, which can be used with standard porcelain on steel marker boards and not screens. Newer projectors are brighter and use less energy and have less expensive lamps.
No Document Cameras were observed	Deploy cost effective document camera technology for the classroom
Assisted listening technology was lacking or limited in deployment	Deploy modern classroom voice reinforcement technology throughout all classrooms and learning spaces to serve all students and teachers. This equipment can also be linked to personal hearing aid equipment for the hearing impaired.

Audio-Visual for Large Venue Spaces

The Cafeteria, which is the group assembly space for the school has a performance stage with an audio system and speakers that did not appear to be functional (Figure 10). Portable audio and projection systems are used when assemblies or performances are held in the space (Figure 12 and 13).

The Gymnasium has poor quality audio system speakers and no real permanent audio system.

Specific Issues	*Recommendations*
Audio system in the primary assembly area was not working.	Install new permeant sound equipment.
There is a portable projection cart with a low lumen projector used in Cafeteria.	Install a permanent mounted high lumen projector with connections to new audio system and inputs at the state for presentations. Upgrade screen.
Gymnasium is without permanent AV equipment	Install new audio system and projection screen on the wall. Upgrade portable cart with high lumen projector for use in the Gym.

Figure 8- Classroom Projection

Figure 9 - Classroom Projection

Cafeteria Stage-Figure 10

Figure 11-Gym Sound System

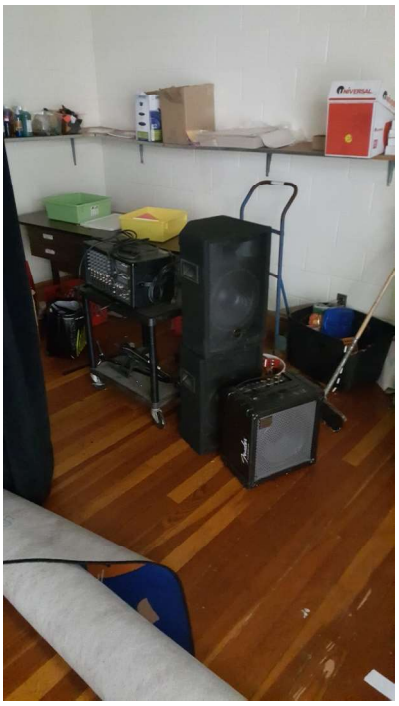

Figure 12-Portable Equipment

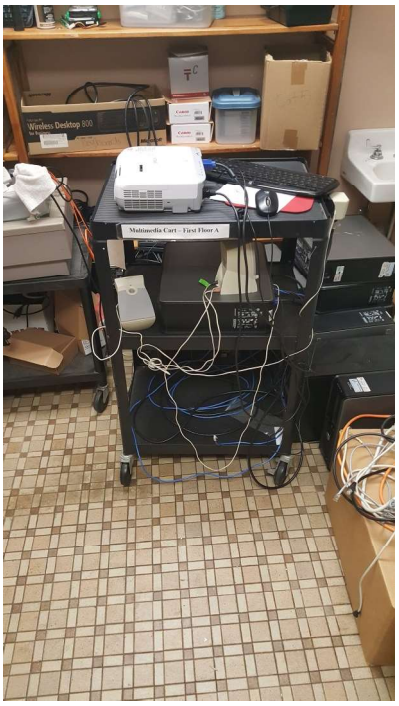

Figure 13-Multimedia Cart

Network Computer Equipment

There are two desktop computers in each classroom (figure 15), with one permanently connected to the projection system. These computers serve teacher and student needs in the classroom. There are also eight (8) mobile carts in the school with 30 Chromebooks in each cart for student to use. Chromebooks are all based on Acer, with Bretford charging charts being the preferred mobile cart.

There are multiple desktop computer workstations in the computer lab (Figure 14). There is a need for better cabling and power distribution in the computer lab to support computers. Computer network servers are centralized at the High school and connect to the school via leased fiber optic cabling from Charter Communications. Currently Charter is also the internet service provider and the School District is considering upgrading their internet bandwidth from 100Mbps to 500Mpps up and down.

Specific Issues	*Recommendations*
Additional student devices are required to move school closer to the ideal of a one-to-one computer to student ratio.	Chromebooks are an excellent platform for cost effectively increasing the ratio of computers to students and additional Chromebooks and charging carts should be procured as needed.
Computer Lab is lacking cable and power distribution methods for desktop computers.	Replace furniture with fabricated casework or furniture that includes cabling distribution and management systems

Wireless Network Equipment

The Balmer Elementary School is currently upgrading their wireless network through E-rate funding, and the wireless access points that will be replaced as a result of this upgrade, will be moved and added to the wireless network at the Northbridge Elementary School. The wireless network will be based on Aruba (Figure 16), which will increase the quantity of Aruba wireless access points and the school's ability to support additional mobile technology. Deploying the Aerohive enterprise district standard should be considered for future upgrade projects.

Specific Issues	*Recommendations*
Ensure that there is an adequate concentration of wireless access points to meet existing and future wireless connection needs.	Increase the number of wireless access points to at least one per classroom and provide multiple access points in larger assembly spaces like the cafeteria, library, gymnasium, etc. Cover all administrative areas. Perform a heat map and deploy wireless access points for optimum coverage to support a one-to-one deployment of user devices.
Aruba is legacy wireless technology in the district.	Upgrade the Aruba wireless access point network to the District Aerohive wireless network standard.

Figure 14—Computer Lab

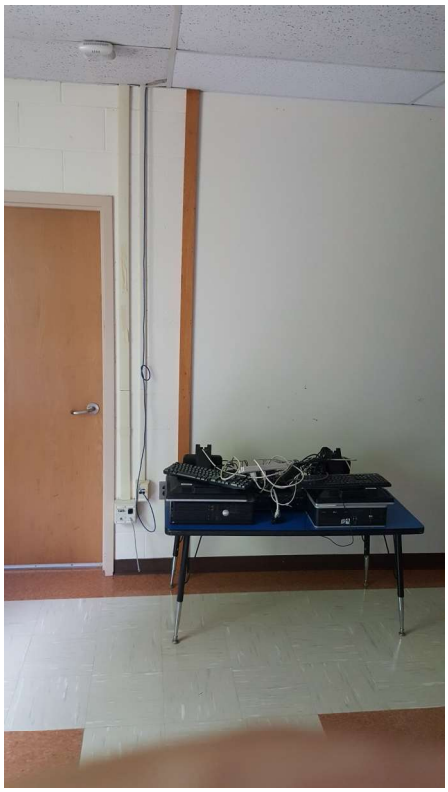

Figure 15– Computers in Classrooms Wireless AP Above

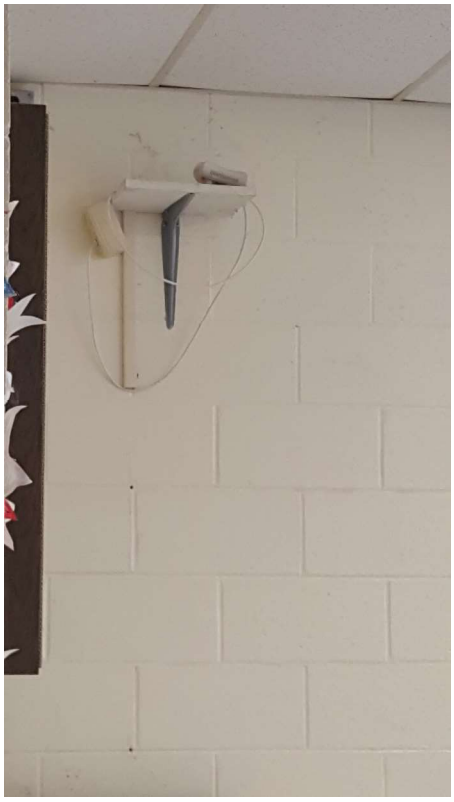

Figure 16—Wireless Access Point

Printing

The school is utilizing more cost effective and centralized large format copier/printer technology. They currently rely on Konica Minolta and Toshiba copier/printers distributed in various locations (Figure 21). The School is also investigating other manufacturers such as Ricoh. They lease the copiers and supplement sparingly with HP laser printers in strategic areas (Figure 22). The HP Lasers are purchased without manufacturer Carepacks and are serviced directly by the district.

Specific Issues	*Recommendations*
No Issues—Centralized and work group printing is being implemented, with private printers deployed on a limited basis.	Maintain strategy and evaluate age of printers. Upgrade Copier Printers and select more current laser printer technology to reduce the cost of printing.

Digital Signage

There is no digital signage currently deployed within the school

Specific Issues	*Recommendations*
No digital signage	Consider digital flat panel signage for strategic areas within the school to enhance the paperless dissemination of public announcements and information to both staff and the public.

Security

There was a security system upgrade and installation involving surveillance cameras, access control, and a multi-zone intrusion detection system about 4 years ago (Summer of 2013). The core system is based around Genetec's Security Center 5.4 platform, which is an excellent platform for integrating security between surveillance, access control and intrusion across the District. Honeywell is the basis of design for intrusion detection (Figure 18). Surveillance cameras are located on the interior and exterior (Figure 19 and 20). A local host server is located in the school which is based on Dell R320 that sends stored video to an archive server located at the High School, maintaining 30 days of stored video. Staff use key fobs with the access control reader located at the main entrance doors (Figure 17). The main door integrates a door buzzer with an intercom system and a security camera so that the main office can see and communicate with someone seeking entrance to the school and remotely control unlocking the door.

Specific Issues	*Recommendations*
Possible lack of coverage by surveillance system cameras and alarm system notion sensors.	Increase the number of cameras and areas of coverage as required or needed. Adjust and modify with additional motion sensors for greater intrusion detection. Maintain system software assurance for best return on investment.

Figure 17 - Access Control

Figure 18 -Intrusion Keypad

Figure 19 -Motion Detector Inside Dome Camera

Figure 20 - Exterior Camera

Figure 21 -Copier/Printer

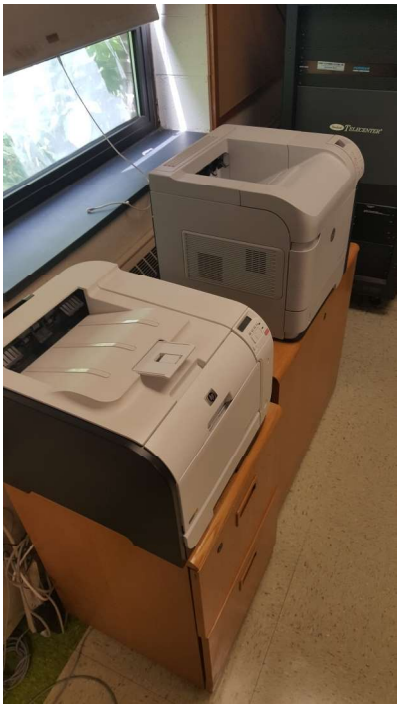

Figure 22 - Workgroup Printer

PLUMBING ASSESSMENT

EXECUTIVE SUMMARY

The majority of piping, fixtures, and equipment are original to the building and past their serviceable life, and are in poor condition. We recommend replacing all piping, fixtures, and equipment.

TERMINOLOGY

Building Condition scale of terms used throughout this report are as follows:

- "Excellent": new or nearly new condition with few or no blemishes or compromises of quality or function.
- "Very Good": highly functional condition with slight wear and tear and/or minor compromises of quality or function.
- "Good": median functional condition with noticeable wear and tear and/or compromises of quality or function.
- "Fair": below median functional condition with significant wear and tear and/or major compromises of quality or function. Seriously worn parts or elements, minor structural compromise. Possible near-future safety hazard.
- "Poor": nearly– or completely non-functional condition with major wear and tear and/or serious compromises of quality or usability. Missing parts or elements, major structural damage or condition. Immediate safety hazard or danger.

INTERIOR

BATHROOMS

Plumbing fixtures are of a variety of types and eras. Urinals are floor mount, and appear to be original to the building. Toilets are a variety of types, and include both flush valve and tank types, and consist of different sizes that relate to the ages served. None of the fixtures are water-conserving type.
One toilet room has been appropriated for use as janitors' closet..

Specific Issues	*Recommendations*
Toilets are a combination of tank and flush valve types, and are not water conserving types. (Figures 2, 4)	Consider replacing all toilets with consistent type throughout building, and featuring low-flow (1.28 gpm) flush valves.
Urinals are floor mounted and 1gallon per flush. Floor mounted urinals do not meet current accessibility codes. Urinals are not shielded for privacy, which is a violation of the plumbing code. (Figure 1).	Replace all urinals with code compliant wall mount types, and replace all flush valves with low-flow (1/8 gpf) types.
Toilet room has been adapted for use as a janitor's closet, (Figure 3).	Determine appropriate use of room; if for storage, remove and cap off toilet.
A lavatory has a chemical dispenser connected to it (Figure 4.)	This is a plumbing code violation and should be removed.
Supply and waste piping at sinks is not typically insulated in conformance with accessibility rules.	Insulate all piping at sinks that could be used by disabled persons.

Figure 1— Urinals

Figure 2— Small pre-k toilket

Figure 3 — Toilet and Janitor's Sink

Figure 4—Tank type toilet and chemical dispenser

INTERIOR

SERVICES

Specific Issues	*Recommendations*
The backflow preventer and pressure reducing valve for the HVAC supply system are in fair to good condition. (Figure 5)	None
Incoming water service is congested by stored materials, which are capable of damaging the piping. Some insulation is slightly damaged and incomplete. (Figure 6)	Remove stored material from the vicinity of the water service piping.
The gas meter is obstructed with vegetation. The concrete pad under the meter appears to be insufficient. (Figure 7)	Remove vegetation from in front of the gas meter. Replace the concrete paver below the meter with a more substantial concrete slab.
The existing gas fired hot water heater is approaching the end of its service life. (Figure 8).	Consider replacing it with a new, high-efficiency gas fired hot water heater.

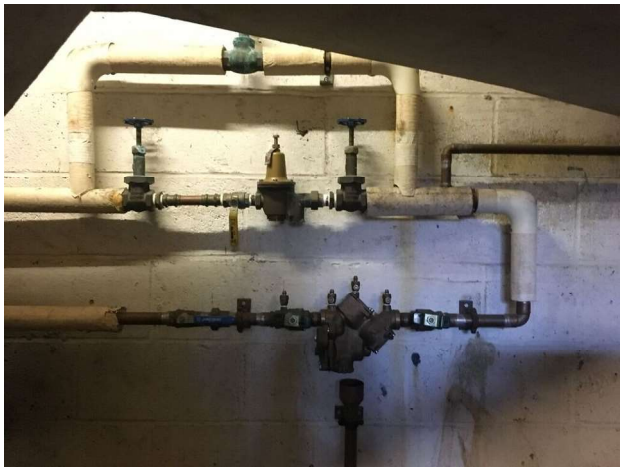

Figure 5— Backflow preventer and PRV (HVAC)

Figure 6— Water Service

Figure 7— Gas service and meter

Figure 8— 75 gallon domestic hot water heater

MISCELLANEOUS

Specific Issues	*Recommendations*
Classroom sinks are generally not accessible. (Figure 9)	Refer to the Regulatory Assessment and Architectural Assessment sections of this report for further discussion.
Janitor's sink has a chemical dispenser. However, there is no backflow preventer installed to prevent cross-contamination (Figure 10).	Backflow preventers are required and will need to be installed per plumbing code.
A classroom sink in the modular classroom building does not have piped plumbing. The clean water is sourced from the container in the left side of the cabinet, and the dirty water is drained into the right container in the cabinet. As a result the sink is also not accessible. (Figure 11)	Provide piped potable hot and cold water supply and sanitary drainage piping to all fixtures.

Figure 9 — Classroom sink

Figure 10 — Janitor's sink

Figure 11 — Classroom sink

FIRE PROTECTION ASSESSMENT

Executive Summary

The existing building does not have a fire suppression system. The existing building is 56, 560 square feet, and consists of a one story building wing and a three story wing (48,510 sq.ft.), and a one story modular building (8,050 sq.ft.). Per the current building code, a building over 7,500 square feet in area requires a fully automatic sprinkler system in compliance with NFPA 13— The Standard for the Installation of Sprinkler Systems.

Since the existing building does not meet the current code, any additions or renovations would trigger the need to install a new fire suppression system throughout the building.

Recommendations

Install a new fire suppression system throughout the building in compliance with NFPA 13.

FOODSERVICE EQUIPMENT ASSESSMENT

Executive Summary

The Northbridge Elementary School serves Pre-Kindergarten, Kindergarten, and First Grade students Current enrollment is approximately 480 students. This school receives prepared meals from an alternate location. It does not have a defined kitchen. Food is served in the Cafetorium with an area set aside for serving equipment and some storage.

There is no plumbed hand sink, and a portable self contained unit is used for the washing of hands. The three bay wash sink is done in a similar manner. There is a small reach in refrigerator to store cold food, and alternate hot food when it arrives is held as well. There is a double-stack electric convection oven used to reheat food and possibly cooking of some items on site. The serving of hot food is done in a portable hot food well unit. Cold food is serviced in an ice-cooled unit. It is not clear where the ice is obtained to for use in this unit.

In summary there is no permanent kitchen facility. The staff are doing the best they can with not very much. It is clear that a kitchen space is needed. It must be equipped with the proper equipment to facilitate the reparation and serving of food.

At a minimum, the ability to conveniently wash hands and utensils must be a priority. Further study is needed as to whether this kitchen should continue to have meals prepared off site or be able to stand alone as a full functioning facility. It is our recommendation that is be a self contained fully functioning facility as this will greatly improve the quality of the food and provide more flexibility in the type of food that can be offered.

KITCHEN

Back of house Equipment

Specific Issues	*Recommendations*
The space where the kitchen serving equipment is located is not able to be secured when not in use. Additionally the space was not designed to be a kitchen space. The floor and ceiling finishes are not appropriate for a kitchen environment. (Figure 1).	A full commercial kitchen, complete with modern equipment, sanitation, and storage facilities is needed.
The three bay sink is a self contained portable unit. The bowls are too small for anything more than washing serving utensils. (Figure 2).	See recommendation for Figure 1
The hand sink is a self contained portable unit. It meets the requirements of the health codes, but a plumbed-in hand sink would offer unlimited water volume and consistent wash temperatures. (Figure 3).	See the recommendation for figure 1.
The cold food serving counter is ice cooled. Ice is a less consistent cooling medium than a mechanically chilled serving pan. (Figure 4).	Replace with a modern mechanically cooled unit.

Figure 1—The kitchen space at the rear

Figure 2—Three bay sink

Figure 3—The hand washing station

Figure 4-The cold food serving counter

UEC universal environmental consultants

August 2, 2017

Mr. Thomas Hengelsberg
Dore & Whittier Architects
260 Merrimac Street
Newburyport, MA 01950

Reference: Hazardous Materials Determination Survey
Northbridge Elementary School, Northbridge, MA

Dear Mr. Hengelsberg:

Thank you for the opportunity for Universal Environmental Consultants (UEC) to provide professional services.

Enclosed please find the report for hazardous materials determination survey at the Northbridge Elementary School, Northbridge, MA.

Please do not hesitate to call should you have any questions.

Very truly yours,

Universal Environmental Consultants

Ammar M. Dieb
President

UEC:\217 265.00\Report-Northbridge Elementary School.DOC

Enclosure

REPORT
FOR
HAZARDOUS MATERIALS DETERMINATION
SURVEY
AT THE
NORTHBRIDGE ELEMENTARY SCHOOL
NORTHBRIDGE, MASSACHUSETTS

PROJECT NO: 217 265.00

Survey Dates:
July 24-27, 2017

SURVEY CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 BREWSTER ROAD
FRAMINGHAM, MA 01702

1.0 INTRODUCTION:

UEC has been providing comprehensive asbestos services since 2001 and has completed projects throughout New England. We have completed projects for a variety of clients including commercial, industrial, municipal, and public and private schools. We maintain appropriate asbestos licenses and staff with a minimum of twenty eight years of experience.

UEC was contracted by Dore & Whittier Architects to conduct the following services at the Northbridge Elementary School, Northbridge, MA:

- Inspection and Testing for Asbestos Containing Materials (ACM);
- Inspection for Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures;
- Inspection for PCB's-Caulking;
- Inspection for Lead Based Paint (LBP);
- Mercury in Rubber Flooring inspection and sampling;
- Airborne Mold inspection and sampling;
- Radon sampling;
- Other hazardous materials.

A comprehensive survey per the Environmental Protection Agency (EPA) NESHAP regulation would be required prior to any renovation or demolition activities.

The scope of work included the inspection of accessible ACM, collection of bulk samples from materials suspected to contain asbestos, determination of types of ACM found and cost estimates for remediation. Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) in accordance with EPA standard. Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Jason Becotte (AI-034963) and analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

Mercury samples were analyzed by an EPA licensed laboratory, EMSL, Cinnaminson, NJ in accordance with EPA method 7471B.

Airborne mold samples were analyzed by an EPA trained laboratory EMSL, Woburn, MA.

Radon samples were analyzed by an EPA licensed laboratory AccuStar, Medway, MA.

Refer to samples results.

2.0 FINDINGS:

Asbestos Containing Materials (ACM):
The regulations for asbestos inspection are based on representative sampling. It would be impractical and costly to sample all materials in all areas. Therefore, representative samples of each homogenous area were collected and analyzed or assumed.

All suspect materials were grouped into homogenous areas. By definition a homogenous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations.

All suspect materials that contain any amount of asbestos must be considered asbestos if it is scheduled to be removed per the Department of Environmental Protection (DEP) regulations.

Number of Samples Collected

Ninety five (95) bulk samples were collected from the following materials suspected of containing asbestos:

Type and Location of Material

1. Pyro block at 1952 building attic
2. Pyro block at 1952 building attic
3. Batting insulation at 1952 building attic
4. Batting insulation at 1952 building attic
5. Wall plaster at 1952 building first floor hallway
6. Wall plaster at 1952 building second floor hallway
7. Wall plaster at 1952 building room 203
8. Wall plaster at 1952 building room 303
9. Wall plaster at 1952 building third floor closet
10. Ceiling plaster at 1952 building first floor boy's room
11. Ceiling plaster at 1952 building room 306
12. Joint compound at 1952 building first floor conference room
13. Joint compound at 1952 building library
14. Textured ceiling plaster at boiler room
15. Textured ceiling plaster at boiler room
16. Textured ceiling plaster at boiler room
17. Old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room
18. Old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room
19. Mastic for old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room
20. Mastic for old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room
21. Old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library
22. Old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library
23. Mastic for old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library
24. Mastic for old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library
25. New 12" x 12" vinyl floor tile at 1952 building first floor hallway
26. New 12" x 12" vinyl floor tile at 1952 building first floor hallway
27. Mastic for new 12" x 12" vinyl floor tile at 1952 building first floor hallway
28. Mastic for new 12" x 12" vinyl floor tile at 1952 building first floor hallway
29. New 12" x 12" vinyl floor tile at 1952 building room 203 (top layer)
30. New 12" x 12" vinyl floor tile at 1952 building room 205 (top layer)
31. New 12" x 12" vinyl floor tile at 1952 building room 304 (top layer)
32. Hidden poured flooring at 1952 building room 203
33. Hidden poured flooring at 1952 building room 205
34. Hidden poured flooring at 1952 building room 304
35. Flooring plaster at 1952 building room 203
36. Flooring plaster at 1952 building room 205
37. Flooring plaster at 1952 building room 304
38. Black flooring paper at 1952 building room 203 (bottom layer)
39. Black flooring paper at 1952 building room 205 (bottom layer)
40. Black flooring paper at 1952 building room 304 (bottom layer)
41. Boiler exhaust insulation at boiler room
42. Boiler exhaust insulation at boiler room
43. Boiler exhaust insulation at boiler room
44. 2' x 4' Suspended acoustical ceiling tile at 1952 building first floor library
45. 2' x 4' Suspended acoustical ceiling tile at 1952 building first floor conference room
46. Exterior door framing caulking at 1952 building
47. Exterior window glazing caulking at 1952 building
48. Exterior window glazing caulking at 1952 building
49. Exterior unit vent grille caulking at 1952 building

50. Exterior unit vent grille caulking at 1952 building
51. Sheetrock wall panel at modular building hallway
52. Sheetrock wall panel at modular building room 5
53. Tan/brown 12” x 12” vinyl floor tile at modular building hallway
54. Tan/brown 12” x 12” vinyl floor tile at modular building room 5
55. Yellow glue for tan/brown 12” x 12” vinyl floor tile at modular building hallway
56. Yellow glue for tan/brown 12” x 12” vinyl floor tile at modular building room 5
57. 2’ x 4’ Suspended acoustical ceiling tile at modular building hallway
58. 2’ x 4’ Suspended acoustical ceiling tile at modular building room 5
59. Black sink coating at modular building teacher’s room
60. Black sink coating at modular building teacher’s room
61. Ceramic cove base glue at 1983 building boy’s room
62. Ceramic cove base glue at 1983 building boy’s room
63. 2’ x 4’ Suspended acoustical ceiling tile at 1983 building room 108
64. 2’ x 4’ Suspended acoustical ceiling tile at 1983 building room 104
65. Old off white 12” x 12” vinyl floor tile at 1983 building nurse
66. Old off white 12” x 12” vinyl floor tile at 1983 building teacher’s room
67. Mastic for old off white 12” x 12” vinyl floor tile at 1983 building nurse
68. Mastic for old off white 12” x 12” vinyl floor tile at 1983 building teacher’s room
69. Old grey/tan 12” x 12” vinyl floor tile at 1983 building hallway
70. Old grey/tan 12” x 12” vinyl floor tile at 1983 building room 101
71. Mastic for old grey/tan 12” x 12” vinyl floor tile at 1983 building hallway
72. Mastic for old grey/tan 12” x 12” vinyl floor tile at 1983 building room 101
73. New tan/brown 12” x 12” vinyl floor tile at 1983 building room 108
74. New tan/brown 12” x 12” vinyl floor tile at 1983 building room 109
75. Mastic for new tan/brown 12” x 12” vinyl floor tile at 1983 building room 108
76. Mastic for new tan/brown 12” x 12” vinyl floor tile at 1983 building room 109
77. New beige 12” x 12” vinyl floor tile at 1983 building room 112
78. New beige 12” x 12” vinyl floor tile at 1983 building room 112
79. Red duct sealant at 1983 building stage
80. Red duct sealant at 1983 building room 104 storage
81. Interior window glazing caulking at 1983 building hallway
82. Interior window glazing caulking at 1983 building teacher’s lounge
83. Interior door glazing caulking at 1983 building hallway
84. Interior door glazing caulking at 1983 building hallway
85. Interior window sill at 1983 building room 106
86. Interior window sill at 1983 building room 109
87. Wood door insulation at 1983 building room 107
88. Exterior window framing caulking 1983 building
89. Exterior window framing caulking 1983 building
90. Exterior window glazing caulking 1983 building
91. Exterior window glazing caulking 1983 building
92. Exterior door framing caulking 1983 building
93. Exterior door framing caulking 1983 building
94. Exterior unit vent grille framing caulking 1983 building
95. Exterior unit vent grille framing caulking 1983 building

Samples Results

Type and Location of Material	**Sample Result**
1. Pyro block at 1952 building attic	No Asbestos Detected
2. Pyro block at 1952 building attic	No Asbestos Detected
3. Batting insulation at 1952 building attic	No Asbestos Detected
4. Batting insulation at 1952 building attic	No Asbestos Detected

5.	Wall plaster at 1952 building first floor hallway	No Asbestos Detected
6.	Wall plaster at 1952 building second floor hallway	No Asbestos Detected
7.	Wall plaster at 1952 building room 203	No Asbestos Detected
8.	Wall plaster at 1952 building room 303	No Asbestos Detected
9.	Wall plaster at 1952 building third floor closet	No Asbestos Detected
10.	Ceiling plaster at 1952 building first floor boy's room	No Asbestos Detected
11.	Ceiling plaster at 1952 building room 306	No Asbestos Detected
12.	Joint compound at 1952 building first floor conference room	No Asbestos Detected
13.	Joint compound at 1952 building library	No Asbestos Detected
14.	Textured ceiling plaster at boiler room	No Asbestos Detected
15.	Textured ceiling plaster at boiler room	No Asbestos Detected
16.	Textured ceiling plaster at boiler room	No Asbestos Detected
17.	Old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room	No Asbestos Detected
18.	Old tan/grey 12" x 12" vinyl floor tile at 1952 building first floor OT/PT room	No Asbestos Detected
19.	Mastic for tan/grey 12" x 12" floor tile at 1952 building first floor OT/PT room	No Asbestos Detected
20.	Mastic for tan/grey 12" x 12" floor tile at 1952 building first floor OT/PT room	No Asbestos Detected
21.	Old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library	No Asbestos Detected
22.	Old off white/green 12" x 12" vinyl floor tile at 1952 building first floor library	No Asbestos Detected
23.	Mastic for off white/green 12" x 12" floor tile at 1952 building first floor library	No Asbestos Detected
24.	Mastic for off white/green 12" x 12" floor tile at 1952 building first floor library	No Asbestos Detected
25.	New 12" x 12" vinyl floor tile at 1952 building first floor hallway	No Asbestos Detected
26.	New 12" x 12" vinyl floor tile at 1952 building first floor hallway	No Asbestos Detected
27.	Mastic for new 12" x 12" vinyl floor tile at 1952 building first floor hallway	No Asbestos Detected
28.	Mastic for new 12" x 12" vinyl floor tile at 1952 building first floor hallway	No Asbestos Detected
29.	New 12" x 12" vinyl floor tile at 1952 building room 203 (top layer)	No Asbestos Detected
30.	New 12" x 12" vinyl floor tile at 1952 building room 205 (top layer)	No Asbestos Detected
31.	New 12" x 12" vinyl floor tile at 1952 building room 304 (top layer)	No Asbestos Detected
32.	Hidden poured flooring at 1952 building room 203	5% Asbestos
33.	Hidden poured flooring at 1952 building room 205	No Asbestos Detected
34.	Hidden poured flooring at 1952 building room 304	No Asbestos Detected
35.	Flooring plaster at 1952 building room 203	2% Asbestos
36.	Flooring plaster at 1952 building room 205	2% Asbestos
37.	Flooring plaster at 1952 building room 304	2% Asbestos
38.	Black flooring paper at 1952 building room 203 (bottom layer)	No Asbestos Detected
39.	Black flooring paper at 1952 building room 205 (bottom layer)	No Asbestos Detected
40.	Black flooring paper at 1952 building room 304 (bottom layer)	No Asbestos Detected
41.	Boiler exhaust insulation at boiler room	No Asbestos Detected
42.	Boiler exhaust insulation at boiler room	No Asbestos Detected
43.	Boiler exhaust insulation at boiler room	No Asbestos Detected
44.	2' x 4' Suspended acoustical ceiling tile at 1952 building first floor library	No Asbestos Detected
45.	2' x 4' Suspended acoustical ceiling tile at 1952 building first floor conference room	No Asbestos Detected
46.	Exterior door framing caulking at 1952 building	2% Asbestos
47.	Exterior window glazing caulking at 1952 building	<1% Asbestos
48.	Exterior window glazing caulking at 1952 building	2% Asbestos
49.	Exterior unit vent grille caulking at 1952 building	5% Asbestos
50.	Exterior unit vent grille caulking at 1952 building	5% Asbestos
51.	Sheetrock wall panel at modular building hallway	No Asbestos Detected
52.	Sheetrock wall panel at modular building room 5	No Asbestos Detected
53.	Tan/brown 12" x 12" vinyl floor tile at modular building hallway	No Asbestos Detected
54.	Tan/brown 12" x 12" vinyl floor tile at modular building room 5	No Asbestos Detected
55.	Yellow glue for tan/brown 12" x 12" vinyl floor tile at modular building hallway	No Asbestos Detected
56.	Yellow glue for tan/brown 12" x 12" vinyl floor tile at modular building room 5	No Asbestos Detected
57.	2' x 4' Suspended acoustical ceiling tile at modular building hallway	No Asbestos Detected
58.	2' x 4' Suspended acoustical ceiling tile at modular building room 5	No Asbestos Detected
59.	Black sink coating at modular building teacher's room	2% Asbestos

60. Black sink coating at modular building teacher's room	2% Asbestos
61. Ceramic cove base glue at 1983 building boy's room	No Asbestos Detected
62. Ceramic cove base glue at 1983 building boy's room	No Asbestos Detected
63. 2' x 4' Suspended acoustical ceiling tile at 1983 building room 108	No Asbestos Detected
64. 2' x 4' Suspended acoustical ceiling tile at 1983 building room 104	No Asbestos Detected
65. Old off white 12" x 12" vinyl floor tile at 1983 building nurse	No Asbestos Detected
66. Old off white 12" x 12" vinyl floor tile at 1983 building teacher's room	No Asbestos Detected
67. Mastic for old off white 12" x 12" vinyl floor tile at 1983 building nurse	5% Asbestos
68. Mastic for old off white 12" x 12" vinyl floor tile at 1983 building teacher's room	5% Asbestos
69. Old grey/tan 12" x 12" vinyl floor tile at 1983 building hallway	No Asbestos Detected
70. Old grey/tan 12" x 12" vinyl floor tile at 1983 building room 101	No Asbestos Detected
71. Mastic for old grey/tan 12" x 12" vinyl floor tile at 1983 building hallway	2% Asbestos
72. Mastic for old grey/tan 12" x 12" vinyl floor tile at 1983 building room 101	5% Asbestos
73. New tan/brown 12" x 12" vinyl floor tile at 1983 building room 108	No Asbestos Detected
74. New tan/brown 12" x 12" vinyl floor tile at 1983 building room 109	10% Asbestos
75. Mastic for new tan/brown 12" x 12" vinyl floor tile at 1983 building room 108	No Asbestos Detected
76. Mastic for new tan/brown 12" x 12" vinyl floor tile at 1983 building room 109	10% Asbestos
77. New beige 12" x 12" vinyl floor tile at 1983 building room 112	No Asbestos Detected
78. New beige 12" x 12" vinyl floor tile at 1983 building room 112	No Asbestos Detected
79. Red duct sealant at 1983 building stage	No Asbestos Detected
80. Red duct sealant at 1983 building room 104 storage	No Asbestos Detected
81. Interior window glazing caulking at 1983 building hallway	5% Asbestos
82. Interior window glazing caulking at 1983 building teacher's lounge	5% Asbestos
83. Interior door glazing caulking at 1983 building hallway	5% Asbestos
84. Interior door glazing caulking at 1983 building hallway	10% Asbestos
85. Interior window sill at 1983 building room 106	No Asbestos Detected
86. Interior window sill at 1983 building room 109	No Asbestos Detected
87. Wood door insulation at 1983 building room 107	No Asbestos Detected
88. Exterior window framing caulking 1983 building	No Asbestos Detected
89. Exterior window framing caulking 1983 building	No Asbestos Detected
90. Exterior window glazing caulking 1983 building	10% Asbestos
91. Exterior window glazing caulking 1983 building	5% Asbestos
92. Exterior door framing caulking 1983 building	No Asbestos Detected
93. Exterior door framing caulking 1983 building	No Asbestos Detected
94. Exterior unit vent grille framing caulking 1983 building	No Asbestos Detected
95. Exterior unit vent grille framing caulking 1983 building	No Asbestos Detected

Observations and Conclusions:

The condition of ACM is very important. ACM in good condition does not present a health issue unless it is disturbed. Therefore, it is not necessary to remediate ACM in good condition unless it will be disturbed through renovation, demolition or other activity.

1. Hidden poured flooring at 1952 building was found to contain asbestos.
2. Flooring plaster at 1952 building was found to contain asbestos.
3. Exterior door framing caulking at 1952 building was found to contain asbestos.
4. Exterior window glazing caulking at 1952 building was found to contain asbestos.
5. Exterior unit vent grille caulking at 1952 building was found to contain asbestos.
6. Black sink coating at modular building was found to contain asbestos.
7. Mastic for old off white 12" x 12" vinyl floor tile at 1983 building was found to contain asbestos.
8. Mastic for old grey/tan 12" x 12" vinyl floor tile at 1983 building was found to contain asbestos.
9. New tan/brown 12" x 12" vinyl floor tile at 1983 building was found to contain asbestos.
10. Mastic for new tan/brown 12" x 12" vinyl floor tile at 1983 building was found to contain asbestos.
11. Interior window glazing caulking at 1983 building was found to contain asbestos.
12. Interior door glazing caulking at 1983 building was found to contain asbestos.
13. Exterior window glazing caulking 1983 building was found to contain asbestos.

14. Interior window glazing caulking at 1952 building was assumed to contain asbestos.
15. Interior door caulking at 1952 building was assumed to contain asbestos.
16. Pipe insulation was assumed to contain asbestos.
17. Boiler exhaust duct insulation was assumed to contain asbestos.
18. Insulation and rope inside boilers was assumed to contain asbestos.
19. Glue holding blackboard was assumed to contain asbestos.
20. Transite panel over doors at 1983 building was assumed to contain asbestos.
21. Paper/glue under stage hardwood floor was assumed to contain asbestos.
22. Roofing material was assumed to contain asbestos. Roofing material does not have to be removed by a licensed asbestos contractor. However, the Demolition/Roofing Contractor must comply with OSHA regulation during demolition and with state regulations for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval
23. Damproofing on exterior and foundation walls was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.
24. Thru-wall flashing was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.
25. Underground sewer pipes were assumed to contain asbestos.
26. All other suspect materials were found not to contain asbestos. Hidden ACM may be found during demolition activities.

Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures:
Observations and Conclusions
Visual inspection of various equipments such as light fixtures, thermostats, exit signs and switches was performed for the presence of PCB's and mercury. Ballasts in light fixtures were assumed not to contain PCB's since there were labels indicating that "No PCB's" was found. Tubes in light fixtures, thermostats, signs and switches were assumed to contain mercury. It would be very costly to test those equipments and dismantling would be required to access. Therefore, the above mentioned equipments should be treated as if containing mercury and disposed in an EPA approved landfill as part of the demolition project.

PCB's in Caulking:
Observations and Conclusions
Caulking was assumed to contain PCB's.

Lead Based Paint (LBP):
Observations and Conclusions
LBP was assumed to exist on painted surfaces in the 1952 building. A school is not considered a regulated facility. All LBP activities performed, including waste disposal, should be in accordance with applicable Federal, State, or local laws, ordinances, codes or regulations governing evaluation and hazard reduction. In the event of discrepancies, the most protective requirements prevail. These requirements can be found in OSHA 29 CFR 1926-Construction Industry Standards, 29 CFR 1926.62-Construction Industry Lead Standards, 29 CFR 1910.1200-Hazards Communication, 40 CFR 261-EPA Regulations. According to OSHA, any amount of LBP triggers compliance.

Mercury in Rubber Flooring:
Number of Samples Collected

Two (2) bulk samples were collected from the following.

Type and Location of Material

1. Rubber flooring at 1983 gymnasium
2. Rubber flooring at 1983 gymnasium

Sample Results

Type and Location of Material	Sample Result
1. Rubber flooring at 1983 gymnasium	0.050 mg/kg
2. Rubber flooring at 1983 gymnasium	ND

Observations and Conclusions:
Samples results of the rubber flooring indicated low level of mercury.

Airborne Mold:
Airborne mold testing was performed utilizing Zefon International Incorporated's Air-O-Cell® sampling device following all manufacturer supplied recommended sampling procedures.

The Air-O-Cell® is a direct read total particulate air sampling device. It works using the inertial impaction principle similar to other spore trap devices. It is designed for the rapid collection and analysis of airborne particulate including bioaerosols. The particulate includes fibers (e.g. asbestos, fiberglass, cellulose, clothing fibers) opaque particles (e.g. fly ash, combustion particles, copy toner, oil droplets, paint), and bioaerosols (e.g. mold spores, pollen, insect parts, skin cell fragments).[1]

The method involves drawing a known quantity of air through a sterile sampling cassette. Subsequent to sampling, the cassette is sealed and transferred to a microbiology laboratory under chain of custody protocol for microscopic analysis. This method counts both viable and nonviable mold spores.

AIRBORNE MOLD and PARTICULATE

Lab ID #	Location	Total Mold Counts/M^3	Pollen	Insect Fragment	Hyphal Fragments
131604724-0001	Room M-4	280	ND	ND	ND
131604724-0002	Room 104	130	ND	ND	ND
131604724-0003	Library	2,030	ND	ND	ND
131604724-0004	Room 201	3,260	ND	ND	ND
131604724-0005	Room 301	1,720	ND	ND	20
131604724-0006	Outside	13,874	ND	ND	ND

AIRBORNE MOLD and PARTICULATE
(Subjective Scales)

Lab ID #	Location	Skin Fragment Density (SFD)	Fibrous Particulates (FP)	Total Background Particulate (TBP)
131604724-0001	Room M-4	2	1	1
131604724-0002	Room 104	2	1	1
131604724-0003	Library	2	1	1
131604724-0004	Room 201	2	1	1
131604724-0005	Room 301	2	1	1
131604724-0006	Outside	1	1	1

Legend:
ND - Not Detected

[1] Zefon International Inc. <www.zefon.com>

Observations:
There are currently no guidelines or standards promulgated by a government agency or widely recognized scientific organization for the interpretation of airborne mold spore levels. The most commonly employed tool used to assess if mold growth is occurring in a structure is to compare quantities and species of mold outdoors to indoor. If there were more mold indoor, and/or if species were present indoor which were not present outdoors, then growth is occurring and remediation is recommended.

The indoor airborne mold spore concentrations were much lower than the outside sample. Based on comparisons with historical data from projects of similar type, building utilization, geographic location and season, the indoor airborne levels are considered low. Indoor mold spore counts in the summer are typically in the 5,000-9,500-spores/cubic meter range.

Pollen, insect fragments and Hyphal fragments were either not present or low in the samples. Hyphal fragment is a non-reproductive part of the mold.

Total background particulate on all samples was assessed as "1" on a scale of 1-5 where 1 is low and 5 is high. Skin fragment density on all samples was assessed as "1-2" on a scale of 1-4 where 1 is low and 4 is high. The total background levels are measured to determine airborne dust not related to airborne mold. Skin fragments are measured to determine proper housing cleaning.

No visible mold growth was observed during sampling.

Radon:
Number of Samples Collected

Five (5) air samples were collected at the following locations:

Location of Sample

1. First Floor Library
2. First Floor Cafeteria
3. First Floor Gymnasium Office
4. First Floor Room 105
5. First Floor Room 111

Location of Sample	**Sample Result**
1. First Floor Library	0.8 pCi/L
2. First Floor Cafeteria	<0.4 pCi/L
3. First Floor Gymnasium Office	2.8 pCi/L
4. First Floor Room 105	<0.4 pCi/L
5. First Floor Room 111	1.2 pCi/L

Observations and Conclusions:
The measured radon concentrations of the samples were found to be much lower than the EPA guideline of 4 picoCuris of radon per liter of air (pCi/L). No further action is required.

Underground Storage Oil Tanks (UST):
Observations and Conclusions
One (10,000 Gallons) UST was found at the school. There were no records on-site to review.

3.0 COST ESTIMATES:

The cost includes removal and disposal of all accessible ACM, other hazardous materials and an allowance for removal and disposal of inaccessible or hidden ACM that may be found during the demolition.

Location	Material	Approximate Quantity	Cost Estimate ($)
1952 Building:			
	Flooring Materials (Second/Third Floors)	9,000 SF	90,000.00
	Interior Windows	8 Total	1,600.00
	Interior Doors	24 Total	4,800.00
	Chalkboards/Tackboards	120 Total	24,000.00
	Light Fixtures Tubes	220 Total	4,400.00
	Hidden ACM	Unknown	15,000.00
	Miscellaneous Hazardous Materials	Unknown	15,000.00
Boiler Room	Boilers	2 Total	19,000.00
	Exhaust Duct Insulation	200 SF	5,000.00
	Pipe Insulation	75 LF	1,500.00
Exterior	Windows	80 Total	24,000.00
	Doors	2 Total	600.00
	Unit Vent Grilles	7 Total	1,400.00
1983 Building:			
	Flooring Materials and Mastic	20,000 SF	80,000.00
	Interior Windows	6 Total	1,200.00
	Interior Doors	10 Total	2,000.00
	Chalkboards/Tackboards	22 Total	4,400.00
	Transite Panels	20 Total	2,000.00
	Light Fixtures Tubes	245 Total	4,900.00
	Sink	1 Total	300.00
	Hidden ACM	Unknown	15,000.00
	Miscellaneous Hazardous Materials	Unknown	15,000.00
Stage	Hardwood Floor Paper/Mastic	800 SF	8,000.00
Exterior	Windows	33 Tot	9,900.00
Modular Building:			
	Light Fixtures Tubes	70 Total	1,400.00
	Sink	1 Total	300.00
Exterior of School	Roofing Material	48,510 SF	97,020.00
	Transite Sewer Pipes	Unknown [1]	50,000.00
	Thru-Wall Flashing	Unknown [1]	50,000.00
	Damproofing on Foundation Walls	1,500 Tons [1]	225,000.00
	UST	1 Total	20,000.00
PCB's Remediation[2]			50,000.00
Estimated costs for ACM NESHAP Inspection and Testing Services			10,000.00
Estimated costs for PCB's Testing and Abatement Plans Services[2]			25,000.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			94,280.00
		Total:	**970,000.00**

[1]: Part of total demolition. [2]: Should results exceed EPA limit.

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

Asbestos:
Asbestos samples were collected using a method that prevents fiber release. Homogeneous sample areas were determined by criteria outlined in EPA document 560/5-85-030a. Bulk material samples were analyzed using PLM and dispersion staining techniques with EPA method 600/M4-82-020.

The samples were analyzed by an EPA approved laboratory EMSL, Woburn, MA.

Mercury in Rubber Flooring:
The bulk sample was analyzed in accordance with EPA method 7471B.

Airborne Mold:
The samples were analyzed by an EPA approved laboratory EMSL, Woburn, MA.

Radon:
Radon samples were analyzed by an EPA licensed laboratory AccuStar, Medway, MA.

Inspected By:

Jason Becotte
Asbestos Inspector (AI-034963)

5.0 LIMITATIONS AND CONDITIONS:

This report has been completed based on visual and physical observations made and information available at the time of the site visits, as well as an interview with the Owner's representatives. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

Asbestos Identification Laboratory

165 New Boston St., Ste 227
Woburn, MA 01801
781-932-9600

Web: www.asbestosidentificationlab.com
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Batch: 24622

NVLAP®
Lab Code: 200919-0

July 31, 2017

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Number:
Project Name: Northbridge Elementary, Northbridge, MA

Date Sampled: 2017-07-27
Work Received: 2017-07-28
Work Analyzed: 2017-07-28

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

Dear Ammar Dieb,

Asbestos Identification Laboratory has completed the analysis of the samples from your office for the above referenced project .

The information and analysis contained in this report have been generated using the EPA /600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials. Materials or products that contain more than 1% of any kind or combination of asbestos are considered an asbestos containing building material as determined by the EPA. This Polarized Light Microscope (PLM) technique may be performed either by visual estimation or point counting. Point counting provides a determination of the area percentage of asbestos in a sample. If the asbestos is estimated to be less than 10% by visual estimation of friable material, the determination may be repeated using the point counting technique. The results of the point counting supersede visual PLM results. Results in this report only relate to the items tested. This report may not be used by the customer to claim product endorsement by NVLAP or any other U.S. Government Agency.

Laboratory results represent the analysis of samples as submitted by the customer. Information regarding sample location, description, area, volume, etc., was provided by the customer. Asbestos Identification Laboratory is not responsible for sample collection activities or analytical method limitations. Unless notified in writing to return samples, Asbestos Identification Laboratory discards customer samples after 30 days. Samples containing subsamples or layers will be analyzed separately when applicable. Reports are kept at Asbestos Identification Laboratory for three years. This report shall not be reproduced, except in full, without the written consent of Asbestos Identification Laboratory.

- NVLAP Lab Code: 200919-0
- Massachusetts Certification License: AA000208
- State of Connecticut, Department of Public Health Approved Environmental Laboratory Registration Number: PH-0142
- State of Maine, Department of Environmental Protection Asbestos Analytical Laboratory License Number: LB-0078(Bulk) LA-0087(Air)
- State of Rhode Island and Providence Plantations. Department of Health Certification: AAL-121
- State of Vermont, Department of Health Environmental Health License AL934461

Thank you Ammar Dieb for your business.

Michael Manning
Owner/Director

July 31, 2017

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Number:
Project Name: Northbridge Elementary, Northbridge, MA

Date Sampled: 2017-07-27
Work Received: 2017-07-28
Work Analyzed: 2017-07-28

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
1 / 276653	Pyro Block	1930 Attic	gray	Cellulose 2 Non-Fibrous 98	None Detected
2 / 276654	Pyro Block	1930 Attic	gray	Cellulose < 1 Non-Fibrous 100	None Detected
3 / 276655	Batting Insulation	1930 Attic	brown	Cellulose 100	None Detected
4 / 276656	Batting Insulation	1930 Attic	brown	Cellulose 100	None Detected
5 / 276657	Plaster	1930 1st FL Hall Wall	multi	Non-Fibrous 100	None Detected
6 / 276658	Plaster	1930 2nd FL Hall Wall	multi	Non-Fibrous 100	None Detected
7 / 276659	Plaster	1930 Rm 203 Wall	multi	Non-Fibrous 100	None Detected
8 / 276660	Plaster	1930 Rm 303 Wall	multi	Non-Fibrous 100	None Detected
9 / 276661	Plaster	1930 3rd FL Closet Wall	multi	Non-Fibrous 100	None Detected
10 / 276662	Plaster	1930 1st FL Boy's Room Ceiling	multi	Non-Fibrous 100	None Detected
11 / 276663	Plaster	1930 Rm 306 Ceiling	multi	Non-Fibrous 100	None Detected
12 / 276664	Joint Compound	1930 1st FL Conference	white	Non-Fibrous 100	None Detected
13 / 276665	Joint Compound	1930 Library	white	Non-Fibrous 100	None Detected
14 / 276666	Textured Ceiling Plaster	Boiler Room	gray	Non-Fibrous 100	None Detected

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
15 / 276667	Textured Ceiling Plaster	Boiler Room	gray	Non-Fibrous 100	None Detected
16 / 276668	Textured Ceiling Plaster	Boiler Room	gray	Non-Fibrous 100	None Detected
17 / 276669	Old Tan + Gray 12x12 VFT	1930 1st FL OT/PT Room	white	Non-Fibrous 100	None Detected
18 / 276670	Old Tan + Gray 12x12 VFT	1930 1st FL OT/PT Room	tan	Non-Fibrous 100	None Detected
19 / 276671	Black Mastic	1930 1st FL OT/PT Room	black	Cellulose 10 Non-Fibrous 90	None Detected
20 / 276672	Black Mastic	1930 1st FL OT/PT Room	black	Cellulose 10 Non-Fibrous 90	None Detected
21 / 276673	Old Off White/Green 12x12 VFT	1930 1st FL Library	green	Non-Fibrous 100	None Detected
22 / 276674	Old Off White/Green 12x12 VFT	1930 1st FL Library	green	Non-Fibrous 100	None Detected
23 / 276675	Black Mastic	1930 1st FL Library	black	Cellulose 10 Non-Fibrous 90	None Detected
24 / 276676	Black Mastic	1930 1st FL Library	black	Cellulose 10 Non-Fibrous 90	None Detected
25 / 276677	New 12x12 VFT	1930 1st FL Hallway	gray	Non-Fibrous 100	None Detected
26 / 276678	New 12x12 VFT	1930 1st FL Hallway	white	Non-Fibrous 100	None Detected
27 / 276679	Old Black Mastic	1930 1st FL Hallway	black	Cellulose 10 Non-Fibrous 90	None Detected
28 / 276680	Old Black Mastic	1930 1st FL Hallway	black	Cellulose 10 Non-Fibrous 90	None Detected
29 / 276681	New 12x12 VFT	1930 Room 203 Top Layer	tan	Non-Fibrous 100	None Detected
30 / 276682	New 12x12 VFT	1930 Room 205 Top Layer	tan	Non-Fibrous 100	None Detected
31 / 276683	New 12x12 VFT	1930 Room 304 Top Layer	tan	Non-Fibrous 100	None Detected
32 / 276684	Hidden Poured Flooring	1930 Room 203	brown	Non-Fibrous 95	Detected Chrysotile 5

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
33 276685	Hidden Poured Flooring	1930 Room 205	black	Non-Fibrous 100	None Detected
34 276686	Hidden Poured Flooring	1930 Room 304	black	Non-Fibrous 100	None Detected
35 276687	Flooring Plaster	1930 Room 203	white	Cellulose 15 Non-Fibrous 83	**Detected** **Chrysotile 2**
36 276688	Flooring Plaster	1930 Room 205	gray	Cellulose 15 Non-Fibrous 83	**Detected** **Chrysotile 2**
37 276689	Flooring Plaster	1930 Room 304	gray	Cellulose 15 Non-Fibrous 83	**Detected** **Chrysotile 2**
38 276690	Black Flooring Paper	1930 Room 203 Bottom Layer	black	Cellulose 50 Non-Fibrous 50	None Detected
39 276691	Black Flooring Paper	1930 Room 205 Bottom Layer	black	Cellulose 50 Non-Fibrous 50	None Detected
40 276692	Black Flooring Paper	1930 Room 304 Bottom Layer	black	Cellulose 40 Non-Fibrous 60	None Detected
41 276693	Boiler Exhaust Insulation	Boiler Room	white	Synthetic 5 Non-Fibrous 95	None Detected
42 276694	Boiler Exhaust Insulation	Boiler Room	gray	Mineral Wool 35 Non-Fibrous 65	None Detected
43 276695	Boiler Exhaust Insulation	Boiler Room	gray	Mineral Wool 35 Non-Fibrous 65	None Detected
44 276696	2x4 SAT Craggy	1930 1st FL Library	multi	Mineral Wool 40 Cellulose 40 Non-Fibrous 20	None Detected
45 276697	2x4 SAT Craggy	1930 1st FL Conference Room	multi	Mineral Wool 40 Cellulose 40 Non-Fibrous 20	None Detected
46 276698	Door Frame Caulk	1930 Exterior Door	black	Non-Fibrous 98	**Detected** **Chrysotile 2**
47 276699	Window Glaze	1930 Exterior Window	white	Non-Fibrous 100	**Detected** **Chrysotile < 1**
48 276700	Window Glaze	1930 Exterior Window	white	Non-Fibrous 98	**Detected** **Chrysotile 2**
49 276701	Unit Vent Caulk	1930 Exterior Vent	multi	Non-Fibrous 95	**Detected** **Chrysotile 5**
50 276702	Unit Vent Caulk	1930 Exterior Vent	gray	Non-Fibrous 95	**Detected** **Chrysotile 5**

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
51 / 276703	Sheetrock Wall Panel	Modular Hallway	multi	Fiberglass 2 Cellulose 5 Non-Fibrous 93	None Detected
52 / 276704	Sheetrock Wall Panel	Modular Room 5	multi	Fiberglass 2 Cellulose < 1 Non-Fibrous 98	None Detected
53 / 276705	Tan w/ Brown 12x12 VFT	Modular Hallway	tan	Non-Fibrous 100	None Detected
54 / 276706	Tan w/ Brown 12x12 VFT	Modular Room 5	yellow	Non-Fibrous 100	None Detected
55 / 276707	Yellow Glue	on #53	tan	Non-Fibrous 100	None Detected
56 / 276708	Tan w/ Brown 12x12 VFT	on #54	yellow	Non-Fibrous 100	None Detected
57 / 276709	2x4 SAT Modern	Modular Hallway	multi	Cellulose 70 Non-Fibrous 30	None Detected
58 / 276710	2x4 SAT Modern	Modular Room 5	multi	Mineral Wool 30 Cellulose 50 Non-Fibrous 20	None Detected
59 / 276711	Black Sink Coating	1983 Teacher's Room	black	Non-Fibrous 98	Detected Chrysotile 2
60 / 276712	Black Sink Coating	1983 Teacher's Room	black	Non-Fibrous 98	Detected Chrysotile 2
61 / 276713	Ceramic Cove Base Glue	1983 Boy's Room	yellow	Non-Fibrous 100	None Detected
62 / 276714	Ceramic Cove Base Glue	1983 Boy's Room	yellow	Non-Fibrous 100	None Detected
63 / 276715	2x4 SAT Craggy	1983 Rm 108	multi	Mineral Wool 40 Cellulose 40 Non-Fibrous 20	None Detected
64 / 276716	2x4 SAT Craggy	1983 Rm 104	multi	Mineral Wool 30 Cellulose 40 Non-Fibrous 30	None Detected
65 / 276717	Old Off White/Green 12x12 VFT	1983 Nurse	green	Non-Fibrous 100	None Detected
66 / 276718	Old Off White/Green 12x12 VFT	1983 Teacher's Lounge	green	Non-Fibrous 100	None Detected
67 / 276719	Black Mastic	on #65	black	Non-Fibrous 95	Detected Chrysotile 5
68 / 276720	Black Mastic	on #66	black	Non-Fibrous 95	Detected Chrysotile 5

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
69 / 276721	Old Gray/Tan 12x12 VFT	1983 Hallway	tan	Non-Fibrous 100	None Detected
70 / 276722	Old Gray/Tan 12x12 VFT	1983 Rm 101	white	Non-Fibrous 100	None Detected
71 / 276723	Black Mastic	on #69	black	Non-Fibrous 98	Detected Chrysotile 2
72 / 276724	Black Mastic	on #70	black	Non-Fibrous 95	Detected Chrysotile 5
73 / 276725	New Tan/Brown 12x12 VFT	1983 Rm 108	tan	Non-Fibrous 100	None Detected
74 / 276726	New Tan/Brown 12x12 VFT	1983 Rm 109	black	Non-Fibrous 90	Detected Chrysotile 10
75 / 276727	Black Mastic	on #73	brown	Non-Fibrous 100	None Detected
76 / 276728	Black Mastic	on #74	black	Non-Fibrous 90	Detected Chrysotile 10
77 / 276729	New Beige 12x12 VFT	1983 Rm 112	tan	Non-Fibrous 100	None Detected
78 / 276730	New Beige 12x12 VFT	1983 Rm 112	tan	Non-Fibrous 100	None Detected
79 / 276731	Red Duct Sealant	1983 Stage	red	Non-Fibrous 100	None Detected
80 / 276732	Red Duct Sealant	1983 Rm 104 Storage	red	Non-Fibrous 100	None Detected
81 / 276733	Interior Window Glaze	1983 Hallway	black	Non-Fibrous 95	Detected Chrysotile 5
82 / 276734	Interior Window Glaze	1983 Teacher's Lounge	black	Non-Fibrous 95	Detected Chrysotile 5
83 / 276735	Door Glass Glaze	1983 Hallway	black	Non-Fibrous 95	Detected Chrysotile 5
84 / 276736	Door Glass Glaze	1983 Hallway	black	Non-Fibrous 90	Detected Chrysotile 10
85 / 276737	Window Sill	1983 Rm 106	black	Non-Fibrous 100	None Detected
86 / 276738	Window Sill	1983 Rm 109	black	Non-Fibrous 100	None Detected

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
87 / 276739	Wood Door Insulation	1983 Rm 107	white	Cellulose 30 Non-Fibrous 70	None Detected
88 / 276740	Window Frame Caulk	1983 Exterior Window	brown	Non-Fibrous 100	None Detected
89 / 276741	Window Frame Caulk	1983 Exterior Window	brown	Non-Fibrous 100	None Detected
90 / 276742	Window Glass Glaze	1983 Exterior Window	black	Non-Fibrous 90	**Detected** **Chrysotile 10**
91 / 276743	Window Glass Glaze	1983 Exterior Window	black	Non-Fibrous 95	**Detected** **Chrysotile 5**
92 / 276744	Door Frame Caulk	1983 Exterior Door	tan	Non-Fibrous 100	None Detected
93 / 276745	Door Frame Caulk	1983 Exterior Door	gray	Non-Fibrous 100	None Detected
94 / 276746	Unit Vent Caulk	1983 Exteiror Vent	gray	Non-Fibrous 100	None Detected
95 / 276747	Unit Vent Caulk	1983 Exteiror Vent	gray	Non-Fibrous 100	None Detected

Monday 31 July 2017

Analyzed by:

End of Report

Batch: 24622

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
1		Pyro block	1930 Attic
2		" "	" "
3		Batting Insulation	"
4		" "	"
5		Plaster	1930 1st fl. hall wall
6		"	1930 2nd fl. hall wall
7		"	1930 Rm 203 wall
8		"	1930 Rm 303 wall
9		"	1930 3rd fl. Closet wall
10		"	1930 1st fl. Boys Room ceiling
11		"	1930 Rm 306 ceiling
12		Joint compound	1930 1st fl. Conference
13		" "	1930 Library
14		Textured ceiling Plaster	Boiler room
15		" "	" "
16		" "	" "
17		old Tan+Gray 12x12 VFT	1930 1st fl. OT/PT Room
18		" "	" "
19		Black mastic	"
20		" "	" "

Reported By: Jason Becotte Date: 7-27-17 Due Date: ----------

Received By: [signature] Date: 7/28/17

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
21		old off white/green 12x12 VFT	1930 1st fl. Library
22		" "	" "
23		Black mastic	" "
24		" "	" "
25		new 12x12 VFT	1930 1st fl. hallway
26		" "	" "
27		old Black mastic	" "
28		" "	" "
29		new 12x12 VFT	1930 Room 203 Top Layer
30		" "	1930 Rm 205 top layer
31		" "	1930 Rm 304 top layer
32		Hidden Poured Flooring	1930 Rm 203
33		" "	1930 Rm 205
34		" "	1930 Rm 304
35		Flooring Plaster	1930 Rm 203
36		" "	1930 Rm 205
37		" "	1930 Rm 304
38		Black Flooring Paper	1930 Rm 203 Bottom Layer
39		" "	1930 Rm 205 Bottom Layer
40		" "	1930 Rm 304 Bottom Layer

Reported By: Jason Beaute Date: 7-27-17 Due Date: ----------

Received By: ---------- Date: ----------

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
41		Boiler exhaust insulation	Boiler room
42		"	"
43		"	"
44		2x4 SAT Craggy	1930 1st fl. Library
45		"	1930 1st fl. Conference room
46		Door frame caulk	1930 Exterior door
47		window glaze	1930 exterior window
48		"	"
49		unit vent caulk	1930 exterior vent
50		"	"
51		sheetrock wall panel	modular Hallway
52		"	modular Room 5
53		Tan w/Brown 12x12 VFT	modular Hallway
54		"	modular Room 5
55		yellow glue	on # 53
56		"	on # 54
57		2x4 SAT modern	modular Hallway
58		"	modular Room 5
59		Black sink coating	1983 Teachers room
60		"	"

Reported By: Jason Becotte Date: 7-27-17 Due Date: ---

Received By: --- Date: ---

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
61		Ceramic Covebase glue	1983 Boys room
62		" "	" "
63		2x4 SAT Craggy	1983 Rm 108
64		" "	1983 Rm 104
65		old offwhite/green 12x12VFT	1983 nurse
66		" "	1983 Teachers Lounge
67		Black mastic	on # 65
68		" "	on # 66
69		old gray/Tan 12x12 VFT	1983 Hallway
70		" "	1983 Rm 101
71		Black mastic	on # 69
72		" "	on # 70
73		new Tan/Brown 12x12VFT	1983 Rm 108
74		" "	1983 Rm 109
75		Black mastic	on # 73
76		" "	on # 74
77		new Beige 12x12 VFT	1983 Rm 112
78		" "	" "
79		Red duct sealant	1983 Stage
80		" "	1983 Rm 104 storage

Reported By: Jason Beattie Date: 7-27-17 Due Date: ----------

Received By: ---------- Date: ----------

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
81		Interior window glaze	1983 Hallway
82		"	1983 Teachers Lounge
83		Door glass glaze	1983 Hallway
84		"	"
85		window sill	1983 Rm 106
86		"	1983 Rm 109
87		wood door Insulation	1983 Rm 107
88		window Frame caulk	1983 exterior window
89		"	"
90		window glass glaze	1983 exterior window
91		"	"
92		Door Frame caulk	1983 exterior door
93		"	"
94		unit vent caulk	1983 exterior vent
95		"	"

Reported By: Jason Becotte Date: 7-27-17 Due Date: ---

Received By: --- Date: ---

OrderID: 011706025

011706025

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Mercury
72-hour TAT

Town/City: Northbridge, MA Building Name Northbridge Elementary

Sample	Result	Description of Material	Sample Location
1		Rubber Flooring	1983 Gym
2		1 1	1 1

Reported By: Jason Bewsee Date: 7-26-17 Due Date:

Received By: 21.3 Date: 7/28/17 09:45

RECEIVED
JUL 27 2017
By

Fx: 7953 1825 8011

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **Ammar Dieb**
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Phone: (508) 628-5486
Fax: (508) 628-5488

8/2/2017

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 7/28/2017. The results are tabulated on the attached data pages for the following client designated project:

Northbridge Elementary - Northbridge, MA

The reference number for these samples is EMSL Order #011706025. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order: 011706025
CustomerID: UEC63
CustomerPO:
ProjectID:

Attn: **Ammar Dieb**
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (508) 628-5486
Fax: (508) 628-5488
Received: 07/28/17 9:45 AM

Project: **Northbridge Elementary - Northbridge, MA**

Analytical Results

Client Sample Description 1
Rubber Flooring - 1983 Gym
Collected: 7/26/2017 ***Lab ID:*** *011706025-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	0.050	0.049	mg/Kg	7/31/2017	LY	7/31/2017	LY

Client Sample Description 2
Rubber Flooring - 1983 Gym
Collected: 7/26/2017 ***Lab ID:*** *011706025-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	ND	0.049	mg/Kg	7/31/2017	LY	7/31/2017	LY

Definitions:
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)

OrderID: 131703310

131703310

UEC universal environmental consultants
12 Brewster Road
Framingham, MA 01702
Phone: 508.628.5486
Fax: 508.628.5488

CHAIN OF CUSTODY

BUILDING / SITE NAME: Northbridge Elementary
TOWN / CITY: Northbridge
WORK AREA:
STATE: MA

Analysis Type	Turnaround Time (x)				
	6-8 Hr	12 Hr	24 Hr	48 Hr	72 hr
TEM / AHERA					
TEM / Level II					
TEM / Dust					
TEM / Bulk					
TEM / Water					
PLM					
Mold			X		
Other:					

Specific Project Notes

SAMPLE ID	MATERIAL DESCRIPTION	SAMPLE LOCATION	START	STOP	TIME	L/MIN	VOLUME
1	24221555	Room M-4	1324	1334	10	15	150
2	24221595	Room 104	1327	1337	10	15	150
3	24219704	Library	1336	1346	10	15	150
4	24219701	Room 209	1340	1350	10	15	150
5	24219675	Room 301	1349	1359	10	15	150
6	24221561	outside	1351	1401	10	15	150

SAMPLED BY: Jason Belcotte
DATE/TIME: 7-25-17
RECEIVED BY:
DATE/TIME:

RECEIVED
JUL 27 2017
By

RELINQUISHED BY:
DATE/TIME:
RECEIVED IN LAB BY:
DATE/TIME:

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131703310
Customer ID: UEC63
Customer PO:
Project ID:

Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project: Northbridge Elementary

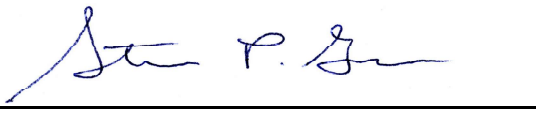
Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 07/25/2017
Received: 07/27/2017
Analyzed: 07/27/2017

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	131703310-0001			131703310-0002			131703310-0003		
Client Sample ID:	1			2			3		
Volume (L):	150			150			150		
Sample Location	room M-4			room 104			library		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	2	40	2
Aspergillus/Penicillium	-	-	-	-	-	-	1	20	1
Basidiospores	13	280	100	4	90	69.2	86	1900	93.6
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	2	40	30.8	3	70	3.4
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Cercospora	-	-	-	-	-	-	-	-	-
Total Fungi	**13**	**280**	**100**	**6**	**130**	**100**	**92**	**2030**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.



Steve Grise, Laboratory Manager
or other approved signatory

Initial report from: 07/27/2017 13:37:37

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131703310
Customer ID: UEC63
Customer PO:
Project ID:

Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 07/25/2017
Received: 07/27/2017
Analyzed: 07/27/2017

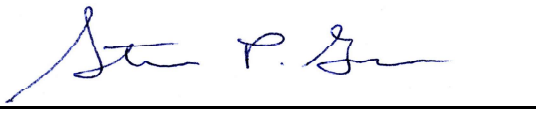
Project: Northbridge Elementary

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	131703310-0004			131703310-0005			131703310-0006		
Client Sample ID:	4			5			6		
Volume (L):	150			150			150		
Sample Location	room 204			room 301			outside		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	-	-	-	1*	7*	0.1
Ascospores	3	70	2.1	-	-	-	47	1000	7.2
Aspergillus/Penicillium	-	-	-	7	200	11.6	-	-	-
Basidiospores	142	3100	95.1	71	1500	87.2	583	12700	91.5
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	3*	20*	0.6	-	-	-	1	20	0.1
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	3	70	2.1	1	20	1.2	5	100	0.7
Myxomycetes++	-	-	-	-	-	-	2	40	0.3
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Cercospora	-	-	-	-	-	-	1*	7*	0.1
Total Fungi	**151**	**3260**	**100**	**79**	**1720**	**100**	**640**	**13874**	**100**
Hyphal Fragment	-	-	-	1	20	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.



Steve Grise, Laboratory Manager
or other approved signatory

Initial report from: 07/27/2017 13:37:37

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

AccuStar
Laboratoire Professionnel D'analyse du Radon Depuis 1984

Radon in Air

NELAC NY 11769
NRPP 101193 AL
NRSB ARL0017

EPA Method #402-R-92-004
Liquid Scintillation
NRPP Device Code 8088
NRSB Device Code 12193

Laboratory Report for:

Universal Environmental Consultant
12 Brewster Road
Framingham MA 01702

Property Tested:

Northbridge Elementary School
30 Cross Street
Whitinsville MA 01588

Log Number	Device Number	Test Exposure Duration:		Area Tested	Result (pCi/L)
2143578	3486390	07/24/2017 2:30 pm	07/27/2017 11:35 am	First Floor Library	0.8
2143579	3486361	07/24/2017 2:33 pm	07/27/2017 11:39 am	First Floor Cafeteria	< 0.4
2143580	3486357	07/24/2017 2:36 pm	07/27/2017 11:40 am	First Floor Gym Office	2.6
2143581	3486354	07/24/2017 2:37 pm	07/27/2017 11:41 am	First Floor Room 105	< 0.4
2143582	3486363	07/24/2017 2:38 pm	07/27/2017 11:42 am	First Floor Room 111	1.2

Comment: Device 3486396 was not received with this datasheet. Universal Environmental Consultant was emailed a copy of this report.

Test Performed By: Jason Becotte

Distributed by: Universal Environmental Consultant

Date Received: 07/27/2017 Date Logged: 07/27/2017 Date Analyzed: 07/28/2017 Date Reported: 07/28/2017

Report Reviewed By: Michael Cleveland Report Approved By:

Shawn Price, Director of Laboratory Operations, AccuStar Labs

Disclaimer:

The uncertainty of this radon measurement is ~+/- 10 %. Factors contributing to uncertainty include statistical variations, daily and seasonal variations in radon concentrations, sample collection techniques and operation of the dwelling. Interference with test conditions may influence the test results.

This report may only be transferred to a third party in its entirety. Analytical results relate to the samples AS RECEIVED BY THE LABORATORY. Results shown on this report represent levels of radon gas measured between the dates shown in the room or area of the site identified above as "Property Tested". Incorrect information will affect results. The results may not be construed as either predictive or supportive of measurements conducted in any area of this structure at any other time. AccuStar Labs, its employees and agents are not responsible for the consequences of any action taken or not taken based upon the results reported or any verbal or written interpretation of the results.

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