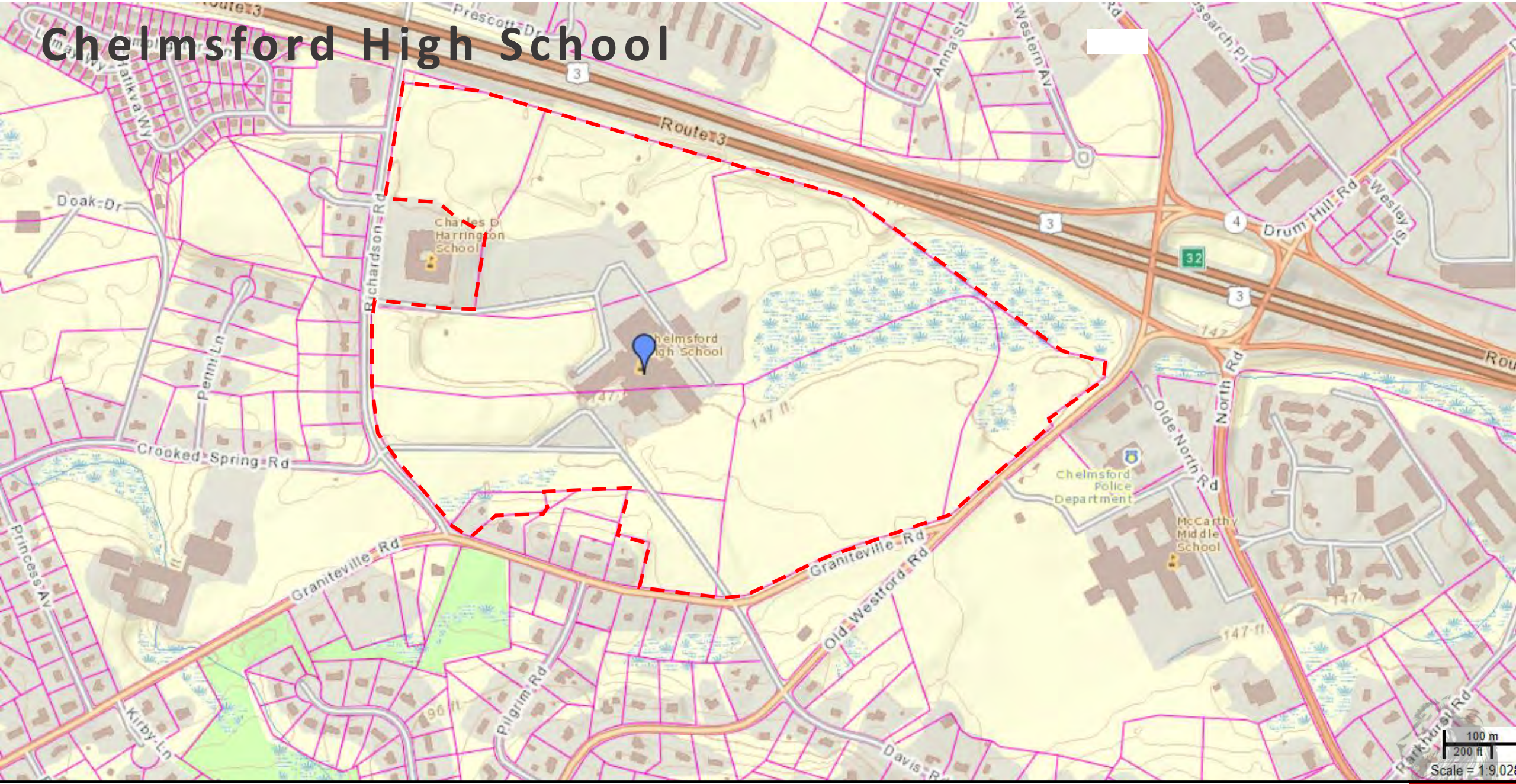
Chelmsford High School



Dore & Whittier Architects Inc.

A1-1

Chelmsford High School

ARCHITECTURAL ASSESSMENT

GENERAL DESCRIPTION

The High School was designed by Day & Zimmermann Associates in 1972, and constructed in 1973-74. A renovation and addition in 2008 by Flansburgh Architects included updates to the science and technology classrooms and a theater addition. The upper two floors of the school have been relatively untouched since the original construction in 1972.

The building is three-stories with an "at grade" level gross floor area of approximately 134,000 SF, and a total of approximately 305,810 gross square feet.

The building is generally described as a steel framed structure, with non-loadbearing interior and exterior walls. The structure is partially 'fireproofed', and as such best fits the description of a Type II-A/II-B construction as defined by the current building code. There is a fire suppression system (sprinklers) in limited areas of the building.

Current enrollment is approximately 1510 students in grades 9-12. Peak staff during the day numbers approximately 225 people.

The building survey for this report was conducted on February 16 - 17, 2016.

Image 1

Image 2

Image 3

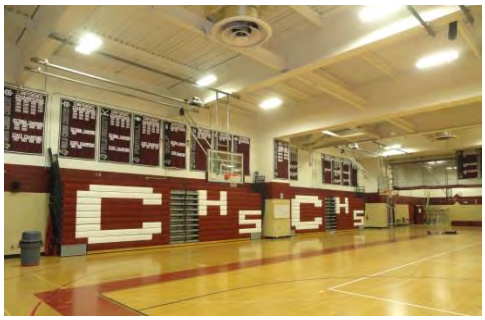
Image 4

GENERAL CODE CONSIDERATIONS

As an occupied building with approved occupant use, significant code upgrades are not required in order to continue using the facility, unless specifically identified as issues requiring remediation by the Building Inspector. However, as the building currently stands, any plans for significant renovations or additions should be planned with the awareness of the following limitations.

At 305,810 square feet in area, a simple analysis of the building occupancy, construction type, and fire protection features suggests that the building appears to significantly exceed the maximum allowable area for its construction type and primary use occupancy. As such, it is likely that any additions to the existing building would require fire walls to subdivide the building, or the installation of a fully automatic fire suppression system (sprinklers) throughout

Image 5



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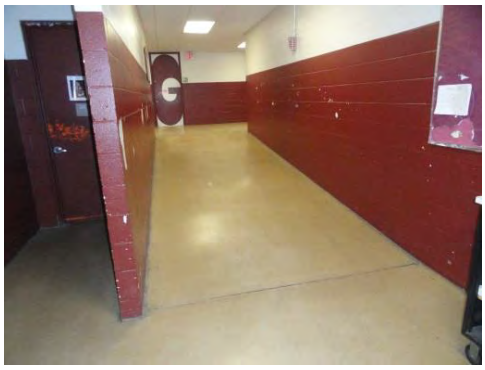


Image 7

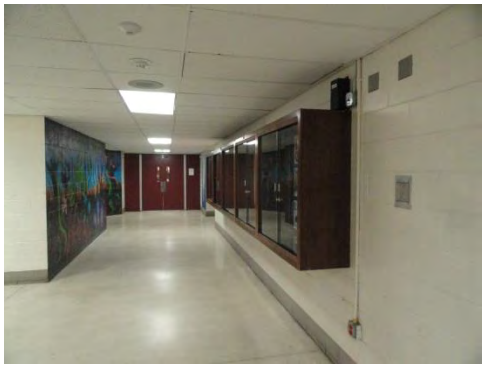


Image 8

the entire facility in order to meet current code. Per MGL Chapter 148 of the current building code educational facilities in excess of 7,500 GSF require fire sprinklers throughout the building. The addition of these sprinklers would also benefit the building height and area limitations previously mentioned.

A more in-depth analysis of the building occupancies and strategies to satisfy building height and area limitations would be required to confirm code requirements at the time of additions or renovations.

Based on the construction type, building area, and lack of sprinkler systems, the current code also requires that different occupancy areas to be separated with rated partitions, and fire walls.

Building codes have been modified since the building was constructed in 1972 and since the addition in 2008. While building codes allow the building to continue to be used for its current purpose without mandatory upgrades (unless specific items have been identified by the Building Inspector as being unsafe), if renovations or capital improvements are to be considered in compliance with current building codes will need to be met. This would include the addition of sprinklers throughout and removal of wired glazing which is no longer an accepted means of fire-rating.

ACCESSIBILITY

The Chelmsford High School has multiple conditions that are considered non-accessible or do not meet the current Massachusetts Architectural Access Board Rules (MAAB) or the Americans with Disabilities Act (2010) Standards (ADA).

EXTERIOR SITE AND BUILDING ENTRANCE

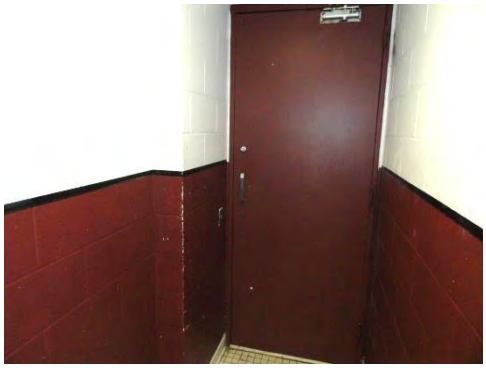
The main entrance to the school and theater are accessible, the entryways are at grade and proper hardware has been installed on the exterior doors to allow for accessibility. However, the travel distance and path from accessible parking appear to exceed the allowable travel distance.

INTERIOR SPACES

The building includes some barriers to accessibility, as it does not provide an accessible route throughout the building and equal access to all spaces. The ramp the gym floor and performing arts wing is too steep per the current code and does not have railings as required for accessible ramps (image 7). Accessibility is provided to these spaces only by exiting and reentering the building. An elevator, lift or renovation to the interior ramp is required to connect these floors properly.

Other specific considerations for accessibility include:

- Provide accessible parking spaces within the maximum travel distance to the main entrance and the entrance to the theater
- Provide curb cuts and cross walks to clearly identify the accessible path
- Renovate existing ramp connection to the lower gym floor with the main corridor to provide the proper slope and handrails
- The gang toilet rooms were being renovated at the time of the survey so they were not included in the survey. It is assumed that the renovations will include accessible fixtures and accessories
- Multiple entries (classrooms, offices, etc.) do not have minimum clearance for pulling or pushing the door open if it has a closer. (Image 10)
- Stairs in the original building do not meet current rise and run requirements. (Image 13)
- Some handrails do not extend as required by current code.
- Some handrails are not the required diameter or dimension from the wall as required by current code. (Image 14)
- Multiple display cases and cabinets protrude from the wall, more than is allowed in the code. (Image 8)
- Many drinking fountains do not provide the required space below and proper height for



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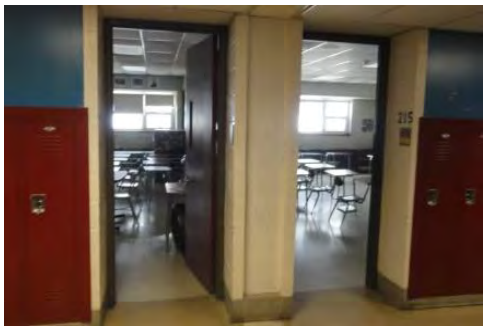

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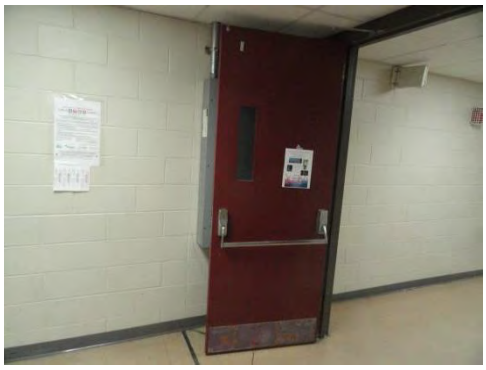


Image 11

Image 12

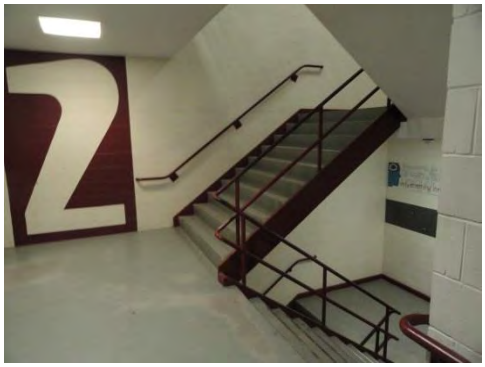


Image 13

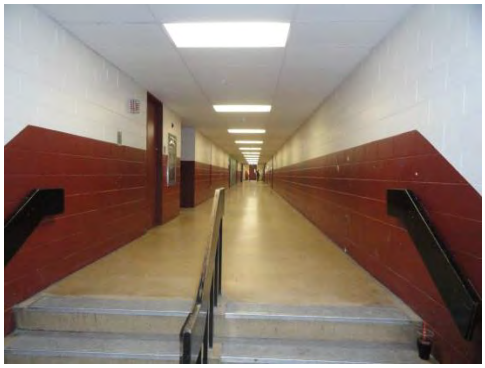


Image 14

Image 15

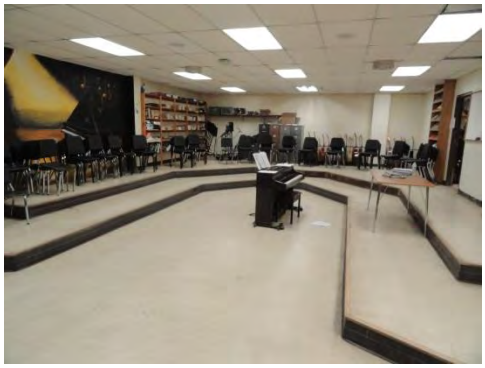


Image 16

someone to roll up with a wheelchair to use them (Image 15)

- Several rooms have tiered floors (lecture halls, choral and band rooms) that are not accessible to someone in a wheelchair. Ramps should be provided in these locations.

EXTERIOR

FOUNDATION

The concrete foundations are overall in generally good condition.

Specific Conditions

- Formed in place interior foundation walls below grade are in good to fair condition (Image 17)
- Areas of the school have retaining concrete foundation walls that are in fair to poor condition.
- The northeast classroom wing appears to have some cracking in the foundation walls. (Image 18)

Recommendations

- Patch and repair cracks in walls.

WALLS

In general the exterior walls are in good to fair condition.

Specific Considerations

- Most of the exterior walls are split-face block and in good condition.
- Accent metal panels are located at the front entrance (Image 1), and at the theater addition (Image 19). These panels are in good condition.
- Standing seam metal panel soffits at the gymnasium are losing their paint (Image 20).
- Some weeps in the CMU and split-face block walls have been blocked by debris or insects.
- Control joints are in fair condition throughout the school.

Recommendations

- Standing seam accent walls at the gymnasium are losing their paint and need to be properly primed and re-painted.
- Remove debris from weeps to allow proper ventilation and drainage from wall cavity.
- Repair exterior control joints

Image 17

WINDOWS

The windows are generally in good condition.

Specific Issues

- Aluminum-framed windows throughout the school and performing arts addition are in good condition. The sealing at the windows appears to be in fair condition.
- The shades are always drawn in the dressing rooms and attached toilet rooms to provide privacy, but don't allow natural light into the rooms.
- The window and door heads and sills on the north and west sides of the Performing Arts wing have gaps or cracked mortar at the lintel and/or sill. The lipped brick at the lintel doesn't sit properly in several locations.
- Windows at the gymnasium may not be flashed properly. Water runoff from the windows has stained ribbed block below them (Image 21)

Image 18

Recommendations

- The dressing rooms and attached toilet rooms need privacy glazing or screening. Consider a privacy film on the window.
- Repair door heads and sills on the north and west sides of the Performing Arts wing
- Review flashing at windows in Gymnasium. Remove windows and replace flashing.

Image 19

Image 20

Image 21

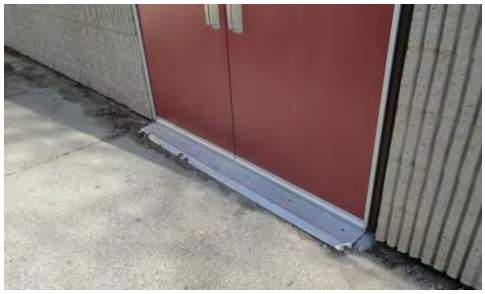


Image 22

Image 23

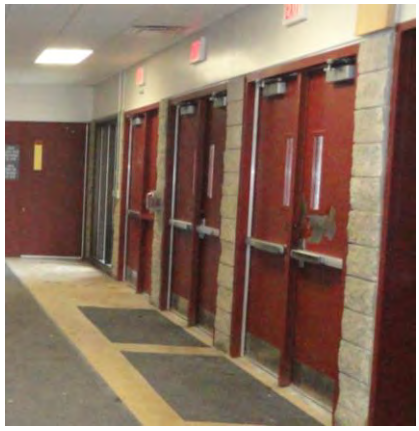


Image 24

DOORS

The condition of the exterior doors varies from good to fair. Some doors have been replaced and have upgraded hardware, others appear to be original to the building. In several areas the thresholds need to be replaced to meet ADA requirements. All exterior doors should be regularly checked to verify that exit hardware and locking systems are in proper working order.

Specific Issues

- Several doors have thresholds that do not meet current codes for accessibility. (Image 22)
- Egress doors from the gymnasium have a step down immediately at the door. This is not acceptable per current accessibility codes and is not considered a safe egress. (Image 23)
- The painted finish on several metal doors has chipped off, which could lead to rusting
- Overhead door at the theater scenery room is in good shape.
- Special oversized doors at the wood shop appear to be in good shape

Recommendations

- A pad and ramp should to be placed at the egress doors from the gymnasium.
- Repair and replace thresholds at doors that exceed ½" in height at egress exits.
- Repaint metal doors and frames to prevent deterioration

LOUVERS / OTHER OPENINGS

Unit ventilators exist in most of the classrooms. These are vented directly to the outside and have metal louvers

Specific Issues

- Aluminum unit ventilator louvers are in good shape. (Image 25)
- Other exterior vents appear to be in good condition and free of debris

Recommendations

- Continue to maintain screens and vents

ROOF

Due to snow and weather conditions the team did not attempt to get onto the roof for surveying. The team is aware of the following conditions.

Specific Conditions

- 2006 replacement of roof is a PVC adhered membrane system.
- Recent installation of photo voltaic cells on roofs.
- Several interior ceiling tiles were found with water stains indicative of a possible roof leak. The age and source of the stains is unknown.

Recommendations

- Investigate source of staining at ceilings. If found to be infiltration at the roof area patch and repair roofing material.

Image 22

Image 23

INTERIOR

FLOORING

Flooring material and condition vary throughout the school. There is carpet in offices and administration spaces as well as in the library. Vinyl composite tile (VCT) is the most common flooring material and can be found in most classrooms, corridors, hallways. The kitchen area has quarry tile and most restrooms have ceramic tile. The flooring condition varies significantly from very good to poor and in need of repair or replacement.

Specific conditions

- Sports flooring system in gymnasium with a faux wood finish is in fair condition. There are some locations with buckling and some missing seams. (Image 27)
- The flooring in the auxiliary gym is wood covered with wrestling mats. Both the wood floor and the mats are in poor condition (Image 28)
- Terrazzo floors in the corridors of the original building are in fair condition. Patching is noted in a few locations where door entries have been renovated (Image 29).
- Corridor stairs at the gymnasium have metal treads in fair condition. (Image 30)

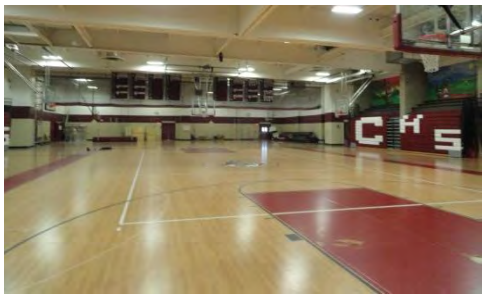


Image 24

Image 28

Image 25

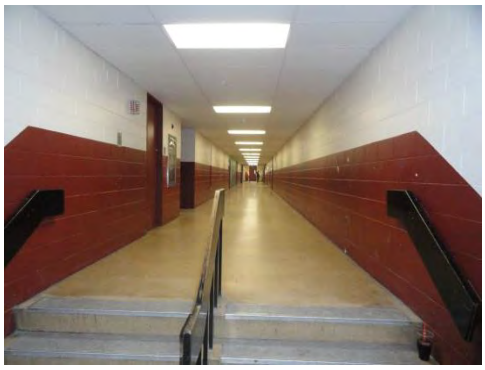


Image 26

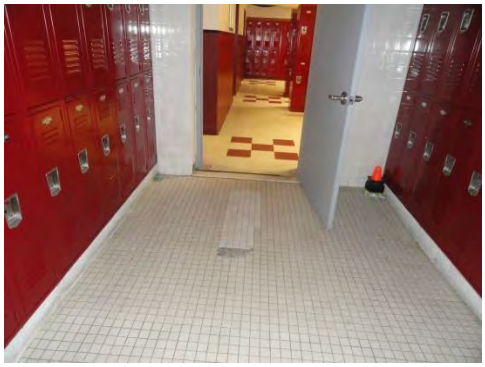


Image 31

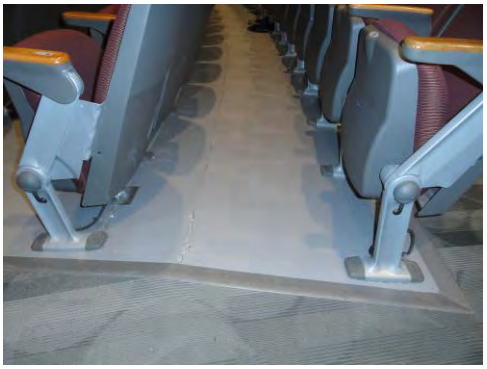


Image 32

- Classrooms, locker rooms, offices and cafeterias have VCT generally in fair condition. VCT in the science classrooms appear to be newer and in better shape, however there are seams and tiles that are popping or separating.
- Other locker rooms, most toilet rooms, and shower rooms have ceramic tile flooring in fair to poor condition. Several rooms have areas of patched flooring and in most areas the grout is stained (Image 31)
- Some toilet rooms were being renovated during our visit. One of the toilet rooms in the process of being renovated had epoxy flooring that was new.
- Athletic offices have sheet vinyl flooring in fair condition. The seams are separating.
- Sports flooring in the weight room is in fair condition.
- The ramp to the gym is terrazzo floor to match the corridors. However, this flooring should be a non-slip surface flooring to meet current code requirements.
- Flooring in the Ice Room has been removed, but adhesive and the seams of old floor tiles are visible.
- In general the flooring in the Arts Wing is in good to very good condition. There are some areas where the concrete topping surface has cracked and should be repaired (Image 32)
- Carpet in the Art Wing and Library is in good condition (Image 32 & 33)
- Carpet in the administration offices and other area appears worn and in good – fair condition
- Sealed/painted concrete in the wood shop, custodial closets and storage rooms appears to be in fair condition. However many areas should be repainted and cracks in the floor should be patched to prevent further deterioration of the floor and tripping hazards (Image 34).
- The quarry tile in the kitchen and servery is in fair condition. Portions of tile have been replaced with mismatched quarry tiles. Older portions of the tile have grout that has stained and appears dirty (Image 35).

Recommendations

- Repair or replace gym flooring
- Replace wood flooring and mats in the auxiliary gym / wrestling room.

- Review VCT in all classrooms and corridors, replace tiles that are popping or cracked
- Replace bathrooms, locker rooms, and shower area ceramic tile floors with epoxy flooring
- Install non-slip material at the ramp, preferably at the same time as correcting the slope to meet current codes.
- Install non-slip flooring in the ice room.
- Patch and repair concrete flooring in the workshop areas
- Replace quarry tile flooring in the kitchen and servery space

Image 27

Image 28

WALLS & PARTITIONS

Corridor and partition walls are mostly painted cmu block walls. Most are in good condition with a few signs of step cracking and cracking at joints. Where gypsum wall partitions exist, mostly in office and administration spaces, these walls are also in good condition.

Specific Conditions

- Folding partitions are in poor condition. These partition walls do not appear to be operable (Image 36).
- Corridor walls are largely painted CMU in good condition. (Image 37). There are many murals by students throughout the building, some require re-painting.
- Some CMU walls have step cracks or cracks at the joints that should be repaired
- Gypsum wallboard partitions are in generally good condition. (Image 38)
- Accent walls with split face block or ribbed block are in good condition. (Image 39)
- Vinyl wall base on many of the walls is very dirty and is peeling off the wall
- CMU walls have painted base that is water stained and dirty from floor cleaning

Image 35

Recommendations

- Replacing existing folding partitions with a stud and gypsum wall that provides appropriate acoustical separation between classrooms.
- Review areas of cracked CMU wall, repair walls as required to prevent further cracking of the block

Image 36

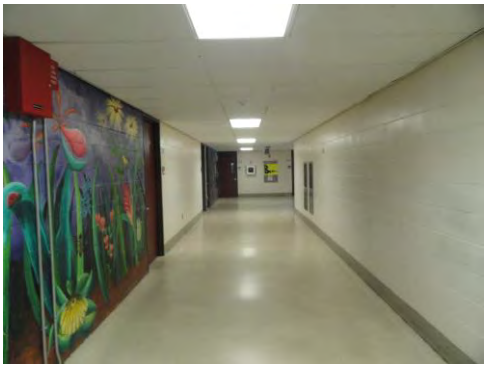


Image 37

Image 38

Image 39

Image 40

- Replace vinyl wall base, consider use of a darker color to prevent the look of dirt and scuffing at the base
- Repaint CMU wall base, consider a darker color to prevent the look of built up dirt at the base

CEILINGS

Most ceilings are acoustical lay-in tiles. Some looked new (as if recently replaced), however others throughout the building were stained. It is unknown how long the stains have been on the ceilings or the direct cause of the staining. On the third floor this may be an indication of roof leaks, on other floors this could be a result of equipment leaking or water infiltration through other sources. Source of staining should be investigated at the time that the ceiling tiles are replaced.

Specific Issues

- Acoustic ceiling tile and grid that are in the science classrooms are in good condition, they were recently replaced with renovations in those rooms.
- Acoustic ceiling tile and grid in the rest of the building is in fair condition, with select areas of staining due to water leaking above the ceiling.
- Some ceilings are cupping and show damage at the edges. Cupping may be due to humidity or moisture (Image 36).
- Gypsum soffit boards are generally in good condition throughout however, some locations show staining and pealing of paint (Image 40).

Recommendations

- Replace damaged ceiling tiles and investigate the source of water or moisture.
- Where stains exist on soffits remove and replace gypsum soffits
- Investigate moisture and humidity levels in classrooms and spaces that have cupping ceiling tiles.

DOORS

Most classroom doors have vision panels and lever hardware. These doors are in generally good condition however, many do not meet the push / pull clearance required by the accessibility codes. Doors in the corridors have vision panels and panic hardware. Most of these doors are on hold opens that are tied to the fire alarm system. Many of the kick plates on these doors are rusting. This rusting in areas that are not exposed to weather is often a result of floor cleaning methods. A few doors throughout the facility still have knob hardware or pulls that do not meet accessibility code requirements. Some doors have surface mounted hardware that extends below the center of the door and interferes with the clear surface requirements of the door. In other locations the height of the push / pulls were noted as non-compliant (Image 44).

Specific Considerations

- Door hardware that does not meet accessibility requirements.
- Push / Pull clearances at doors to classrooms, restrooms or other spaces that are required to provide accessibility.
- Rusting kick plates and bottom of metal doors

Recommendations

- Replace rusting kick plates and review floor cleaning methods to prevent continued buildup of water and chemicals on the base of the doors
- Replace any remaining non-compliant door knobs with lever hardware
- Review the installed heights of door pulls and reinstall at correct heights where required
- Where renovations are planned, consider removing one or two lockers at each side of the classroom doors to provide the proper push / pull clearance for accessibility
- Where door hardware is surface mounted and is located below the center of the door, replace doors with hardware that is integral to the door system

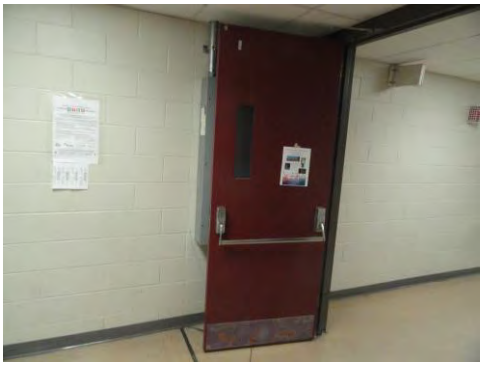


Image 41

Image 42

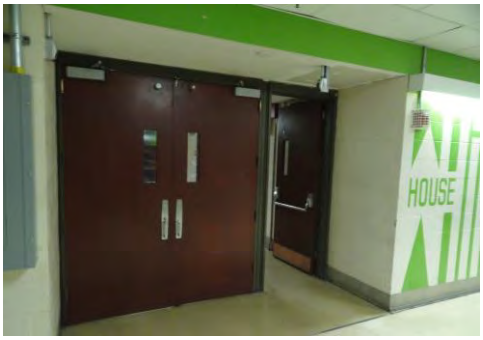
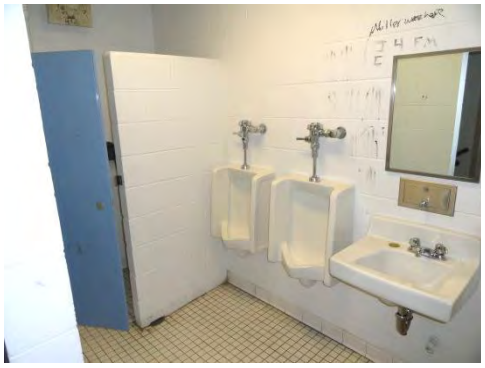


Image 43

Image 44



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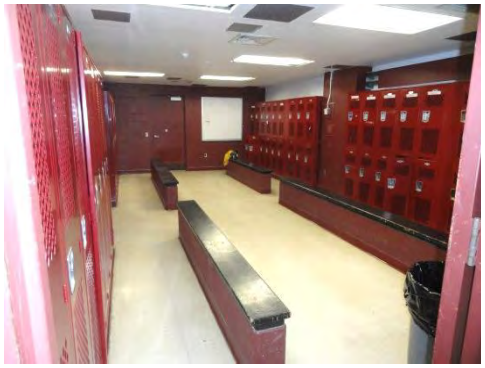

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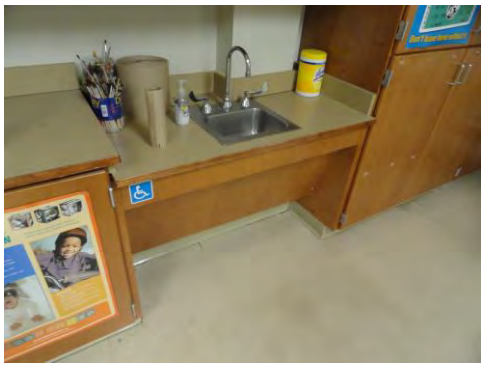

Image 47

FIXTURES & FURNITURE (BUILT-IN)

Much of the built-in fixtures and furnishings throughout the school are dated and in fair condition. Many of the restrooms are undergoing revisions. There are several restrooms where it appears that newer fixtures have been installed however, in some cases, these fixtures have not been installed to meet current code requirements. In Image 45 the two urinals appear to be recent additions to this restroom. When more than two fixtures are in a restroom at least one must be accessible. Neither of these urinals are installed at an accessible height. Partitions should be installed between urinals and the minimum distance between the sink and the urinal has not been met. The faucets on this sink are not accessible and the partition is in poor condition. Several restrooms have similar conditions. In locker rooms newer lockers have been installed in some locations. In other locker rooms the lockers are dented or damaged and in need of repair or replacement. Accessible lockers must be provided in locker rooms and in the general hallways. The older benches in the locker rooms have concrete bases and wood tops. The wood tops to the benches are worn. Showers are in poor condition and not operable.

In classrooms and administration spaces much of the built-in cabinetry is showing its age with delamination of the base cabinets and the counter tops.

Science rooms have new furnishings in good condition.

Specific Issues

- Toilet rooms and shower areas in the locker room areas seemed relatively untouched since the school was built.
- Toilet rooms lack minimum space requirements for turning. The height and locations of toilet room accessories should be checked to verify that they are installed to meet accessibility requirements.
- Some locker room benches are in poor shape and in need of repair or replacement

- Lockers in both the locker rooms and in the main corridors do not have accessible lockers
- Older lockers should be replaced
- The cabinets and other built in fixtures in classrooms are dated and in need of repair

Image 48

Recommendations

- Provide accessible lockers in corridors
- Provide accessible lockers in locker rooms
- Replace toilet partitions throughout the school
- Relocate toilet fixtures and accessories that are not installed to meet accessibility requirements
- Replace or repair classroom cabinets and countertops that are delaminating and chipping
- Replace showers in locker rooms

CIVIL ENGINEERING ASSESSMENT

Nitsch Engineering has performed research of the existing site conditions at the Chelmsford High School located at 200 Richardson Road in Chelmsford, Massachusetts. Nitsch Engineering used Chelmsford GIS and design drawings provided by the Town. Nitsch Engineering gathered information during a site visit conducted by Brittney Veeck, EIT on February 17, 2016 and a site visit conducted by Dave Conway, PE on March 4, 2016.

Image 1

GENERAL SITE DESCRIPTION

The existing Chelmsford High School is located at 200 Richardson Road, Chelmsford, Massachusetts. The site is bounded by Richardson Road and Harrington Elementary School the east, Route 3 Northwest Expressway to the North, Graniteville Road to the South, and wetlands and Old Westford Road to the east.

There is a wetland in an area to the south of the high school building that is connected below grade to the wetlands to the east of the site (Image 1).

There are two asphalt paved entrances to the site along Richardson Road and an entrance to the site along Graniteville Road. There is a parking lot to the east of the building, staff parking to the north of the building, and another parking lot north of the building and track.

Fields are located on the site as described in the Playfields section of this report.

Image 2

EXISTING SITE UTILITIES

Image 3

STORM DRAINAGE

Chelmsford GIS shows there is a closed stormwater system in a section of Graniteville Road adjacent to the site.

No downspouts were observed on site and stormwater runoff from the roof is likely collected by interior roof drain in the building and discharged below grade.

Image 4

Catch basins were observed throughout the site in all of the parking areas and driveways (Image 2). One of the catch basin grates was broken and had water bottles visibly floating in them (Image 2 and 3).

Image 5

Image 6

Image 7

Image 8

There is a bioretention basin east of the school between the parking lot and tennis courts. Inlet pipes were observed entering a sediment forebay from the west side of the basin. Stormwater then overflows into the bioretention (Image 5). There is an outlet control structure located along the west side of the bioretention basin (Image 5). It is not clear where the bioretention basin overflows.

It appears that stormwater runoff from the site may be discharged to the wetlands located along the east side of the site or to the closed drainage system in Graniteville Road.

SEWER

There are Town sewer mains in Richardson Road, Graniteville Road, and Old Westford Road adjacent to the site.

Town GIS shows the sewer service for the high school exiting the building along the southeast side then going underneath the building and then going through the parking lot before connecting with the sewer service for Harrington Elementary School. The sewer service then exits the town property and connects to the sewer main in Richardson Road.

Sewer manholes were observed onsite in similar locations as the sewer manholes from the town GIS (Image 6).

WATER

The Town of Chelmsford is split up into three separate water districts: the Chelmsford Water District, the North Chelmsford Water District, and the East Chelmsford Water District.

A water valve was observed along the north face of the building by the staff parking (Image 7). Water service likely enters the building at this point. Fire department connections were located on the face of the building adjacent to the water valve (Image 8). It is not clear whether the water service for the building connects to a Chelmsford water main.

Three (3) fire hydrants were observed onsite. One of the hydrants is located along the edge of the parking lot to the north of the school building, one is located along the parking

to the east of the building, and the other hydrant is located along the driveway from Graniteville Road.

NATURAL GAS

There is a gas meter located on the north face of the building by the staff parking. The meter is behind a partial wall (Image 9 and 10). Dig safe markings show the gas service coming through the staff parking but does not continue to the roadway. The gas service for the building may connect to the gas main in Richardson Road, Graniteville Road, or Old Westford Road.

There is a generator located at the northwest corner of the building.

Image 9

Image 10

ELECTRICAL

There is a transformer located to the north of the building along the teacher parking lot (Image 10). Electrical services enter the building along the north face near the mechanical and electric rooms.

It is not clear where the electrical service enters the site.

Image 11

EXISTING SITE CONDITIONS

SOILS

Based on the Natural Resources Conservation Service (NRCS) Middlesex County Soil Survey the site of the Parker Middle School property is on soil classified as Udorthents- Urban Land Complex, Windsor loamy sand, and Udorthents-sandy.

PAVEMENT/CURBING

The asphalt pavement within the site is in generally fair condition with some areas of cracking and degradation (Image 11).

Image 12

Walkways onsite are asphalt or concrete and are generally in fair condition. There was a lot of ice observed on sidewalks/walkways which indicates there may be poor drainage in some areas. A walkway along the wetland to the south of the building was completely iced over and unsafe to


Image 13

walk on (Image 12). A sidewalk along the parking lot to the southeast of the building was iced over and unsafe to walk on (Image 13).

There is some vertical granite curb and concrete curb onsite. The condition of the curb varies throughout the site. Some curb is in good condition and some is in poor condition and has been degraded (Image 14).

PLAYFIELDS


Image 14

The large field adjacent to Graniteville Road includes two baseball diamonds and two softball fields. The skinned infields have patches of grass growing in them and are in need of maintenance. All four of the fields have backstops, with the baseball backstops being taller and having the fenced overhangs. There are no outfield fences or lights and the grass cover through the outfield areas is patchy. There was no scoreboard or irrigation heads observed in the fields

There are six tennis and three basketball courts located on the site. Both sets of courts have severe to moderate cracking with areas of puddling and uneven play surfaces. There are no lights on the courts except for one security light adjacent to the entrance to the tennis courts.

Alumni Stadium consists of a synthetic surface play field with bleachers along both sidelines, a concession/utility building and field lighting. The bleachers on both sidelines have accessible ramps. There is a press box on the bleachers along the north side line. All of the facilities at Alumni Stadium appear to be in good to excellent condition.

The grassed practice field to the west of Alumni Stadium are in average condition with patchy grass coverage. The fields are fairly level and there appears to be some irrigation infrastructure (irrigation control boxes) in the fields. There are no lights on the practice fields and there does not appear to be any accessible path or paved roadway to the fields.

The track at the high school has seven (7) lanes, synthetic surface track with a grassed infield and event aprons (shot put, long and triple jump pits). There is a small section of bleachers along the south side line and there is an asphalt walk up to the track. There are no lights at the track and the grass in the infield is in fair condition.

PERMITTING CONCERNS

The Chelmsford High School has wetlands onsite and parts of the site are within regulated buffer zones. Work within the site may require permitting and approval from the Chelmsford Conservation Commission. The site is within a Zone II Wellhead Protection Area. The site abuts a FEMA Flood Zone A and parts of the site may be within this zone.

RECOMMENDATIONS

- Mill and overlay sections of pavement where cracking/degradation has occurred.
- Regrade paved areas to prevent ponding which can lead to ice patches in the cold weather.
- Clean out existing catch basins.
- Replace broken catch basin grate(s).
- Install hoods on existing catch basin.
- Replace degraded curb.

STRUCTURAL – CHELMSFORD HIGH SCHOOL

The purpose of this report is to assess the structure of the existing building, comment on the existing structure and comment on the structural integrity of the building.

Basis of the Report

This report is based on visual observations during our site visit on February 16, 2016. During the visit we did not remove any finishes or take measurements; so our understanding of the structure is limited.

Existing Conditions

The original school is a three-story structure. The building was constructed in 1974 with renovations and additions in 2007.

In the floors and in the stair construction, we observed light hairline cracking due to shrinkage, which is not a structural concern. Also at the stair wells, we observed concrete masonry block walls and noted small cracks. Above the cracks, on the ceiling, we observed some rust staining. The concrete floor in the basement exhibited various cracks emanating from the column box-outs.

The 2007 auditorium addition appeared to be in sound condition for the most part. We noted that one letter was missing in the “Performing Arts Center” sign.

At the roof, access was locked; thus the roof was unobservable at the time of the visit. In limited locations we were able to make observations. Photovoltaic panels are supported on the roof. Snow was on the roof at the time of the visit.

The architect reported half height masonry walls on February 17, 2016. These walls would need to be anchored to the main structure when a future renovation is planned.

The exterior façade consists of textured pre-cast concrete and appeared to be in sound condition at the time of the visit. Supporting the wall, we observed the outside face of a cast in place concrete foundation wall. In various locations we noted some cracking and delamination, probably due to moisture at grade-level. The deterioration was focused at building corners.

We observed various exterior steel columns and noted rusting.

HVAC ASSESSMENT

The Chelmsford High School had a recent renovation and addition of an auditorium. The renovation occurred in 2006 when all the classrooms unit ventilators were replaced and the existing hot water rooftop units with individual recirculation pumps were removed and replaced with gas fired roof top units. There was also a complete controls upgrade which occurred in 2015. The school mostly consists of rooftop air handlers which provide heating, ventilation and for some areas, air conditioning. These units are associated with duct distribution systems for the supply and return air. Some areas utilize duct mounted reheat coils for individual space temperature control. The general classrooms utilize unit ventilators for their heating, ventilation, and in some spaces air conditioning. Exhaust air is provided throughout the building through the use of roof mounted exhaust fans. (Figure 11) The buildings overall temperature control system is handled with direct digital controls which are manufactured by Tridium Niagra Controls. This control system is part of a town wide building management system which is serviced and installed by FMC. It appears that the building has received average maintenance over the years , however some components are beginning to fail or show signs of possible future issues.

Figure 1 - Boilers

Figure 2 – Boiler Breeching

Figure 3 – Hot Water Pumps

COOLING PLANT:

The building is not equipped with a central chiller plant. Majority of the cooling provided for the building is through the use of the roof top units which are equipped with direct expansion cooling sections. Some spaces that are served with unit ventilators are provided with split cooling systems which are served by roof mounted condensers. These specific rooms are the Choral, Band & Orchestra and the Art rooms. These condensers appear to be relatively new and in good working condition.

Figure 4 – Pump VFD Drive

Figure 5 – ATC/DDC Control Panel

Figure 6 – Entryway Cabinet Unit Heater

Specific Issues:

- None

Recommendations:

- Provide regularly scheduled routine maintenance on all roof top units and split cooling systems.

HEATING PLANT:

There are five (5) gas fired condensing boilers manufactured by Aerco, model Benchmark 2.0, each with an input capacity of 2,000 MBH and a gross output of 1760 MBH. (Figure 1) These four boilers were installed in 2000 and are in excellent condition. The fifth boiler has dual duties, during summer operation the boiler is valved off from the remaining boilers and utilized for domestic water heating only. This is accomplished through the use of a Smart Plate system which is manufactured by Aerco. This system utilizes its own pumping system which draws from the heating loop. During the winter months the valves are opened and the fifth boiler is used as part of the overall heating plant and the domestic load draws off the main heating system as needed. Each boiler is provided with dual low water cut-offs and all operating and safety controls. The boilers are sequenced from an Aerco boiler management system controller. There are no motorized isolation valves at each boiler, which allows system return water to circulate through idle boilers and mix with the hot water coming out of the active boilers. This mixing reduces overall system water supply temperature, which makes the overall heating plant less efficient. Hot water expansion is handled through the use of two horizontal non-insulated style expansion tanks. There is also a five gallon chemical shot feeder in the system for chemical treatment of the piping system. The heating hot water piping itself is schedule 40 black steel and is insulated with fiberglass insulation. The piping within the boiler room is insulated with new fiberglass insulation which was installed as part of the boiler renovations. Throughout the rest of the building the original fiberglass insulation is utilized. The boilers are vented into a common double wall stainless steel breeching which connects to the original stack that exits the building

through the roof and terminates with a rain cap. Combustion air is directly ducted to each boiler from a wall mounted louver. (Figure 2) This ductwork is insulated with fiberglass insulation. Heating hot water is circulated throughout the building with base mounted end suction pumps. (Figure 3) The system has four base mounted Bell & Gossett pumps. Two pumps serve the fin tube and unit ventilators and the other two for duct mounted hot water re-heat coils. Therefore there are two separate hot water loops that travel throughout the building. Both loops are tied together for emergency purposes in the event the pumps fail. Currently each pump set only has one pump operating while the other pump is non-functional. The non-functional pumps have been disconnected and abandoned in place. The two functioning pumps are equipped with variable frequency drives however system modulation is not being provided and both loops are being driven at constant speed. (Figure 4) For the new Auditorium addition there are two inline Taco pumps which tie into the existing hot water system. There are no variable frequency drives associated with these pumps therefore they operate at constant speed. There is no ventilation being provided in the boiler room which is not code compliant.

Specific Issues:

- There is a lot of corrosion occurring on the exposed piping and flanges within the boiler room. This may cause piping failures in the future.
- The air separator associated with the hot water system does not have an air vent.
- There are no pressure gauges on one set of pumps.
- There is no stand-by pump for each pumping sets.
- One of the existing functional pumps appears to be having a bearing issue due to the noise being generated from the impeller casing. Also this pump does not have a premium efficiency motor nor is it inverted duty which is required for pumps with variable frequency drives. This may be why the bearings are beginning to fail.

Figure 7 – Classroom Unit Ventilator

Figure 8 – Kitchen Exhaust Hood

Figure 9 – Ductless AC Unit

Figure 10 – Rooftop Air Handling Unit

Figure 11 – Roof Exhaust Fan

Figure 12 – Air Cooled Condensing Unit

Figure 13 – Fin Tube Radiation

Figure 14 – Rooftop Air Handling Unit

Recommendations:

- Further investigation should be considered to determine the water quality and the necessary chemical treatment/maintenance that should be performed.
- A second stand-by pump should be provided for each set of pumping systems.
- Any and all sections of piping insulation that is missing, damaged or soiled should be replaced.
- An air vent should be installed on the air separator.
- The existing functional pump with the non-inverted rated motor should be replaced with a premium efficiency inverted duty motor . This would include replacing the pump bearings and adding shaft grounding rings to prevent the bearings from pitting.
- Due to the high corrosion occurring on the pipe flanges and exposed pipes, consideration should be given to providing some type of ventilation/exhaust system within the boiler room. Providing tempered air recirculation can provide better air quality.

AUTOMATIC TEMPERATURE CONTROLS:

The building is served by Novar/Trend Tridium Niagra based direct digital controls. This is town wide system which was just installed in 2015. The new control system provides combination temperature sensors/CO2 sensors in each classroom which provides demand control ventilation. In the boiler room, the Trend system monitors HWS temp, HWR temp, OA temp and boiler alarms. The Trend system controls pump start/stop and speed and split air conditioner start/stop. The boilers are sequenced and operate via the standalone Aerco boiler management controller. Boiler faults are picked up by the Trend system. Utility type spaces and toilet rooms are controlled by local controls with no night setback capability. The boiler plant is equipped with an automatic outdoor air reset control function which provides energy savings when the building load does not require high temperature water due to warmer outdoor conditions. (Figure 5)

Specific Issues:

•The hot water system is not modulating based on the building load.

Recommendations:

- Provide differential pressure sensors and modulate the heating hot water system based on building demand for energy savings.

General Classrooms, Offices and Shop Areas

There are two different types of systems that heat, ventilate, and air condition these spaces. The first type is roof top units which consists of a supply and return fan, filter section, direct expansion cooling coil, and gas fired furnaces. The roof top units that were installed as part of the renovation in 2006 are manufactured by McQuay and Seasons 4. All these roof top units are associated with galvanized sheet metal duct distribution systems which deliver and return the tempered air to and from the spaces. Within the duct distribution systems are duct mounted hot water coils. These coils provide individual temperature control for each room. This system provides individual control of the hot water coil through a wall mounted thermostat. The roof top unit delivers a constant 60 degree supply air temperature which is then reheated through the use of the duct mounted hot water coil based on the individual occupant temperature set point. The roof top units do have a manufacture provided DDC controller to operate and function the gas fired furnace and direct expansion cooling. This controller / terminal strip is interfaced with the Tridium control system. The second type of system utilizes wall mounted vertical unit ventilators. (Figure 7) These units provide outside air through the use of a through wall louver system which is ducted to the back of the unit ventilator. Within the unit is a supply fan, hot water coil, a filter rack and outside/return air dampers. The unit ventilators are manufactured by Johnston Controls and have Tridium Controls within its cabinet, as well as, Belimo actuators. Each unit ventilator is controlled via the wall mounted thermostat which reports back to the DDC system. All of the classrooms along the perimeter are provided with wall mounted hot water fin tube radiation which is also controlled through the same wall mounted thermostat. (Figure 13)

Figure 15 – Ductless AC Unit Condensing Unit

Figure 16 – Rooftop Unit

Specific Issues:

- RTU-18 requires a VFD to reduce overall air flow.
- The Art room unit ventilators are original to the building and were never replaced. These units are causing temperature control issues.

Recommendations:

- Provide VFD for RTU-18
- Replace five unit ventilators associated with the Art wing.
- Provide routine maintenance on all equipment.

NON-AIR CONDITIONED SPACES:

The following spaces are not provided with any air conditioning, Locker Rooms, Gym and Kitchen. All of these spaces are only provided with heating and ventilation air through the use of roof top units.

The roof top units consist of a supply fan, filter section and a gas fired furnace. All of these roof top units are associated with galvanized sheet metal duct distribution systems which deliver and return the tempered air to and from the spaces. Each roof top unit and gas fired furnaces are both controlled via manufactures controls and tied into the building DDC system for monitoring only. Each rooftop unit is associated with its own wall mounted thermostat.

Other non-air conditioned spaces include storage rooms and some toilet rooms and corridors.

Specific Issues:

- Within the Gym, the supply and return distribution occurs high within the space. However it appears that there is an issue with heating the space. This is caused by the return and supply air being at the same level which is causing the air to be short circuited.

Recommendations:

- Due to the short circuiting issues, provide different style diffusers on the supply ductwork which will force the air down to within the occupied area.

EXHAUST SYSTEMS:

Throughout the building, general exhaust is provided through the use of roof mounted exhaust fans. These fans are located in areas such as Toilet rooms, Storage rooms, Shower areas, Custodial closets, Mechanical spaces and Electric rooms. All the fans are associated with their own independent galvanized sheet metal duct distribution systems and all terminate within the spaces with ceiling mounted grilles. Overall, most of the fans appeared to be functioning.

Specific Issues:

- None

Recommendations:

- Provide routine maintenance on all exhaust fans such as replacing belts and lubricating their motors and shafts.

COMMON AREAS:

The common areas such as Corridors, Vestibules, Restrooms and Lobbies are all heated and ventilated via local roof top units that serve that general area. The corridors and vestibules are provided with supplemental heat through the use of wall/ceiling mounted cabinet unit heaters and fin tube radiation. Each component is controlled via a wall mounted thermostat which communicates back to the Delta control system. (Figure 6)

Specific Issues:

- None

Recommendations:

- Provide routine maintenance on all equipment such as motor and shaft lubrication, filter replacement and coil cleaning.

ELECTRICAL ASSESSMENT

The original building was constructed in 1974 with the auditorium addition constructed in 2005. Most of the systems original to the 1974 building are over 40 years old and although functioning, have outlived their intended useful life. The facility's electrical service is provided by National Grid and is secondary metered. Other incoming utilities include telephone, cable TV, fiber, and fire alarm.

The power distribution system original to the 1974 building is in poor condition and should be replaced. Most of the lighting systems have been retrofitted with T8 lamps and ballasts, but most light switches and wiring were reused. Many of the areas are in need of lighting upgrades due to poor condition of the fixtures. The fire alarm system is addressable but it is obsolete. Parts are no longer manufactured but may still be available. System has full coverage, however the notification devices consist of horns; voice evacuation is currently required by code.

The emergency generator and transfer switches were installed in 2005 and are in good condition, however the existing panels that it back fed are in poor condition. The emergency lighting panels are not in compliance with current codes as there are no electrical and physical separation from non-emergency systems.

The 2005 auditorium addition and equipment installed during the upgrade are in good condition.

Figure 1 – Pad Mounted Transformer

Figure 2 – Main Switchboard

Figure 3 – Typical Original GE panels

POWER DISTRIBUTION SYSTEM

The primary service runs underground into a pad mounted transformer behind the receiving area. Secondary service runs underground between the transformer and a 3,000 ampere, 277/480 volt, 3 phase, 4 wire switchboard. The switchboard has integral C/Ts and a main breaker. The two distribution sections consist of fusible switches.

The switchboard manufactured by GE, is original to the building and is in poor condition. Most local and remote GE panelboards are also original and are generally full and in poor condition. Panels are of the breaker type and generally located within electric closets. Stepdown transformers have been replaced with newer Powersmiths ultra efficient units.

The newer transformers, in some instances, infringe on the code required working clearances for adjacent panelboards.

A 1,600 Ampere GE distribution section was tapped to the switchboard during the 2005 auditorium addition. The distribution section feeds a local 600 Amp distribution panel and the 800 Amp panel at the auditorium. One 350 Amp breaker is in the 'Off' position and there are space provisions for two breakers.

The switchgear provided during the 2005 addition was manufactured by GE and is in good condition.

The main switchboard has rear access. Electric room doors are not equipped with panic hardware. The door into the boiler room swings into the electric room, but is required to swing out.

The motor control centers are original and are in poor condition.

A 200 Amp disconnect switch has also been tapped to the switchboard to feed the automatic transfer switch, ATS 2.

Newer normal and normal/emergency surface panelboards have been provided during a receptacle upgrade in 2005. The panels are located in corridors and are in good condition. Panels were manufactured by Eaton/Cutler-Hammer. The conduit fittings have been color coded for ready ID: Yellow – N/E Power, Blue – Normal Power, the Normal Only panels are generally full. Recommendations:

1. The original 1974 switchgear is in poor condition, generally full, and should be replaced. The existing feeders and branch circuits would be refed.

INTERIOR LIGHTING

The corridor lights consist of recessed 2x4 troffers with acrylic lens and two T8 lamps. Occupancy sensors exist in corridors to control lights. A typical classroom has three rows of 2x4 recessed troffers with two T8 lamps, controlled with an occupancy sensor and one wall switch.

Figure 4 – New Transformer

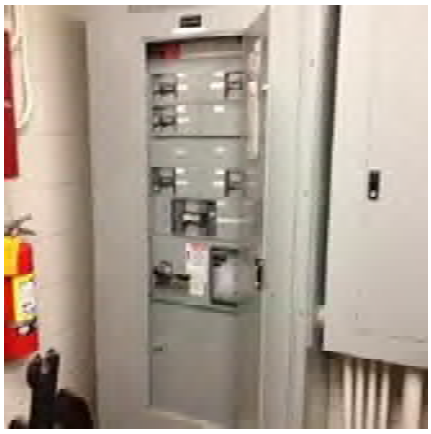

Figure 5 – Newer Distribution Panel in Auditorium

Figure 6 – Motor Control Center

Cafeteria and Science Labs have 2x4 recessed parabolic fixtures with three T8 lamps. Cafeteria also has 1x4 surface wraparound fixtures on perimeter interior walls. Fixtures are controlled with occupancy sensors.

The Kitchen has 1x4 recessed lensed fixtures with two T8 lamps. Some in poor condition. Fixtures are controlled with local switches. The hood has recessed 1x1 lensed fixtures with incandescent lamps.

Office areas have 1x4 and 2x4 recessed troffers with T8 lamps and occupancy sensors.

The Gym has 2x4 fluorescent high bays with (6) T5HO lamps with lens and wireguards. Fixtures are controlled with occupancy sensors.

The Locker rooms have 2x4 and 1x4 recessed troffers with two T8 lamps controlled with occupancy sensors. Fixtures are in poor condition.

Showers have 1x4 surface lensed fixtures also in poor condition.

The TV studio has recessed 2x2 troffers, many with broken lens. The ceiling surface mounted wiremold raceways with plug-in receptacles do not appear to be functional. The use of extension cords was noted throughout the studio for performance plug-in lights. The use of extension cords for permanent wiring is a code violation.

The Auditorium house lights have recently been replaced with LED recessed down lights. Performance lights consist of Source Four at the front of the house mounted on catwalk and two wall forms.

Isle lights exist, mounted on seat arm rest, as well as, wall mounted.

Lobby has recessed down lights with CFL lamps and pendant indirect decorative bowl fixtures.

The Stage work lights consist of fluorescent strips mounted at ceiling level, virtually inaccessible. Stage has three electrics with Source Fours fixtures and Fresnels.

Figure 7 – Tapped Disconnected Switch for ATS 2

Figure 8 – Newer Surface Panels in Corridor

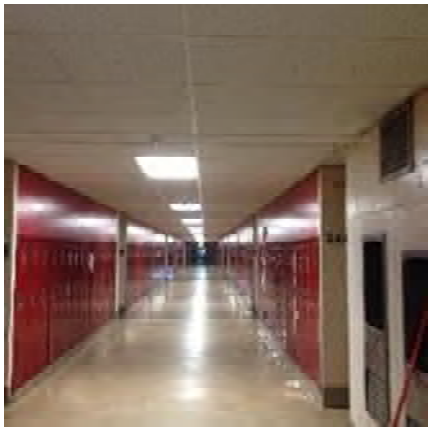

Figure 9 – Corridor Lights

The dimming system consists of an 800 Amp, 120/208 Volt, 3 Phase, 4 Wire EDI MX series system. The double rack has (150) 1.2kW dimmers. The house lights have recently been removed from the dimming racks and are now fed and controlled by a recently installed ETC-Unison Echo relay panel system.

An emergency lighting transfer cabinet, ELTS is located in the dimmer room.

The Auditorium lighting and control systems are in good condition.

The School does not have automatic dimming in areas with daylight contribution.

Overall the lighting is in fair to good condition. A fair amount of occupancy sensors are located throughout the School.

The facility does not have an Automated Lighting Control System.

Recommendations:

1. Replace lighting in Kitchen, Locker rooms, Showers, and TV Studio.
2. Under a renovation program, replace lighting with new LED sources with automatic dimming where daylight is available.
3. Provide an Automated Lighting Control System.

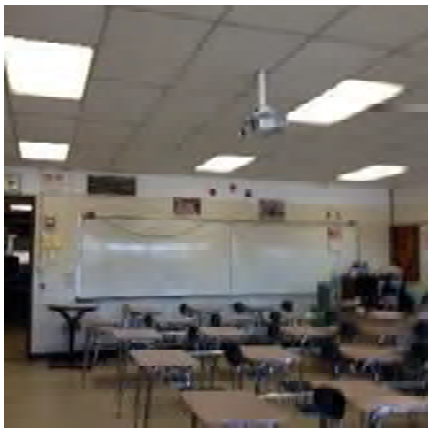

Figure 10 – Classroom Lights

Figure 11 – Cafeteria Lights

Figure 12 – Gym Lights

EXTERIOR LIGHTING

Roadway lighting consists of 12' aluminum poles with LED adjustable square fixtures. Fixtures are not dark sky compliant with the up-tilt.

Fixtures over doors range from jelly jar sconces to eyelid fixtures with compact florescent lamps.

HID mini-wall packs are located under door soffits.

The rear parking areas are lit with LED building mounted floods.

The sports field parking lot is lit with one wooden pole with three LED floods. The lot is inadequately lit.

Could not locate flagpole lighting.

The exterior lighting is timeclock controlled.

Recommendations:

1. Replace building mounted compact fluorescent sconces with LED fixtures of the cut-off type.
2. Provide uniformed pole mounted LED fixtures for parking areas.

Figure 13 – Pole Lights

EMERGENCY STANDBY SYSTEM

The facility has an exterior diesel fired generator with an integral base mounted tank and weatherproof sound attenuated enclosure.

The generator is rated at 150kW, 277/480 Volt, 3 Phase, 4 Wire, manufactured by Olympian D150P1. The generator is within a fenced area and has a 10' stack.

Figure 14 – Exterior Wall Sconce

A 200 Ampere, 277/480 Volt, 3 Phase, 4 Wire Asco series 300 automatic transfer switch ATS 1 is located in the Boiler room. The switch is fed with MI cable from the emergency source including the start circuit. The switch in part feeds the boilers, pumps, ATC compressors, sump pumps, fire pump, jockey pump, and elevator.

A second 200 Ampere, 277/480 Volt, 3 Phase, 4 Wire Asco series 300 automatic transfer switch ATS 2 is also located in the Boiler room. The switch feeds a 75kVA transformer for 120 volt loads including receptacles.

A third 100 Ampere, 277/480 Volt, 3 Phase, 4 Wire automatic transfer switch is located in an emergency closet in the Auditorium. The switch feeds emergency lighting and appears to be in compliance with current codes.

Figure 15 – Exterior Generator

The generator remote annunciator is located in the Main Electric room and includes low battery and low fuel, as well as fuel tank rupture alarms.

The generator and transfer switches were installed during 2005 and are in good condition. The emergency transfer switch and emergency panels feeding emergency lighting at the school are not housed within 2-hour rated dedicated rooms and therefore are not in compliance with current codes.

Exit signs are generally of the LED type but do not have battery back-up. While some exit signs in the gym have wireguards, others do not.

Recommendations:

1. Upgrade the life safety branch of the standby system to bring it into compliance with current codes. This would include providing 2-hour emergency closets for the life safety lighting transfer switch and emergency panels. Emergency panel feeders would require MI cable.

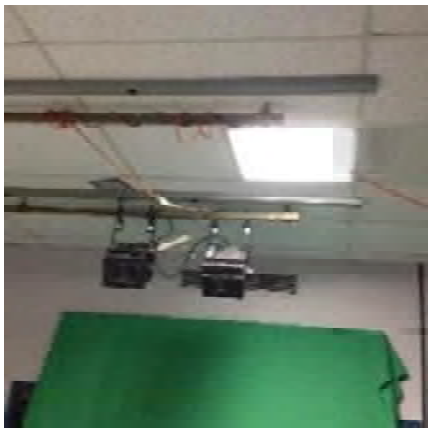

Figure 16 – TV Studio Lights

FIRE ALARM SYSTEM

The fire alarm system consists of a Gamewell/FCI IF632 addressable control panel located in the Main Electric Room. The system was installed during 2005 and the panel is obsolete. Parts are no longer manufactured but may still be available. The form of alarm transmission is via a digital dialer and also via a local energy master box #33. The master box with a lever is located at the main entrance. A knox box is located adjacent to master box. The IMSA cable runs underground between the street and the master box.

The notification appliances consist of horn/strobes in the school.

The Auditorium has voice evacuation consisting of speaker/strobes. The voice evacuation panel is manufactured by Wheelock with a microphone.

The facility has full coverage of smokes and heats.

The Auditorium addition sprinkler system is supervised including the fire pump status.

Manual pull stations exist at exterior doors. Pull stations have tamperproof covers.

A surface mounted remote LCD annunciator and graphic map are located in the Auditorium main vestibule.

Horn/strobes generally have protective wireguards.

Corridor doors have magnetic door holders.

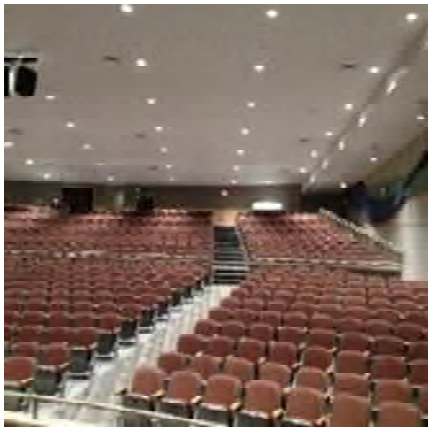

Figure 17 – Auditorium Lights

Figure 18 – Auditorium Lobby Lights

Nurse's suite has smoke detectors and strobes, but no carbon monoxide detectors were noted in sleeping areas.

Main kitchen hood does not have a fire suppression system.

Local plug-in CO detectors noted in Science classrooms.

The Stage fire curtain control panel is connected to the fire alarm system.

The Gym has (6) beam detectors with protective wireguards.

The fire alarm system generally has adequate coverage of detection and notification appliances.

Current codes require voice evacuation for Pre K-12, Group E occupancies.

Recommendations:

1. Replace fire alarm control panel with new FCI E3 which is backwards compatible with the existing devices.
2. Replace horns with speakers for general voice evacuation under a renovation. New speakers will require new twisted pair shielded cabling.

MISCELLANEOUS

The facility has a roof mounted ballasted photovoltaic system connected to the grid. A 400A and a 60A, 480 Volt main PV connect switches are located within sight of the pad mounted transformer.

One (1) 225 kW Solectria SGI225 and (2) Solectrica PVI 13kW inverters are located in the Boiler room.

The facility does not have a Lightning Protection System.

The typical classroom has a fair amount of receptacles added during the receptacle upgrade.

Kitchen receptacles are not GFI protected and are sparsely located.

Teachers desks in Science labs are located away from the wall requiring cables across floor, causing a trip hazard.

Figure 19 – ATS 1 in Boiler room

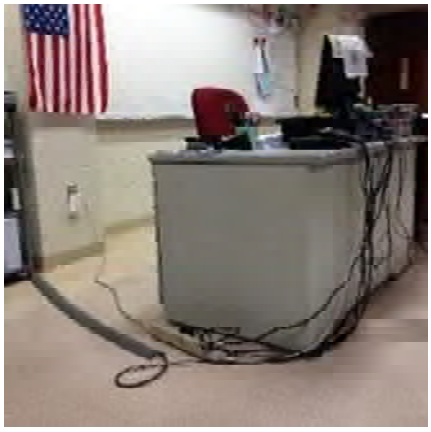

Figure 20 – Science Room Desk Wiring

Figure 21 – FACP in Electric Room

The emergency shower flow switches are not monitored for inadvertent use.

The facility does not have a bi-directional antenna system used to enhance communications with portable radios by First Responders.

DATA/TELEPHONE/CLASSROOM INTERCOM/ CLOCKS

The School's Head End/MDF room is located on the third floor adjacent to the Media Center. The MDF room is the center of the Star Topology. Each IDF in the building is connected to the MDF with vintage 62.5 micron multi-mode fiber. The High School is connected to the district WAN via a single mode fiber which is terminated in the MDF room.

Some IDFs are installed in dedicated closets; however, most are installed within other spaces. Remote IDFs are not equipped with UPS units for backup of the network electronics.

In general, the data network is in good condition; cabling varies from Cat5e to Cat6. Over time, data has been added to accommodate the technology equipment provided in the building. A series of surface mounted raceways, wiremold, and power poles have been installed for the data wiring. The quality of the installation varies throughout the building. There are examples of poor wiremold installation, most notably in the Library circulation desk.

Cables in the IDF and MDF rooms are not neatly dressed, most are strung across the patch panels to the network switch using patch cables that are too long.

Wireless coverage seems to be adequate in the majority of the school. Entersys wireless access points are installed on the ceiling and on the walls in most spaces throughout the school. The Gymnasium wireless access points are protected with a wire guard.

The MDF room contains dedicated cooling units that seem to be adequately sized. There are two for redundancy, since the High School contains the District's disaster recovery failover servers.

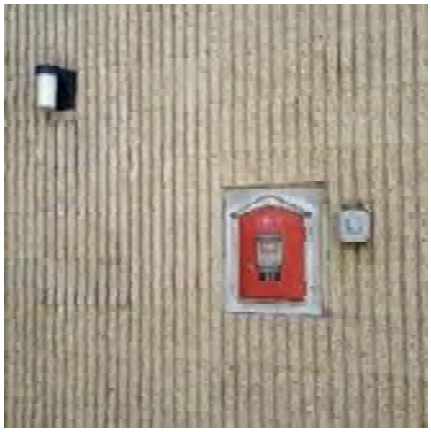

Figure 22 – Flush Master Box & Knox Box

Figure 23 – Voice Evac Panel in Auditorium

Figure 24 – Ann. & Graphic Map

The High School is equipped with numerous computer labs, specialty classrooms, and a language lab that require heavy data usage and large quantities of hard-wired data drops. In general, the quantity of data seems adequate in most spaces.

The language lab utilized SANAKO Study 1200 software.
Computers are hard-wired back to the teacher's podium.

Most classrooms are equipped with teacher workstations that connect to ceiling mounted interactive or non-interactive projectors. The cabling is typically installed in surface mounted raceways. Some classrooms contain LED monitors in lieu of projectors.

The telephone system is a hosted DSCI system; handsets are Polycom. The paging system is interfaced with the hosted system; however, it does not function properly and is problematic. A microphone was added to the paging system due to the issues of interfacing the two systems. Any building page has to be made at the microphone, which is located at the paging system head end in the Mail room on the second floor behind the Main Office.

The paging system has been upgraded to a Rauland Telecenter; however, existing wiring and speakers seem to have been reused and are in poor condition. A Standard Time 1462 Time Controller is the master clock for the school; this master clock is obsolete. Some clocks seem to be operating, however there are a number of clocks that have been replaced with stand-alone clocks.

The High School is equipped with an Intrusion Detection System which consists of an intrusion control panel, keypads, motion sensors, and door contacts. The system is a DSC Maxsys 18-zone system. Each zone is annunciated on the keypads located at building main entry points. The system is operational and in fair condition.

The High School is equipped with an access control system which consists of card readers, door controllers, request to exit devices, and electronic door hardware. The access control system is manufactured by S2. The head-end is located in the Central Administration Office Building and communicates to door controllers in the High School via the Town fiber network. There were some poorly installed card readers mounted on surface boxes that could easily be pulled off, that should be corrected.

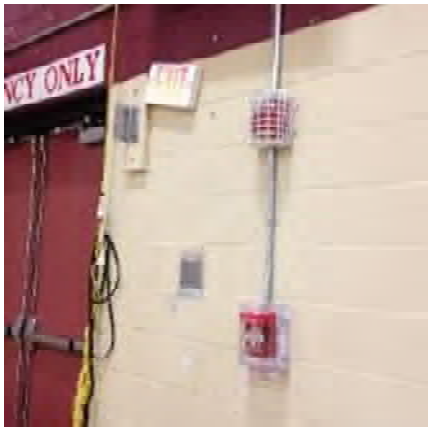

Figure 25 – Pull & Horn/Strobe

Figure 26 – Roof PV Panels

Figure 27 – 225 Kw Inverter

There were also maglocks that were used in which a push button request to exit button was installed to operate in case of motion REX failure.

There are CCTV cameras installed throughout the building, mainly in the corridors. The cameras vary in age and are in the process of being converted over to IP type. Older style cameras are Axis 211 cameras installed within ceiling dome; these are being upgraded to dome style Axis P3364 cameras. Video from those cameras are stored at the Central Administration office building and are accessed via S2 video management software. CCTV can be accessed by the Chelmsford Police Department.

The Main entry at the High School is equipped with an Aiphone intercom system with remote door release function. A video monitor is installed at the Main Administration desk to view visitors at the Main Entry, the intercom station is audio only.

PLUMBING ASSESSMENT

Presently, the plumbing systems serving the building are domestic potable hot and cold water, non-potable hot and cold water, sanitary, waste and vent system, special waste and vent system, storm drain piping, and natural gas. Municipal sewer and municipal water service the building.

The Core Toilet Rooms were in the process of being renovated at the time of our visit. It appears as though the renovated Toilet Rooms will result in water-saving type fixtures and sensor operated flush valves on the water closets and urinals. Lavatories will include sensor operated faucets.

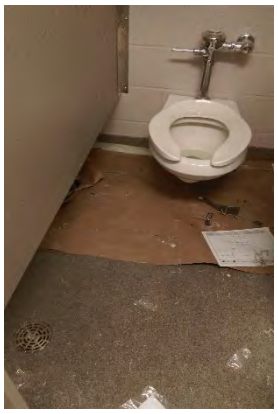

Figure 1 – Wall Hung Water Closet

FIXTURES

Water closets are wall hung and vitreous china with manual or automatic sensor type flush valves. (Figure 1)

Urinals are wall hung vitreous china with manually operated or automatic sensor type flush valves. (Figure 2)

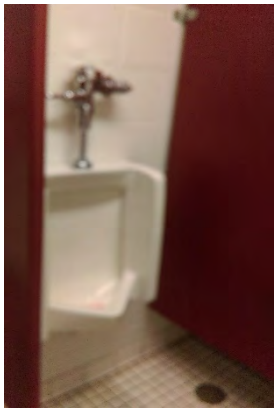

Figure 2 – Urinal

Lavatories are wall hung vitreous china. The lavatories are fitted with hot and cold water faucets (Figure 3)

Janitors sinks are floor mounted mop receptors. Faucets are equipped with vacuum breakers. (Figure 4)

Utility sinks are floor mounted molded plastic sinks with deck mounted faucet. Faucets are not equipped with vacuum breakers. (Figure 5)

Drinking fountains are stainless steel recessed type. (Figure 6)

Electric water coolers are stainless steel surface mounted or stainless steel hi low fixtures with recessed chiller.

Classroom sinks are stainless steel drop-in type with gooseneck faucet and bubbler. (Figure 7)

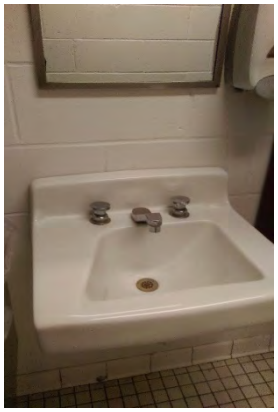

Figure 3 - Lavatory

Art sinks are molded stone wall mounted type deep 2 bowl sinks or epoxy countertops with integral bowls utilizing hot and cold faucets and are equipped with plaster traps. (Figure 8)

Science sinks are epoxy resin type with gooseneck faucet equipped with vacuum breakers. Science sinks are fed with non-potable hot and cold water and the drainage is acid resistant polypropylene piping. The drainage is directed to an acid neutralization system. (Figure 9)

Science classrooms include emergency showers and eyewashes. It appears as though the emergency fixtures are fed with cold water only. (Figure 10)

Showers include surrounds and tiled floor with floor drains. Individual tempered water supplies feed each stainless steel column type shower heads. The tempered water is delivered from a master mixing valve. (Figure 11) (Figure 12)

Kitchen area fixtures are in fair condition. The pot washing sink is piped to a floor mounted grease interceptor. (Figure 13)

WATER SYSTEM

The domestic water service is located in the Mechanical Room. The service appears to be 4" in size and includes a meter. (Figure 14)

Piping is copper tubing with sweat joints. The majority of piping is insulated. In general, the original gate valves are in fair condition. In portions of the building that have been recently renovated the piping is insulated, labeled and the ball valves are in good condition.

The main building domestic hot water is generated through a gas-fired high efficiency, condensing water heater with auxiliary storage tank. The water heater has a natural gas input of 400,000 BTUH and a water storage capacity of 100 gallons. (Figure 15)

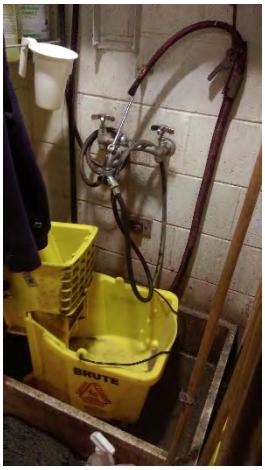

Figure 4 – Janitor's Sink


Figure 5 – Utility Sink

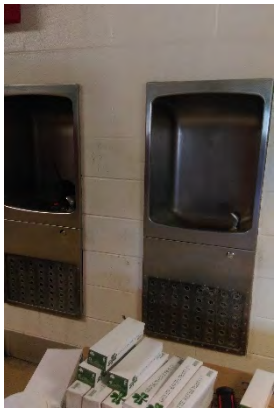
Figure 6 – Drinking Fountains

A thermostatic mixing valve is provided for the building domestic hot water system. The domestic hot water system is recirculated. (Figure 16)

GAS

Building is serviced by an elevated pressure natural gas service. The gas service, regulator, and meter is located outside the Boiler Room. Gas service is 4" in size. (Figure 17)

Gas is supplied to heating boilers, rooftop units, water heater, kitchen equipment, Science Classroom turrets and an emergency generator.

Gas piping is black steel with either welded or threaded joints, depending on pipe size.

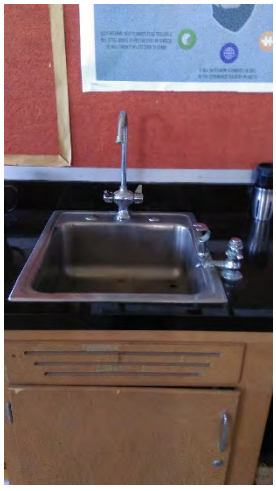

Figure 7 – Classroom Sink

SANITARY DRAINAGE SYSTEM

In general, cast iron is used for sanitary drainage. Piping and fittings above slab are no-hub with coupling joints and bell and spigot. Where visible, the cast iron pipe appears to be in fair condition. Smaller pipe sizes appear to be copper for waste. (Figure 18)

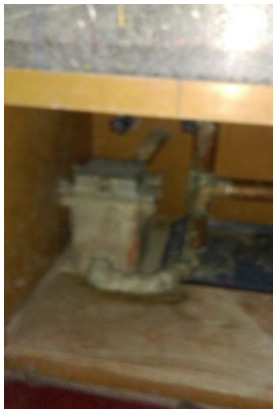

Figure 8 – Plaster Trap

ROOF DRAINAGE SYSTEM

The flat roofs are collected by roof drains and interior cast iron rain leaders. The roof and drains are in fair condition. Horizontal rain leader piping is insulated.

RECOMMENDATIONS

1. Plumbing fixtures meet current code for water conservation. However, new high-efficiency low flow fixtures could be installed to reduce water consumption in the Toilet Rooms not being renovated at the time of visit.

2. In general, existing cast iron drainage piping can be re-used if sized appropriately. We recommend video inspection of existing drains to confirm integrity.

Figure 9 – Science Sink Piping

3. Provide reduced pressure backflow preventers at Janitor's closet soap dispenser.

4. Local sewer may require Kitchen waste be directed to exterior grease trap.

5. Current Code requires emergency fixtures be supplied with tepid water. Hot and cold water should feed a mixing valve to blend water to tepid temperatures supplying the emergency showers and eyewashes.

Figure 10 – Emergency Shower/Eyewash


Figure 11 – Shower


Figure 12 – Mixing Valve


Figure 13– Pot Wash Sink


Figure 14– Water Meter


Figure 15 – Domestic Storage Tank


Figure 16 – Mixing Valve


Figure 17 – Gas Service

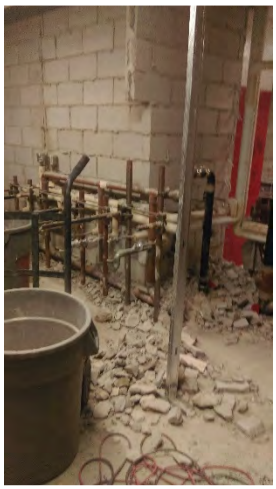
Figure 18 – Drainage Piping

FIRE PROTECTION ASSESSMENT

The Chelmsford High School was built in 1974 and underwent an extensive addition/renovation project in 2007. At that time an automatic sprinkler system was installed to protect portions of the building. Currently the High School is not 100% protected.

EXISTING CONDITIONS

There is an 8" fire service which enters the Main Mechanical Room. Service is protected with an 8" double check valve assembly.

After the double check valve a 30 horsepower fire pump boosts the fire water pressure. (Figure 1)

The system includes a wet alarm check valve and a dry pipe alarm check valve with flow switches. (Figure 2)

The Fire Department connection is a Siamese type. A water motor gong and electric bell is located above the Fire Department connection. The 3-way fire pump test header is also located on the exterior wall. (Figure 3)

Sprinkler piping is black steel with coupling joints on larger pipe size and threaded joints on smaller size branch piping. The piping appears to be in good condition.

Sprinkler heads are quick response type and appear to be only located on either side of Corridor doors.

RECOMMENDATIONS

- Owner to continue to inspect/maintain system per NFPA 25 requirements.
- Provide 100% sprinkler coverage to entire School. Compliance with Massachusetts General Law M.G.L. Chapter 148 Section 26G is required in all existing buildings in which renovations will exceed 7,500 square feet in area or in which major alterations are planned. Under these conditions, an existing building must provide a full sprinkler fire suppression system. A major alteration is defined as a reconfiguration of walls, doors, windows, mechanical systems, etc., which effectively makes installation of sprinkler systems easier and which affects more than 33% of the building area or more than 33% of the assessed value of the building.

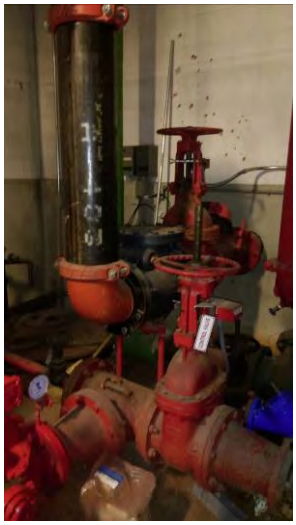

Figure 1 – Fire Pump

Figure 2 – Dry alarm Check

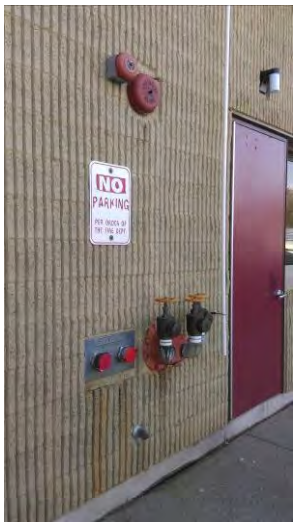

Figure 3 – FDC and Test Header

FOODSERCVICE EQUIPMENT ASSESSMENT

Figure 1

The Chelmsford High School serves approximately 1,600 students in grades 9 through 12. The facility was originally built in 1974 and underwent a renovation in 2007. As part of that renovation the kitchen was completely renovated and it appears a combination of existing and new equipment was used to refit the kitchen at that time.

The school's cafeteria kitchen serves the typical school lunch program offering a wide variety of food options at four service points. This kitchen also supports a portion of the lower schools within the district. In general, the equipment is well maintained but many pieces have failed. Floors, walls, and ceilings are constructed of the apprpriate materials and in good condition.

Figure 2

KITCHEN EQUIPMENT

During the site visit we noticed many pieces of equipment that are antiquated, have failed, or are in need of replacement.

Sneeze Guard Figure 1:

- The glass at the end of the unit is cracked.
- The guards are antiquated and no longer meet the latest standards for sneeze guard protection.

Griddle Figure 2:

- The griddle is located at one of the serving lines. The griddle is no longer used and has been off line for some time.

Figure 3

Equipment Power Source Figure 3:

- Adjacent to the storage rack there appears to be a space where a piece of equipment was located. The equipment has been removed and the power for it is still in place. It is not clear if the power feed seen here is still live. If still live this is a hazard and it must be corrected immediately.

Steamer Figure 4

- The pressure steamer shown here is a style that is no longer commonly used. It is a pressure steamer meaning the doors are sealed allowing high-pressure to build in the steam cavity. This provides for fast cooking times however these types of steamers destroy the integrity of the food. Vegetables cooked in this type of steamer tend to be soggy and less likely to appear crisp and fresh looking.

- Additionally, the high-pressure steam condition caused a safety hazard. Steam burns with this type of steamer are more likely.

- Modern steamers are much more efficient with the use of water and take up much less floor area.

Figure 4

Oven Figure 5

- There are two roll in ovens that are part of the cooking equipment. The model of oven shown in this image is no longer in common use. This roll in concept is still used but modern ovens have a much more compact footprint. The specific model shown in the image is no longer manufactured.

- The oven shown here is not used. It appears the unit has failed. The unit is now used for storage. Associated with the oven is a complimentary warming cabinet located at the end of the cooking line. See Figure 6.

Figure 5

Oven Figure 6

- The location of the warming cabinet shown in Figure 6 is not located in a convenient location. It is rather detached from the serving lines. Additionally, the unit is large. Modern units are much more compact, fully insulated, and Energy Star rated, and much more mobile.

Figure 6

Steam generator Figure 7:

- The blue steam generator shown in this image is used to generate steam for the steamer shown in Figure 4 and for the kettles shown in Figure 7.
- Not all the kettles in Figure 7 appear to be used. Two kettles have plastic coverings over them indicating they have been mothballed. Additionally, one of the kettles has a mixer associated with it. The mixer does not appear to be used which is not surprising since the style of cooking is no longer needed for the modern school lunch program.

Figure 7

Deck oven and Range Figure 8:

The deck oven in Figure 8 is the workhorse in this kitchen. We suggest replacing the shown oven with a convection oven. A modern convection oven will encompass a smaller footprint but at the same time allowing for higher product output.

The two-burner range adjacent to the range is a standing pilot burner system. A modern range will allow for a pilotless burner system, which is more energy efficient and allows for additional safety features that prevent gas leaks.

The range does not have a surface protection that is provided by a fire suppression system. A fire protection system is prescribed by current NFPA 96 code. In a modern kitchen the range top would be protected by a wet chemical fire suppression system that is also tied into the building fire alarm system.

Figure 8

Tilt Braising Pan Figure 9:

The tilt-braising pan does not have a fire suppression system above it as prescribed buy current code requirements. In a modern kitchen the braiser would be protected by a wet chemical fire suppression system.

The cover assist mechanism on the braising pan is broken.

Figure 9

Recommendations:

1. Eliminate electrical hazards.

2. Refit the equipment below the cooking lines to better reflect a more contemporary style of cooking. At this time address the lack of proper fire suppression equipment.

3. Identify equipment items within the kitchen and serving areas that are no longer used and remove them. In place of the removed items study the food program to see what new equipment should be put in place to better serve the kitchen staff and students.

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 years of experience.

As part of the proposed renovation and demolition project, UEC was contracted by Dore & Whittier Architects to conduct the following services at the High School, Chelmsford, MA:

- Inspection and Testing for Asbestos Containing Materials (ACM);
- Inspection for Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures;
- Inspection for Lead Based Paint (LBP).

Information included in this report was based on the AHERA Management Plans and on a determination inspection performed by UEC. Limited testing was performed as part of this study. It is recommended that once a detailed scope of work is identified for a renovation or a demolition project, a comprehensive Environmental Protection Agency (EPA) NESHAP inspection including asbestos testing for all suspect materials and testing for other hazardous materials including, Polychlorinated Biphenyls (PCB's) and Lead Based Paint (LBP) should be performed, which would provide a more accurate hazardous materials abatement costs and scope.

Additional testing and abatement plans for EPA review are required to be performed should PCBs be found in the caulking.

The scope of work included in 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 Massachusetts licensed asbestos inspector Mr. Jason Becotte (AI-034963) and analyzed by a Massachusetts licensed laboratory EMSL, Woburn, MA.

Refer to samples results.

2.0 FINDINGS:

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 >1% 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

Five (5) bulk samples were collected from the following materials suspected of containing asbestos:

Type and Location of Material

1. Hard joint insulation at boiler room
2. Ceiling plaster at locker room
3. Interior vertical caulking at hallway
4. Interior terrazzo floor caulking
5. Exterior expansion joint caulking

Samples Results

Type and Location of Material	Sample Result
1. Hard joint insulation at boiler room	No Asbestos Detected
2. Ceiling plaster at locker room	No Asbestos Detected
3. Interior vertical caulking at hallway	No Asbestos Detected
4. Interior terrazzo floor caulking	No Asbestos Detected
5. Exterior expansion joint caulking	No Asbestos Detected

3.0 OBSERVATION AND COST ESTIMATES:

OBSERVATIONS:

All ACM must be removed by a Massachusetts licensed asbestos abatement contractor under the supervision of a Massachusetts licensed project monitor prior to any renovation or demolition activities that might disturb the ACM.

1. 12” x 12” Vinyl floor tile and mastic were previously found to contain asbestos. The ACM was found on top of 9” x 9” vinyl floor tiles.
2. Boiler exhaust insulation was previously found to contain asbestos.
3. Pink sink coating was previously found to contain asbestos.
4. Interior door framing caulking was previously found to contain asbestos.
5. Insulation inside boilers was assumed to contain asbestos.
6. Stage fire curtain was assumed to contain asbestos.
7. Glue holding blackboard was assumed to contain asbestos.
8. All remaining suspect materials were found not to contain asbestos.
9. Rubber flooring was assumed to contain mercury.
10. Underground sewer pipe was assumed to contain asbestos.
11. 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 in an EPA approved landfill that does not recycle.
12. Roofing materials were assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal in an EPA approved landfill that does not recycle.
13. Painted surfaces were assumed to be LBP. 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.
14. 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. Tubes, thermostats, exit 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 disposed in an EPA approved landfill.

15. Caulking materials were assumed to contain PCB's.

COST ESTIMATES:

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

Location	Material	Approximate Quantity	Cost Estimate ($)
Various Locations	Multiple Layers of Vinyl Floor Tile and Mastic	180,000 SF	900,000.00
	White Expansion Joint	1,000 LF	10,000.00
	Door Framing Caulking	1,000 LF	10,000.00
	Sinks	11 Total	1,100.00
	Blackboards	Unknown	30,000.00
	Hidden ACM	Unknown	50,000.00
	Miscellaneous Hazardous Materials	Unknown	50,000.00
Boiler Room	Boilers	3 Total	25,000.00
	Exhaust Insulation	200 SF	5,000.00
Gymnasium	Rubber Flooring	17,000 SF	170,000.00
Weight Room	Rubber Flooring	1,600 Sf	16,000.00
Exterior	Transite Sewer Pipes	Unknown[1]	50,000.00
	Roofing Materials	285,882 SF	285,882.00
	Damproofing on Exterior/Foundation Walls	Unknown[1]	475,000.00
PCB's Remediation[2]			75,000.00
Estimated costs for ACM Inspection and Testing Services			15,000.00
Estimated costs for PCB's Testing and Abatement Plans Services[2]			50,000.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			197,018.00
		Total:	**2,325,000.00**

[1]: Part of Total Demolition and Excavation.
[2]: Should results exceed EPA limit.

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

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.

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.

Inspected By:

Jason Becotte
Asbestos Inspector (AI-034963)

CAPITAL IMPROVEMENT PLAN

		CHELMSFORD HIGH SCHOOL	Health, Safety & Welfare	Code Compliance	Functional Use of Building or Site	Handicap Accessibility	Extending the Life of the Building (Maintenance)	Energy Efficiency / Energy, Water Saving	Hazardous Material Abatement	Estimated Project Cost (5/2016 $)	High Priority (1-3 yrs)	Medium Priority (4-6 yrs)	Low Priority (7-10 yrs) or under full renovation project	On Going Maintenance	Notes
		305,810 GSF													
1	**Site & Civil**														
	1.01	Mill and overlay sections of pavement where cracking/ degradation has occurred.					x			$30,360	$30,360				
	1.02	Regrade paved areas to prevent ponding which can lead to ice patches in the cold weather.	x				x			$15,180	$15,180				
	1.03	Clean out existing catch basin grate(s).					x			$3,036				$3,036	
	1.04	Install hoods on existing catch basin.					x			$7,590	$7,590				
	1.05	Replace degraded curb.					x			$6,072	$6,072				
	1.06	Review travel distance from HC parking to front entrance - provide spaces with minimal travel distance								$22,770			$22,770		
	1.07	Provide curb cuts and crosswalks to clearly identify the accessible path								$45,540			$45,540		
		TOTAL									$59,202	0	68310	3036	$130,548
2	**Structural Elements**														
	2.01	Half-height masonry walls need to be anchored to the main structure.		x	x					$1,139					walls were removed from restrooms
	2.02	Sand and repaint exterior columns with rust-prohibitive paint.					x			$2,277	x			$2,277	
		TOTAL									$0	$0	$0	$2,277	$2,277
3	**Exterior Architectural Elements**														
	3.01	Patch and repair cracks around foundation walls					x			$57,684			$57,684		
	3.02	Repaint metal panels and soffits that are rusting					x			$7,590	$7,590				
	3.03	Repair / maintain exterior control joints					x			$6,831				$6,831	
	3.04	Remove debris from weeps to allow for proper ventilation					x			$11,537	x			$11,537	
	3.05	Install privacy glazing or film on windows in toilet rooms			x					$1,093				$1,093	
	3.06	Repair door heads and sills on the north and west sides of the Performing Arts wing					x			$4,099				$4,099	
	3.07	Review window flashing around the gym - install flashing where missing					x			$5,693		$5,693			
	3.08	Address step condition at exit door at gym - install landing and ramp	x	x	x	x				$37,950			$37,950		
	3.09	Replace thresholds that are not ADA complinat (exceed 1/2" in height)				x				$3,795				$3,795	
	3.10	Repaint metal doors and frames to prevent further deterioration and rusting					x			$2,277				$2,277	
	3.11	Where interior ceilings are stained investigate roof for leaking			x		x			$1,518				$1,518	
		TOTAL									$7,590	$5,693	$95,634	$31,149	$140,066
4	**Interior Architectural Elements**														
	4.01	Renovate ramp to the lower gym floor to provide proper slope and handrails				x				$42,504			$42,504		
	4.02	Renovate all restrooms to meet ADA requirements		x		x				$1,214,400					completed in 2016
	4.03	Renovate showers			x	x				$13,662					complete except for boy & girl locker rooms
	4.04	Renovate classroom entrances to provide push / pull clearances				x				$207,207			$207,207		
	4.05	Provide new handrails at stairways to meet accessiblity requirements	x	x	x	x				$69,221		$69,221			
	4.06	Replace existing display cases with new cases that meet accessibility requirements (cases should extend to floor or provide a shield or cane indicator)		x		x				$45,540				$45,540	
	4.07	Replace existing drinking fountains with accessibility compliant drinking fountains				x				$36,432					project started in 2016
	4.08	Install assessible ramp to areas with tier floors or platforms (music room)				x				$22,770			$22,770		

	4.09	Repair or replace gym floor			x		x			$823,424			$823,424		
	4.10	Repair or replace floor in wrestling room			x					$68,310					complete
	4.11	Replace floor mats in wrestling room			x					$22,770		$22,770			
	4.12	Replace VCT flooring where cracked or damaged			x		x			$30,360				$30,360	
	4.13	Replace bathrooms tile floors					x			$304,359					completed
	4.14	Replace locker room flooring					x			$313,467					completed
	4.15	Replace shower room flooring					x			$36,242				$36,242	
	4.16	Install new floor in ice room					x			$5,237	$5,237				
	4.17	Replace the quarry tile flooring in the kitchen	x				x			$121,364	$121,364				
	4.18	Remove folding partion walls and replace with gyp wall			x					$194,000	$194,000				
	4.19	Review areas of cracked cmu wall and repair walls			x		x			$15,180		$15,180			
	4.20	Replace vinyl wall base where damaged and stained					x			$7,590			$7,590		
	4.21	Repaint CMU wall base throughout corridors					x			$208,072				$208,072	
	4.22	Replace damaged ceiling tiles - repair source of staining					x			$22,770	x			$22,770	
	4.23	Replace damaged gyp soffits					x			$7,590				$7,590	
	4.24	Review humity levels or other sources for cupping ceiling tiles			x		x			$2,277	x			$2,277	
	4.25	Replace rusting kick plates					x			$15,301					include with replacement of non-compliant hardware
	4.26	Replace knobs with lever hardware				x				$27,324					include with replacement of non-compliant hardware
	4.27	Renovated to classroom entrances to allow for push / pull clearances				x							x		this condition is grandfathered until a major renovation occurs
	4.28	Replace non-complinate door hardware				x				$54,648	$54,648				
	4.29	Replace doors and side lights with wire glass		x						$45,540				$45,540	
	4.30	Replace locker room benches			x	x				$6,527					completed
	4.31	Replace damaged lockers			x					$6,600				$6,600	
	4.32	Replace cabinets and counter tops in classrooms			x		x			$2,349,864		$2,349,864			81+/- classrooms, 40-50 lf / clrm
	4.33	Add accessible lockers to general lockers and locker rooms				x				$9,108		$9,108			
		TOTAL									$375,250	$2,466,143	$1,103,495	$404,992	$4,349,879
5	**Mechanical - HVAC**														
	5.01	Continue regularly scheduled routine maintenance on all roof top units and split cooling systems.					x			$37,950				$37,950	
	5.02	Consider further investigation to determine the water quality and the necessary chemical treatment/maintenance should be performed.					x			$15,180				$15,180	
	5.03	Provide a second stand-by pump for each set of pumping systems.			x					$53,130					completed
	5.04	Replace any and all sections of piping insulation that is missing, damaged or soiled.					x			$22,770		x		$22,770	
	5.05	Install an air vent on the sir separator.			x		x			$4,554				$4,554	
	5.06	Replace the existing functional pump with the non-inverted rated motor with a premium efficiency inverted duty motor. This includes replacing the pump bearings and adding shaft grounding rings to prevent the bearings from pitting.			x		x			$5,313	$5,313			completed	
	5.07	Provide ventilation/ exhaust system within the boiler room due to the high corrosion occurring on the pipe flanges and exposed pipes. Providing tempered air recirculation can provide better air quality.	x				x			$30,360			$30,360		
	5.08	Provide differential pressure sensors and modulate the heating hot water system based on building demand for energy savings.						x		$30,360			$30,360		
	5.09	Provide VFD for RTU-18			x					$12,144	$12,144				

	5.10	Replace five unit ventilators associated with the Art wing.			x					$57,684		$57,684			
	5.11	Provide routine maintenance on all equipment.					x			$30,360				$30,360	
	5.12	Provide different style diffusers on the supply ductwork due to the short circuiting issues. It will force the air down to within the occupied area.			x					$53,130	x			$53,130	
	5.13	Provide routine maintenance on all exhaust fans such as replacing belts and lubricating their motors and shafts.					x			$15,180				$15,180	
	5.14	Provide routine maintenance on all equipment such as motor and shaft lubrication, filter replacement and coil cleaning.					x			$15,180				$15,180	
		TOTAL									$17,457	$57,684	$60,720	$194,304	$330,165
6	**Electrical**														
	6.01	Replace the original 1974 switchgear that is in poor condition and generally full. The existing feeders and branch circuits would be re-fed.			x		x			$303,600			$303,600		
	6.02	Replace lighting in kitchen, locker rooms, showers and TV Studio.			x					$37,950	$12,650.00	$12,650.00	$12,650.00		
	6.03	Replace building mounted compact fluorescent sconces with LED fixtures of the cut-off type.			x					$13,662					completed
	6.04	Provide uniformed pole mounted LED fixtures for parking areas.			x					$303,600					completed
	6.05	Install emergency transfer switch and emergency panels in a 2-hour rated enclosure to comply with current codes.		x								x			
	6.06	Install a lightning protection system.	x		x					$232,110					existing
	6.07	Install GFI receptacles, and add additional receptacles, in the Kitchen area.	x							$9,488	$9,488				
	6.08	Install recessed cable access for teacher desks in science labs.			x					$1,063	$1,063				
	6.09	Monitor emergency shower flow switches for inadvertent use.			x			x		$1,063				$1,063	
	6.10	Install bi-directional antenna for communications with radios by First Responders.	x							$75,900			$75,900		
	6.11	Replace paging system due to problematic function.			x					$348,165	$348,165				
	6.12	Update master clock system as it is obsolete.					x			$348,165		$348,165			
	6.13	Continue to inspect/ maintain system per NFPA 25 requirements.					x							x	
	6.14	Install 100% sprinkler coverage to entire school.		x									x		
	6.15	Replace horns with speakers for general voice evacuation under a renovation.		x						$232,110	$232,110		x		
		TOTAL									$603,475	$360,815	$392,150	$1,063	$1,357,502
7	**Plumbing**														
	7.01	Install newer hig-efficiency, low flow fixtures to reduce water consumption.						x		$189,750					complete
	7.02	Inspect with video to confirm integrity of existing cast iron piping.					x			$3,036				$3,036	
	7.03	Provide reduced pressure backflow preventers at Janitor's closet soap dispenser.			x					$7,590					complete
	7.04	Redirect kitchen waste to exterior grease trap.			x					$22,770			$22,770		interior trap exists
	7.05	Supply emergency showers with tepid water per current code.Install a mixing valve to blend water to emergency showers and eyewashes.			x					$75,900				$75,900	
		TOTAL									$0	$0	$22,770	$78,936	$101,706
8	**Fire Protection**														
	8.01	Install sprinkler system through remaining portion of the building								$3,027,519		$3,027,519			
		TOTAL									$0	$3,027,519	$0	$0	$3,027,519
9	**Hazardous Material**														
	9.01	Replace 12" x 12" Vinyl floor tile and mastic that were previously found to contain asbestos. The ACM was found on top of 9" x 9" vinyl floor tiles.							x						
	9.02	Replace Boiler exhaust insulation that was previously found to contain asbestos.							x						
	9.03	Replace pink sink coating that was previously found to contain asbestos.							x						
	9.04	Replace interior door framing caulking that was previously found to contain asbestos.							x						
	9.05	Replace insulation inside boilers that was assumed to contain asbestos.							x						

	9.06	Replace stage fire curtain that was assumed to contain asbestos.							x						
	9.07	Replace glue holding blackboard that was assumed to contain asbestos.							x						
	9.08	Replace rubber flooring that was assumed to contain mercury.							x						
	9.09	Replace underground sewer pipe that was assumed to contain asbestos.							x						
	9.10	Replace damproofing on exterior and foundation walls was assumed to contain asbestos.							x						
	9.11	Replace roofing materials that were assumed to contain asbestos.							x						
	9.12	Remove and repaint surfaces that were assumed to be Lead Based Paint.							x						
	9.13	Replace various equipment such as tubes, thermostats, exit signs and switches that were assumed to contain mercury.							x						
	9.14	Replace caulking materials that were assumed to contain PCB's.							x						Haz/Mat includes cost associated with complete renovation or demolition; additional costs are included should results exceed EPA limits
		HAZMAT ALLOWANCE								$2,790,000				$2,790,000	

GENERAL NOTES

1. Refer to each section of the Report for more detailed information. Before moving forward with a specific project, a detailed review of the scope of work and a re-assessment of the cost estimate for that scope should be performed.

2. Some items should be completed in combination with other items. Some of these suggestions may be noted above. We recommend that once a scope of work is desired to be pursued, a mini-study should be done to confirm which work should be done together. See the next general note below for additional information.

3. Due to the conceptual nature of these recommendations and estimates and the complexity of existing conditions, several solutions may be provided to achieve the end result. Existing conditions in some areas may limit the ability to fully implement the proposed scope of work. Part or all of this work may trigger other renovation requirements related to code, seismic, sprinklers or handicap accessibility. Once a determination is made to move forward with a specific improvement line item, a mini study specific to the scope of work should be done to confirm the scope of work, prepare sketches as necessary and prepare a refined cost estimate.