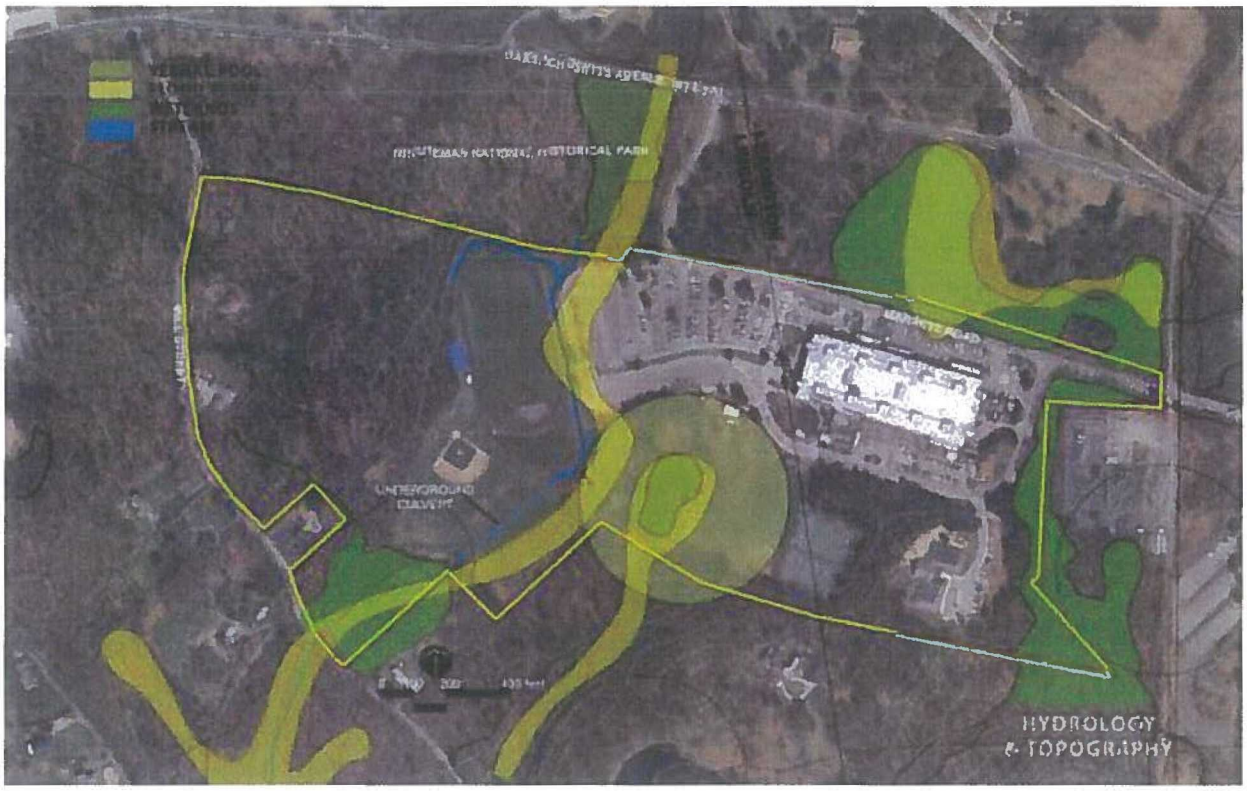


MINUTEMAN REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL - GRADES 9 THROUGH 12; APPROX. 820 STUDENTS

SITE

SURROUNDINGS

The Minuteman Regional Vocational Technical High School (MRVTHS) is located on 66 acres. The site is almost equally divided between the Towns of Lexington and Lincoln. The property is generally rectangular shaped, with the east-west axis being the long dimension. The property is mostly surrounded by woodlands and wetlands. Minuteman National Historic Park borders the school site on the north. South and west of the property are residential properties. East of the property is an electric company depot and the Cranberry Hill office park. Electrical transmission lines and easement, running in a north – south direction, are also located to the east of the site.

Wetlands are a major feature on and off the school property. Wetlands are located north and east of the school, just outside the loop road, prohibiting further development in that direction. A pond, southwest of the High school building and surrounded by an abandon rope course, fluctuates according to season, sometimes inundating adjacent play field and paths. A gravel access road/path to the outer fields (practice football and soccer) runs along the edge of this pond and is often wet. The wetlands north of the school are connected to the wetlands southwest of the school by a stream, which runs between the football field and the student parking area. The numerous wetlands may also indicate a high ground water table in many areas of the site.

OTHER STRUCTURES ON-SITE

In addition to the main school building, the District utilizes multiple outbuildings on the site. Southwest of the main school building is a wood-framed structure (26' x 52') that houses the grounds maintenance equipment and storage for the Arts Department. North of this structure, on the school side of the loop road is a "Quonset" style green house (30' x 32'), that is used by the Horticulture program. Further west of the maintenance building, outside of the loop road, are two structures that are used by the Horticultural Department. One structure is a "Quonset" style green house (30' x 12') and the other a pre-engineered metal building (48' x30'). The metal building is in poor condition with holes in the roof. A small wood framed shed in located south of the bus stacking area. This shed (8'x10') is used by the bus operations company for storing traffic cones and other equipment used during bus driver training in the adjacent parking lot. Just west of this shed is a metal storage box (40' x 8') with a wood framed gable roof over it, extending out an additional 6' to the south to provide a sheltered area. Both the sheltered area and storage box are used for storage of football equipment. Roof structure appears to be in poor condition with signs of rotting fascia boards. A wood framed concession stand (24' x 12') is located at the west of the track, south of the bleachers. This building has service counters on east side of building and an overhead door on the south side. A chemical storage building is located on the north side of the school building and is used by the automotive body shop class. Another masonry chemical/gas storage building in located at the southeast side of the school building, just west of the Superintendent Association Office. This structure houses welding gas tanks (oxygen/acetylene) and other tanks and containers used by the school programs.

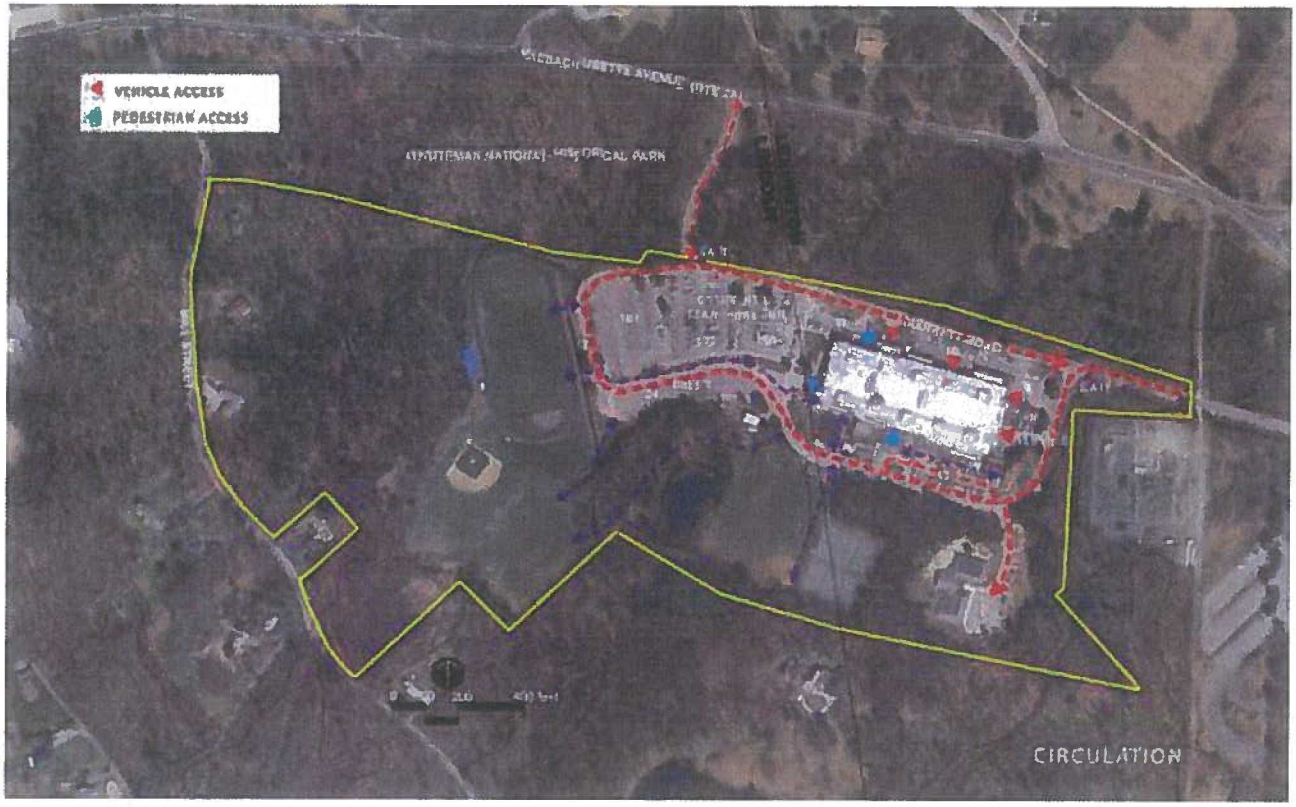
SHARED ON-SITE USES

Located on the school property but not related directly to the school functions are several residences and a daycare facility. The day care facility, partially constructed by the faculty and students of the MRVTHS and run by MIT / Lincoln Labs, is south of the main school building. Three residences on the west side of the property are maintained by the school and are now rental properties benefiting the school. The Massachusetts Association of School Superintendents also occupies a residential type building on site, at the southeast corner of the high school. Vehicular access for the day care facility and the Superintendent's office is via school access roads. Residential structures are accessed via Mill Street with no direct access to the School.

VEHICULAR ACCESS

The school's primary access is from a signalized intersection on Rte. 2A, from the east. The entrance drive is approximately a quarter of a mile long and has several speed bumps installed to keep speeds down on this relatively straight road. The roadway also serves as the access to the office park and the electric company. A metal swing gate is located at the west end of this drive that, if closed, would prohibit access to the school without hindering access to the electric company or the office park. A secondary access to Rte 2A is located north of the main parking area for the school, west of the main building. This access road passes through the National Park property and is barred during most of the day to limit entry and exit during school hours. One final access point is from a dirt path, connecting the western most field to Mill Street, and exits across from Oakdale Lane. Most of the paved roadways appear to be old with the exception of the conference center parking lot. Numerous repairs and patches are apparent. Most paved parking areas and drives are relatively flat and don't appear to be extremely well drained. Road way and parking lot paving is in fair to poor condition. Pavement is crumbling around catch basins and drainage manholes. The paved area outside of the cafeteria is used for outdoor dining by students and is used for limited deliver truck access. This area is lower than adjacent site and according to District Staff is drained via pumps. According to staff, extensive maintenance and operation has been required to keep this pump system operational.

The High School is well served by access drives. A loop road (29'-30' wide) completely encompasses the building, parking lots and staging areas for the different delivery and shop areas. Parking for staff is located on the north, east and south sides of the building, within the loop road. Service areas on the north and east side of the building are separated from the loop road and adjacent uses by privacy fences or planted hedges. Student parking and parking for sports events are located within the loop road, west of the building. South of the student parking is a large paved area for bus staging in the afternoon as well as bus driver training. Due to the large number of towns the school serves, a total of 32 buses (21 large and nine (9) mini-buses) service the school. In addition, there are numerous vans and cars that transport smaller populations of students to and from outlying towns. These smaller vehicles pickup students at the visitor parking lot loop on the southeast side of the school. Buses transport approximately 450 of the students. While the parking around the building was utilized, with few spaces empty, the western most lot of the student parking is used infrequently during school operation, but is utilized during field sporting events. The main entrance to the building, which faces south, has adjacent visitor parking. There is a liberal use of brick in the plaza areas and the roadway as well as granite curbing, helping distinguish the area as the main entrance to the school. ADA designated spaces do not meet state codes due to lack of curb cuts, no designated striped loading areas and/or lack of signage. Other ADA designated spaces are dispersed around the building and the site. Signage for the site is fair, correctly directing visitors to the different activity areas of the site, though there was no signage to direct visitors to the day care center. Even with site signage, the building's main entrance is not a prominent feature on the site and can be



difficult to find.

PEDESTRIAN ACCESS

Most of the paved surfaces for pedestrian use are asphalt, behind granite curbs. Walks extend around the south and west side of the building. There are also walks on the northwest side of the building in the vicinity of the conference center. There are no walks on the east or northeast side of the school. Most of these walks are in need of replacement, as they have cracked and been sealed repeatedly. Several of the walks have depressions and puddle during rain events or have settled at back of curb. At the main entrance, there were numerous stairs for access to the building. There is a brick plaza outside the pool portion of the school with seating and drainage. Drainage basins in this plaza are completely filled with sediment. Due to the sites being mostly level, there are few slope issues that would impede ADA access. Most of the door sills for the building are accessible. Curb cuts that would allow ADA access from the school to the athletic field are lacking along those existing sidewalk paths that are separated by curbs from the adjacent roadways. Accessible paths and viewing areas are lacking to all of the athletic fields and associated bleachers.

OUTDOOR ATHLETIC FACILITIES

The outdoor athletic facilities are located to the south and west of the school. Due to the flatness of the school site and the extensive wetland systems on and around the site, numerous athletic facilities are inundated with water during the spring and other wet times during the year, rendering the field s and courts unusable.

Remediation of drainage/water problems for fields and courts would likely required reconstruction and

addition of free draining sub-base material or fill in addition to an under drain system to ensure spring through fall use.

South of the school are six tennis courts (constructed in 1975), a soccer field that plays at 327' x 194' and a softball field whose outfield plays over the soccer field. According to District staff, these facilities flood during high water periods. The tennis courts are un-usable due to cracking, settlement and deteriorated asphalt and have not been in service for at least three years. Grades to the south and southeast contribute to water flooding the tennis courts. The chain link fence around these courts is rusted and has lost tensioning bars, ties, and other supports. There is an electrical outlet and a water fountain on the west fence line of the tennis courts. The backstop for the softball field is in fair condition. West of the soccer field is a wooded area that contains a decrepit rope course.

West of the school are two athletic fields, separated by a drainage swale. The northern field is a turf field, surrounded by an asphalt track. The field is separated from the student parking area by a stream and is accessed from the parking by a small wooden bridge (6' wide) or a culverted walk. This field is used for football and is 226' wide from inside edge of track to inside edge. There does not appear to be any type of drainage, either surface or subsurface, for the field. The track is lacking striping of any kind for events and appears that the synthetic surface has worn off. Inside the track, a flagpole, scoreboard, field goals and a paved long jump are located in the D zones. West of the track are a concession stand and bleachers, which include a press box. There is fencing around the top of the press box so that it could be used as a film platform. These bleachers have been condemned due to rotting footboards and no risers, as well as other structural reasons. The bleacher has neither ADA compliant seating nor access. Deflection in first row of seating may indicate some settlement of structure. The field is lighted, but in a limited manner, with small flood lights that would not be adequate for safely lighting the field for a game.

South of the track and football field, a large turf field is used for soccer, baseball and practice football. The football and soccer fields were striped at 157' x 327' and 194' x 327' respectively. The baseball field infield is turf and infield mix, though the base lanes are overgrown with weeds. According to District Staff, baseball field is not used in spring very often due to overly wet field conditions caused by poor drainage and groundwater conditions. Two chain link fences, separated by 2' to 3', constitute the backstop. The newer one was constructed in front of a chain link fence that is in poor condition. There are team seating benches alongside both the first base and third base lines. Benches consist of multiple styles of bench and the seating area on the third base line is separated from the field by a swale. The overall field is bisected northeast to southwest by a 36" underground drainage culvert, which is buried just below the surface. The delineation between the soccer and football fields follows the line of the culvert and consists of a grade change of approximately three feet. While the soccer field is relatively smooth, grades in sections of the football field undulate unevenly. These fields are connected to the school by a foot path running through the wooded area and emptying out by the soccer field south of the school. There is evidence that portions of this path are submerged under water during the year. These fields have no lighting.

None of the athletic fields have any under drainage or irrigation. A maintenance program for the fields includes aeration and fertilization.

A series of paths through wooded areas make up a cross country trail.

The complete program for the outdoor athletic activities includes Boy's Lacrosse, Football (Freshman, JV and Varsity), Boys and Girls soccer, Girls softball, Boys baseball & Basketball, Boys Golf (off campus), Boys and Girls Tennis (now off campus) and Boys and Girls Cross country.

LANDSCAPE & SITE AMENITIES

Vegetation around the site is in relatively good health and of a diverse nature. The front entrance of the school is planted with honey locust trees, in planters, all of which appear in good condition. Most of these trees have up lighting. Condition of up lighting was not assessed, but some fixtures appear to have been damaged and abandoned. Two flagpoles are located east of the Main entrance. The outer islands at the main entrance, separating the parking from the loop road, have been planted with shrubs, perennials and annuals and are well maintained.

West of the school is a brick plaza, which is bordered with mature white pines and a variety of evergreen and deciduous shrubs. These planted areas are designated by landscape timbers. Benches and picnic tables and a small basketball court (38' x 50') constitute the outdoor eating area for the students. Southwest of the school, north of the soccer field, a variety of plants have been recently planted, in an arboretum style. They are planted around the several outbuildings located in this vicinity. Around the rest of the site, mature trees and hedges can be found in landscape islands, mostly used as a separating element between the loop road and the paved service areas. Trees in the student parking lot are protected by metal guardrails, which effectively prevent the parking of cars within the drip lines of the trees, keeping them healthy.

UTILITIES

School building is serviced by electricity, cable, telephone, domestic water and sewer, natural gas and propane. The sewer system is a combination of force main and gravity and is maintained and operated by the District. The system also supports the Minuteman National Monument Visitor Center and the

Cranberry Hill Office Building. The system flows via gravity from the west (Visitor Center) to the east (Cranberry Hill) to a pump station in the vicinity of the School's sign at Route 2A. The water system loops around the building in the loop road. Electrical, cable and telephone are also underground in the roadways on the north side of the school. There is an unused underground oil storage tank under the roadway south of the mechanical room. This tank has not been used since the school was converted to natural gas. Propane tanks are located on the north side of the school in the vicinity of the kitchen delivery area.

STRUCTURAL

The Field Engineer made the following observations during this cursory structural examination of the Minuteman Regional Vocational Technical High School:

1. At several/varied locations throughout the school building, the first floor concrete slab on grade is cracked. Many of these cracks were found in the stairwells. In some instances, these cracks appear to continue into adjacent concrete foundation walls. (Refer to Photos #1 to #4 below.)

PHOTO #1: The photo above shows one of the many cracks in the first floor concrete slab on-grade. It is located in one of the stair towers where cracks of this type were prevalent.

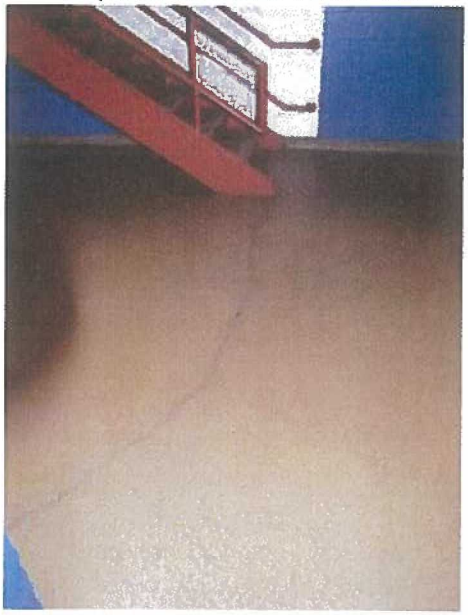


PHOTO #4: The photo above shows another of the many cracks in the first floor concrete slab on-grade in a stairwell.

COMMENT FOR ITEM NO. 1: The cracks in the first floor concrete slab on-grade appear to have occurred as the result of several circumstances. The majority of the cracks appear to be shrinkage-type cracks. Several of them appear to be settlement cracks, including the cracks that appear to continue into the foundation walls. These settlement-type cracks were found in several stairwells throughout the building. In general, the cracks in the first floor concrete slab on-grade are not a serious structural concern, and do not pose a life/safety issue. The cracks do however, reduce the usefulness/serviceability of the floor, and pose a potential tripping hazard.

2. At several locations throughout the school building, the masonry block walls in the stairwells are cracked. In addition, the control joints in the stairwell masonry block walls appear to have widened. The masonry block walls appear to support the steel framing that supports the stairs. (Refer to Photos #5 to #7 below.)

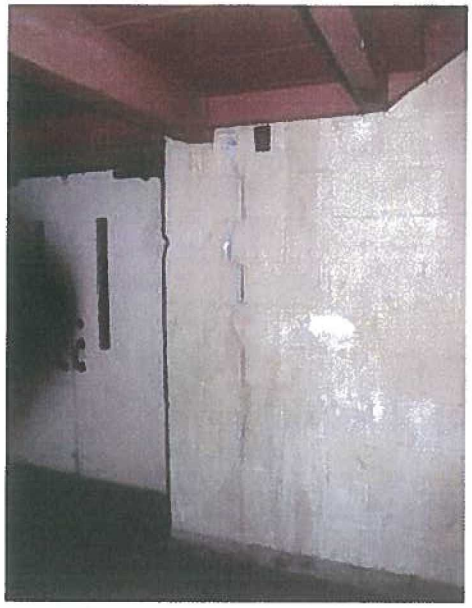


PHOTO #5: The photo above shows one of the many cracks in the masonry block walls of the stair towers.

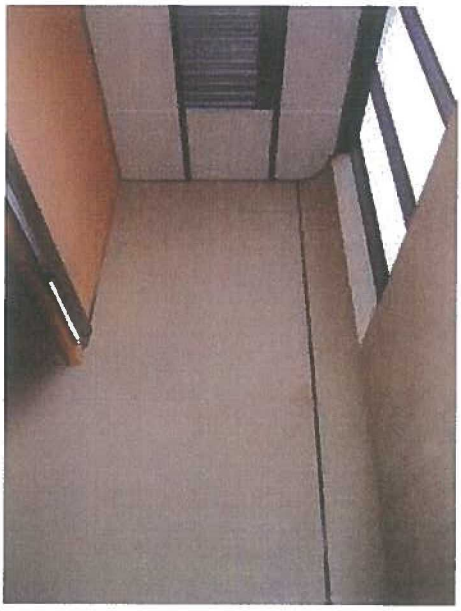


PHOTO #7: The photo above shows cracking at the top of the masonry block wall in one of the stair towers, and the enlarged control joint in this masonry wall.

COMMENT FOR ITEM NO. 2: Many of the most significant cracks in the masonry block walls of the stairwells and the widening of the masonry control joints appear to be the result of settlement of the supporting foundation walls. Several of the smaller cracks in the stairwell masonry blocks appear to occur where the concrete blocks were cut to surround supporting steel columns. Cracking of the masonry block walls may also have been caused by water infiltration into the building envelope. Further investigation is recommended.

3. At isolated locations, the sealant for the exterior brick veneer control joints has failed. (Refer to Photo #8 below.)

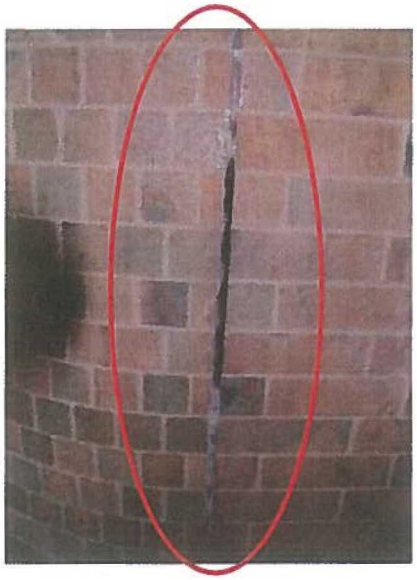


PHOTO #8: This photo shows one location where the joint sealant for the exterior brick veneer has failed.

COMMENT FOR ITEM NO. 3: The failure of the joint sealant for the exterior wall brick veneer control joints may be allowing water to enter into the building envelope; this water may be further damaging the building structure. A program of repair and maintenance for the exterior wall joint sealants should be instituted to prevent further damage to the building structure and finishes.

4. At several and varied locations throughout the school building, the interior masonry block walls have cracks. (Refer to Photos #9 and #10 below.)

PHOTO #10: The photo above shows another of the isolated cracks in the interior masonry block walls found throughout the school.

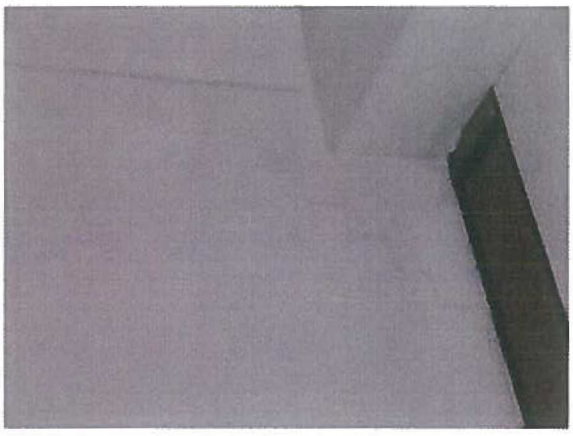


PHOTO #9: This photo shows one of the several cracks in the interior masonry block walls.

COMMENT FOR ITEM NO. 4: Many of the cracks in the interior masonry block walls appear to be minor in nature. In several instances, these cracks appear to occur where the concrete blocks were modified to accommodate the building columns. In other cases, the cracks appear to be caused by minor movements of the building superstructure. Further investigation is recommended.

5. There has been considerable water infiltration of the exterior brick veneer on the south and west exterior wall elevations of the Boiler Room building with efflorescence and brick deterioration. In addition, there has been significant cracking and displacement of the brick veneer. Some minor corrosion of the steel roof beams of the Boiler Room building was evident as a result of water infiltration into the building envelope. (Refer to Photos #11 to #13 below.)

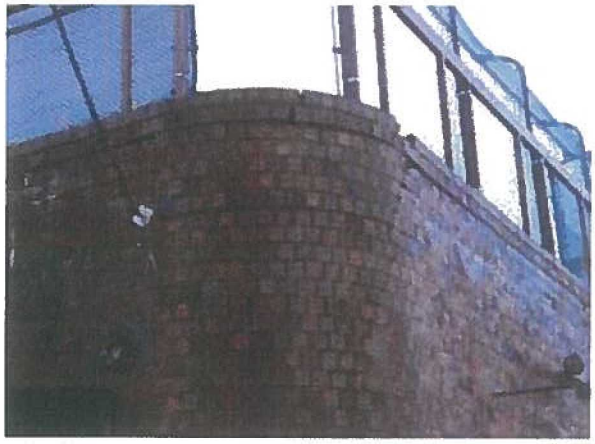


PHOTO #11: Above represents the significant displacement and cracking of the brick veneer on the south and west exterior walls of the school's Boiler Room building.

PHOTO #13: This photo shows the water infiltration inside the Boiler Room Building and the minor corrosion of the roof framing members.

COMMENT FOR ITEM NO. 5: These exterior brick veneer walls will require partial reconstruction and repair. Waterproofing measures will be required to prevent water from infiltrating into the walls and penetrating the building envelope.

6. At the Natatorium housing the Swimming Pool, the concrete floor has cracked and spalled at several locations. (Refer to Photos #14 and #15 below.)

PHOTO #14: This photo shows one location where the concrete floor in the Natatorium has cracked and spalled.

PHOTO #15: This is another of the cracks & spalls in the concrete floor of the Natatorium.

COMMENT FOR ITEM NO. 6: The cracks and spalls in the concrete floor of the Natatorium should be repaired with specialty concrete repair products to prevent further deterioration of the concrete floor.

ADDITIONAL STRUCTURAL ISSUES & CONCERNS

In addition to the structural issues addressed in the Observations section of this report, there are additional areas of structural concern that were not directly observed by Odeh Engineers' Field Engineer during the site visit. Odeh Engineers was made aware of these additional structural issues or concerns by means of indirect observations, discussions with the Minuteman Regional Vocational Technical High School Building Facilities personnel, and by photographs provided by Kaestle Boos Associates, Inc. These additional areas of structural concern include the following:

A. It was reported to the Field Engineer by a Facilities Staff Member that the stairways utilizing steel channel stringers as a primary means of support for the outboard side of the stairway vibrate vigorously when in use by the students and staff. (Refer to Photo #16 below.)

PHOTO #16: This photo shows one of the stairways that reportedly vibrate vigorously when in use. Notice the long span of steel channel stringer that supports the outboard side of the stairs.

COMMENT FOR ITEM A: The steel channel stringers that support the outboard side of the stairs have a relatively long span for the depth of the channel. Further investigation and analysis of the stairway is recommended.

B. It was reported to the Field Engineer by the Facilities staff member that the underside of the structural concrete bleachers on each side of the swimming pool in the Natatorium is deteriorated. The extent and the severity of the deterioration were not defined. In addition, the Facilities staff member informed the Field Engineer that the dehumidification system for the Natatorium had not been operational for an extended period of time. Finally, the Facilities staff member was unaware of any inspection of the existing condition of the Gymnasium floor structure that is located directly above the Natatorium (Refer to Photo #17 below.)

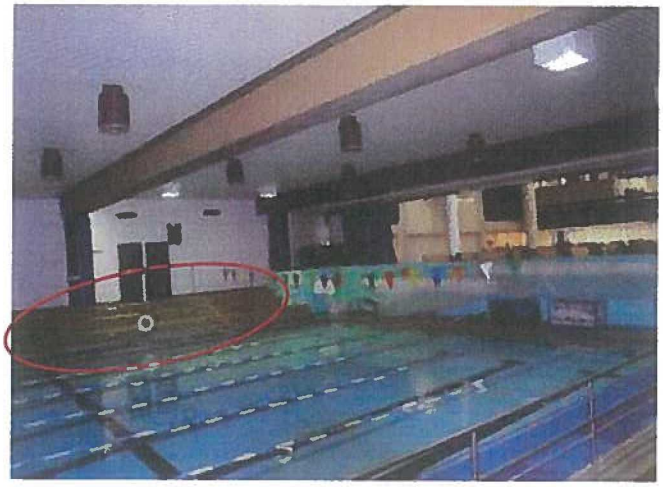


PHOTO #17: This photo shows the structural concrete bleachers alongside the swimming pool that are reportedly deteriorated below. In addition, this photo shows that the Gymnasium floor structure above the Natatorium is concealed behind the ceiling of the Natatorium.

COMMENT FOR ITEM B: The reported deterioration of the underside of the structural concrete bleachers should be investigated further. Natatoriums can create an extremely corrosive environment (high humidity and chlorine forming hydrochloric acid) if the ventilation and dehumidification systems are not working properly. Although no evidence of structural distress of the Gymnasium floor structure above the Natatorium was observed by the Field Engineer, inspection of the existing condition of the Gymnasium floor structure is recommended.

C. There are several instances of brick cracking and vertical displacement of the brick walls that are located above the main roof of the school building. (Refer to Photos #18 to #20 below.)

PHOTO #18: This photo shows one of the several cracks in the exterior brick walls located above the roof of the school building

PHOTO #20: This photo shows the vertical displacement of one of the exterior brick walls located above the main roof of the school building.

COMMENT FOR ITEM C: The cause(s) of the brick cracking and vertical brick displacement for the screen walls located above the main roof of the school building will require further investigation.

D. There is some corrosion of a steel frame that is supporting a rooftop HVAC unit on the main roof of the school building. (Refer to Photo #21 below.)

PHOTO #21: This photo depicts the corrosion of the steel frame supporting an HVAC roof top unit above the main roof of the school building.

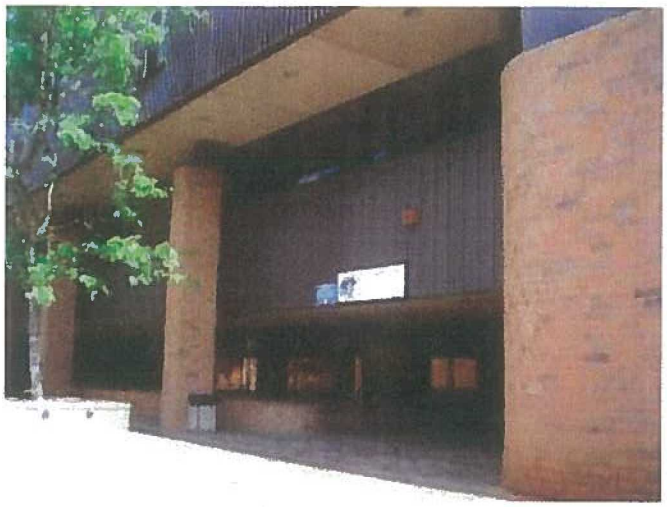
COMMENT FOR ITEM D: The extent of the corrosion of the steel framing members should be investigated further. If the corrosion is minimal, then proper surface preparation and painting of the steel framing members will be required to prevent further deterioration.

PLEASE NOTE: The majority of this preliminary structural examination report was based on observations by Odeh Engineers' Field Engineer during a site visit on December 11, 2008. The remainder of the report was gathered from information received by Odeh Engineers via the Minuteman Regional Vocational Technical High School Building Facilities Personnel and Kaestle Boos Associates, Inc. Additional existing structural deficiencies, not documented or described in this report may, or may not, exist.

ARCHITECTURAL

The Minuteman Regional Vocational Technical High School (Minuteman) was originally constructed in 1974. Through the years to follow work was commence in the effort to correct ailing problems or to upgrade the facility. In 1985 the original built up roof was replaced with a PVC system which has given the facility a lot of issues and continues to leak and get patched even as of the summer of 2008. In 1998 the child care area's original brick veneer was removed and replaced with an insulated metal panel system to match the metal panel system of the original building. Other tenant fitups were also incorporated into the facility as well (i.e. Mc Donald's restaurant, additional classrooms, addition of landscape division, etc).

The purpose of reviewing the existing conditions at Minuteman is to evaluate and identify any deficiencies of the entire facility including the following: exterior building envelope, interior finishes, structural elements, and handicapped accessibility.



EXTERIOR BUILDING ELEMENTS

The exterior envelope varies per level at Minuteman and as follows:

Main Level

- The exterior wall envelope is jumbo masonry brick veneer (3 5/8" x 3 5/8" x 11 ½"), 1 ¼" airspace, 1 ½" insulation (2 ¾" total cavity space), and 8" CMU backup wall constituting a 1'-2" total wall assembly with either painted, furred out, or acoustical panels applied. There is no air and vapor barrier in the wall envelope, and the rigid insulation is interrupted at certain detail locations.

Second Level

- Scenario 1: The exterior wall envelope is the same as the Main Level.
- Scenario 2: The exterior wall envelope is a 3 1/8" insulated metal panel with continuous glazing on the upper portion of the exterior walls. The metal panel is acting as the air and vapor barrier.

Third Level

- The exterior wall envelope is 3 1/8" insulated metal panel, back-up wall construction (?) metal panel interior with periodic window punches on the third level. The metal panel is acting as the air and vapor barrier.

Known issues with the walls, are that they do not meet current energy code standards for required continuous R-values, and location of air/vapor barrier. Also found on the exterior walls are multiple settlement stress-cracks; they are found throughout the facility. These cracks allow air to infiltrate the building, particularly in the stair towers. Another issue observed was some expansion joints that are un-caulked, leaving yet another place for air to infiltrate.

Air infiltration equals heat loss or gain depending, on the season. Furthermore, field cut holes to install the supplemental heating/cooling units are not sealed correctly adding to the air infiltration issues.

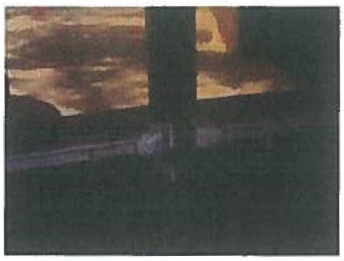
The current energy code requires an R-value of R-7 for Masonry < 35 p. s. f. or R-5 for masonry >35 psf. For metal stud-framed walls, an R-3 of continuous insulation and an R-13 between framing members is required; a continuous R-value of 20 is required on the roof.

EXTERIOR WINDOWS

The glazing throughout Minuteman is 1" tinted single-pane insulated glazing set in a non-thermally broken aluminum frame (Curtain wall type system). These windows are original to the 1974 building and do not meet the current energy code requirements (specifically the window frames). This allows for rapid heat gain in the warmer months and rapid heat loss during the cooler months. Many of the windows have gaps allowing air to infiltrate due to failing neoprene gaskets. The most extreme example of this occurrence is in the pool area; the sealant is failing and noticeably pulling away from the frames, allowing air infiltration. The windows are required to have a U-value of .6, and skylights must have .8; not to exceed more than 3% of the roof assembly area.

EXTERIOR DOORS AND FRAMES

The exterior doors are generally hollow metal in a hollow metal frame with the exception of the main entrance doors which are a non thermally-broken aluminum framing system and glass. Unfortunately, all the doors are original to the original construction and many do not operate properly. The main entrance doors in particular have had many of their pivot hinges replace by traditional square corner hinges as the pivot hinges fail. As a result the door opening forces exceed the required maximum of 15 lbs. Some of the doors have receive a panic hardware update but they are all well abused and in need of replacement. Most of the other egress doors remain with their original hardware. Some of these doors especially those used by the gym area do not close properly leaving gaps to the exterior due to failing hardware and abuse received. The hardware has been beat up from 30+ years of use and is in need of replacement. The thresholds at these doors are also suffering from long-term wear and are in need of replacement.

While some of the overhead doors in the shop areas remain original to the building some have been replaced. All of the overhead doors are in need of replacement due to the long term wear and abuse that they have suffered.

Our recommendation is that a replacement program be instituted. This would be in concert with fulfilling code requirements.

ROOF

The original built up roof was replaced in 1985 with a PVC roof membrane system. The roof consists of PVC membrane, set atop a 2 ½" Rigid insulation, set on a vapor barrier on the warm-on-winter side and this entire system is fastened to 4 ½" pitched light weight concrete on 1 ½" metal deck. Complaints were made of the constant need of repairs. The roof has been a problem for many years and has been patched on multiple occasions. The last repairs were done during the summer of 2008 when it was discovered that there was water infiltration, the water soaked the insulation and diminished its R-value.

The number of skylights and the number of penetrations for roof accessories will always be a source of repairs. The skylights are failing and most are covered with transparent tarps fastened to their curbs.

Our recommendation is that the roof and the skylights be replaced.

TRIM, MISCELLANEOUS SPECIALTIES & OUTBUILDINGS

The trim throughout the exterior of Minuteman appears to be well maintained and in good condition considering the 30+ years out in the elements. An exterior element that is in need of some attention is the greenhouse adjacent to the Landscape Department. Glazing and the associated framing are stained and deteriorating due to the high humidity levels that occur in that space.

INTERIOR BUILDING ELEMENTS

INTERIOR WALLS

Both the corridor walls and the declining partitions are painted concrete block. Generally, all of the interior walls are non-load bearing since this building's primary structure is steel beams bearing on interior and exterior piers. However, there are some temporary walls that have been introduced, perhaps by the staff or students that vary in construction. The preservation of these walls is reasonable, not requiring ample care, and withstanding a great deal of abuse; they present themselves well. The foremost issue that the current wall system presents is improper sound separation between classrooms. It was observed that the walls in many areas terminate at the ceilings. In other areas of the building, the wall stops short, leaving gaps between the top of the wall and the ceiling. This produces a disruptive environment, distracting both teachers and students.

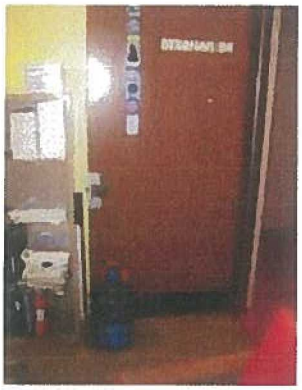
Our recommendations are to maintain the existing walls as has been done and make changes that are needed by Code or educational requirements. With the interior partitions measures should be made to improve the sound transmission coefficient rating between spaces. The interim walls that were installed should be replaced with more permanent non combustible construction.

INTERIOR FLOORS

Floor levels 1.5, 2, 2.5, and 3 are 3 ¼" concrete slab on 1 ½" metal deck for a 4 ¾" of total assembly. The Lower Level & Lobby Level are 'slab-on-grade' with a variety of finishes.

INTERIOR DOORS AND FRAMES

The interior doors vary between solid-core wood and hollow metal in hollow metal frames. Where glazing occurs within doors or borrowed lights consists of wired glass. In areas where new glazing was added float, tempered, and plexi-glass were found. Most of the doors are original to the 1974 construction and vary in condition. The doors in the spaces (gym, cafeteria, shop areas) which receive the most use are well worn. The doors in spaces which may not receive as much traffic (classrooms) are wearing well and could remain in service for a while provided they receive the required hardware updates to become code compliant.



There are a series of overhead doors that are in service at the High School. Coil overhead doors are used in the cafeteria to close the individual serveries. These doors are in good condition and good working order. Sectional overhead doors used in the shop areas are damaged from long-term wear; many of the insulated panels have fallen off, or are significantly damaged.

The hardware is in good to fair condition considering the age of the building; however, the majority of the hardware is not MAAB/ADA compliant. Hardware original to the 1974 building consists of brass knobs, closers, and panic hardware. The knobs still function but are a code violation. Some of the original closers remain in operation but do not have exceeded their useful lives. Some of the original closures have been disabled leaving remnants of components behind. In areas that have been recently updated MAAB compliant hardware was used. Many hazardous areas must be provided with closers by the Code.

Our recommendations are that a program be undertaken that would replace all of the non MAAB compliant hardware, and provide handicapped accessibility as well as proper Code hardware in areas which require such.

INTERIOR FINISHES

The interior finishes of this building vary from area to area. The floor finishes vary from area to area. Resilient flooring was used in and around the pool, locker rooms, along with their associated circulation elements, and toilet room areas. This floor finish is cracking and in some areas coming up. The locker room floors need to be redone due to the removal of locker bases which resilient remnants still remain.

The lobby floor has an extension of the jumbo brick from the exterior and has been well kept and is in very good condition. The cafeteria and corridors leading up to the shop areas have a unique 4x6 wood flooring system which has been shellacked. This particular flooring system is in great shape considering its age and should be maintained due the amount of labor that was involved to implement such a system. The shop areas had concrete floors which bare the markings associated with the shops function. Classrooms on the lower level and some on the upper levels had VCT which are well kept. The kitchen had quarry tile that is typically found in schools from that era. The quarry tile has been well kept. Some of the sections are carpeted. Carpet was used in some of the classrooms, library, upper cafeteria and some expanses of corridors. The carpet remains in fair condition and but is worn. Public stairs at one point have rubber treads and risers adhered to the metal pan stair system. The egress stairs have sealed concrete treads and painted risers.

The wooden gym floor has been well maintained and remains in good condition despite the humidity from the pool below. The majority of the walls are painted CMU which have been well kept. Newer constructed walls were gypsum board on metal studs with vinyl base which have also been well kept. There were some plywood on wood stud partitions that were put up to divide spaces which are not allowed per the building and fire codes due to the inability to meet any class of flame spread rating.

The toilets and locker rooms have resilient flooring and base, painted CMU walls, and plaster or ACT ceiling mounted in the original acoustical ceiling tracks. The locker room bathrooms have ceramic tile floors, painted CMU walls, and plaster ceilings.

The typical ceiling system found throughout Minuteman, which is from the original construction, consists of a lay-in type of acoustical panel system that runs continuously from space to space. Water staining is prevalent throughout the ceiling system due to the roof system failures that the facility has experienced. Some spaces have updated the ceilings by inlaying ACT and additional intermediate cross grids into the original panel track. The restaurant on the mall level has an open wooded grid trellis system which is open to the typical ceiling above and is in great shape. Plaster ceilings exist in corridors, toilet rooms and locker rooms of Area A. The plaster ceilings have staining and are flaking in some areas the previously got wet.

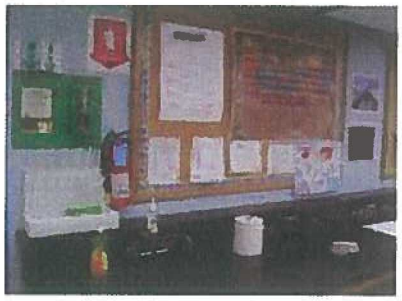
Our recommendations are to replace finishes that do not meet flame-spread ratings.

Accessories

Toilet partitions in this building are in fairly good condition for a vocational high school however appear to be from the original construction due to the amount of paint on their surfaces. In many instances they improperly divide the compartments and make non handicap accessible toilet areas which are required to be. There is relatively little damage in the Toilet Rooms.

The lockers in the corridors are in good condition in spite of their age, they would however benefit from refreshing. Where lockers have been damaged, they have been replaced with other doors and components from other lockers which do not match the remaining lockers. Lockers in the Male and Female Locker rooms are in fairly good condition. The lockers in the male locker room appear to have been updated from the originals.

Surface mounted fire extinguishers are located throughout the building in every space due to the lack of a fire suppression system in the facility. They appear to be in good working order and were recently charged and inspected. Chalkboards were a part of the original installation and occasionally there will be one that is left in a classroom. For the most part marker boards have replaced the chalkboards. Both marker boards and tack boards are the norm at Minuteman. Digital boards are currently being added throughout the facility. Display cases throughout the facility vary from wood to aluminum framed.



The window treatments were not reviewed at this time. There is a lack of natural light in most of the classrooms on the third level. There exists are no handicapped signage anywhere in this building. Generally, the accessories have been well maintained.

Equipment

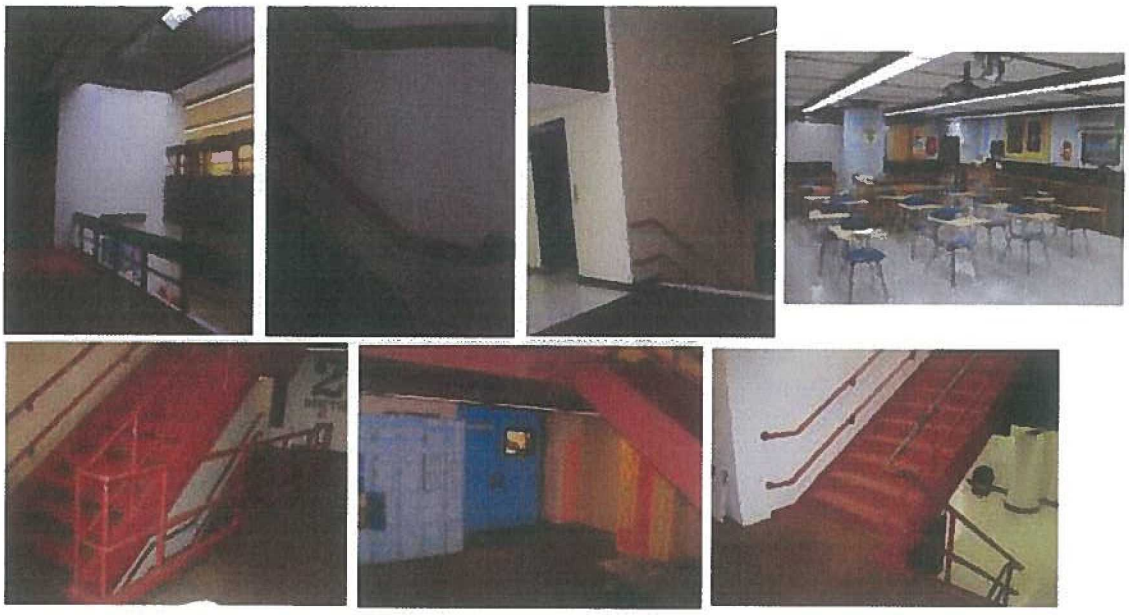
Fixed projectors have just been updated in certain classroom areas. Occasionally manual projector screens were used but the classrooms that had digital boards (fixed and movable) used those.

Kitchen equipment appeared to be in good condition and well cared for. Our recommendations are that the food service equipment is reviewed by a specialist and new recommendations be made.

Vertical Circulation

All stairs are a metal pan stair system with concrete treads in all egress stairs. Code violations in the stairs consist of the lack of guardrails as required for the continuous railing in the center of the stair. The wall mounted handrails do not have the required approaches of 1'-11" at the bottom of the run or 12" at the top. Furthermore, the continuous rail lacks the required vertical balusters that are required for fail protection. The bottom of the stairs near the shop areas are being used for storage which is also a code violation.

The guard rails throughout the facility where they are the proper height lack fall protection that is required per building code. There needs to be a system installed that will not allow for a 4 inch ball to pass through and fall to the lower levels.



The main lobby stairs have rubber treads and risers applied to the metal pan stair system. The main stair leading to the mall level is too wide and in need of an intermediate handrail. The approaches are also a code violation on these stairs as well.

Virtually all of the stair shafts have suffered from what appears to be a major settlement issue, and the exterior wall appears to be pulling away from the building. Please refer to the structural report for further information.

Elevators

Minuteman RVTHS has three elevators within the facility. There is sufficient elevator access to all levels; all appeared to be in working order. There are two 4000 pound passenger elevators located by the main entrance and one by the kitchen and a 6500 pound freight elevator. All the elevators are of adequate size, contain compliant grab bars and door openings, and have been recertified for operation until August 29, 2009.

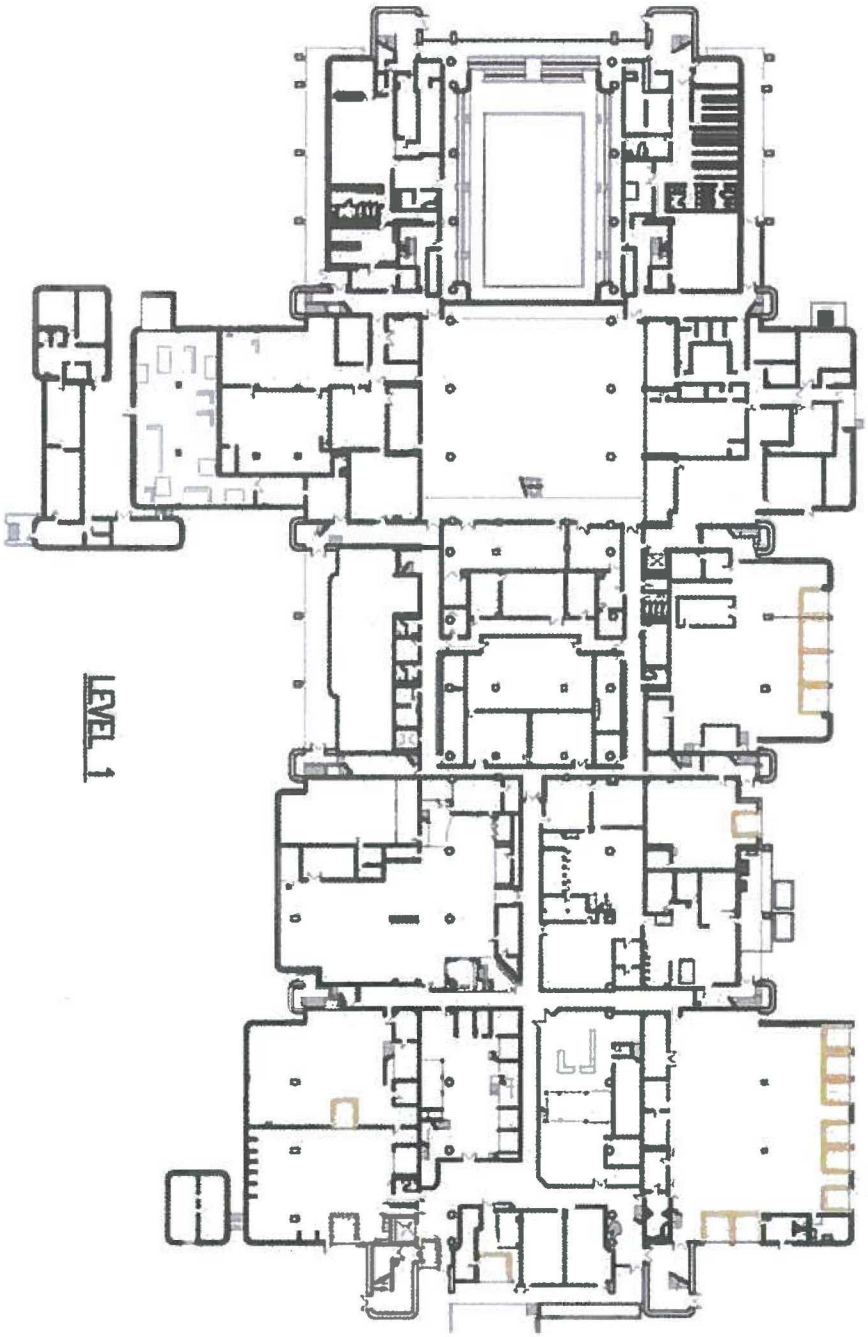


Deficiencies that were found amongst all the elevators were found to be with the signage and controls. Where the main entrance elevator had adequate signage, the other elevators only had signage on the door jambs and none on the exterior face of the corridor walls that served them. In all of the elevators, the control buttons on the corridor walls were to higher than the required 42" to the center of the panel.




Exterior lanterns which indicate the elevator is in use are located on the control panels however lanterns are required to be a minimum of 2-1/2" in the smallest dimension and mounted with its centerline at 72" above the finish floor. Furthermore there was no recollection of an audible alarm which alerts once for up, and twice for down heard upon observation.

Inside the cab, the controls were found also to be in violation with the Massachusetts Architectural Access Board's (MAAB) requirements. Per MAAB, the control buttons are to be mounted between 34" and 48" for frontal approach and 34" and 54" for side approach. The emergency buttons were also found to be on the upper portion of the control panel and are actually required to be at the bottom. Furthermore, the controls are required to have Arabic characters and standard symbols which coincide with each button (i.e., raised star indicating the main level) in addition to Braille. KBA recommends possible finish upgrades and the installation of MAAB required indicators, signage, and controls.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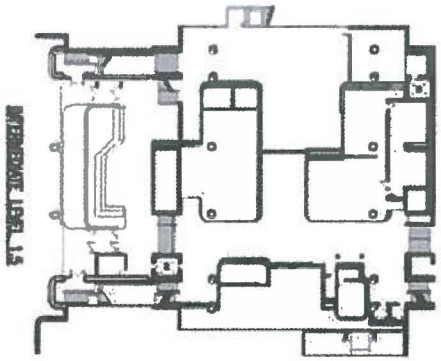

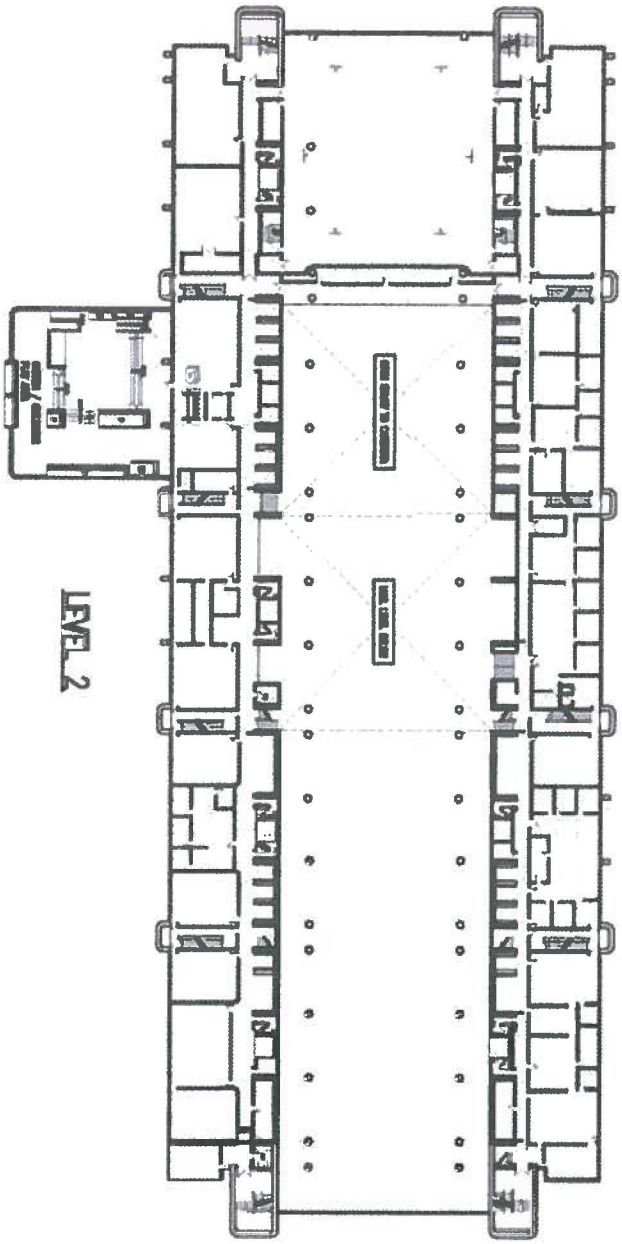
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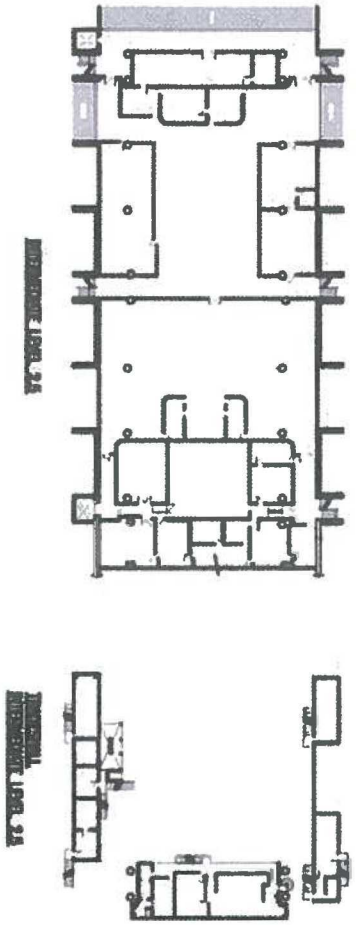

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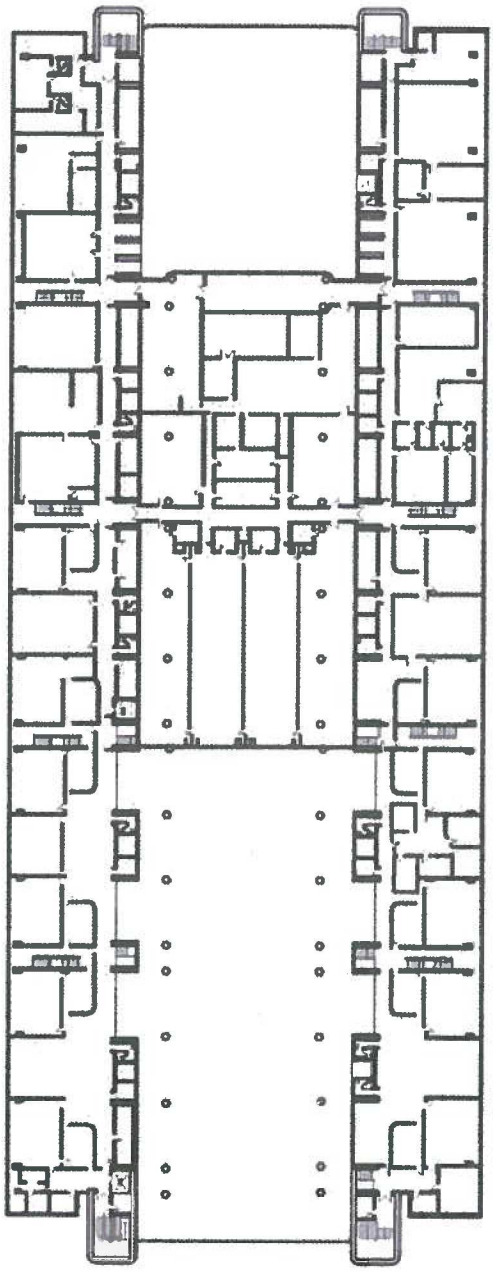
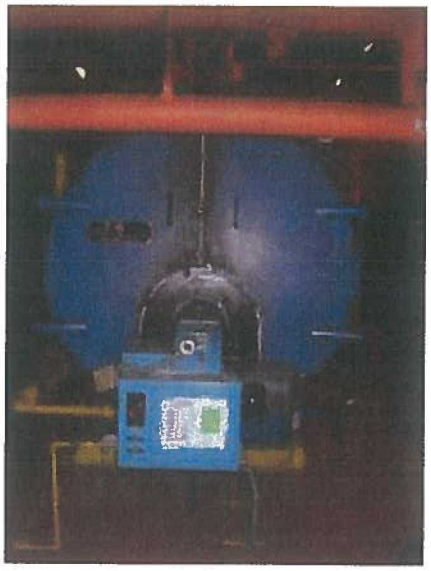


MECHANICAL/HVAC

BOILER ROOM



The Boiler Room is provided with two (2) individual Kewanee fire-tube boilers. Each boiler was installed during Original construction of the building, in approximately 1974, and operates on low-pressure steam. Steam from each boiler is distributed to a single overhead header which serves as a central distribution point for two domestic hot water heaters, one steam absorption chiller, and two steam-to-hot water heat exchangers for the building heating system.

Each boiler is provided with dual low water cut offs as well as all operating and safety controls. The condition of each boiler shell was noted to be very good considering their age. It was not possible to view the internal fire tubes; however, considering the very good maintenance that the boilers have received it would not appear to contain tube perforation or fire box damage. Historical data does suggest that boilers of this nature should have a life expectancy of approximately 40 years considering normal maintenance; however, with continued good maintenance additional service life will be achieved.

At the rear of the boilers is a blow-down separator which is mounted on the wall. This separator receives blow-down sediment from each boiler, and is mixed with City water for cooling prior to discharging to the City sewer. The blow-down separator is provided with discharge aquastats and operating controls; it does appear to be in operating condition. In conversation with Maintenance Personnel, it was said to have been abandoned in-place. This is a concern, should this be the case, system sediment could be collecting within the steam system and possibly reducing heat transfer and overall power plant efficiency.

On the interior side of the boiler room adjacent to the boilers is a floor mounted condensate return/boiler feed water system. The system is made up of single un-insulated steel storage tank with one single boiler feed water pump for each boiler with a common standby pump. The entire system was noted to be in very good condition and operating as intended. Slight surface soiling was noted on the tank and it also appears that one of the three pumps was recently replaced. Heating hot water is generated by two steam to hot water heat exchangers which generates approximately 200° supply water to the building. Each heat exchanger is provided with automatic control valves which regulate hot water supply temperature through supply line aquastats. Hot water is distributed to the heating system by a constant flow primary and standby base-mounted end section pump for distribution to various zones throughout the building. Both pumps were noted to be in good condition and operating as intended. The insulation on the heat exchanger tube bundle was noted to be in good condition; however, because of the covering it was not possible to inspect the shell or the tubes. Maintenance personnel have indicated that the equipment has not been problematic in the past.

Heating hot water piping is schedule 40 black steel which appears is insulated with fiberglass insulation with an all service jacket. From an outward standpoint much of the insulation was noted to be in good condition considering its age. Various sections of the pipe should be removed and examined internally for the presence of corrosion, however, based on the overall condition of the entire power plant and the general maintenance it has received it does not appear that corrosion would be a concern at this time.

Steam and condensate piping is schedule 40 black steel which appears is insulated with fiberglass insulation with an all service jacket. From an outward standpoint much of the insulation was noted to be in good condition considering its age. Various section of the pipe should be removed and examined internally for the presence of corrosion, however, based on the overall condition of the entire power plant and the general maintenance it has received it does not appear that corrosion would be a concern at this time. The condensate piping in the area of the condensate return and boiler feed water system was not insulated.

The breeching from the boilers appears to be of the single wall welded black steel design and is insulated with what appears to be calcium silicate insulation (or asbestos) with a canvas jacket. Samples of this material should be tested for the presence of asbestos and remediated if noted positive. The breeching was provided with a single cleanout at the end of the common breeching. The chimney is of the pre-manufactured steel and refractory type and appears to be of adequate height to maintain proper draft. The entire installation of breeching and chimney was noted to be in good condition and operating as intended.

#4 fuel oil was originally provided throughout the boiler room through an overhead schedule 40 black steel piping system from exterior buried tanks; however, fuel oil is no longer used since natural gas was provided in recent years. As we understand it the tanks were removed but the fuel oil transfer pumps and piping remain in place abandoned.

Combustion air for the boiler room is provided by an air handling unit which is suspended from the ceiling in the boiler room. This air handling unit is provided with a direct source of outside air from a wall-mounted intake louver. The air handling unit is of the recirculation design with a minimum outside air requirement equal to the combustion air requirement of the boilers. The air handling unit is provided with a hot water coil with face and bypass control. Supply air is provided to the space through an un-insulated galvanized sheet-metal distribution system which travels the length of the boiler room. The outside air duct between the louver and the inlet of the air handling unit is insulated with rigid fiberglass insulation. The entire system was noted to be slightly soiled however does appear to operate satisfactorily.

The automatic temperature controls for the entire building are through a central pneumatic automatic temperature control system. The system is provided with a single air storage tank with remote dual compressors and dual motors mounted on a concrete pad adjacent to the air storage tank itself. Located adjacent to the air storage tank is a wall mounted refrigerated air-dryer which is provided with an oil and water separator. It does appear that the system is generating day and night control pressures which allows for night set back control and at the time of our visit pneumatic air was being generated for distribution to all control devices. Comments from maintenance personnel does suggest that the automatic temperature control throughout the building are somewhat antiquated which could relate to failing control devices throughout. Both the refrigerated air-dryer and the compressed air storage tank are provided with manual blow down lines and appear to operate. The original compressors were recently abandoned in-place and were replaced with the two slab mounted

compressors adjacent to the storage tank.

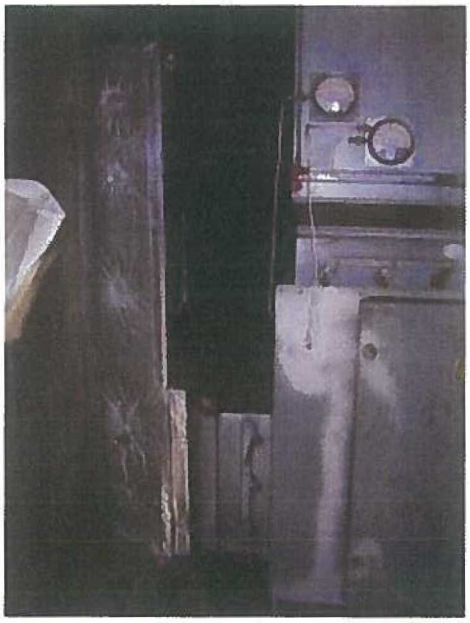
Although the pneumatic system is considered to be in good condition, considering the relatively antiquated nature of all of the control devices, consideration should be given to a complete upgrade to include a new direct digital automatic temperature control system at this time.

Also located within the boiler room is a low pressure steam absorption chiller. The chiller is the original installed in 1972 and provides a chilled water supply to the entire building. Located at the rear of the chiller are two base mounted condenser water pumps which communicate to a roof mounted PVC cooling tower. The single condenser water pump is of the horizontal split case design and communicates to the cooling tower through an un-insulated schedule 40 black steel piping system. The cooling tower appears to have been replaced within the last three years. Maintenance personnel have indicated that the new cooling towers continue to leak and the units are showing a general state of disrepair with numerous warped structural panels and leaking piping. Chilled water is distributed by a single horizontal split case distribution pumping system. Chilled water is provided to the entire building through a fiberglass insulated schedule 40 piping system. Both the condenser water piping system and chilled water piping system appear to be in very good condition and maintenance personnel has indicated that they have not been problematic in the past. It does appear that proper chemical treatment is being provided for the cooling tower. The absorption chiller is a very uneconomical operating chiller which requires the steam boilers to run throughout the summer months to create the cooling energy required within the chiller. Consideration should be given to a complete upgrade of the chiller, however, the condenser water and chilled water piping and pumps are capable of being reused. It does appear that the cooling tower is in need of replacement.

The building is also provided with two geothermal cooling systems which utilize ground water for condensing cycles. Each unit appears to be approximately 20 years old and appeared to be isolated two specialized areas within the building. The cooling systems do not connect to the central chilled water plant. Both systems are completely abandoned in-place and are no longer used.

Air Distribution Systems:

The entire heating ventilation and air-conditioning system originates in (10) roof-mounted mechanical penthouses. Each mechanical Penthouse is provided with either one or two floor mounted air handling units each of which are provided with a combination of supply fans, chilled water cooling coil, hot water heating coil, filter section, and a combination return air outside air mixing box. Each air handling unit receives a direct source of outside ventilation air from a continuous intake louver which runs the entire length of each mechanical Penthouse. Located on the opposite wall is also a continuous louver which is utilized for relief and exhaust air. It was noted that the intake louvers primarily on the intake side had been modified to allow for entrance doors into each space. It appears that the louvers were modified in the field and were not supported adequately allowing the louver blades to be unsupported vertically at each side of the door. It was also noted that the fresh air intake and the relief air connections to the louvers did not meet adequate design standards allowing the effective free area of the louvers to be minimized due to the very short connection of sheet metal. The outside air intake ductwork was insulated with rigid fiberglass insulation much of which was noted to have surface damage. The supply air in return air ductwork was not insulated. The air handling units whether they are air-conditioning or heating and ventilation, all units were noted to have extensive surface contamination and soiling, limited to extensive damage on the fan casings, and generally suggesting that they have reached their maximum serviceable life.



Each air handling unit is provided with an in-line return air fan which returns air from each of the occupied spaces directly to its associated supply air handling unit. All ductwork associated with the return air systems are un-insulated galvanized sheet-metal. Each system is provided with return air and exhaust air dampers which allow the return air could be recycled back to the air handling unit or discharged to the exterior through the wall mounted louver. It was noted that the relief air connections to the louvers did not meet adequate design standards allowing the effective free area of the louvers to be minimized due to the very short connection of sheet metal.

Supply-air ductwork to the individual occupied areas travels vertically through central shafts to the respective zones which they serve. All supply ductwork provides air at a constant supply air presumably at approximately 55° (for those units with cooling) and approximately 70° (for those units without cooling). All supply air travels in a medium pressure high velocity distribution ducting system which terminates in each occupied area at a ceiling mounted velocity reduction terminal unit.

Each terminal unit is a static velocity reduction box which is of galvanized sheet metal, internally lined with acoustic liner. Each velocity reduction box is also provided with a hot water heating coil which ties into the re-circulating hot water distribution system. Each coil is provided with a modulating hot water valve controlled by a pneumatic wall mounted thermostat.

At the discharge of each velocity reduction terminal unit, is a small length of un-insulated galvanized sheet metal ductwork with a single supply diffuser for providing ventilation and temperature air to each occupied area. All ceiling diffuses were noted to have surface soiling with overall condition consistent with their age of approximately 35 years.

All supply ductwork was soiled on the exterior however was not damaged and appeared capable of reuse. All velocity reduction terminal units, discharge ductwork beyond the velocity reduction terminal units, and supply diffusers have reached their maximum serviceable life and should be replaced.

In a number of locations additional spaces were created utilizing full height partitions however, the mechanical systems were not modified adequately to address the proper amount of ventilation and supply air to these newly created spaces. As a result many of the spaces are considered non code compliant with the result and deficiency in ventilation air. In addition, supply diffusers were located incorrectly very close to adjacent walls resulting in draft conditions.

PUBLIC TOILET AREAS

The individual public toilet areas are provided with a combination of ceiling and wall mounted exhaust registers generally located in the area of the plumbing fixtures. All exhaust registers were noted to be slightly soiled and in some damaged. The exhaust system is made up of galvanized sheet metal ductwork which terminates with roof mounted exhaust fans. Limited ventilation control is being maintained throughout all toilet spaces and it does appear that the exhaust fans are running; however, we cannot be certain if the air volumes are in compliance with building code conditions at this time. Considering the approximate 30 year age of all systems and general poor performance consideration should be given to an overall upgrade at this time.

It was noted that there was no mechanical make up air provided for any of the toilet spaces. It appears that all make up air for the spaces is through the combination of undercut does and door louvers. This could be contributing to the poor ventilation control noted.

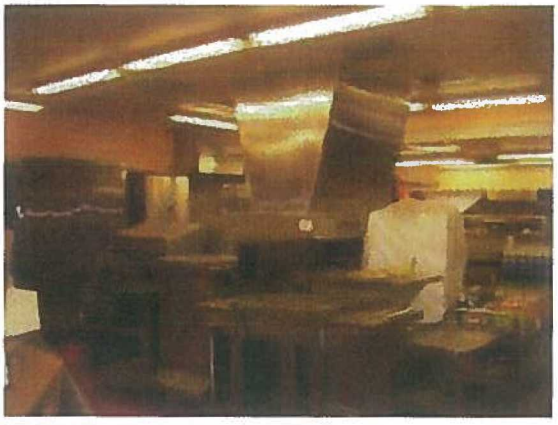
KITCHEN

The kitchen and culinary arts area is provided with heating and ventilation air for the general space provided from a roof mounted air handling unit located within mechanical Penthouse number 3. The air handling unit is typical to all remaining units described above, however, the distribution system is of the low velocity low-pressure design. This system is not provided with any velocity reduction terminal units. The overall condition of all ductwork, equipment, and supply diffusers is generally typical and reaching their maximum serviceable life.

In addition to the above, the kitchen is provided with two additional air handling units which are located at the ceiling of the kitchen itself. Each air handling unit is provided with a supply fan, hot water heating coil with face and bypass control, and a direct source of outside air through wall mounted intake louver. Each unit is of the 100% outside air design and are intended as makeup air for a centrally located exhaust hood located within the kitchen. The overall condition of all ductwork, equipment, and supply diffusers is generally typical and reaching their maximum serviceable life.

The exhaust hood is of the canopy style stainless steel design which is ducted directly through a dedicated exhaust system to roof mounted exhaust fans. The overall condition of the hood was noted to be good and clean and was provided with cleanable cartridge filters, and vaportight incandescent lighting.

A secondary kitchen is located adjacent to the primary kitchen which was at one time used as a McDonald's restaurant. The secondary kitchen is provided with a first-class kitchen preparation area including stainless steel exhaust hood with roof mounted exhaust fan, and a gas-fired rooftop make up air unit. The exhaust hood is noted to be in excellent condition and is of the proper size and height for the area served. The rooftop unit is showing signs of surface contamination due to weather influences however as we understand it the unit does operate satisfactorily. The restaurant is no



longer in service and the entire system has been abandoned in place.

GYMNASIUM, POOL, AND LOCKER AREAS:

The gymnasium, locker rooms, and pool area are all served by two common air handling units located in mechanical penthouses 1& 2. Each air handling unit is of the ventilation and heating design and are typical all air handling units described above.

The gymnasium is provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

The locker rooms are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

The pool area is provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building. Air distribution for the pool area utilizes a side wall supply registers located approximately 16 feet above the floor which discharge horizontally across the pool area. All supply registers were noted to have surface soiling and contamination and generally have reached their maximum serviceable life.

Located along the exterior wall of the pool is a continuous length of fin tube radiation located beneath the slab. Although the amount of heat provided is adequate to a set draft, convective air currents are reduced due to the location of the fin element obstructing make up air from entering the fin element. As a result overall output of the heating is dramatically reduced. It was also noted that there was extensive soiling and contamination on the discharge grille in fin tube elements.

VOCATIONAL TRAINING AREA

All vocational training areas are all served by individual air handling units located within the roof mounted mechanical penthouses as described above. All air handling equipment is noted to be in similar condition as the remainder of the building.

All vocational training areas are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

Also located within this space were various hot water horizontal unit heaters generally intended for space heating. As we understand it two of the three unit heaters do not operate at this time and generally one heater is maintaining all temperature control. All unit heaters were noted to be dirty and contaminated and generally in need of replacement.

The woodworking area is provided with a dust collection system and through the communication of a spiral wound galvanized exhaust system, conveys all woodworking particulate between machinery and an outside mounted dust collection unit. This dust collection unit is of the 100% recirculation type and all exhaust from the space is distributed back to the space at the in-line filters. The outside dust collection unit is extremely rusty and antiquated and at the time of our visit the system was not operating. Consideration should be given to an overall upgrade at this time.

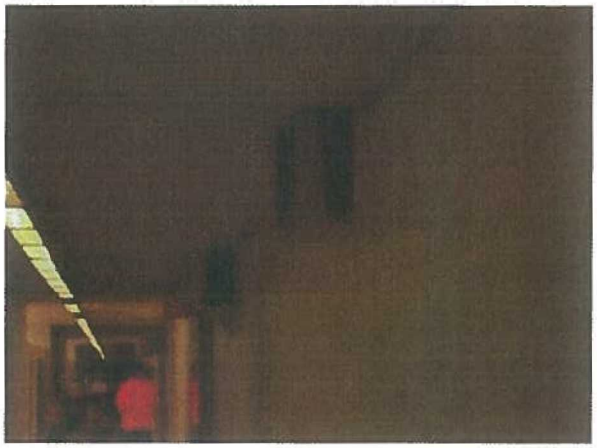
The welding area is provided with a series of welding benches located at one side of the space. Each welding bench is provided with a flexible exhaust captures system which collects in an overhead common exhaust duct which communicates to a space mounted centrifugal exhaust fan. The exhaust system does operate and appears to be sized with common industrial ventilation standards. Because of its use the system is extremely contaminated and upgraded the system is recommended.

The automotive repair area is provided with an underfloor vehicle capture exhaust system which through the use of flexible hoses connected to the exhaust tailpipes of the vehicles ventilates exhaust gases to the exterior of the building. The sheet-metal ductwork which is located between the floor and the fan is damaged and vented. It does appear that the system is sized in accordance with common industrial ventilation standards, however, considering its age in use and upgraded the system is recommended.

ADMINISTRATION AREA

The administration area is served by a single air handling unit located within the roof mounted mechanical penthouses as described above. All air handling equipment is noted to be in similar condition as the remainder of the building.

The administration offices are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.



The administration area has suffered from a lack of air-conditioning capacity which could be related to an undersized air handling unit, undersized cooling coil within the air handling unit, a poor balancing. As a result, secondary air-conditioning units in the form of window air-conditioning units and wall mounted air-conditioning units have been installed in many of the offices to compensate for the deficiency. At approximately 6 locations windows style air-conditioning units are mounted in interior walls with the condensing sections discharging condensate and heat into an adjacent circulating corridor. This resulting condition is causing the communicating corridor to overheat and impose an additional air-conditioning load into this corridor. The entire condition should be upgraded.

ENTRANCES, VESTIBULES, & CORRIDORS

The main entrances and vestibules were all provided with hot water cabinet unit heaters adjacent to each doorway. It was noted that generally all heaters were slightly damaged, dirty, and contaminated, however, as we understand it do operate and maintain reasonable heating control at all entrances and doorways. All units are generally in need of cleaning and considering the 35 year age and general state of disrepair consideration should be given to an overall upgrade at this time.

Communicating corridors throughout the entire building were provided with a limited amount of ventilation of which does not appear adequate to meet the current building code requirements. No exhaust systems were provided however should be considered to improve overall air quality.

ELECTRICAL

The electrical systems for the Minuteman Regional High School are generally of the original vintage. The site is primary metered with the meter located in the main Electric Room. The primary service enters the school underground via a pad mounted transformer. Primary switches and pad mounted transformer is located outdoors in a fenced in area at the back of the school. The 4000 ampere, 277/480V, 3 phase, 4 wire switchboard manufactured by FPE is old and in poor condition.

A new service switchboard from the existing pad mounted transformer with a secondary voltage of 277/480 volt, 3 phase, 4 wire should be provided. The interior secondary transformer and 120/208 volt, 3Ø, 4 wire switchboard should also be replaced.

Panel boards located throughout the facility should be replaced with new housed in electric closets.
The facility has two outdoor Onan 45KW propane stand-by emergency generators. The generators are old, rusted and in poor condition.

Various areas of this facility are currently provided with emergency lighting from the two generators. Exit signs in general were incandescent and fluorescent and were in poor condition. Exit signs shall be replaced with new energy efficient LED type with additional units provided as required to meet the latest codes. New generator should be provided for all life safety systems including lighting and exit signs, standby loads such as heating system, walk-in freezers and coolers, telecommunication systems, etc. Dedicated emergency electric rooms needs to be provided with properly rated assemblies.

The fire alarm system consists of a Faraday control panel and exterior master box. The system is a conventional type with horn/strobes, pull stations and limited smoke detectors and heat detectors throughout the building. This building is not sprinklered. Most areas do not have any fire alarm detector coverage or fire alarm horn/strobe units. System is antiquated and does not meet the latest code requirements. Most shop areas area provided with heat or smoke detectors with emergency pushbutton operator (EPO) switches. The security system consists of control panel in the break room keypads and door contacts only.

We recommend that a new integrated electronic security system be provided for the entire facility consisting of passive infrared sensors in all corridors and perimeter spaces with windows at grade level, closed circuit television system, CCTV with cameras and monitors and card access proximity readers at designated doors. Currently facility has two CCTV cameras and no card

access system. The existing security system is antiquated and does not provide sufficient coverage of building perimeter spaces.

The typical classroom consists of surface fluorescent wraparounds individually switched with one row over marker board also separately switched, clock, wall phone, speaker, one (1) CAT5 data drop at teacher's station and two (2) duplex receptacles. Additional receptacles should be provided to accommodate the needs of the space. The existing intercom/paging is a Paso system providing all call functions throughout the building. The system is located in the mail room across from the administration area. Some shops have in-floor walker duct raceway system. Recommend that a new lighting system be provided for the entire facility with new energy efficient code compliant luminaires. An automated lighting control system for both interior and exterior lighting should be provided.

Due to the age of most equipment including the fire alarm system and with the exception of the primary switches, it is our recommendation that all electrical systems be replaced with new energy efficient code compliant integrated systems suitable for the needs of the school.

Electrical Distribution System:

The site is primary metered. The primary service originates on a utility pole and runs underground to an exterior pad mounted cubicle. Adjacent to the primary switch cubicle is a pad mounted transformer which feeds a switchboard rated at 4000 amperes, 277/480 volt, 3 phase, 4 wire and is housed in the main electrical room in the basement of building. The switchboard sits on concrete housekeeping pad. The switchboard manufactured by FPE has a 3000A fused bolted pressure switch with ground fault interrupter, GFI protection. The branch devices consist of fusible distribution switches.

The switchboard feeds a series of panel boards located throughout the school. The switchboard also feeds a 500KVA, 480V to 120/208V, 3Ø, 4W transformer which feeds a 1600A switchboard. This switchboard also feeds automatic transfer switch for normal/emergency panel boards. The switchboard although in fair condition is over 30 years old and is at the end of its expected life span. The panel boards range from fair to poor condition.

Although the site is primary metered it appears that the primary switch cubicle and pad mounted transformer is owned by the Utility Co.

Standby Generator:

The emergency system consists of two 45Kw/56.25Kva, 277/480 volt, 3 phase, 4wire propane gas generators within exterior enclosures. The generator manufacturer is Onan with (1) 100 ampere main breaker that feeds a 100 ampere automatic transfer switch housed in the electric room. The automatic transfer switch manufacturer is Onan and feeds normal/emergency panel boards located throughout the facility. The emergency system is in violation of current codes as it does not maintain separation of emergency and standby loads. The equipment including the automatic transfer switch and panel boards are not housed within dedicated spaces with properly rated assemblies.

Emergency Lighting and Exit Signs:
The emergency lighting consists of the same normally on fixtures connected to the two generators in corridors, stairwells and other circulation spaces.
Most exit signs are incandescent or fluorescent and are in poor condition.

Interior Lighting:

- Corridor lighting consists of surface 1'x 4' fixtures with prismatic lens with (2) T8 lamps and electronic ballasts. Lighting control consists mainly of local switches.
- Typical classroom consists of (3) rows of surface fixtures, with prismatic lens with (2) T8 lamps and electronic ballasts. Lighting controls consist of single pole switch by the entrance installed in the classroom.
- Shop lighting consists mainly of continuous rows of 8' suspended industrial strips with (2) 8' T8 lamps and electronic ballasts. Some shops also utilize HID lighting as supplementary. Lighting controls consist of a local switch within each shop.
- Labs consist of multiple rows of surface fixtures, with prismatic lens with (2) T8 lamps and electronic ballasts similar to classrooms. Controls are typically local switches.
- Media center consists of mainly continuous rows of pendant fluorescent fixtures with prismatic lens with (2) T8 lamps and electronic ballasts controlled with local switches.
- Cafeteria consists of mainly surface cylinders with HID lamps and fluorescent cove lighting.
- Kitchen, locker rooms, etc. consists of fluorescent vapor tight surface fixtures with (2) T8 lamps and electronic ballasts.
- Toilets range from 2' x 4', 3 recessed with T8 lamps and electronic ballasts and 1' x 4', surface with T8 lamps with electronic ballasts.
- Offices and support spaces generally consists of 1 x 4 fixtures and 2 x 4 recessed with prismatic lens with (2) T8 lamps and electronic ballasts. Spaces are generally single switched.

Mechanical spaces typically have 4' strips with (2) T8 lamps and electronic ballasts.
Gymnasium consists of metal halide high bay luminaires. Fixtures do not appear to have quartz re-strike lamps for instant-on. Fixtures are switch controlled with local key switches. Redundant incandescent fixtures located adjacent to every other HID fixture are connected to the generator.
Pool consists mainly of upgraded pendant cylinder fixtures with compact fluorescent lamps as well as pendant HID high bays with glass lens. Fixtures appear to be switch controlled via multiple relays. A system of sparsely located incandescent high bay fixtures exist connected to the generator.

Exterior Lighting:
Exterior lighting consists of pole mounted HID fixtures as well as building mounted floods, time clock controlled.

Fire Alarm:
The existing fire alarm system consists of a conventional Faraday fire alarm control panel located in the janitor's office room. System smoke detector coverage consists of mainly smoke detectors adjacent to corridor smoke doors only. Horn/strobe units exist mainly in corridors and are generally not of the ADA type. Some ADA compatible horn/strobe units have been added within one wing but mounting heights exceed ADA guidelines. System transmission is via IMSA cable and a master box located in the main vestibule. The fire alarm system is obsolete. The building is not sprinklered.

Recommendations

Interior Lighting:
The interior lighting is generally outdated and is not conducive to an environment where the use of VDT's is ever/more present. Classroom/labs would benefit from a system of indirect suspended luminaires with T5 high output lamps with electronic ballasts.

Fixtures along exterior walls with natural light contribution could be fitted with dimming ballasts automatically adjusted via daylight dimming sensors used for daylight harvesting. A system of multiple switches would be utilized to allow the instructor flexibility but livened by an occupancy sensor that turns all lights off when the space is unoccupied.

Corridor lighting and other circulation spaces are currently manually controlled. The facility would benefit from an automated lighting programmable control system that will turn off lights on predetermined schedules to suit the needs of the facility. The automated control system could interface with the proposed facility's energy management system as required. Day lighting controls should be installed on non-emergency lighting in spaces where daylight harvesting is feasible.
Media center and other large spaces with natural daylight contribution could benefit from a system of dimmable fixtures along perimeter walls automatically adjusted via daylight dimming sensors.

Toilets with constant-on lighting or locally switched could be automatically controlled with occupancy sensors for normal only lights that turns off these lights when space is unoccupied. Individual offices could be retrofitted with a wall mounted occupancy sensor to turn off fixtures when space is unoccupied.

Larger enclosed support spaces should be provided with remote mount occupancy sensors.

Gymnasium could be retrofitted with new metal halide high bays with pulse start high-low ballasts with dual level controls. A reduced number of same fixtures will be provided with quartz re-strike ballasts connected to normal/emergency lighting and monitored with supervisory relays when switched off.

A system of surface prismatic troffers with (4) or (6) T5 high output lamps and electronic ballasts multi-switched could also be considered for gym. Wire guards to be provided in either case in gym

Pool area should be provided with non-corrosive energy efficient fixtures as well as new emergency lighting.

Electrical Distribution System

The electrical distribution system in general is old and the condition ranges from good to poor. The distribution equipment although relatively well maintained is over 30 years old and at the end of its useful life.

With the switchboards being of the fusible type and being in poor condition we recommended that they be replaced. A system of computer grade panel boards with double neutrals and surge suppression devices fed from K-Rated transformers would enhance the power quality and mitigate harmonic effects generally caused by such equipment. Original panel boards should be replaced and added to meet the needs of the facility.

Standby Generator

The existing generators are marginally sized for this facility. The life safety system including emergency lighting, exit signs, generator, feeders, etc. is in violation of today's codes. It is recommended that a new generator be provided located on the exterior of the facility adequately sized for life safety needs as well as other essential loads.

Dedicated automatic transfer switches are required to feed emergency lighting and exit signs from panel boards within fire rated dedicated spaces fed with fire rated feeders such as MI Cable or equivalent assembly.

Other essential loads including kitchen coolers and freezers, freeze protection including boilers and pumps, sewage ejector and sump pumps, telecommunications systems, lifts, etc. would be on separate transfer switches.

Wiring Devices

Receptacles are sparsely located within instructional spaces and are inadequate for a modern day facility for computer and electronic related loads.

Fire Alarm System

It is recommended that this facility be provided with a new fully addressable fire alarm system that meets code and is ADA compliant. Smoke detectors should be provided in egress corridors, stairwells, electric rooms, etc.

Audible/visual devices should be provided in egress corridors, classrooms, labs, shops and other large open areas such as kitchen, cafeteria, gymnasium, etc. System to interact and provide auxiliary functions including smoke door closure, HVAC shutdown, kitchen hood interface, etc. and allow for supervision of future sprinkler system. The existing system shall remain fully operational until the new system is fully functional. Installation may be phased.

PLUMBING

Executive Summary

The Minuteman Regional High School has received minimal maintenance on the plumbing systems and equipment over its occupied years. Even with adequate maintenance, systems will gradually deteriorate due to scale and poor water conditions. Although most of the systems are working adequately at this time, the major equipment and systems are near the end of their useful life. Along with aging systems, many of the systems are not up to current codes. If it is anticipated that major modifications are planned for this building then the plumbing systems should be considered for an overall upgrade and a complete fire protection system installed.

Fixtures:

- Fixtures are generally original, indicating the time of their original installation. Some fixtures have been replaced to try to meet the accessibility codes.
- The water closets are wall mounted vitreous china, flush valve type with siphon jet action.
- Fixtures are generally in fair condition.
- The urinals are wall hung vitreous china, flush valve type with siphon jet action.
- The lavatories are wall hung vitreous china. The faucets are metering type with hot and cold water controls and spouts.
- The locker room showers appear to be in fair condition. Some modifications have been made due to failure of the shower valves.
- The janitor's sinks are cast iron wall hung with stainless steel rim. The faucets are wall hung but have no vacuum breakers. These fixtures are in poor condition.

Water System:

The building is supplied with two domestic water services, one from the north and the other from the south. The north side domestic water service is a 4" service with a meter and backflow preventer. The south side domestic water service is a 6" service with a meter and backflow preventer. The domestic water pressure is between 90 – 100 psi.

The domestic hot water is provided by two P.K. steam fired storage tank type water heaters. Of the two heaters, the one heater does not operate. There is a master thermostatic mixing valve on the system. There are two abandoned geothermal tanks and one abandoned solar hot water tank. Both of these systems are abandoned in place. There are a few electric point-of-use hot water tanks throughout the building serving remote locations.

Drainage System:

- The sanitary and storm drainage piping systems are cast iron. The exposed piping is visibly in good condition.
- The science waste is drained with copper piping directly into the sanitary system. There is no separate science waste piping system or neutralization for the science waste.
- The sanitary drainage system is piped to a municipal sewer system.
- The roofs are drained by roof drains and interior piping that exits the building and connects to the municipal storm system. There is no secondary roof drainage system.
- The floor drains in the trade areas of the school are piped to an exterior gasoline/oil separator prior to discharging into the municipal sewer system.

Natural Gas and Propane Gas Systems:

The building has a natural gas service that feeds the two heating boilers only. There are (3) 1,000 gallon, above ground propane tanks on the property, two on the north side and one on the south side of the building. Propane is provided for an exterior generator, the kitchen equipment and the trade shops.

Compressed Air System:

There is a central compressor in the boiler room that supplies the carpentry and automotive shops with multiple compressed air drops. Each compressed air drop is provided with a quick connect fitting.

Kitchen:

The kitchen equipment is generally aged but in working condition which indicates the vintage of the time of installation. The cooking equipment is all propane fired. There is a three pot sink in the main kitchen that has a point-of-use grease interceptor. There is also a three pot sink in the restaurant kitchen that has no grease interceptor.

FIRE PROTECTION

There is no fire protection sprinkler system installed in the main building; however, there is a limited area fire protection sprinkler system in the wood shop that is supplied off of the domestic water system.