LIN ASSOCIATES, INC.
CONSULTING ENGINEERS

**STRUCTURAL MEMORANDUM**

**TO:** Jason Knutson - CGKV Architects

**FROM:** Bob Lie

**REGARDING:** Existing Structural Conditions Building Evaluation
Pentucket Regional High School, West Newbury, Massachusetts

**Date** 3 March 2015

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On 26 February 2015, the undersigned visited the school to conduct a visual evaluation of the school. The purpose of this evaluation is to provide a cursory assessment on the structural condition of the school building to support the District's Statement of Interest submission to the Massachusetts School Building Authority.

Mr. Greg Hadden, Facility Manager of the Pentucket Regional School District, assisted the evaluation by providing the background of the school construction and its past expansions. Mr. Hadden then proceeded to show some known structural concerns that he has noticed over the years, including the most recent hydrant line break under the east wing of the school that had necessitated an intensive structural intervention to stabilize the structure surrounding the break.

The undersigned then proceeded to perform a walk-through of the building and conducted visual observations on the accessible areas inside and around the building. No removal of finishes was conducted during this visit.

### *General Building Description*

The original building, built mid to late 1950s, was a "Tee" shape structure with two story classrooms on the east and south wings, gymnasium on the west end and single story support spaces surrounding a two story high Auditorium at the center. Structural system consists of bulb Tee poured gypsum roof deck over steel joists flat roof framing supported on masonry bearing walls, supplemented with structural steel framing. Cast in place concrete waffle slab system is used for the suspended first floor slab. Ground floor is cast in place concrete slab on grade over shallow spread footing bearing on competent soil foundation system. Lateral resisting system for the building is primarily the unreinforced (?) concrete masonry block and brick walls with concrete floor and flexible gypsum roof deck as the horizontal diaphragm elements. Connections of the horizontal diaphragms to the supporting walls were not obvious during the visit since they are mostly concealed by finishes.

The school had a significant addition in the mid 1990's on its south and west ends. A two story classroom and library was built along its southern boundary. High bay one story Physical Education area was built on its western end. Typical structural system consists of structural steel framed roof and floor supporting metal deck roof and concrete filled metal deck first floor. Substructure is comprised of concrete slab on grade at ground floor and shallow spread footing foundation system. Lateral resisting system for the addition is structural steel concentric braced frames.

Cafeteria addition was the latest expansion. Structural system is not known.

Structural As-Built drawings are available for the existing original building and the 1993 addition.

### *Existing Condition Evaluation*

Our observation indicated that the overall building appears to be in fair structural condition. No significant distress or movement was observed on the building structures. Several notable items were observed:

- 6"ø hydrant line traversing north-south under the health office at the east classroom wing burst on early spring last year. Significant amount of fines from the underlying soil had washed up to the inside of the room. The disturbance to the bearing soil had caused the concrete floor and adjacent walls to settle. Under the supervision of registered structural and geotechnical engineers, the slab and foundation was stabilized using


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the compaction grouting method and returned to service. The hydrant line has been cut, capped and filled with cement slurry. The Facility office keeps good record of the stabilization effort.

- Vertical crack was observed on the wall of the gymnasium northwest corner, likely a stress release crack due to lack of movement control joint.
- Step cracks were noted on the glazed tile "pilasters" at the northeast and southeast corner of the auditorium facing the corridor. Similar crack was observed on the masonry walls across the corridor from these "pilasters". Likely cause is the end rotation of the roof beams when subjected to load. Noted that this location is where the low corridor roof meets the high wall of the auditorium, thus can be subjected to significant snow drifting.
- Vertical crack on the east masonry wall of the metal shop, likely a stress release crack due to lack of movement control joint.
- Crack and or movement joint on the slab on grade have translated thru the finish floor tile at several locations.
- Shrinkage cracks on the first floor waffle slab were visible at several locations.
- The EIFS clad façade of the library facing the courtyard exhibited corrosion along its termination around the windows and at the soffit. Closer evaluation of this condition was not possible due to the blocked access into the courtyard from snow accumulation. Evaluation of the photograph appeared to indicate corrosion of the metal termination or corner beads within the EIFS system.
- The 1993 addition brick façade utilized manufactured stone sill under the windows. These sills have exhibited movement over the years, some of them reportedly almost dislodged from the wall. Currently these sills were held back with the use of stainless steel plate bolted to the sill and to the adjacent brick wall. Anchorage of these sills will need to be evaluated in more detail.
- Brick "blade wall" adjacent to door A3 at the east wing showed movement crack at mid-height of first floor window line.
- Boiler room brick chimney appeared to be in fair shape. Efflorescence was noted on the upper portion of the chimney as well as loss of mortar on the brick joints for a few coursed below the cap.
- Plastic "Faux Brick" façade of the cafeteria addition showed impact damages along the bottom of the wall.
- Exterior envelopes appear weather tight with no major leakage observed.

## *Conclusion*

Based on our field evaluation, the existing building appears to be structurally sound. Several deficiencies notes here will need to be investigated further for needed repairs or strengthening.


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**Slab Jacking at Health Office at Spring 2014**
**Due to hydrant line burst under the building.**

**Vertical Crack at NW Gymnasium Corner**

**Step Cracking at Glazed Tile Pilaster**
**Corner of Auditorium**

**Masonry Vertical Crack at Metal Shop**


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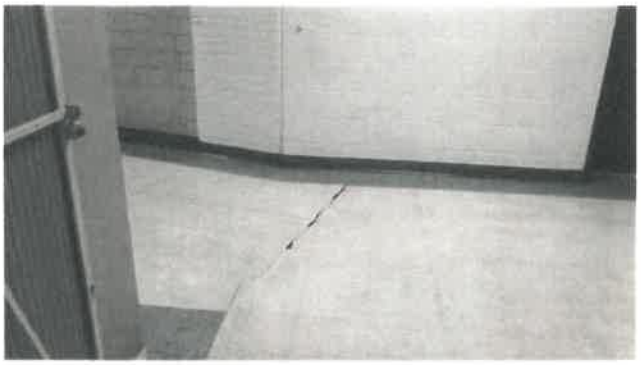

**Movement Joint or Crack at Slab on Grade**

**Library Façade at Courtyard**
**Note corrosion along its edges**

**Cast Stone Window Sill Retainer Plate**

**Blade Wall adjacent to Door A3**
**Note step crack at window mid-height**

**Boiler Room Chimney**
**Note efflorescence and some loss of mortar at joint.**


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**Cafeteria Addition**
**Note impact damage on "faux brick" plastic façade**


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# VII. APPENDIX B

Pentucket Regional High School
Mechanical, Electrical and Plumbing Existing Conditions Report

March 19, 2015

Fitzemeyer & Tocci Associates, Inc.
300 Unicorn Park Drive, Fifth Floor
Woburn, MA 01801

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FITZEMEYER & TOCCI ASSOCIATES, INC.

# Pentucket Regional High School

# Mechanical, Electrical and Plumbing

# Existing Conditions Report

**Prepared For:**

Pentucket Regional School District

24 Main Street, West Newbury, MA 01985

March 19, 2015

F&T Project No. 150010.01

**Prepared By:**

Fitzemeyer & Tocci Associates, Inc.
300 Unicorn Park Drive, 5th Floor
Woburn, MA 01801

781.481.0210 | 781.481.0203

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## 1. EXECUTIVE SUMMARY

The Pentucket Regional High School was originally constructed in 1956. The school was then renovated and additional spaces were added in 1993. There was also a small addition to the Cafeteria in 2001. The current, cumulative size of the building is now approximately 210,000 square feet.

The building consists of classrooms, gymnasiums, locker rooms, an auditorium, bathrooms, a library, administration/office spaces, mechanical rooms, electrical/IT rooms, storage spaces and other miscellaneous areas.

The HVAC system and equipment is either past or nearing the end of its useful life expectancy, as detailed by the HVAC Applications - ASHRAE Handbook. Facility staff has done a commendable job in maintaining, replacing and fixing the equipment and systems as needed; however it is evident that the HVAC system is in need of replacement in the near future. Additionally, the HVAC equipment within the Apparatus Room dating back to 1956, appears to be in imminent danger of possible failure. This would result in a large portion of the school being without heat.

As with the HVAC system, much of the Plumbing systems and equipment is 20+ years old and has surpassed its useful life expectancy. Many of these systems appear to be in need of full replacement.

The majority of the electrical power distribution system, including the buildings electrical service, is in poor physical condition and well past its useful life of 25 years. Equipment is still in operation from the original high school construction in 1956 and no longer has replacement parts available. The original 1956 electrical distribution equipment, including the original Frank Adam switchboard, appears to be in imminent danger of possible failure; which would result in the school being without power.

The lighting system throughout the 1956 original construction was visually in good condition in most areas. There are some fixtures that are worn and in poor condition. The 1993 building addition lighting is in good condition. Both lighting systems did not have any reported issues other than failing occupancy sensors that are being removed and bypassed as they fail..

The building is fully equipped with an addressable, voice evacuation fire alarm system that was installed within the past 10 years. The system consist of speaker/strobes, pull stations, heat detectors, smoke detectors, and a graphic annunciator. The first alarm system is in good physical and operating condition and the maintenance staff did not have any report any overall system issues. There are a few damaged smoke detectors noted in the gym but they still are operational. The existing fire alarm system provides adequate coverage and appears to be in compliance with the latest editions of NFPA 72 and the Commonwealth of Massachusetts Building Code (780 CMR).

The building is equipped with 19 CCTV cameras located throughout the building, at key security points; including the office, main entrance, cafeteria and some hallways. In addition, the front door is electronically locked and includes and intercom and CCTV that feeds back to the main office. All security systems are in good physical and operation condition.



*Mechanical/Electrical Engineers*

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# 2. HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC)

## 2.1. Existing HVAC System Evaluation

The existing HVAC system includes systems and equipment from the original 1956 installation, as well as the 1993 installation. The HVAC system and equipment described herein will be compared to the Service Life Estimates, as detailed in the 2011 HVAC Applications – ASHRAE Handbook.

There are currently two (2) existing Cleaver Brooks fire tube, steam boilers (Model CB200) in the Boiler Room. The boilers are dual fire, such that they are able to run on natural gas or fuel oil; although Facility staff operates the boilers primarily on natural gas at this time. Both boilers are weathered and in poor condition. Currently the boilers operate in a duty-standby operation, as Boiler B-2 is in worse condition and has had numerous maintenance issues. Boiler B-2 is merely a back-up at this time. Boiler B-1 appeared to be in better condition, but still appears to be quite fatigued. According to the ASHRAE service life estimates, fire-tube boilers have a life expectancy of 25 years. With the boilers having been installed in 1993, they are nearing the end of their useful life, and are in need of replacement.

The boilers produce steam which are tied into a 12" diameter header, which is original to the 1956 installation. The header is in poor condition, and appears to have needed repairs and corrective measures. From the steam header, there are several branches that serve various systems and equipment. There is a branch that serves the domestic hot water storage tanks (see Plumbing Section herein for storage tank condition), as well as a branch that serves AH-4, which is used for combustion air for the Boiler Room. AH-4 is in poor condition, and when operating is excessively loud. The associated dampers for this unit have been fixed open to allow for entrance of combustion air, however this limits the combustion air and decreases boiler efficiency. There is a 6" diameter branch off the steam header that serves a shell and tube, steam to hot water heat exchanger. The hot water then serves various terminal units throughout the 1993 addition. The shell and tube heat exchanger appeared to be slightly weathered, but is in moderate working condition. According to ASHRAE, a shell and tube heat exchanger has a life expectancy of 24 years. With that, the heat exchanger is nearing the end of its useful life. There are also 10" diameter and 5" diameter branches that exit the Boiler Room and serve various terminal units and then other shell and tube, steam to hot water heat exchangers located in the Apparatus Room.

Within the Apparatus Room, there are two (2) shell and tube, steam to hot water heat exchangers. These heat exchangers are original to the 1956 installation and are in very poor condition. As stated earlier, the shell and tube heat exchangers have a life expectancy of 24 years, and are decades past their useful life expectancy. Additionally there are various gate valves that allow for individual hot water supply and return branches to be isolated. The gate valves also appear to be original to the 1956 installation, are in poor condition and do not appear to be operable. The distribution piping within the Apparatus Room is also mostly original and appears to have needed numerous maintenance upgrades to fix and/or prevent leaking. The equipment within the Apparatus Room, dating back to 1956, appears to be in imminent danger of possible failure. Failure of this equipment, such as the shell and tube heat exchangers, would cause a large portion of the High School to be without heat.

On the waterside of the heat exchangers, there are three (3) hot water distribution, base mounted, end suction pumps that serve the various terminal units throughout the Building. The hot water distribution pumps were installed in 1993, however have needed to be rebuilt, and appear to be worn. According to ASHRAE, base-mounted pumps have a life expectancy of 20 years; therefore the distribution pumps have exceeded their useful life expectancy.



*Mechanical/Electrical Engineers*

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There are various terminal heating units throughout the school that were installed in 1956 and 1993. Included are unit heaters, cabinet unit heaters, finned tube radiators and unit ventilators.

Hot water unit heaters (including cabinet unit heaters) have an ASHRAE life expectancy of 20 years, and have all exceeded their useful life expectancy. Furthermore, upon inspection, they appeared to be corroded, fatigued and likely have poor heat transfer capability due to corrosion.

Finned tube radiators have an ASHRAE life expectancy of 25 years, and have either far exceeded (1956 radiators) or are nearing the end (1993 radiators) of their useful life expectancy. Finned tube radiators that are original to the building, are in poor condition and do not have the desired heat transfer capability. The finned tube radiators installed in 1993 were in moderate condition, however some appear to be worn as they are in high traffic areas, such as corridors.

Each classroom has a single unit ventilator that provides supply air for ventilation. The unit ventilators are provided with hot water heating coils for tempering incoming air during winter and/or shoulder months. The air is then exhausted via roof mounted exhaust fans. The unit ventilators have an ASHRAE life expectancy of 20 years, thus have all exceeded their useful life. During inspection, it was identified that the unit ventilators installed in 1956 were in very poor condition, as they are quite corroded and fatigued. The unit ventilators installed in 1993 are in the moderate condition and are operable.

The roof mounted exhaust fans have an ASHRAE life expectancy of 20 years, and have all exceeded their useful life expectancy. Facility staff appears to have had to rebuild many of these fans in order to maintain operability. They appeared to be fatigued, however most were operable.

There are various air handling units throughout the school that provide heating, ventilation and in some cases cooling. AH-1, AH-2 and AH-3 all have hot water heating coils in addition to DX cooling coils with remote air cooled condensers for cooling. These were all installed in 1993. AH-1 serves Word Processing, AH-2 serves Computers, and AH-3 serves the Library offices. According to ASHRAE, air handlers and air cooled condensers have a life expectancy of 20 years; therefore these have all exceeded their useful life expectancy. The air handling units were observed to be operational and in moderate working condition; however they are noisy due to age and wear of bearings and fittings.

The school Gym is served by HV-1 and HV-2, which have bottom mounted return air connections, a mixing box and hot water heating coil. These units provide heating and ventilation to the space during times of high occupancy. Both units have a life expectancy of 20 years, thus are past their useful life; as they were installed in 1993. Both are operable, however they are in poor condition with visible corrosion and ripped flexible connections. Furthermore, they quite noisy when operating due to age and corrosion.

The kitchen was previously served with a direct, gas-fired makeup air unit; which has since been deemed inoperable. It is now served by a hot water, air handling unit (HV-3); which serves as the kitchen makeup air unit. There are kitchen canopy hoods over the equipment that is tied into a roof mounted exhaust fan for heat, smoke removal. HV-3 is operable and in moderate condition; however it is past its useful life expectancy of 20 years.

The Office and Administration area are served by three (3) packaged rooftop units that provide cooling. These were all installed in 1993 and are all operable. The rooftop units all have ASHRAE life expectancy's of 15 years, thus have all exceeded their useful life expectancy.

All equipment and system controls are pneumatic, which is an outdated technology, as most schools and facilities have moved to completely electric temperature controls. With electric temperature controls, building HVAC systems can be monitored for alarm or maintenance issues. Additionally, HVAC equipment operation can be scheduled to ensure maximum energy reduction. This older, pneumatic



*Mechanical/Electrical Engineers*

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system does not have that capability. Pneumatic systems and equipment have an ASHRAE life expectancy of 20 years. There have been several pieces of controls equipment that has been replaced by Facility staff in order to maintain controllability; however there are parts of this system that are now almost 60 years and in need of full replacement.

Fire-Tube Steam Boiler

Condensate Receiver

Apparatus Rm – Corroded Gate Valve

Shell & Tube Heat Exchanger

Pneumatic Compressor

Air Handling Unit AH-1

Rooftop Exhaust Fans

Unit Ventilator (1956)

Unit Ventilator (1993)



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HV-2 with Torn Flex Connection

Finned Tube Radiator

Hot Water Unit Heater

## 3. PLUMBING

### 3.1. Existing Plumbing System Evaluation

The existing domestic hot water system is served by two (2) gas fired hot water heaters that are severely corroded and in poor condition. Additionally, there are two (2) domestic hot water storage tanks with steam heating coils that can provide domestic hot water when the boilers are operating. Domestic Hot Water Tank #2 is currently inoperable due to age and corrosion. Domestic Hot Water Tank #1 is operable, however is in poor condition. Currently, Facility staff operates the gas fired hot water heaters and Domestic Hot Water Tank #1 in order to provide sufficient heat to the domestic hot water system. Due to age and condition, the gas fired hot water heaters and hot water tanks are in need of replacement.

The School currently operates its boilers on natural gas, however there is still an underground fuel oil storage tank next to the Boiler Room. The underground storage tank is 10,000 gallons and was installed in 1993. The duplex fuel oil supply pumps were also installed in 1993, and are said to be operable; however they are in poor condition. The fuel oil tank is monitored by a Veeder Root control panel for tank level, tank leak, tank overflow and other alarm and/or monitoring. The fuel oil supply system is still operable, however is near the end of its useful life.

The natural gas service feeds the boilers, domestic hot water heaters and also travels to the Science wing where it feeds various classroom gas turrets. Each classroom appeared to have an emergency gas shut down button or valve, which were said to be operable. The gas service appeared to be in satisfactory condition.

The domestic hot water supply, hot water re-circulation and cold water supply serves various bathrooms, shower areas and classrooms throughout the facility. Some of this piping was replaced in 1993, along with fixture fit-out work; however some of the piping is original to the Facility. Piping that dates back to 1956 would need to be replaced as the age and corrosion is causing sporadic pipe point failure.

The Science Wing also has an acid waste system that was installed in 1993. The acid waste piping appeared to be in moderate condition, however the acid waste filter tank appeared to be aged. The acid waste system gets scheduled maintenance to ensure operability, however is at the end of its useful life.

Additionally, the Science Rooms have emergency showers and eye washes that were installed in 1993. These are said to be tested and functional and appeared in moderate condition.

Most of the plumbing fixtures had been added or replaced during the 1993 installation. The fixtures vary as to the condition. Some of the fixtures are operable and in satisfactory condition; while many others



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appeared to be leaking and in poor condition. With the fixtures being 20+ years old, they are at the end of their useful life expectancy.

The roof drainage system, where visible, appeared to be in poor condition. The exposed roof drains within the Gymnasium showed signs of corrosion and failure; and appeared to have needed significant repair in order to maintain operation.

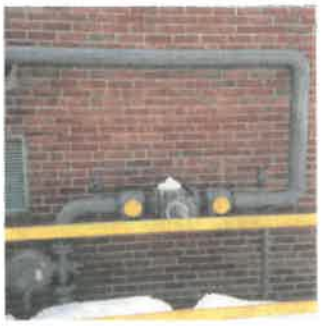
Gas Fired Hot Water Heaters

Domestic Hot Water Tank #1

Fuel Oil Supply Pumps

Emergency Shower

Gymnasium Roof Drain Connection



Natural Gas Service

## 4. ELECTRICAL

### 4.1. Existing Electrical System Evaluation

Primary electrical service is provided to the site via overhead cable from Main Street to a utility pole located in the North parking lot of the High School with a riser down the pole to an underground ductbank. A primary utility meter (Meter No. 05 150 776) services both the High School and the Middle School and is installed on the utility pole. The July utility bill indicated a peak electrical demand of 300 kW, however, the exact electrical demand of the high school cannot be determined since the primary meter is used for both buildings. A full year of utility bills was not available to determine the peak demand through a 12 month period. The primary utility cable then enters the building through the Utility Vault located within the Apparatus Room. The primary cable is split within the vault and one cable is then routed from the vault to the pad mounted transformer located at the Main entrance of the High School and the other primary cable is routed up the street to the Middle School transformer. The primary cables are original to the 1956 construction of the building and noted to be in poor physical condition. Maintenance staff indicated there



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was a recorded cable failure that resulted in damaged cable within the vault that required removal of the damaged cable. New cable was spliced with the existing cable within the vault, the primary cable splice did not appear to be installed in accordance manufacturer's requirements. The secondary cable (5 sets) is provided in an underground ductbank from the transformer back through the Primary Cable Vault where it terminates on a bus duct. The bus duct then penetrates the wall of the Primary Cable Vault/Apparatus Room to enter the buildings main switchboard.

The main switchboard to the building is a 1600 Amp, 120/208 Volt, 3 Phase, 4 Wire switchboard manufactured by Frank Adam. The switchboard is original to the 1956 construction of the high school (59 years old) and noted to be in poor physical condition. The switchboard is well past its useful life of 25 years and replacement parts for the switchboard are no longer manufactured making it difficult to perform routine maintenance on the switchboard or find replacement parts. The original 1956 Frank Adam switchboard, appears to be in imminent danger of possible failure. This would result in loss of power to the entire building.

It should also be noted that the Apparatus Room only has one egress door, which is not in compliance with the National Electrical Code (NEC). Article 110.26 (C) of the NEC requires an electrical room with equipment over 1200 Amps to be provided with two means of egress unless double working space clearance is provided in front of the equipment (7'-0"). Due to the mechanical equipment located within the room the additional working space clearance cannot be achieved.

In 1993 an additional section was added to the existing Frank Adam main switchboard. The bus bars within the Frank Adam switchboard were extended to the 1993 switchboard section. The new switchboard section is also rated for 1600 Amps and is a Spectra series switchboard as manufactured by General Electric (GE). The GE switchboard was noted to be in fair physical condition and reaching the end of its useful life of 25 years (switchboard section is approximately 22 years old) and therefore becoming difficult to find replacement parts. The GE switchboard distributes power to the 1993 school addition as well as the 2001 extension of the Cafeteria. The GE panelboards installed during the 1993 addition are in fair physical condition but are getting close to the end of their useful life of 25 years.

The high school still has original 1956 electrical distribution equipment (panelboards) in use in the original building section of the high school. The Frank Adam panelboards are all in poor physical condition and are well past their useful life of 25 years. Many of the panelboards have circuit breakers that are falling apart and maintenance staff are routinely replacing broken circuit breakers. Since replacement breakers are not available for the Frank Adam panelboards, maintenance staff has utilized circuit breakers from existing Frank Adam panelboards that have been removed due to failure/degradation of the panels. Similar to the main switchboard, the original 1956 electrical distribution system which includes Frank Adam panelboards and transformers, appears to be in imminent danger of possible failure. This would result in loss of power to the area(s) that are fed from a failed panelboard.

The High School also has I-T-E panelboards located in the original construction area of the High School. The panelboards are also in poor physical conditions and maintenance staff has indicated circuit breakers are failing within the panelboards.

Classrooms within the 1956 construction only included a single receptacle branch circuit and typically only 2 duplex receptacles, which does not provide adequate branch circuitry or electrical infrastructure within classrooms for to accommodate modern classroom power requirements. Due to the lack of electrical infrastructure, maintenance staff have installed panelboards within classrooms in order to provide power to new receptacles for projectors, general purpose receptacles and computers. The panelboards within classrooms are often being blocked by debris not allowing for proper working space clearance in front of the equipment. The panelboards are also not properly protected from damage when



*Mechanical/Electrical Engineers*

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installed within the classrooms which can be a safety hazard for students and faculty. Additionally, maintenance staff have been replacing the Frank Adam and I-T-E panelboards as they fail with new GE panelboards.

Primary Meter

Primary Cable Vault

Main Switchboard

Frank Adam Panelboard

Gym I-T-E Panelboard

Typical Classroom Panelboard

The building is not currently equipped with standby power, however, a 40 kW generator was removed from the Middle School in 2014 and is currently planned to be tied into the high school.

The lighting system within the high school mostly consist of fluorescent lamps, which includes compact fluorescent downlights, linear 4'-0" 32 Watt-T8 lamps, 32 Watt-T8 U-Lamps, and 54 Watt-T5HO lamps. The hallways consist mostly of 4'-0" linear fluorescent lighting fixtures and 2'x2' lighting fixtures with fluorescent U-Lamps. The classrooms within the original construction of the building and non-finished areas including mechanical rooms and closets, consist of 1'x4' linear fluorescent lighting fixtures. The classrooms within the 1993 addition consisted of 2'x4' (15 cell) parabolic fluorescent lighting fixtures. The school also includes 1000 Watt, metal halide lighting fixtures within the Gym and LED down lighting fixtures within the kitchen and linear LED lighting fixtures in select locations in the building including the Men's Locker Room.

The existing florescent lighting fixtures within the majority of the building appeared to be in good physical condition except for the lighting fixtures within the main entrance hallways between the main office and cafeteria which had noticeable physical damage.

Emergency lighting is provided within the building via wall mounted battery units and remotes heads. The emergency lighting appeared to be original to the construction and in fair condition. However, proper emergency lighting did not appear to be provided throughout the building along the paths of egress (hallways and stairways).



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Lighting controls consisted of wall mounted switches and some occupancy sensors. The occupancy sensors are in poor operating conditions and many are failing. Failed occupancy sensors are being removed and bypassed for control by the wall mounted switches. Wall plates for switches in the original construction of the building also appeared to be in poor physical condition. Exterior lighting is controlled via a Tork timer switch mounted on the Frank Adam switchboard. During inspection it was noted that the exterior lighting was on, which indicates the timer switch may no longer be working properly or not programmed properly.

Exterior lighting consisted of a combination of wall mounted lights and utility owned flood lighting mounted on utility poles metered separately from the school. The majority of the wall mounted lighting fixtures were visually inspected and appeared in poor physical condition. Some fixtures were either no longer functional or the lamps need to be replaced. The overall lighting within the parking lot did not appear as though it would provide lighting levels that would meet the recommendations of IES for security lighting in parking lots.

Typical 1993 Addition Lights

Typical Hallway Light

Typical 2'x2' Light

The existing fire alarm system consist of an addressable MS-9600LS Fire-Lite main fire alarm control panel (FACP) with voice evacuation system located in the IT Closet within the Main Office, manual pull stations (located at exits and stairways), speaker/strobe devices (located throughout the building), smoke detectors (hallways, classrooms, auditorium, elevator lobbies, and stairways), heat detectors (located in mechanical rooms, kitchens, and laboratory classrooms), and a remote annunciator located at the main entrance to the building. Based upon discussions with maintenance staff, the existing fire alarm system was upgraded within the last 10 years. In addition, the existing fire alarm system appeared to be in compliance with the latest codes including NFPA 72 (National Fire Alarm and Signaling Code), NEC (NFPA 70), and the Massachusetts Building Code (780 CMR). However, it should be noted that the useful life of FACP's is approximately 15 years.

The majority of the fire alarm equipment appeared to be in good physical condition and maintenance staff did not indicate issues with the existing system or devices. However, detectors within Mechanical rooms and within the Gyms appeared to be damaged.



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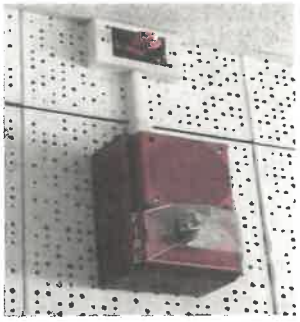
Main FACP



Typical Speaker/Strobe

Typical Smoke Detector

Gym Smoke Detector

Typical Gym Pull Station

Voice Evacuation Panel

The building is equipped with 19 high definition, fixed mounted, CCTV cameras located at strategic locations throughout the building. This includes the office, main entrance, cafeteria and some hallways. The cameras are in good operational condition and no issues were identified by maintenance staff. However, given the total square footage of the high school (210,000 sf), 19 cameras may not provide complete coverage of the building for security and safety of students/faculty. Camera locations should be evaluated to determine if additional coverage is required.

The High School also has electronically locked doors at the main entrance with a camera and intercom system that is tied back to the secretary desk in the Main Office.

The building is equipped with a digital phone system which is in good operational condition, no issues were expressed by maintenance staff.

The buildings PA/Intercom system appeared to be in fair physical condition, no issues were expressed by maintenance staff. However, it was noted that some existing speakers had physical damage and in need of replacement.

WIFI was provided throughout the building and appeared to have been installed in the last 3 years and appears to be in good condition. Maintenance staff did not indicate any issues with the existing system.



*Mechanical/Electrical Engineers*

300 UNICORN PARK DRIVE, 5TH FLOOR, WOBURN, MA 01801 (P) 781.481.0210 (F) 781.481.0203 (W) www.f-t.com