

GRIFFITH & VARY, INC.



# Mechanical, Electrical, Plumbing and Fire Protection Existing Conditions Narrative for MV Regional High School

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Martha's Vineyard Public Schools  
Oak Bluffs, Massachusetts

March 26, 2021

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## ***Fire Protection***

### **Existing System Summary:**

1. This building is fully protected by four (4) wet-pipe sprinkler systems. These were installed throughout different times as the school was renovated. (1959, 1980s & 1990s)



**Each Fire service is provided with (2) 2 ½" FDC connections.**



**Original 6" Service in portion of building constructed in 1959**



**6" Service in portion of building constructed in 1980s**

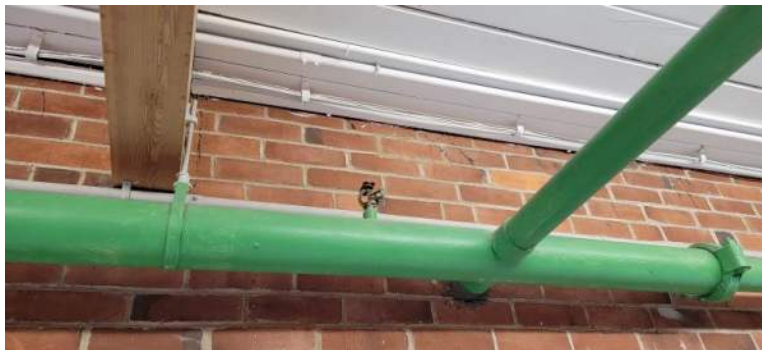


**6" Service in portion of building constructed in 1990s**



**8" Service in portion of building constructed in 1990s**

2. The School is protected by varies types of sprinkler heads. Which range from uprights, sidewalls, & semi recessed. Along with a mixture of Fuse Link & Bulb style sprinkler heads. It is recommended that all Fuse link sprinkler heads to be replaced with quick response sprinkler heads.
3. In the original portion of the school the school is mostly exposed wood beams, with exposed mains & branches with fuse link uprights or sidewall sprinklers.



4. In the two (2) additions from 1980s & 1990s the classrooms & Corridors have ACT ceilings and are protected with Semi Recessed sprinkler heads.
5. Existing Electrical room with Mechanical Mezzanine room above is currently protected with fuse link upright sprinkler heads, no sprinkler heads are located in the Electrical/Data room below. There is no 2-hour rated separation between rooms and upright sprinkler heads should be added to space below for proper coverage.



- a. It is recommended to seal the Mezzanine slab, in an event that a sprinkler head goes off in the Mechanical room above. Water will flow down these unsealed openings directly on top of the electrical equipment below.

6. Both the Main Kitchen & Culinary Kitchen hoods are protected with an Ansul System.



**Culinary Kitchen hood**



**Main Kitchen Hood**

## ***Plumbing***

### **Existing System Summary:**

1. This School is supplied by Town water from two (2) domestic water supplies. One is believed to feed the original school along with the 1980s addition, as the other is believed to feed the 1990s addition of the Gym (locker rooms, showers, gang bathrooms), PAC (Performing Arts Center), & some classrooms. It is recommended to add a full-sized reduced pressure backflow preventor to each service to protect the town & the school's water from possible backflow.



**6" service reduced down to a 4" water meter with no Reduced pressure backflow preventor. located within the original school's mechanical room.**



**4" service reduced down to a 3" water meter with no Reduced pressure backflow preventor. located in exterior access Mechanical room in 1990s addition**

2. The school is supplied with four (4) Propane tanks located outside around the site. Each is provided with regulators before entering the school.



**(2) Propane tanks to feed kitchen equipment for Culinary kitchen.**



**Propane tank located outside of original Mech room which feeds new instantaneous propane fired domestic water heaters.**



**(2) Propane tanks to feed kitchen equipment for Main kitchen.**





**Single Propane tank to feed Gas turrets in Science classrooms, along with a main gas shut off.**

3. The school has two (2) main Mechanical rooms one is located in the original portion built in 1959 & the other is located in the most recent addition from 1990s
  - a. In the Original building there is Four (4) oil fired boilers which create domestic hot water and stored in a 1,000 Gallon indirect storage tank.
  - b. These Four (4) boilers create hot water for the whole school. Minus a Small custodial Staff Area which is supplied by a small Electric water heater.
  - c. Within that last few years Four (4) Navien 199,900 BTU instantaneous propane fired water heaters were installed to be used in the summer months because the main boilers are not being used for heating in the summer.
  - d. Currently there is some issues with the installation which have led to the main boilers to not be used for the domestic hot water, and only the instantaneous water heaters are creating hot water for the school. It is recommended the piping between the piping from the boilers, water heaters & Storage tank be re-piped with proper isolation valves to allow change over of systems depending on the season.



**Main (4) Boilers in 1959 Mechanical room      (4) Instantaneous water heaters with 1,000 Gallon Storage tank behind**





**Small Electric water heater feeding  
Custodial area near 1990s Mechanical room**

4. The school consists of mostly sloped roofs with a few portions of the school that have flat roofs which include the gym, auditorium, automotive & Carpentry shops.
5. Gutters are provided at sloped roof locations, were there is downspouts from gutters they spill to grade. It is recommended downspouts are piped to an underground storm system to direct the water away from the school.



### Plumbing Fixtures

1. Bathrooms have wall hung vitreous china water closet and urinals with sensor flush valves and are in fair condition.



2. Bathrooms Lavatories are wall hung, vitreous china with manual metering faucets in fair condition.



3. Mop service sinks are Fiat molded stone mop service basin fitted with faucet having threaded connection and vacuum breakers



4. Drinking fountain are a mixer or different brands and styles depending on location in school. All are not in use and taped off due to current Covid-19 Pandemic.



#### Automotive and Carpentry Shops:

1. Automotive shop compressed air system is currently supplied by a 5HP 2 stage air compressor that is at the end of its life, and is slated to be replaced in the near future.



2. Emergency eyewash & shower combo located within the automotive shop. It appears to be feed from a cold-water supply with no mixing valve. The eyewash drain is hard piped. No floor drain provided for shower.



3. sensor operated stainless steel sink located in automotive sink in fair condition.



4. The floor drains located within the automotive shop do not appear to go to Gas & Oil separator before entering the sanitary system.

### Science Classrooms

1. Each of the science classroom are provided with deck mounted LP gas turrets.



2. The Science Classrooms include an emergency shower and eyewash station.



3. Science Classrooms include sinks without vacuum breakers. There are no cross-control devices. The main water lines may be subject to backwater conditions that would contaminate the piping system without backflow prevention.



#### Art / Pottery Classroom

1. The sink located in the art class room is a multi-person use foot operated stainless-steel sink. Giving its location & use it is required to have a paster trap to protect the sanitary system from debris.



2. Located in Storage / Kiln room of art classroom is an emergency shower. it is unknown if this emergency station is functional, and is useable in the current state due to items being stored under it.



### Main Kitchen

1. Main kitchen is located in original portion of school and appears all fixtures are piped to an exterior grease interceptor located just outside kitchen. The size is unknown.





2. 3 pot sink with recessed grease interceptor located below.



3. Main kitchen has commercial grade dishwasher provided with electric booster heater, and food disposal system. no grease interceptor was found to be associated with this dish washer.



Commercial Dishwasher



Food disposal system



Electric booster heater

### Culinary Kitchen

1. The Culinary is located in 1980's portion of school. It is unknown if this kitchen was tied into the main exterior grease interceptor located in the original school, and if the existing grease interceptor was replaced to handle the load of both Kitchens & Extra meals being prepared.
2. There is a smaller commercial grade dishwasher located in the culinary kitchen with associated Electric booster heater & grease interceptor.



3. The 3 pot sink located in the culinary kitchen goes to a grease interceptor which is located in the storage room of the carpentry shop.



4. Located in the Culinary kitchen is an Emergency Shower/Eyewash station.



### Gymnasium

1. The gym roof is one of the few flat rooms in the school and is drained by roof drains.



1. The Boys' and Girls' shower rooms have not been used in many years and are currently being used for storage. The Boys' showers are of the gang arrangement. The main mixing valve that feeds both shower rooms is currently turned off.



## **HVAC**

### Existing System Summary:

#### *1. Boiler Plant:*

There are two boiler rooms serving the building. A boiler room locating in the 1959 portion of the building and a boiler room locating in the 1990s additions.

The 1959 boiler room has (4) four oil fired boilers manufactured by Burnham Corporation boiler model FF-506. The boilers are 6-section cast iron standard efficiency having an input capacity 8.3 GPH and an output capacity of 827 MBH. For a total output plant capacity of 3,308 MBH. The boilers are equipped with Carlin oil fired burners model 702CRD having an input capacity of 8.3 GPH.

The boilers provide hot water for heating the 1959 portion of the building which is circulated by two sets of pumps (four pumps total). Each set is arranged in a primary/stand-by configuration. The boilers and pumps appear to be in good shape for the age. Some of the motors on he pumps have been replaced, unable to tell how old they are.



**1959 Boiler Room**





### **Oil Duplex Pumps and Underground Oil Storage Tank**

The pumps are equipped with variable frequency drive (VFDs). The VFDs have been placed in hand mode and do not react to system pressure changes in the system.



### **Base Mounted Pumps**



### **Pump VFDs**

Combustion air is brought into the building by a roof mounted intake hood. With a short section of ductwork to house a damper. Today's code requires ductwork with a lower opening at 12" above finished floor and a high

opening at the ceiling level. The combustion air intake does not meet today's code.



**Combustion Air Intake**

Products of combustion exit the building thru an insulated galvanized steel breeching. The galvanized breeching extends about 10'-0" above the finished roof.



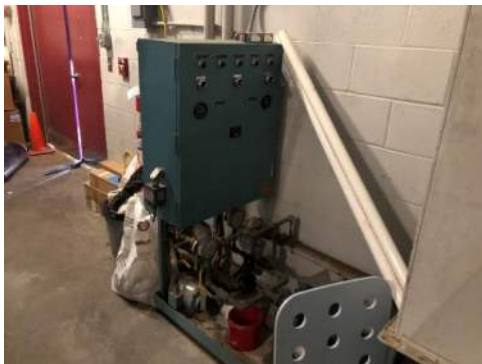
**Boiler Breeching**

The 1990 boiler room has (4) four oil fired boilers manufactured by Burnham Corporation boiler model FF-509. The boilers are 9-section cast iron standard efficiency having an input capacity 12.6 GPH and an output capacity of 1257 MBH. For a total output plant capacity of 5,028 MBH. The boilers are equipped with Carlin oil fired burners model 801CRD having an input capacity of 12.6 GPH.





**1990 Boiler Room**



**Oil Duplex Pumps and Underground Oil Storage Tank**

The boilers provide hot water for heating the 1990 portion of the building which is circulated by two sets of pumps (four pumps total). Each set is arranged in a primary/stand-by configuration. The boilers and pumps appear to be in good shape for the age. Some of the pump motors have been replaced, unable to tell how old they are.



**Base Mounted Pumps**

The pumps are equipped with variable frequency drive (VFDs). The VFDs have been placed in hand mode and do not react to system pressure changes in the system.



**Pump VFDs**

Combustion air is brought into the building by a wall louver with ductwork. The combustion air exits the ductwork about 12" above the finished floor. There is no high vent which is required by code.



**Combustion Air Intake**

Products of combustion exit the building thru galvanized steel breeching with aluminum shell. The breeching extends about 10'-0" above the finished roof.



## Boiler Breeching

### 2. Controls:

The building management system is Metsys by Johnson Controls. The building is direct digital control meeting today's standard for building controls. However hot water coils are still equipped with 3-way valves which prevent taking advantage of the pumps VFDs. Recommending to replacing 3-way valves with 2-way valves which will allow the system to adjust pump flow based on maintaining system pressure. Matching the building load will save energy. The current valving arrangement constantly flows heating hot water either through the coil or away from the coil if the space is satisfied. The flowing away from the coil is the wasted energy. With a 2-way valve the coil would be closed to the system. The system would see a rise in pressure and slow the pumps down to bring the system back to set pressure. Using less pump energy and less boiler energy.



## Automatic Temperature Control Panel

### 3. HVAC System:

#### Classrooms:

Classrooms are heated and ventilated by classroom unit ventilators. Outside air is supplied to the unit ventilators via wall louvers located below the windows. Each unit ventilator has a hot water coil, filters, outside/return air dampers and supply fans. Valve and damper actuators are direct digital control. The classroom unit ventilators were manufactured by American Air Filter and appear to be installed during the 1990 addition/renovation. The unit ventilators appear to be in good shape for their age but are close to the end of their useful service life.





**Classroom Unit Ventilators**



**Ceiling Classroom Unit Ventilators**

General exhaust for the classrooms is provided by a system consisting of ceiling exhaust grilles, ductwork and roof exhaust fans. The exhaust fans appear to be in good shape for their age but are close to the end of their useful service life.



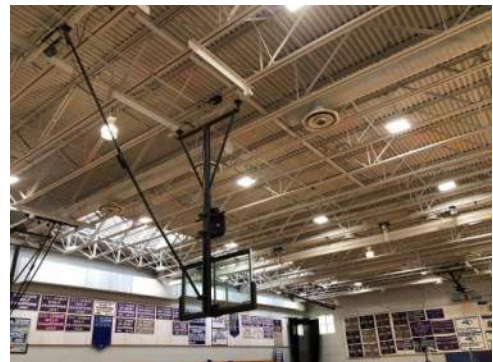
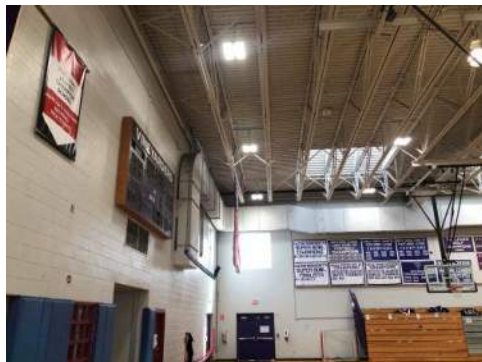
**Roof Mounted Exhaust Fans**

Gymnasium:

The gymnasium is heated and ventilated by two (2) central station air handling units. Located above the ceiling in the gymnasium storage room and locker rooms. Each unit serves one half of the gym with overhead ductwork and diffusers. The air handling units are original, these systems have outlived their useful service life. The units are difficult to service and would be close to impossible to replace unless hard ceiling and/or portion walls were removed. Access to the units is through 24"x24" access doors. Most components in the AHU are bigger than the 24"x24".



**Gym AHU Located in Storage Room and Above Locker Room Ceiling**



**Gym Supply Ductwork**



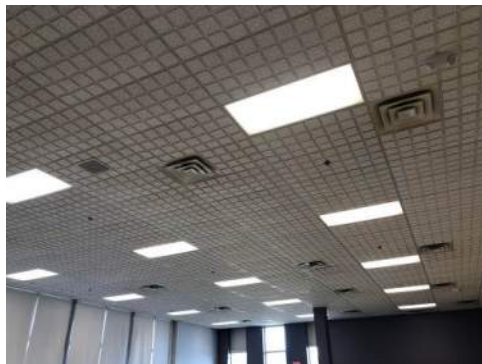
## **Gym Return Ductwork**

### **Kitchen and Cafeteria:**

The kitchen and cafeteria are heated and ventilated by a single central station air handling unit. Located above the ceiling in an adjacent office space. The unit serves the kitchen and cafeteria with overhead ductwork and diffusers. The air handling unit is original, these systems have outlived their useful service life. The unit is difficult to service being placed above a section of ceiling in an adjacent office. Access to the unit is through the atc grid requiring a tall ladder to get access to the unit.



**Location of AHU Above Ceiling**



**Cafeteria and Kitchen Overhead Ductwork**

The kitchen is equipped with a kitchen hood and dedicated exhaust. Make-up air for the kitchen hood is from the single central station air handling unit serving the kitchen and cafeteria.





**Kitchen Hood & Dishwasher Exhaust**

Media Center:

The Media Center is heated, cooled and ventilated by a single central station air handling unit. Located above the ceiling in the Media Center. The unit serves the Media Center with overhead ductwork and diffusers. The Media Center has perimeter fin tube wrapping the exterior walls. Air condition is provided by a remote air-cooled condenser located outside the Media Center. The air handling unit and air-cooled condenser appear to be original; these systems have outlived their useful service life. The unit is difficult to service being placed above section of ceiling in the Media Center. Access to the unit is through the atc grid requiring a tall ladder to get access to the unit.



**Location of AHU Above Ceiling**



**Outdoor Air-Cooled Condenser**

Performing Arts Center:

The Performing Arts Center is heated, cooled and ventilated by a single central station air handling unit. The unit is located in a machine room above on of the electrical closets. The unit serves the Performing Arts Center with overhead ductwork and diffusers. The air handling unit is original, the system have outlived their useful service life. The unit is located on a mezzanine which allows for easy service access to the unit. However, the opening to gain access to the unit is small. The access opening is not large enough to rig in or removed large components of the air handling unit. To replace the unit a large opening would need to be created either in the floor or at one of the portion walls.



**AHU serving Performing Arts Center**

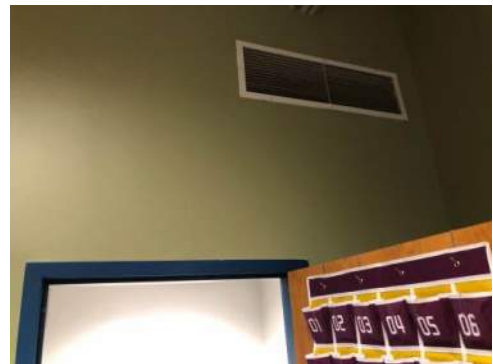


## **Overhead Ductwork Serving the Performing Arts Center**

### Administration:

The Administration Clusters are heated, and ventilated by central station air handling units. The units are located above the ceilings in their respected administration cluster. The units serve the Administration Wings with overhead ductwork and diffusers. The air handling units are original, these systems have outlived their useful service life. The units are difficult to service being placed above section of ceiling in the in each Administration cluster. Access to the units is through the atc grid requiring a tall ladder to get access to the units.

Ductless wall mounted cooling units have been added to the administration clusters to provide air conditioning. The wall units are centrally located within the common space within each cluster. Individual offices do not have dedicated equipment providing air conditioning. Condition air comes from the centrally located ductless wall unit.



### **AHU Located Above Ceiling**



**Indoor Ductless Cooling Unit and Outdoor Remote Condenser**

Automotive and Carpentry Shops:

The Automotive and Carpentry shops are heated and ventilated by indoor central station air handling units. The units are located within the space they serve. The air handling units are original, these systems have outlived their useful service life. Access to the units for service is not restricted but does require ladders.



**AHU located in Automotive and Carpentry Shops**

The automotive shop is equipped with vehicle exhaust capture system. The ports are located in the floor with flap covers to prevent debris from getting into the system. The ductwork runs below the slab to a duct riser and exhaust fan exiting the building at the mezzanine level of the shop.





### **Vehicle Exhaust Capture System**

The carpentry shop is equipped with a dust collection system. The dust collection system is located indoors and does not meet today standard and safety requirements. At the time of the visit, we informed that a new outdoor dust collection system was in the works.



### **Indoor Dust Collection System**

#### **Culinary Kitchen Shop:**

The Kitchen shop is heated and ventilated by indoor central station air handling units. The unit serves the Kitchen Shop with overhead ductwork and diffusers. The unit also provides make-up air for the kitchen hoods. The air handling unit is original, and has outlived its useful service life. The unit is located in a small machine room above a small closet in the dishwasher room. The opening to gain access to the unit is small. The access opening is not large enough to rig in or removed large components of the air handling unit. To replace the unit a large opening would need to be created either in the floor or at one of the partition walls.



**Indoor Dust Collection System**



**AHU Located Above Storage Room**



**Access Point to AHU**



## ***Electrical System***

### **Existing System Summary:**

#### **1. Electric Services:**

##### **Building –**

The building has two services to the building, one at 2000 amp, 120/208v, three phase, four wire Switchboard 1 located in Main Electric Room 1 and 2,000 amp, 277/480 volt, three phase, four wire switchboard in the Main Electric Room 3. Both are fed by a pad mounted electric utility co. transformers at the side of the building, via underground conduit and cabling in ductbank and an electric utility co. meter. The electric utility co. 120/208v meter is located in Main Electric Room 1 and the 277/480v meter is located on the exterior of the building next to the pad mounted transformers. The primary electric service comes from an electric utility pole on Sanderson Ave on the left-hand side as you enter the property via underground conduit and cabling in ductbank.

##### **Horticultural Buildings and Football Stadium –**

The Horticultural Buildings and football stadium is served from the 277/480v Switchboard 3 via a 400/3 breaker.



**120/208v Transformer**



**277/480v Transformer**

#### **2. Telephone Service:**

The telephone service originates at a pole on Sanderson Ave and comes into the building via underground conduit and cabling in ductbank to the demarcation point in the Boiler Room. The telephone service appears to be original to the building and is in fair condition.

3. Normal Power System:

Switchboard 1

The switchboard as manufactured by Westinghouse is rated for 120/208v, three phase, four wire, 2000 amp and has a 2000/3 main breaker, a 1000/3 breaker which feeds Switchboard 2 and branch panel breakers. The Main Electric Room does not have proper working space and dedicated electrical space as required by the National Electric Code, as it relates to the switchboard. The switchboard appears to have been installed when the 1980's addition was built and is in fair condition.



**Switchboard 1**

Switchboard 2

The switchboard as manufactured by Square D is rated for 120/208v, three phase, four wire, 1200 amp and has a 1200/3 main breaker, which has issues to be opened as there is a cover plate which does not open properly, and branch panel breakers. The switchboard appears to be original to the building and is in fair to poor condition.



**Switchboard 2**

### Switchboard 3

The switchboard as manufactured by Square D is rated for 277/480v, three phase, four wire, 2000 amp and has a 2000/3 main breaker, a 400/3 breaker which feeds the automatic transfer switch in the generator enclosure, the Performing Arts Center, and the horticultural center / football field. The switchboard appears to have been installed when the 1990's addition was built and is in good condition.



**Switchboard 3**

### Power Distribution –

Normal power distribution 277/480- and 120/208-volt, three phase, four wire panelboards as manufactured by Square D, Westinghouse and GE are located throughout the building. Dry-type transformers are used to step down to 120/208 volt. Most Shops have dedicated panelboards within the spaces. Where there are Shops with

motor equipment, there are mushroom type buttons for shutting down power upon an emergency condition. The Kitchen panelboards do not appear to have shunt trip circuit breakers capable of tripping power to kitchen equipment under the hood upon fire alarm activation. The normal power distribution appears to be original to the building, as well as the 1980's and 1990's addition and is in fair condition.



**Panelboard Samples**

4. Emergency Power System:

The building has a 277/480-volt, three phase, four wire, 100 kW diesel generator as manufactured by Kohler is located in an exterior stand-alone building, adjacent to the Main Electric Room. The generator has a 225/3 circuit breaker on it which feeds the emergency side of the automatic transfer switch located in the enclosure. The automatic transfer switch as manufactured by Kohler and is rated at 260-amp, 277/480-volt, three

phase, four wire. The load side of the automatic transfer switch feeds the emergency distribution panelboard EDP, also located in the generator enclosure. Panelboard EDP feeds adjacent panelboard EL via a transformer, both of which are located in the generator enclosure, panelboards B-H, PP-B, LP-B, KP-B, as well as AHU's 8 and 10. These panelboards feed mixed emergency loads including both optional standby and emergency circuits. There are numerous emergency system deficiencies as it relates to current Codes. There is only one automatic transfer switch which controls both emergency life safety and optional stand by loads. Emergency panelboards need to have dedicated two hour rated emergency electric rooms and cannot share space with optional standby and normal panelboards. Emergency panelboards require two-hour feeders such as MI Cable and are required to be housed in two-hour electric rooms. Emergency panelboards have to be dedicated to emergency loads and cannot feed optional standby loads within the same panelboard. The emergency power distribution appears to be original to the building and the installation as it relates to today's Codes is poor. Also, there was 3-4 inches of water in the bottom of the generator enclosure which is a hazard to staff as well as the equipment. The generator system is in poor condition.



**Interior of Enclosure**



**Automatic Transfer Switch**





## Emergency Distribution

### 4. Fire Alarm:

The addressable fire alarm control panel as manufactured by Simplex series 4100, is located in the Janitor's Office. The panel is not setup as a voice evacuation panel, there is no microphone and no drill switch. There are no annunciators located at the entrance vestibules. There is one exterior mounted knox box located near the main entrance to the building. There are duct smoke detectors on Mechanical equipment. There are no speakers in the building, horn/strobes. The Toilet rooms do have strobes as required by ADA. There is no carbon monoxide detection in the Day Care Room where children presumably take naps. Local sound systems do not have the capability to shut down upon fire alarm activation. Most of the fire alarm system appears to be original to the building and is in poor condition.

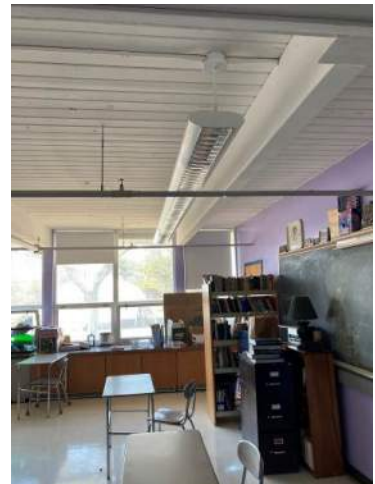
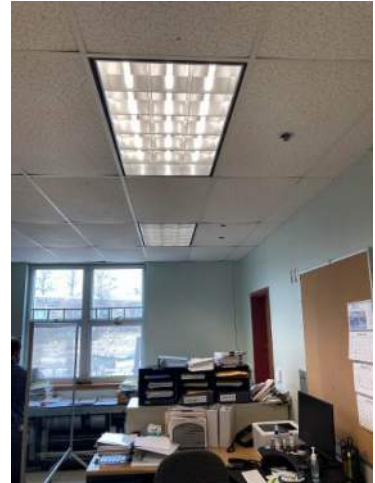


Fire Alarm Control Panel and Notification Device

### 5. Lighting:

#### Interior –

Staff indicated that the original lighting fixtures were replaced with new or existing was retrofitted with new T8 lamps, via electric utility co. program. Interior lighting is made up of dust moisture resistant, wraparounds, parabolic, prismatic, industrials, strips, wall brackets, linear pendants, industrial high bays with T8 lamps; downlights, pendant cylinders, and wall sconces, with high intensity discharge lamps; and track lighting. Exit signs provide for direction to paths of egress. Deficiencies of interior lighting include improper coverage of exit signage and some exit signage not functioning. Lighting is not the most efficient as it relates to today's standards. The interior lighting appears to be in fair condition.



**Samples of Interior Lighting Fixtures**

Exterior –

Lighting is made up of mostly wall packs which were replaced in 2019 with LED fixtures. The original parking lot poles have been retrofitted with LED heads back in 2019. The building mounted exterior lighting fixtures as well as the replacement pole mounted fixture heads appears to be in good condition. The poles supporting the parking lot LED heads appear to be in fair condition.



#### Switching –

Most of the spaces including the Classrooms and Toiler rooms have local wall switches with occupancy sensors. The Cafetorium lighting is controlled via switching on the Stage. Track lighting for the Stage is controlled by a dimming rack on the Stage. Gymnasium lighting fixtures have integral occupancy sensors, with override switches in the Gymnasium. The Corridors are controlled by local switches. Emergency lighting is unswitched, consuming energy 24 hours a day. This installation does not meet the International Energy Conservation Code as local control of light fixtures is required.

The lighting controls appears to be in fair condition.

#### 6. Devices –

Receptacles and switches are mostly white with stainless steel plates. Receptacles are ground type. The Kitchen areas and Teacher Station's with sinks have receptacles which are not GFCI type as required by the National Electric Code. Receptacles have been added over the years through the use of EMT conduit with surface boxes, tele-power poles, plugmold, and wire mold. Devices for the most part are not tamper resistant and appear to be in fair condition.

#### 7. Lightning Protection –

There does not appear to be a lightning protection system on the building.

8. Sports Lighting –

The football stadium is lit through the use of sports lighting poles with sports lighters. There are a total of four poles with lighters. Lamps are likely between 1,000 and 1,500 watts each. The tennis courts are no lit. The football stadium sports lighting appears to be in fair condition.



**Football Field with Sports Lighting**

9. Scoreboard –

The Gymnasium has a wired scoreboard and two shot timers. The Gymnasium lighting appears to be in fair condition. Scoreboard/shot timer system appears to be original to the building and is in poor condition.



**Scoreboard**

10. Bi-directional Amplifier System –



The building does not have a bi-directional amplifier system which would include an amplifier and cabling above the ceiling for amplifying police and fire alarm radio signals. Reception in the building is poor for cell phones, and likely also for radios.

11. Mass Notification System-

The building does not have a mass notification system to provide emergency information as well as evacuation or stay in place notifications.

12. Wiring –

Wiring is made up of MC cabling, FA MC cabling, EMT, Rigid, and PVC conduit.

13. Wind Turbine –

There is an existing wind turbine on site which is currently non-operational. The controls are interior of the building and are non-operational as well. It was indicated that at some point the turbine will be fixed and made operational, but it is not a priority to have this work done.



**Wind Turbine and Control Equipment**