BLW ENGINEERS

Sylvester School
495 Hanover Street
Hanover, MA

MEP Facilities Assessment

Prepared For:

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FIRE PROTECTION

Summary

The existing building is currently without any automatic fire sprinkler systems.

Fire Protection Recommendations

A substantial renovation of the existing building will trigger the need for new automatic fire sprinkler systems throughout the entirety of the existing building. Wet pipe sprinkler systems will be used for all heated areas of the building. Dry pipe sprinkler systems will be used for all unheated areas of the building. Standpipe systems do not appear to be required due to the height of the building, however, due to the presence of a theatrical stage the requirement for fire department hose valves may be triggered. If standpipe systems are required then these systems shall be installed in accordance with NFPA-14. The sprinkler systems shall be installed in accordance with NFPA-13. A new underground fire service main will need to be provided into the building. The new fire service main shall be installed in accordance with NFPA-24. At this time, it is not known if the water and pressure available from the city water supply will be enough to provide the new fire sprinkler systems without the need for a fire pump. Should a fire pump be required then the installation shall be in accordance with NFPA-20.

End of Fire Protection Section

PLUMBING

Summary

The plumbing report is based on a brief site visit to the Sylvester School, not involving any extensive exploratory work with respect to future building alterations. The plumbing systems were visually noted and inspected for signs of deterioration and major compliance issues. The existing building is reported to be built in 1927.

Plumbing Existing Conditions

The existing building is currently fed via an existing domestic water service that appears to be a 4” diameter pipe that enters into a cabinet within one of the bathrooms. This 4” diameter water service is reduced to 2” diameter to supply the building. An existing water meter has been installed on the 2” pipe within the cabinet. The existing water piping appears to be a mixture of older copper tubing with solder fittings and newer copper tubing with the solder fittings. In general, the existing piping systems appear to be in fair to good condition, however, these piping systems are showing signs of deterioration especially at valves and fittings. The valves that were observed are a mixture of older gate valves and ball valves. The cold water distribution piping is run through the building to the various plumbing fixtures and appears to have been provided with pipe insulation for most of the observable piping systems. The pipe insulation is old and is showing signs of deterioration.

Cold water is provided to the plumbing fixtures throughout the building. The existing plumbing fixtures appear to be a mixture of old non-conservation type and newer low-flow type. The toilet fixtures that were observed are floor mounted with flush valves with some of toilets being stamped as water conservation type and some without any identifying markings. Urinals are wall mounted with flush valves. Bathroom lavatories are counter mounted with double handle faucet, the faucets are not water conservation type and do not have metering/mixing features. Kitchen sinks are stainless steel with traditional fixed spout faucets and do not appear to be water conservation type. Classroom sinks are stainless steel with single fixed spout faucet and drinking fountain spout. The water coolers are single basin type and are surface wall mounted. Almost all of the plumbing fixtures are showing signs of deterioration, some from lack of use and some from age. None of the plumbing fixtures observed appear to be ADA compliant.

Hot water is provided to the plumbing fixtures throughout the building via an existing gas fired atmospheric type water heater. The unit appears to be an 80 gallon storage tank type and is in fair to good condition, however, the unit is nearing the end of its life expectancy. The existing water piping appears to be a mixture of older copper tubing with solder fittings and newer copper tubing with the solder fittings. In general, the existing piping systems appear to be in fair to good condition, however, these piping systems are showing signs of deterioration especially at valves and fittings. The valves that were observed are a mixture of older gate valves and ball valves. The hot water distribution piping is run through the building to the various plumbing fixtures and appears to have been provided with pipe insulation for most of the observable piping systems. The pipe insulation is old and is showing signs of deterioration. There appears to be a small circulation pump located adjacent to the water heater indicating that the hot water distribution system has been provided with a circulation system with pump and controls. An existing mixing valve has been provided to temper the hot water to the building and to prevent over heating of the hot water in the distribution piping system. The mixing valve and the immediate associated piping appear to be a fairly recent replacement and are in good condition.

Sanitary and Vent piping systems are a mixture of cast iron and copper pipe. The fittings are a mixture of hub & spigot type and hubless type for the cast iron pipe, and solder fittings for the copper pipe. The sanitary and vent piping systems connect the plumbing fixtures throughout the building. Floor drains have been provided in the bathrooms, mechanical spaces and the commercial kitchen areas. The existing floor drains are old and are showing signs of deterioration. The piping systems are a mixture of older original piping and newer replacement piping and vary in age and condition. Some of the older piping is showing signs of deterioration while the newer replacement piping appears to be in good condition. The underground piping systems could not be observed and the condition of the underground piping is unknown. This report assumes that the underground piping systems are original to the building and are quite old. The fact that the existing floor drains are showing signs of deterioration lends itself to the assumption that the existing underground piping systems may be deteriorating as well. During the site visit it was relayed to BLW that the existing building is on a septic system and that the existing sanitary piping systems are connected to this septic system located somewhere outside the building. The size and condition of the existing septic system are unknown.

Storm Drain system appear to be comprised of roof drains installed into the flat roof areas with connecting piping systems that are internal to the building. The existing storm drain piping systems are assumed to be installed through the interior of the building, down through the floor levels, and to underground where they are assumed to be taken out of the building to the site storm drain systems. These assumptions could not be verified in the field and the existing storm drain piping system could not be visually inspected.

Natural Gas has been provided to the building via an existing underground gas service with an existing gas meter located on the outside of the building. The gas piping is painted yellow and is labeled “5 PSI” which is indicative of a high

pressure gas piping system. The natural gas system is used to supply the two HVAC boilers and the water heater in the mechanical room. Natural gas has been installed into the commercial kitchen and appears to have been connected to the kitchen cooking equipment at one time but the equipment has been removed and the associated gas piping connections have been capped. No evidence of any other gas fired appliances in the building was observed. The existing gas piping systems appear to be black steel pipe with threaded ends and screw fittings. Most of the piping systems are painted and could not be inspected but appear to be in fair to good condition.

A Commercial Kitchen has been provided in the school building. This kitchen contains various food preparation equipment and fixtures, hand washing sink fixtures, and a dishwashing room with pot washing sink and a commercial dish machine. All of the existing fixtures and equipment are showing signs of age and deterioration as are the floor drains that have been located in the kitchen areas. There are three interior grease interceptors that have been provided as point-of-use installations at the grease waste producing fixtures. One interceptor is on the floor at the dish machine, one is on the floor at a pot washing station and one is on the floor at a pre-rinse station. All of these interior interceptors are old and are in poor condition. It was relayed to BLW that an exterior grease interceptor has not been installed for the commercial kitchen and that the interior interceptors are the only grease waste treatment currently provided.

Typical Toilet

Typical sink

Typical old and corroded fixture piping

Typical Water Cooler

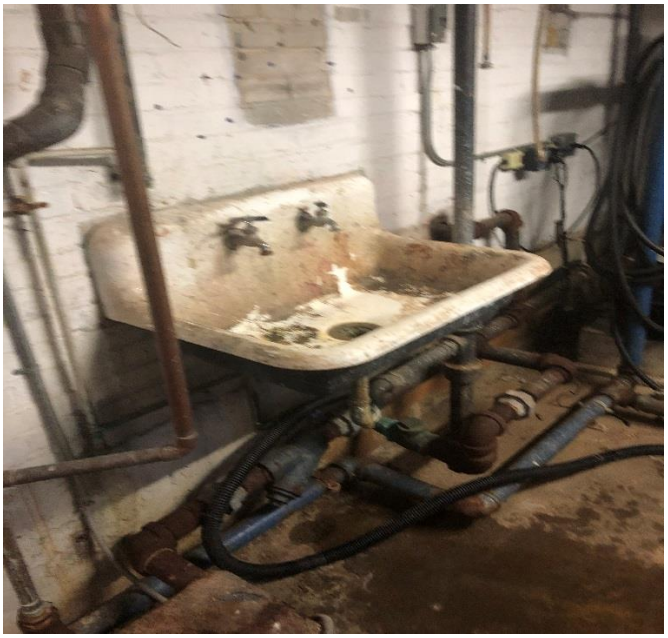
Typical Urinals

Typical Lavatories

Typical corroded floor drain

Typical classroom sink

Typical example of original and replacement piping



Typical original fixture and piping

Existing janitors sink

Existing grease interceptors

Existing gas fired water heater

Existing kitchen equipment and fixtures

Existing piping at kitchen hood

Existing water service and meter

Existing Gas Meter

Exterior Gas Vent Piping

Existing high pressure gas pipe

Plumbing Recommendations

The existing building is reported to have been built in 1927 and is approximately 92 years old. Some of the existing piping systems appear to be original to the building while some appear to have been updated as part of renovation work. It is not possible to trace the existing plumbing systems to determine what portions of these systems may be salvageable if at all. It is recommenced that all of the existing plumbing systems be removed in their entirety as part of a building renovation project.

Plumbing Fixtures

The existing plumbing fixtures should be removed in their entirety and should be replaced with new fixtures, flush valves, faucets and trim. ADA compliant fixtures should be provided as required. All new plumbing fixtures will be water conservation type. Toilets will be 1.28 gpf flush valve type and will be wall or floor mounted as dictated by the architectural features of the building renovation. Urinals will be wall mounted with 0.5 gpf flush valves. Bathroom lavatories will be wall or counter mounted as desired and will be provided with 0.5 gpm faucets. Each lavatory faucet shall be provided with a mixing valve to limit the hot water temperature to the faucet to a maximum of 110 degrees F. Kitchen sinks will be stainless steel with 1.5 gpm faucets. Classroom sinks, if used, will be provided with a hand washing faucet and a drinking fountain fitting. All classroom sink faucets will be provided with a mixing valve to limit the hot water temperature to the faucet to a maximum of 110 degrees F. If art room sinks are provided then solids interceptors will be provided on the drain piping from the sinks. Water coolers will be wall mounted and will be ADA compliant with Hi-Low basin design with the low basin on the right-hand side. A bottle filler station may be provided if desired. Shower fixtures, if provided, will be 1.5 gpm rated. Janitors closet mop sinks will be provided with wall mounted faucets with vacuum breaker, pail hook, wall support and integral check valves to prevent hot or cold water cross-over.

Cold Water will be provided to the building via the existing 4” domestic water service if this service can be verified to be in good condition and usable. Coordination with the local water department will need to be performed in order to identify the age and condition of the existing domestic water service. If it is determined that the existing water service is usable then the existing water service may remain in place, however, a new water room will need to be provided for the water service and meter. If it is determined that the existing water service it too old to be usable then a new domestic water service will need to be installed and should be brought into the mechanical room of the building. A new water shut off valve and meter will be provided at the water service point of entry into the building. Cold water piping systems will be provided to supply the plumbing fixtures and kitchen fixtures throughout the building. All water piping systems will be copper with solder fittings. All water pipe, fittings and valves will be provided with insulation. All water pipe will be labeled to indicate service type.

The existing water heater will be removed in its entirety. Hot water will be provided to the building via a new gas fired water heater. The new water heater will be storage type and will be high efficiency with CPVC exhaust flue and CPVC fresh air intake flue. These flue pipes will be run independently up through the building and out through the roof. Hot water will be provided as a two-temperature system. A 140 degree hot water piping system will be used to supply the commercial kitchen. A 120 degree hot water piping system will be used to supply the plumbing fixture throughout the building. A master mixing valve will be provided at the water heater to temper the 140 degree hot water down to 120 degrees for the building use. Each hot water piping system will be provided with its own dedicated circulation loop with

its own dedicated pump and controls. All water piping systems will be copper with solder fittings. All water pipe, fittings and valves will be provided with insulation. All water pipe will be labeled to indicate service type.

All new sanitary and vent piping systems will be provided for the building. The new sanitary piping systems will connect all of the new plumbing fixtures and drains. New floor drains will be provided as required. All floor drains will be provided with trap primer systems. The new vent piping systems will be taken up through the roof of the building. All fixtures and drains will be properly vented. It is being assumed that the underground piping systems are all original to the building. Given the fact that the building is approximately 92 years old it should be assumed that the existing underground piping systems are not usable for a building renovation project and should be replaced in their entirety with new underground piping systems. The new sanitary piping systems will be taken to below the floor slab and to outside the building where the new building sewer will be connected to the site sewer system by the civil engineer. The plumbing contractors work will terminate at a point 10 feet outside of the building. A civil engineer will need to determine if the new building sewer will be connected to a septic system or to the municipal sewer system. The new sanitary and vent piping systems will be cast iron with hubless fittings and copper DWV piping with solder fittings.

All new storm drain piping systems will be provided for the building. The new storm drain piping systems will connect all of the new roof drains. It is being assumed that the underground piping systems are all original to the building. Given the fact that the building is approximately 92 years old it should be assumed that the existing underground piping systems are not usable for a building renovation project and should be replaced in their entirety with new underground piping systems. The new storm drain piping systems will be taken to below the floor slab and to outside the building where the new building storm sewer will be connected to the site storm drain system by the civil engineer. The plumbing contractors work will terminate at a point 10 feet outside of the building. The new storm drain piping systems will be cast iron with hubless fittings. All horizontal storm drain piping and fittings including roof drain bodies will be provided with insulation. All piping will be labeled to identify the service type.

The natural gas piping systems for the building shall be entirely new. All new piping distribution systems will be provided to supply the new gas fired equipment and appliances as required. Gas will be provided to the HVAC boilers and the new domestic water heater. Gas will be provided to the new commercial kitchen cooking appliances. The gas supply to the cooking appliances located under a mechanical exhaust hood will be provided with a safety shut off system that will be connected to a carbon dioxide detection system that will be dedicated for the commercial kitchen spaces. The new gas piping systems within the building will be changed to low pressure not to exceed 14”w.c. Once the new gas loads are known, coordination with the gas company will be performed to insure that the existing gas service and meter have enough capacity to supply the renovation project.

At this time it is unknown if a new commercial kitchen will be provided as part of the building renovation. If a new commercial kitchen is proposed then all of the existing kitchen equipment will be removed and new equipment will be provided. The existing kitchen has not been provided with a large central exterior grease interceptor. A new kitchen, or any renovation to the existing kitchen will most like trigger the need for the installation of a large exterior grease interceptor. All kitchen waste will need to be entirely new and will need to be taken underground and out to the exterior grease interceptor. The new kitchen fixtures will be provided with a dedicated kitchen waste piping system that will collect all of the new kitchen fixtures, equipment drains and floor drains. This dedicated kitchen waste system will be connected to the new exterior grease interceptor. The discharge of the exterior grease interceptor will be taken by the civil engineer to a septic system or to a municipal sewer system, whichever is available. The destination of the

grease interceptor discharge pipe will be determined by the civil engineer. Small point of use grease interceptors will be provided on the interior of the building and will be located at individual grease waste producing fixtures in order to take as much grease out of the underground piping system prior to its connection to the large exterior grease interceptor. The commercial kitchen will be provided with hot water and cold water piping systems that will supply the fixtures and equipment throughout the kitchen space. Hot water to the kitchen will be 140 degrees and will be provided with a circulation loop back to the central water heater that will be located in the mechanical room. All equipment and fixtures in the kitchen will be provided with cold water and 140 degree hot water. Hand washing sinks will be provided with mixing valves that will temper the hot water to a maximum of 120 degrees to prevent scalding. Natural gas will be provided to the kitchen cooking equipment. The natural gas supply will be provided with a safety shut off system that will be connected to a carbon monoxide detection system located in the cookline room where the exhaust hood will be.

End of Plumbing Section

MECHANICAL

Summary

The HVAC report is based on a brief site visit to the Sylvester School, not involving any extensive exploratory work with respect to future building alterations. The HVAC systems were visually noted and inspected for signs of deterioration. The existing building is reported to be built in 1927.

Mechanical Existing Conditions

The building is heated with (2) Weil-McLain natural gas fired boilers that generate steam. The boilers have been reported to have been installed in 2003 and are 16 years old. Stream is distributed throughout the building with steam pipe distribution system. Condensate is collected through a condensate piping system and is drained back the condensate receiver located within the boiler room. The condensate receiver appears to be 16 years old. The steam and condensate piping system are insulated. This insulation is noted to potentially have asbestos.

Space heating is through steam radiators and unit ventilators. The radiators appear to be original to the building and the unit ventilators appear to be more than 20 years old.

Ventilation is provided though a central fan. Ventilation air is ducted from the supply fan throughout the building through a duct distribution system. The ventilation air is heated through steam heating coils. The ventilation system appears to be more than 20 years old.

Controls are through pneumatic controls. The air compressor is located within the blower mechanical room and appears to be 10-15 years old.

Bathroom exhaust is through several exhaust fans, exhaust ductwork and air outlets. The systems appear to be more than 20 years old.

Kitchen hood exhaust is through a side wall fan. The fan appears to be 10-15 years old. The space has not been provided make-up air.

There is no cooling within the building.

Typical Unit Ventilator

Typical Radiator with Cover

Kitchen Exhaust Fan

Kitchen Exhaust Hood

Steam Boilers

Ventilation Supply Fan

Mechanical Recommendations

The existing HVAC systems, including steam boilers, condensate receiver, piping, ventilation system, and exhaust systems are at the end or past their useful life expectancy. BLW would recommend the systems be removed and replaced with new.

BLW would recommend heating be provided through high efficiency hot water boilers, hot water piping distribution systems, pump and water specialties.

Heating shall be provided through finned tube radiation.

Ventilation shall be provided through an Energy Recovery System with packaged heating and cooling systems. Ductwork shall extend from the ERV unit throughout the building and terminate to air outlets in each space.

Controls shall be electronic DDC controls and be monitored with a building management system.

If cooling is required, a VRF cooling system shall be provided. Each space shall be provided with fan coil and space thermostat. Refrigerant pipe shall extend from each fan coil to refrigerant valve box and then extend to the associated heat pump outdoors. The heat pump shall be installed on a equipment support as required by the manufacture.

End of Mechanical Section

ELECTRICAL

Summary

The electrical report is based on a brief site visit to the Sylvester School, not involving any extensive exploratory work or building life safety assessment with respect to future building alterations. The electrical systems were visually noted and inspected for signs of deterioration and major compliance issues.

The majority of the electrical systems distribution and lighting equipment were replaced within the last 15-20 years, however there are still approximately 20% of the buildings panels from the original install. These older panels have long exceeded their life expectancy, are in various states of disrepair. In addition, the probability of equipment failure and down time is much greater now that replacement parts are not readily available.

Electrical Existing Conditions

Primary power provided by NGrid originates from an overhead pole mounted transformer located on a pole adjacent to the main driveway. The main circuit breaker and main panelboard, located in the main electric room, are manufactured by Cutler Hammer/Thomas & Betts, rated 400A, 120/240V, 1 -phase, 3 -wire. Circuit breakers distribute the remainder of loads to secondary distribution panelboards and miscellaneous loads located throughout the building.

Condition: The general condition of the main disconnect and panelboard were observed to be in fair condition.

Capacity: The existing 400A service at 240V equates to 96kVA which allows for approximately 3 W/sqft based on the approximated overall school size of 31,000sqft. Given the building size and occupancy 3W/sqft is undersized.

Power Distribution

All power distribution originates from the main panelboard and feeds branch circuit panels located throughout the building. The sub panels located throughout the building are as follows:

- Kitchen Panel, 100A
- Hall DW (?), 100A
- Hall Panel, 60A
- Lower Panel Rear, 60A
- Boiler Room Panel, 100A
- Old Boiler Room Panel, 100A

In general, the newer electrical distribution equipment in the building is predominantly mixed. Older fused panels are still in use while newer panels have replaced older panels in approximately 75% of the building. Older panels in the building appear to be from the original construction and are well past the end of their useful life expectancy. An auditorium lighting panel was observed to be using fuse technology and a rheostat for dimming.

Equipment Manufacturer's: The power and distribution equipment manufacturers currently utilized throughout the facility were noted as:

- Thomas & Betts

- General Electric (A Series)
- Cutler Hammer
- Kelek

These manufacturers are all of known quality, reputation, and continued service. Kelek, (single panel) is out of business. For the majority of the older gear, replacement parts and system components are not readily available for repairs, renovation, or system upgrades because of the age of the equipment.

Cable and Conduit

Power distribution is predominantly accomplished utilizing conduit and conductor. Observed wiring consists of copper conductors with thermoplastic insulation. Conduit types varied throughout the building dependent upon area and usage. Galvanized rigid metal conduit is used in areas subject to constant moisture and/or physical damage. Electrical metallic tubing (EMT) is used in interior spaces. MC cable was observed to be in use above suspended ceilings.

There is the potential that branch circuit wiring from older panels, concealed in the walls, is of an older cloth insulation type.

Lighting System

The lighting system installed throughout the building consists predominantly of lensed wraparound fluorescent lamped fixtures. There is also a variety of utility strip, direct/indirect, pendant, and down light fixtures in the building. Many fixture lenses were observed to be dirty, cracked and or missing. In most cases, lighting fixtures are controlled via wall toggle switches.

Emergency lighting is achieved using battery units with dual heads in common corridors and auditorium space. Lit Exit signage also appears to be fed from integral batteries.

Newer exterior lighting fixtures surface mounted to walls are visible source type LED flood lights. While these are efficient they offer poor visual quality. Not all exterior doorways have lighting fixtures directly at the door, but those that do have older fixtures (jelly jar and decorative style). It does not appear that any of the egress doors have emergency lighting capabilities.

Fire Alarm System

The main fire alarm control panel is located in the main vestibule. The control panel is a Gamewell Zans 400 which is a conventional panel, with general evacuation. The fire alarm system is approximately 25-30 years old. All detection, initiation and notification devices appear to meet current code requirements. While the system appears to be operational, it is an older system and does not meet current code requirements for a voice evacuation system.

PA & Intercom Systems

The existing systems is manufactured by Bogen and does have connectivity with all rooms in the building. The system is an older system, but was spot tested and does operate properly.

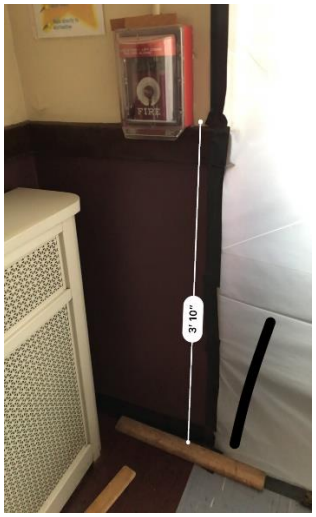
Main Service Disconnect and Main panelboard

Main Panelboard

Older Auditorium Lighting Panel

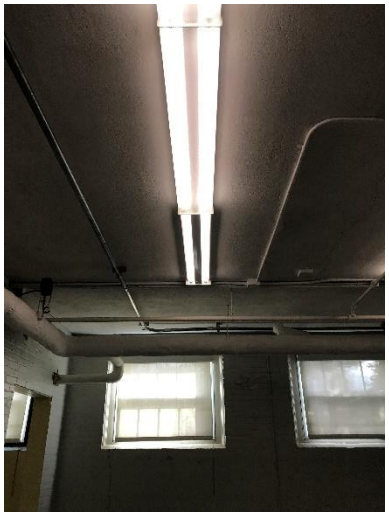
PA Intercom System Head End

Fire alarm Control Panel



Fire alarm Pull Station Height

Incoming Overhead Service Wires (Pole mount Trans)



Typical Hallway Lighting

Typical Smoke Detector

Typical Lit Exit Sign

Classroom PA/Intercom

Typical Exterior Flood Lighting

Typical Classroom Receptacles

Typical Older Style Panel

Typical Classroom Panoramic Photo

Electrical Recommendations

Power Distribution

1. Upgrade the exiting service:

The capacity of the existing electrical service is undersized and single phase. For this building to be able to power up a new 3 stop elevator the service will need to be upgraded to provide three phase power. There is three phase power available on Hanover street. Any extension of the street's three phase overhead lines would have to be provide by the Utility Co to the existing pole adjacent to the main driveway.

Because of the anticipated new service size (estimated 800A) there will need to be room on site for an approximate 8'x8' pad mount transformer (it does appear there is space directly outside of the electric room.)

Power Distribution

2. Provide new distribution equipment:

Given the recommendation to the upgrade the service per the above, new distribution equipment will have to be provided to accommodate a larger service size. A new 800A distribution panelboards with service entrance rated main breaker is recommended.

3. Replace existing panels with new:

While some of the existing panels could be proposed for reuse, it is recommended that at least 4-5 of the building's panels be replaced with new. Each approximately 100A

4. Provide new panels as required:

It is estimated that (2) additional 225A panels will be required for the new distribution requirements.

Cable and Conduit

5. Investigate concealed feeders for older cloth insulation:

Although no cloth insulated conductors were observed, attic and wall chases should be investigated for the presence of old cloth insulation. Cloth insulation found should be replaced.

Lighting System

6. Replace the building lighting in its entirety

Although functional, all existing lighting should be considered for replacement with a more energy efficient LED style fixture.

7. Exterior Emergency lighting

Exterior emergency lighting should be added to all egress doors from the building.

Fire Alarm System

8. Replace the existing main fire alarm control panel

Although functional, depending on the amount of renovations to the building, to meet current codes for an education use group, a voice evacuation system is required. It is recommended that the existing panel be replaced with a new

addressable voice evacuation panel. Modification to the existing NAC circuit wiring will need to be made to accommodate new speaker/strobe notification devices.

PA & Intercom Systems

9. Replace existing PA/Intercom system with intercom/PA/phone system throughout

While the existing PA/Intercom system is functional new technologies can offer additional benefits with regard to privacy and emergency situations.

End of Electrical Section