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HALDANE CENTRAL SCHOOL DISTRICT
ELEMENTARY – MIDDLE SCHOOL
2018 PRE-BOND EVALUATION

The original Haldane School building was built in 1934 with additions added in 1964 and 1979.

HEATING VENTILATING AND AIR CONDITIONING:

The steam boiler plant was recently replaced with new cast iron sectional boilers. The boiler feed pump had been reportedly installed in 1973 and is well beyond its useful life (15 years per 2015 ASHRAE Handbook).

Figure 1: Recently Installed Boilers

Steam piping failures have been reported in the 1934 Building and in the 1979 Addition since 2006 and have continued through 2017. We expect this condition to continue unless a long term strategy is implemented.

There are four domestic hot water heaters. One serves the lavatories and sinks throughout the building, one serves the Kitchen and the other two have failed.

Figure 2: Domestic Hot Water Heaters

The 1964 Addition has two steam to hot water converters and hot water pumps in a separate Mechanical Room to heat the 1964 portion of the building with hot water. Two of the original pumps have failed and have been abandoned in place. There are also two in-line pumps that serve separate zones in this portion of the building. The steam to hot water converters have outlived their useful life (24 years per ASHRAE 2015 Handbook).

Figure 3: 1964 Mechanical Room

The 1934 Building classrooms have steam unit ventilators that were reportedly installed in 2003 and are approaching the end of their useful life. The 1979 Addition has perimeter steam finned tube radiation and a roof mounted air handler for ventilation.

The Library is served by 2003 vintage steam unit ventilators and ductless split systems for air conditioning. The ductless splits do not provide outdoor air to the space and reportedly fall short on cooling on very hot days. If the unit ventilators are operating during the warmer months to introduce code compliant outdoor air at the same time as the ductless splits are operating, humidity could condense out onto surfaces in the space.

Figure 4: Library Floor Mounted Unit Ventilator and High Wall Ductless Split AC

The Gymatorium in the 1934 Building has perimeter steam radiators for heat. The original steam air handler in the rooftop Mechanical Room has been abandoned in place. Gravity exhaust shafts behind the balcony area would relieve the outdoor air formerly introduced by the abandoned air handler. Windows are the only source of ventilation in the cooler months which does not conform to current NYSED standards. Five rooftop units above the space provide cooling and ventilation in the warmer months only. Four of them blow air from one outlet each in the ceiling without distribution. The fifth one is ducted behind the Stage. They are reportedly approaching the end of their useful life.

Figure 5: Gymatorium Rooftop Unit Ceiling Outlets

The Music Room off the Cafeteria appears to have had a unit ventilator at one time because there is an abandoned unit ventilator fresh air intake louver on the exterior wall. However, a cabinet heater has been installed in front of the blanked off intake. There is no powered ventilation introduced into the space which does not conform to NYSED standards.

Figure 6: Music Room with No Ventilation

The Main Office/Nurses Room have perimeter radiators and ducted exhaust. There are window air conditioners for cooling only. There is no powered ventilation to this space which does not conform to NYSED standards.

Figure 7: Main Office Radiator and Window Air Conditioning

ELECTRICAL:

Distribution

The original building was built in 1934, the first addition was added in 1964 and the second addition was added in 1979. The existing electrical service and main distribution board was upgraded in 2005. A new primary feeder was installed from utility pole to the pad mounted transformer and from the transformer to the new main service switch.

The main distribution board is adjacent to the Boiler Room on the ground floor. It is rated 2500 amps at 120/208V, 3 phase, 4 wire with a 2500 amp main service switch. The electrical service also has a built in surge suppressor and ground fault protection. Upon visual inspection, it was determined that there are two (2) 400 amp, three (3) 225 amp, three (3) 100 amp spaces for future work.

The capacity of existing service is approximately 900 kW and as per NEC and IBC, the building is allowed to use up to 80% of the capacity, which equates to 721 kW. From our visual inspection, there are at least 4 pole spaces available in each main distribution board for future proposed work. This amount to 597 kW spare capacity left for future work.

Figure 8: 2500 Amp, 120/208V, 3 Phase MDP

The majority of existing panelboards have minimum spare capacity to support additional loads if future expansion or additional receptacles are required in classrooms, offices, etc.

Lighting and power panelboards are circuit breaker type throughout. The 1934 portion of building contains few panelboards and perhaps feeders that have outlived their useful life. The life expectancy of electrical panelboards and feeders is 50 years. Most of the panelboards were retrofitted from 1964 and thereafter. In 2005 three (3) new panelboards were added, intended for technology infrastructure power distribution. The lighting and power panelboards are in fair condition including the feeders. In the next 7 years, a number of existing panelboards and feeders will have outlived their useful life. Infrared testing on all original panels and insulation resistance testing on all feeders is recommended. As the nature of electrical loads change year after year, periodic testing of panelboards and feeders can give insight to the condition of equipment prior to any malfunctions.

All switches and connections should be inspected, exercised and connections tightened for proper operation. Depending on results, panelboards and/or feeders may require replacement.

Figure 9: Electrical Panel with Spare Capacity

Lighting and Power

Generally all lighting fixtures in corridors, classrooms and offices were replaced with new in the 1990's. In the 1934 original building light fixtures were replaced with new fluorescent type in 2003. The Gymnasium contains fluorescent lighting as well as the Cafeteria. All fluorescent light fixtures utilize energy saving ballasts and lamps. Light levels appear adequate in all areas except in the Cafeteria the levels are fair. The lighting in classrooms is automatically controlled but not in toilets, storage areas and closets.

Emergency lighting is accomplished via wall mounted emergency battery packs. The National Fire Protection Agency (NFPA) requires a minimum of one foot candle of illumination. It appears there is inadequate quantity of emergency lighting fixtures throughout. The measurement of foot candle can be verified by using a light meter to determine actual foot candle levels.

The exit lights are energy efficient LED types. There appears to be a lack of coverage in some of the public areas. Some of the exit signs appear to be damaged. The damaged lights need to be replaced with code compliant LED type exit lights and new exit lights need to be added in some areas.

The classrooms in general have only two convenience receptacles. Some of the classrooms have had additional convenience receptacles installed. Extension cords are being utilized in some of the classrooms as a permanent means of power distribution, which is not compliant with NEC Code requirements.

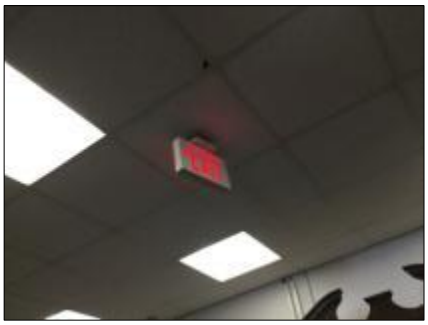

Figure 10: Typical Exit Lighting

Figure 11: Typical Emergency Light

There is no emergency battery pack or remote lighting unit mounted outside at each exit discharge of the building. As per the latest NFPA requirements outdoor emergency lighting is required.

Fire Alarm

The existing fire alarm system is an addressable system installed in 2004. The Fire Alarm Control Panel manufactured by Notifier model #NFS-640 is located in the basement outside the Boiler Room.

When the system was upgraded devices were replaced, but not upgraded to meet today's Americans with Disabilities Act (ADA) standards. Mounting heights, quantities of manual pull stations and quantities of visual indicating devices do not meet current code. Smoke detectors and heat detectors coverage is not adequate. The smoke detectors in the 1979 Addition are original to building construction and are the non-addressable type. The existing elevator does not have elevator recall. The roll down gate between the Cafeteria and Kitchen is not connected to fire alarm system. The District has not employed the services of a central station monitoring company. All trouble and fire alarm signals encountered by the fire alarm system automatically alerts the local authorities.

Figure 12: Fire Alarm Control Panel

Figure 13: Fire Alarm Pull Station

RECOMMENDATIONS

HEATING VENTILATING AND AIR CONDITIONING:

1. Convert 1934 Building and 1979 Addition from steam to hot water. Convert existing boilers from steam to hot water and remove existing failing boiler feed pump. Provide base mounted pumps in Boiler Room for building hot water distribution. Eliminate steam to hot water converters and pumps in 1964 Addition Mechanical Room and feed 1964 Addition directly with hot water system in Boiler Room. Replace floor mounted unit ventilators that are approaching the end of their useful life in the 1934 Building with vertical energy recovery type unit ventilators that are capable of supplying ventilation air and exhausting air locally at each exterior classroom wall. Replace roof mounted air handler in 1979 Addition with the same vertical unit ventilators in each classroom. Provide hot water distribution piping and finned tube radiation throughout the 1934 Building and 1979 Addition. New vertical unit ventilators are much quieter than floor mounted unit ventilators. This approach will allow the steam system to remain in operation while a good portion of the hot water system is installed. It will also allow for the steam piping in the tunnels to be abandoned in place and reduce the amount of asbestos abatement. The District will continue to see steam piping failures without a long-term solution. Failures can cause costly damage to the building as well as potential safety hazards. Providing a new hot water distribution loop at the same time as classroom ceilings are replaced will prevent redoing ceiling work in the future for pipe installation.

2. Replace existing domestic hot water heaters with two high efficiency propane type condensing hot water heaters. One would serve the Kitchen and the other would serve the rest of the building.

3. Replace the Gymatorium steam air handler with a new hot water air handler in the existing rooftop Mechanical Room that provides outdoor air during heating and cooling mode. This will meet current code and NYSED standards. Provide a roof mounted condensing unit and eliminate the five cooling only rooftop units.

4. Provide a new ducted rooftop unit with a hot water coil in the ceiling of the Music Room to provide heating, cooling and ventilation per current code and NYSED standards. A few solar panels may need to be removed or relocated.

5. Provide a new ducted rooftop unit with a hot water coil in the ceiling of the Library to provide heating, cooling and ventilation per current code and NYSED standards.

6. Provide new heat pump type split systems with outdoor air capability in the new ceilings in the Main Office and Nurse's Room to provide heating, cooling and code compliant ventilation and to meet NYSED standards.

RECOMMENDATIONS

ELECTRICAL:

A. Distribution

1. If the District decides to add Air Conditioning loads to the Music Room, Library, Main Office and Gymatorium, the existing electrical service will still have enough capacity for approximately 15 tons of air conditioning in the future.

2. Provide additional branch circuit panels for convenience receptacles being added to classrooms

B. Lighting and Power

1. Add emergency battery packs in areas where they are lacking.
2. Add emergency egress lighting at every door.
3. Replace damaged exit lights and add exit lights in areas where they are lacking.
4. Replace lighting in all classrooms where ceilings are being replaced.
   - Probable Cost based on the installation of nine (9) 2'x 4' fixtures in each room.
5. Add Receptacles in all classrooms.
   - Probable Cost based on the installation of six (6) duplex receptacles in each room.

C. Fire Alarm

1. Replace the entire Addressable Fire Alarm System in building. Current system is not code compliant.