



BURLINGTON
HIGH SCHOOL



TAPPÉ
ARCHITECTS

MECHANICAL
EXISTING CONDITIONS REPORT
MAY 28, 2024

HVAC

Existing Conditions

HVAC Systems

The existing school is equipped with a natural gas fired, hot water heating system and DX cooling system with boilers, pumps, air-cooled condensing units, rooftop air handling units, variable air volume units with hot deck-cold deck, pneumatic controls, and sporadic electronic controls. A majority of the equipment is original to the building, beyond its useful life, is in disrepair and in need of replacement.

The existing mechanical room is located toward the back, lower portion of the building. The mechanical room is equipped with three (3) gas fired, fire tube boilers, Kewanee model H2W-300-K boilers, rated for 300 boiler horsepower each. There are three (3) hot water lead/standby base mounted circulating pumps which pump water to eight (8) secondary single primary pumps within the building serving the building heating systems. The existing boilers, pumps and associated equipment were installed back in 1972 and are in various levels of disrepair.



Photo 1 - Boiler



Photo 2 - Pumps

The Classrooms, Administration area, Library, Auditorium, and Cafeteria are provided with heating, ventilating and air conditioning rooftop air handling units with hot water heating hot deck/DX cooling air cold deck and return fans located in roof level mechanical penthouses. All units are original to the building and appear to be in disrepair. Each rooftop unit is provided with an air-cooled condensing unit on the top of the mechanical penthouse. Rooftop air handling units provide air through separate ductwork distribution to dual duct variable air volume terminal units that mix the cold deck/hot deck for individual zone space temperature control. The ceiling space within each zone is used as a return air plenum. Each zone has been provided with a space sensor. All spaces have also been provided with fintube radiation at the exterior walls to provide supplemental heating.

The kitchen is equipped with a hot water heating Make-up Air Unit (MAU) with large exhaust hoods for both the dishwasher and cooking equipment that are exhausted up through the roof to upblast exhaust fans. Exhaust hoods are provided with individual sprinkler systems and emergency shutoff switches.

Various IT/MDF and electrical rooms have been provided with VRF Ductless Split indoor units with individual room controls for cooling. These units are located within the rooms to maintain temperature and the outdoor condensing units are located on the roof. Refrigerant piping is run between them. They appear to be in fairly good condition.

The Locker Rooms, Paint Spray Booth, and Miscellaneous Shop Areas have been provided with heating and ventilating from hot water heating heating/ventilating units throughout the building, associated exhaust fans and an insulated duct distribution systems from the dual duct heating and cooling system.

The science classrooms are provided with chemical exhaust hoods with controls and make-up air systems that do not appear to be functioning and appear to have failed.



Photo 3 – Rooftop Exhaust Fans



Photo 4 – Exhaust Hood with Make-up Air Fan



Photo 5 – Air-Cooled Condensing Unit



Photo 6 – Penthouse Air Handling Unit

Restrooms and gang bathrooms are exhaust through exhaust registers on the ceiling and rooftop exhaust fans. Controls are operated continuously during occupied hours and do not operate during unoccupied hours. Heating is provided by hot water terminal equipment.

Each entry, stair and miscellaneous other spaces in the building have been provided with terminal hot water heaters. Miscellaneous spaces, such as storage rooms, are provided with hot water heating, where required, and an exhaust air system.

All existing automatic temperature controls are pneumatic and a DOS based front end; the system has degraded over time, is not maintainable due to unavailable replacement parts, has many air leaks and has left the building with little to no control in most areas.

Recommendations

Existing boilers will be replaced with new high efficiency condensing boilers. Main system and secondary pumps will be replaced with new high efficiency pumps with variable frequency drive (VFD) motors.

Main heating equipment and rooftop air handling equipment serving the classrooms, administration area, library, auditorium, and cafeteria will be replaced with new, high efficiency equipment with new air-cooled condensing unit and energy recovery to meet new energy conservation codes.

Hot deck/cold deck systems are very inefficient and will be removed for a high efficiency ductwork distribution system that will meet the new IECC and Massachusetts energy conservation codes. New terminal equipment should be removed and replaced with new and existing pneumatic controls should be removed and replaced with new electronic controls.

The existing hot water distribution system will be modified to provide new heating, ventilating and air conditioning equipment with heating and reinsulated in accordance with the latest energy conservation codes. All existing hot water distribution piping will be cleaned and flushed prior to re-use and replaced where required.

The kitchen heating and ventilating systems will be removed and existing exhaust hoods and associated ductwork and accessories will be removed and replaced with a new Make-up Air Unit (MAU) with new ductwork and UL listed exhaust hoods and exhaust fans.

Exhaust fans and exhaust registers will be removed and replaced with new. Existing ductwork will be reused as much as possible and cleaned.

New hot water terminal heating equipment shall be provided for all miscellaneous spaces, entryways, storage spaces, and electrical rooms where required.

New automatic temperature control systems shall be provided for all new equipment, and new building management systems will be provided for maintenance control of discharge air temperatures, supply and return water temperatures, outdoor air system control as required for a full and complete heating, ventilating and air conditioning system. Building management systems shall provide new graphics for scheduling, monitoring and alarming for building maintenance personnel.