Cohasset Town Hall
Cohasset, MA
HVAC Existing Conditions Systems Report
J#732 006 00.00
L#56566/Page 1/May 23, 2017

HVAC

Heating Plant

The original Town Hall building and Addition building are primarily heated by a gas fired hot water plant that is located in the basement. The boiler plant consists of two standard efficiency gas fired boilers, in line pumps, hydronic accessories (expansion tank and air separator), controls and steel/copper piping distribution system. The boilers were installed approximately 15 years ago and were manufactured by Buderus (Model Logano G334). The boilers each have a capacity of 542 MBH input, 451 DOE rated output, and 392 MBH Net I-B-R output; and combustion efficiency of 83.4%. Required boiler safety devices including low water cutoff, boiler safety fuse-o-matic switch and burner switch are installed. The boilers are vented through the use of galvanized steel un-insulated breeching that is routed from the boilers to masonry chimney. The breeching appears to be in fair condition, but shows some signs of corrosion.

There are two in-line hot water pumps installed in the basement boiler room. One pump serves the original Town Hall building's heating system and the other pump serves the Addition building's dual temperature heating and cooling system. The addition building pump was manufactured by Bell& Gossett and appears to be in good condition, while the original building hot water pump was manufactured by Taco, and appears to be in poor condition. Neither of the pumps are equipped with VFD (variable frequency drives) drives or ECM motors.

Existing Hot Water Boilers, Expansion Tank & Air System

Hot Water Pump (Taco)

Boiler Breeching

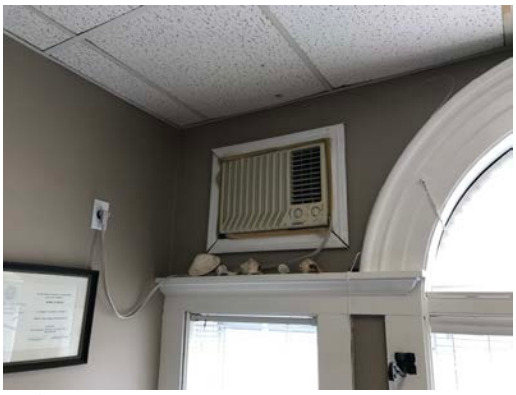
Boiler Chimney

Air Conditioning Systems

The original Town Hall building offices are primarily air conditioned by window air conditioning units. There are also some window AC units located in the dressing room areas of the Auditorium. The window AC units generally appear to range from fair to poor condition. The Auditorium is not air conditioned.

The Addition building is air primarily air conditioned by an outdoor grade mounted chiller that is located behind the building within a fence enclosure. The chiller was manufactured by Trane (model CGACC30, R-22 refrigerant) and has a nominal capacity of 20 tons. The Chiller was installed in 1988, is approximately 29 years old and is beyond its expected useful service life of 20-25 years. The chiller casing and fan guards are rusted in areas. Chilled water is distributed from the chiller to building fan coil units by a dual temperature in line pump that is connected to an insulated steel and copper insulated piping system.

Outdoor Air Cooled Chiller

Window AC Units

Piping Distribution:

The two-pipe change over piping distribution system that serves the Addition building was installed circa 1988, and appears to be in fair condition. The piping is approximately 29 years old and nearing the end of its expected useful service life of 30 years. Many sections of piping insulation, particularly in the basement and Auditorium dressing room appears to be in poor conditions and showing signs of water damage from condensate occurring on the exterior surface of the piping and possible small pipe leaks which may have occurred in the past. Some piping hangers are also corroded due to direct contact with piping.

Damaged Dual Temp Piping Insulation

Chilled Water Piping Missing Insulation

The dual temperature system is changed over from heating to cooling by a set of manual change over valves that are located in the basement boiler room.

The original Building's hot water piping distribution system is believed to pre-date the Addition building piping system, and therefore is over 29 years old and past its useful expected service life of 30 years.

Dual Temperature Pump

Heating and Cooling Equipment:

The original Town Hall building offices and the Auditorium are heated by hot water radiators. The radiators appear to have been installed prior to the construction of the Addition building. Therefore the equipment is older than 29 years, and has exceeded its expected useful service of 25 years. The radiators generally appear to be in poor physical condition. The main entryway of the Auditorium does not appear to have sufficient heating.

The Addition building offices, corridors, and meeting rooms are heated and air conditioned by 2-pipe hot water-chilled water change-over fan coil units. The fan coil units were installed circa 1988 and are 29 years old. The units appear to range from fair to poor condition. In total, there are approximately 21 fan coil units. Approximately 20 units are vertical console type fan coil units. One horizontal blower fan coil unit serves the corridor and copy /file room areas located on the first floor of the Addition building. Some areas of the building are heated by hot water fin tube radiation heating equipment.

The restrooms in the original and addition areas of the building are heated by a combination of hot water fin tube radiation and convector radiator heating equipment. The majority of this equipment is in poor physical condition.

Addition Fan Coil Unit

Original Building Convector Radio

Restroom Convector

Auditorium Fin Tube Radiation

Supplemental Cooling Systems:

There is a thru wall ventilation and air conditioning unit installed in on the second floor of the original Town Hall building. The unit was manufactured by Carrier (model 50QT224300, R-22 refrigerant). The unit appears to be inoperable and in poor condition.

The Addition basement and first floor Vault rooms air conditioned by (2) split system air handling unit with associated supply and return ductwork and in-duct electric steam generating humidifier. The indoor units are connected with refrigeration piping to (2) outdoor grade mounted condensing units that are located adjacent to the Chiller. The basement vault AC unit was manufactured by Bryant, and has an associated 1.5 Ton outdoor R-22 air cooled condensing unit that was manufactured by Ameristar (Model PA13NR018). The indoor and outdoor units appear to be in good physical condition. Some sections of the vault ductwork insulation appear to be damaged and in need of repair or replacement. The first floor vault AC system indoor and outdoor units are believed to have been installed in 1988. The outdoor unit appears to be in poor condition.

Thru-Wall AC Unit

Basement Vault AC Unit

Air Cooled Condensing Units

Ventilation and Exhaust Air Systems:

The original Town Hall building is primarily ventilated through the use of natural ventilation by use of operable windows and a whole building exhaust ventilation ductwork system. Several of the restrooms did not have mechanical ventilation systems installed. There is an exhaust turbulator system installed which appears to exhaust some rooms in the original building. However, this system appears to be in poor condition and in need of replacement and upgrades. The Auditorium dressing/storage room exhaust ventilation systems are not operable, and need replacement. The Auditorium does not appear to have a mechanical ventilation system installed.

Original Town Hall Turbulator Exhaust (right) and Louver (left)

Original Town Hall - Exhaust Grille

Toilet Room - Ceiling Exhaust Fan

Auditorium – Dressing Room Exhaust Fan

The Addition building toilet rooms and janitor's closet are exhausted by ceiling mounted exhaust air fan systems. There is also an exhaust fan serving the interior of the second floor Collector/Treasurer office area. The exhaust fans appear to have been installed in 1988 and are in poor condition. The elevator machine room is ventilated by an exhaust air fan. The kitchen range hood fan is vented to the outdoors.

The basement Addition meeting room is ventilated by a static plate type energy recovery ventilation unit that is installed in the basement. The unit is a ceiling suspended horizontal model manufactured by RenewAire. The is unit operated by a wall mounted switch located in the meeting room.

The unit and associated ductwork distribution appears to have been installed in recent years, and appears to be in good condition.

Meeting Room ERV Unit

Automatic Temperature Controls:

The original building heating system is controlled by wall mounted thermostat and hot water valve controls. The controls are electric. The Addition building heating and cooling systems are controlled by wall mounted thermostats. The HVAC heating and dual temperature pumps are controlled by a Taco Relay controller.

Room Thermostats

Boiler Pump Relay

Recommendations:

- The existing original building and addition HVAC systems are generally in poor condition and in need of replacement and upgrades in terms of energy efficiency, thermal comfort, acoustics and improved indoor air quality.

- The existing boiler plant has a lower efficiency than current high efficiency boiler plants, and is nearing the end of its expected service life of 20 years. We recommend that the existing boiler plant be replaced with a high efficiency gas-fired condensing boiler for improved energy savings. New boiler breeching and combustion air ductwork should also be provided. New hot water pumps equipped with variable flow VFD drive or ECM motors and associated controls should be provided for additional energy savings.

- The existing Addition building Chiller is past its useful service life and has a much lower efficiency that high efficiency models that are commercially available today. The existing chiller also does not have capacity to air condition the entire building complex. Therefore we would recommend that a replacement chiller is sized to provide chilled water for the entire building complex.

- Existing hot and dual temperature piping and terminal heating/cooling equipment (fin tube radiation, convectors, fan coil units and unit heaters) should be removed and replaced with a new 4-pipe insulated hot water, chilled water piping distribution system and terminal heating and cooling equipment.

- Mechanical ventilation should be provided to all occupied areas of the building by new indoor air handling units equipped with energy recovery, hot water heating, chilled water cooling, supply and return fans and filters. Potential locations for air handling equipment include the basement and Attic areas of the building.

- The existing HVAC control system including thermostats, relays, control valves/dampers and wiring should be replaced, and a direct digital control (DDC) system should be provided to control all newly installed HVAC systems. The DDC system will provide energy savings by managing the HVAC system. The DDC system will control space set points, reducing set points during unoccupied times, and turn off equipment not needed during unoccupied times.

- The original Building's hot water piping distribution system is believed to pre-date the Addition building piping system, and therefore is over 29 years old and past its useful expected service life of 30 years.