

## **FINE ARTS BUILDING (0060)**

The Fine Arts building was originally constructed in 1938 and was heated and ventilated only. Air conditioning was added in 1938 utilizing several single zone air handling units and fan coil units with chilled water cooling and steam heating. Over the years there have been several modifications and replacements to the heating, ventilating and air conditioning systems. In 2004, the theater dressing rooms were updated to include a new variable volume air handling unit with zone terminal units provided for each of the six theater dressing rooms. In 2014 the third floor auditorium was renovated with a new air handling unit.

The unit serving the third floor auditorium is a single zone, variable volume air handling unit with a direct outdoor air intake. The supply air is a mixture of recirculated air from the auditorium and ventilation air from outside the building. Approximately 40% of the air supplied to the auditorium is made up of ventilation air. The unit is equipped with chilled water cooling coils, hot water heating coils and MERV 11 filters. The auditorium AHU (AHU-5) is also equipped with an ultraviolet filtration unit (UV) that inhibits biological activity within the units.

Other areas of the building are generally served by smaller fan coil units and single zone air handling units with chilled water cooling and hot water heating. Each unit directly serves a small area of the building with a dedicated supply and return air distribution system. The dressing rooms are served by a central variable volume air handling unit (AHU) with variable volume terminal units which vary air volume to each dressing room and provide heating based on space temperatures.

The AHUs have an operating schedule that turns them off during unoccupied periods. The operating schedule has been modified to operate continuously on the weekdays to provide additional ventilation while the building is unoccupied as part of FMD's COVID 19 response plan.

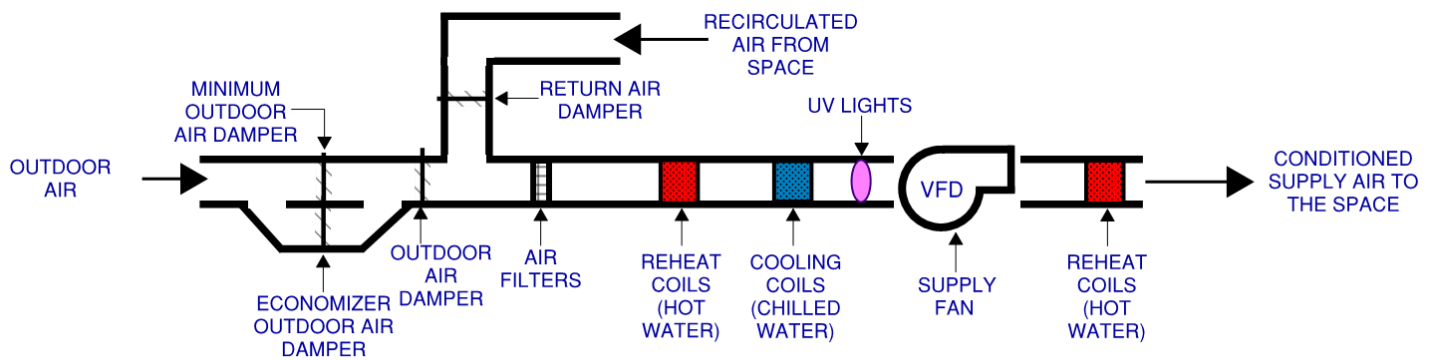
Chilled water is supplied throughout the building from the campus chilled water system. Heating hot water, distributed throughout the building for heating, is provided by a steam to water heat exchanger using steam from the campus steam system.

## VARIABLE VOLUME SINGLE ZONE AIR HANDLING UNITS (AHU-5)

The Auditorium Air Handling Unit (AHU-5) delivers a variable supply air volume composed of a mixture of recirculated air from the space and outside air included for ventilation. The unit maintains the space temperature by modulating the flow of chilled water and hot water to coils in the unit. The unit also has the capability of operating in a dehumidification mode when relative humidity levels are elevated, by simultaneously cooling the mixed air and then reheating it to a moderate temperature before supplying the air to the auditorium.

The unit is equipped with MERV-11 filters installed upstream of the cooling coil and supply air fan. Air from the space is recirculated back to the unit where it is mixed with outside air before passing through the filter bank. The AHU is also equipped with air side economizer function that allows the unit to increase ventilation levels when outdoor air conditions are appropriate. The unit utilizes a demand controlled ventilation (DCV) sequence to reduce the ventilation during periods where the space is not occupied based on space CO<sub>2</sub> levels as an occupancy indicator. The demand control ventilation sequence has been disabled as part of FMD's COVID-19 response program. The AHU is also equipped with an occupancy schedule that shuts down the unit in the evening and early morning before the building is occupied. This schedule has been changed to provide continuous operation (and ventilation) even during periods where the building is not occupied as part of FMD's COVID-19 response program. The AHU has also been equipped with a UV filtration system that inhibits biological activity within the unit.

### AHU-5 3rd Floor Large Lecture Room



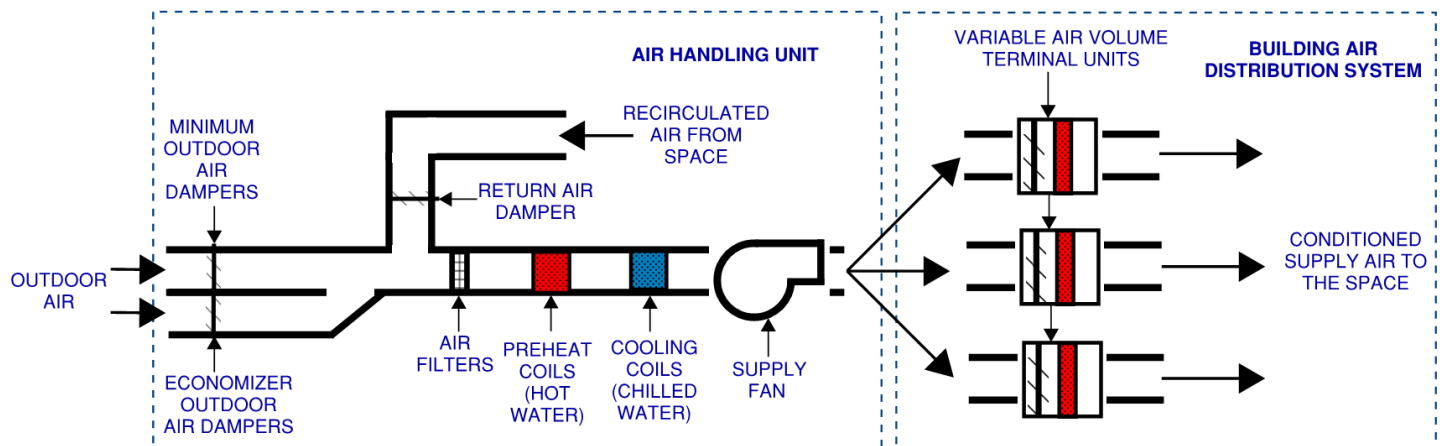
### SINGLE ZONE AIR HANDLING UNIT SCHEMATIC

## VARIABLE VOLUME AIR HANDLING UNIT (DRESSING ROOM AHU-1)

The dressing room Air Handling Unit (AHU-1) delivers a variable volume of conditioned air consisting of a mixture of recirculated building air and fresh air from outside of the building. The dressing room return air is mixed with outdoor air, passed through a bank of filters and cooled with chilled water coils in the air handling unit before being supplied to the dressing rooms through above ceiling ductwork. Variable Air Volume terminal units (VAVs) are located in supply air ductwork to allow cooling or heating operation in each of the spaces served by the central unit. Each VAV terminal unit is equipped with an air damper to regulate the volume of air delivered from the central AHU and a hot water heating coil to provide heating to each space as required.

Air is recirculated from the building back to the air handling unit through ceiling mounted air return registers located in each space. Return air is pulled from a plenum space above the ceiling. Exhaust is provided in restrooms on each floor to remove odors and to maintain a slightly positive building pressurization.

The air handling unit is equipped with an air side economizing function that enables it to increase ventilation when ambient weather conditions are appropriate. The AHU has ultraviolet light filtration to inhibit biological activity within the unit. There is an occupancy schedule in place to disable the AHU when the building is not in use. The occupancy schedule for this unit is set to provide continuous operation to increase the ventilation to the building as part of FMD's COVID-19 response plan. The unit also has a demand controlled ventilation program that reduces ventilation when the space is determined to be unoccupied based on CO<sub>2</sub> levels. This energy saving sequence is being disabled to increase ventilation as part of FMD's COVID-19 response plan.

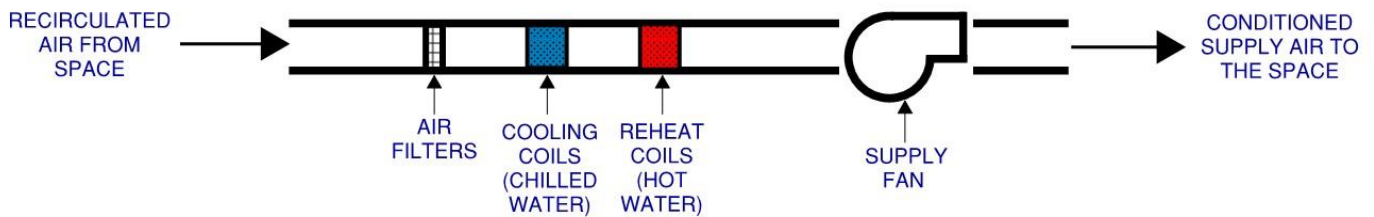


**VARIABLE VOLUME AIR HANDLING UNIT SCHEMATIC**

## FAN COIL UNITS

A fan coil unit is fairly simple: it's a fan with a coil or coils (like a car radiator) that can add heating and cooling to the air stream flowing through it. The FCUs have air filters to remove particulate matter from the air, a hot water coil and chilled water coil for heating and cooling the air, and a supply fan for forced air circulation through the unit and into the space. There is no ventilation air provided for these FCUs because they are located in spaces with transient occupancy.

Chilled water is supplied throughout the building from the campus chilled water system. Heating hot water, distributed throughout the building for heating, is provided via a steam to hot water heat exchanger located in the building using imported steam from the central campus steam system.



**4-PIPE FAN COIL UNIT SCHEMATIC**