JACKSON STREET VISUAL ARTS BUILDING (0040)

The Jackson Street building was originally built in 1961. The building underwent a complete renovation of the heating, ventilating and air conditioning systems in 1989. In 2011, the HVAC system was completely replaced except for the chiller plant.

The two lecture halls located on the first floor are each conditioned and ventilated by a single zone air handling unit (AHU) with hot water and chilled water coils used for space heating and cooling. Room 125 is served by AHU-1 that supplies 2,280 cfm of supply air with 1,600 cfm of outside air. Room 123 is served by AHU-2 that supplies 2,120 cfm of supply air with 1,600 cfm of outside air. Both units are equipped with demand controlled ventilation programming that varies outside air flow based on sensed occupancy.

Studio rooms 130 and 132 are conditioned by a chilled beam system with a dedicated outside air unit (DOAS) with energy recovery. Exhaust from all of the restrooms and ventilation air are handled by the outside air unit that utilize an energy wheel for heat recovery.

The balance of the building is served by five variable volume air handling units with fan powered variable volume terminal units (PIU) and variable volume terminal units (VAV) The supply air from these units are as follows:

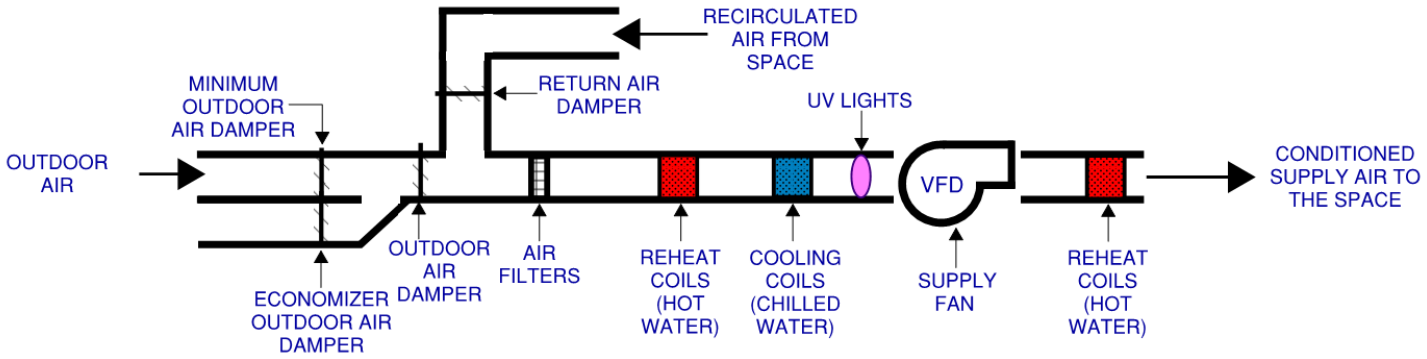
- AHU - 3: 34% outdoor air fraction with six PIUs and one VAV
- AHU - 4: 21% outside air fraction with seven PIUs.
- AHU - 5: 7% outside air fraction with five PIUs.
- AHU - 6: 46% outside air fraction with two VAVs.
- AHU - 7: 39% outside air fraction with four PIUs and two VAVs.

Each central Air Handling 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. Each AHU is also equipped with air side economizer function that allows the unit to increase ventilation levels when outdoor air conditions are appropriate. Each AHU utilizes a demand controlled ventilation (DCV) sequence to reduce ventilation during periods where the space is not occupied based on space CO_2 levels as an occupancy indicator. These demand control ventilation sequences have been disabled as part of FMD's COVID-19 response program. Each AHU and the DOAS 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. Each AHU and the DOAS has also been equipped with a UV filtration system that inhibits biological activity within the unit.

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

SINGLE ZONE AIR HANDLING UNITS (AHU-1 & AHU-2)

The two large lecture room Air Handling Units (AHU-1 and AHU-2) deliver a variable supply air volume composed of a mixture of recirculated air from the space and outside air included for ventilation. AHU-1 and AHU-2 have a shared outdoor air intake. Each unit maintains the space temperature by modulating the flow of chilled water and hot water to coils in the unit. The units also have 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 lecture rooms.

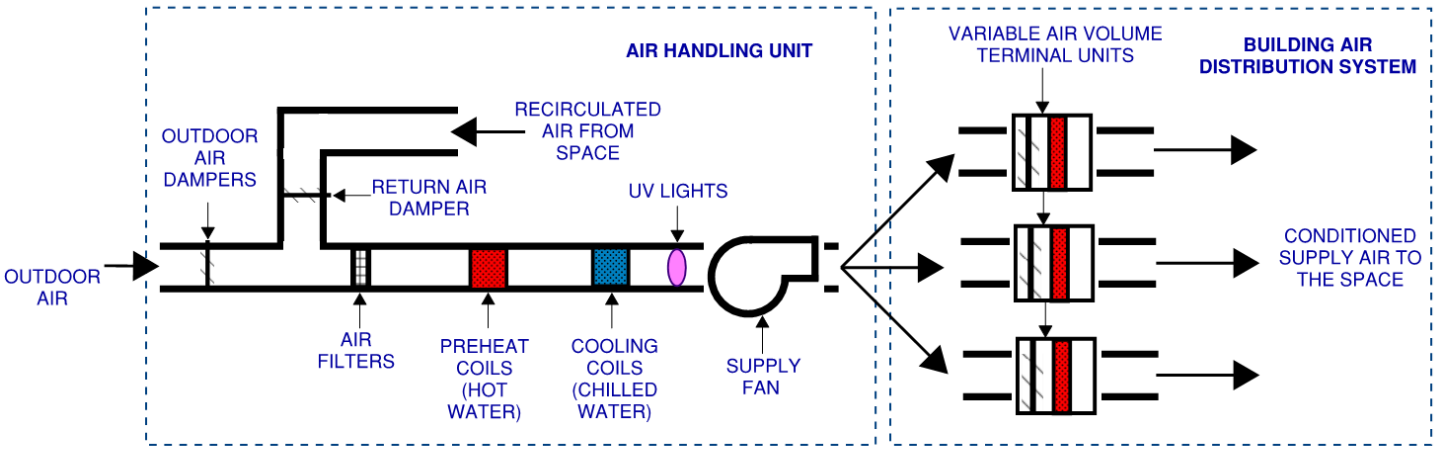


SINGLE ZONE AIR HANDLING UNIT SCHEMATIC

VARIABLE VOLUME AIR HANDLING UNITS (AHU-3, AHU-4, AHU-5, AHU-6, & AHU-7)

The air handling units deliver a variable volume of conditioned air consisting of a mixture of recirculated building air and fresh air from outside of the building. The building return air is filtered, mixed with outdoor air and cooled with chilled water coils in the air handling unit before being supplied to rooms throughout the building through above ceiling ductwork. VAVs are equipped with an air damper to regulate the volume of air delivered from the central AHU to the space based on the current space temperatures. In areas requiring heat, the PIU's also include a fan, a hot water coil and a filter combination that will mix in air from the above ceiling plenum with the conditioned air from the central AHU when the space requires heating.

Air is recirculated from the spaces 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.

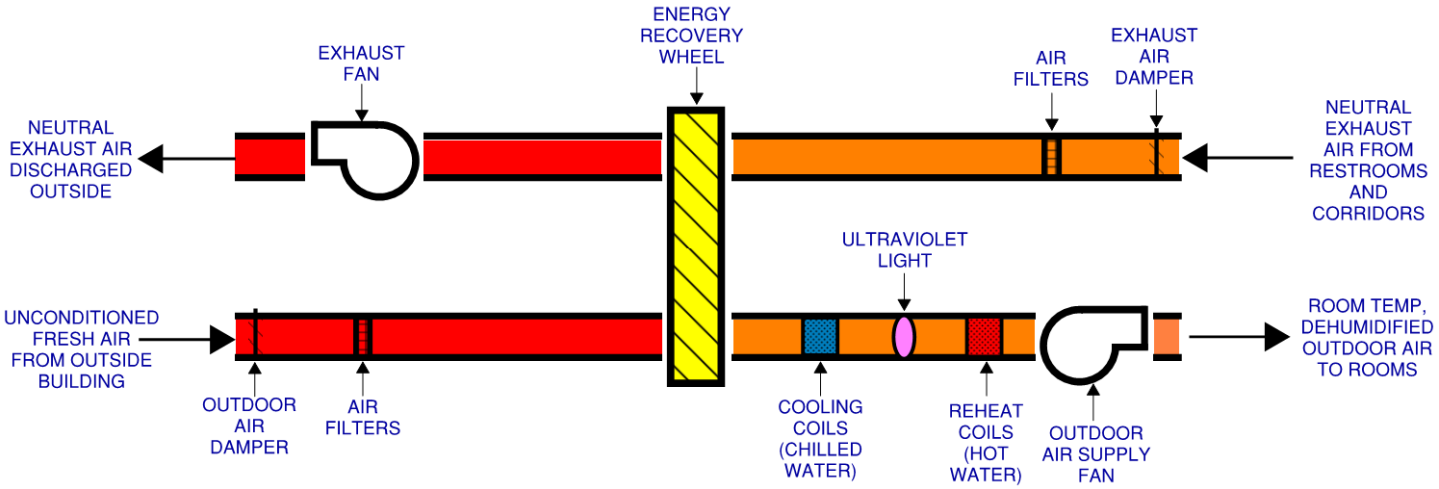


VARIABLE VOLUME AIR HANDLING UNIT SCHEMATIC

DEDICATED OUTDOOR AIR SYSTEM WITH ACTIVE CHILLED BEAMS

Ventilation and building exhaust are provided to Studios 130 and 132 by a dedicated outdoor air system (DOAS) located in the ground floor mechanical room. The DOAS preconditions the incoming outdoor ventilation air using a total energy recovery wheel that is exposed to the outdoor airstream flowing into the building and the exhaust airstream leaving the building. Exhaust air is drawn through the building via ductwork by exhaust fans in the DOAS where it passes through a filter bank and then through a turning energy recovery wheel that transfers both sensible and latent heat to/from the exhaust air stream. The incoming outdoor air is drawn through the DOAS via separate fans within the unit where it passes through a filter bank and the turning total energy recovery wheel to be pre-conditioned with energy transferred from the exhaust air stream. The pre-conditioned outdoor air is then heated or cooled via hot water and chilled water coils for heating and cooling before being delivered to the chilled beams for zone heating and cooling in the spaces served.

The active chilled beams consist of fin-and-tube heat exchangers contained in a housing that is suspended from the ceiling. The chilled beams contain an integral air supply that is provided by the dedicated outdoor air system. The supply air passes through nozzles, which induce air from the space up through the cooling coil. This induction process allows an active chilled beam to cool or heat the air in the space via either a hot water heating coil or a cold water cooling coil.



DEDICATED OUTDOOR AIR SYSTEM - UNIT SCHEMATIC