Pacific Northwest
NATIONAL LABORATORY

Large Office Building Emulator

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U.S. DEPARTMENT OF ENERGY BATTELLE

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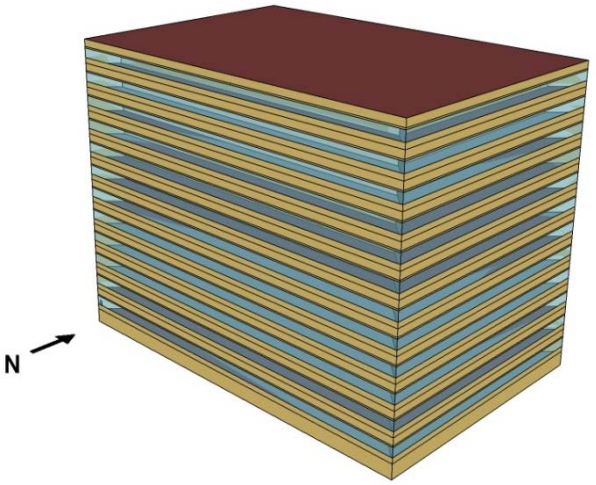
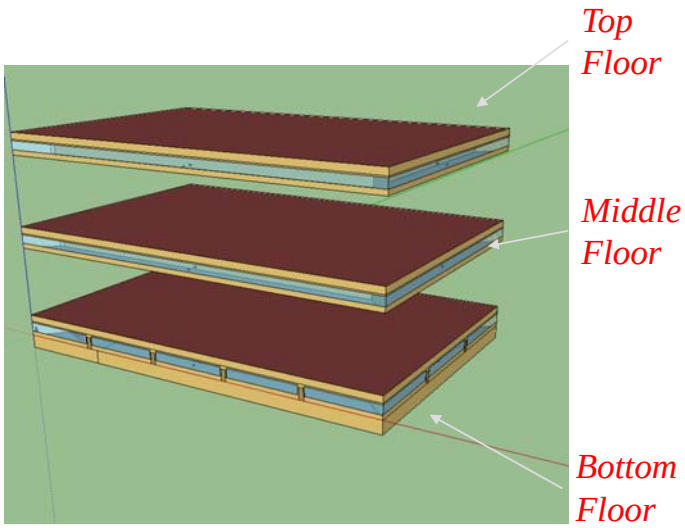
Building

Middle Floor represents the 2nd to 11th floor in the system modeling since they share the same load profiles.



Large Office Building:
12 Floors (excluded basement)

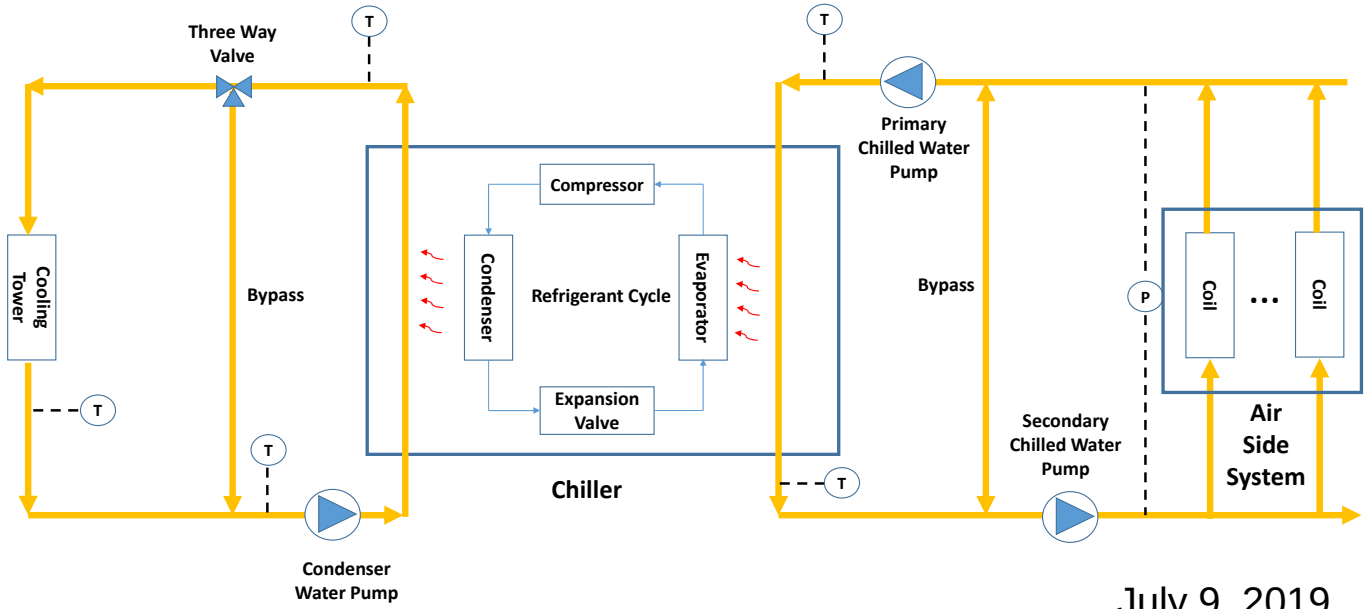


Simplified Building

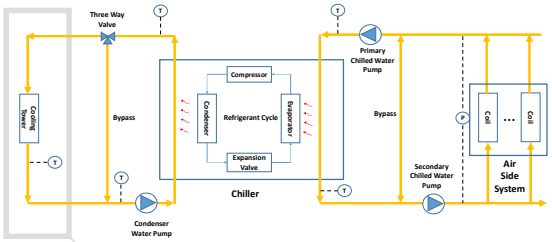
Water Side System

A typical chiller water system with a primary-secondary chilled water loop

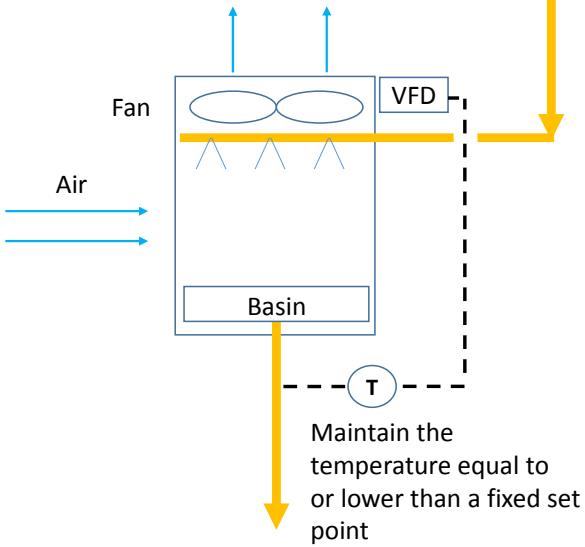
- One Chiller
- One Cooling Tower
- One Condenser Water Pump, One Primary Chilled Water Pump, One Secondary Chilled Water Pump



Water Side System – Cooling Tower



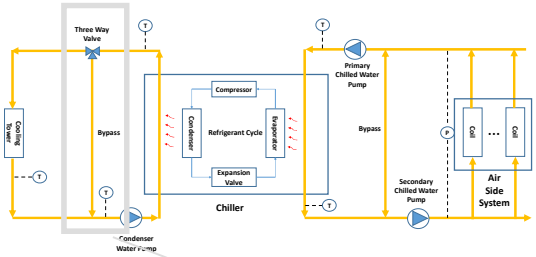
From Chiller

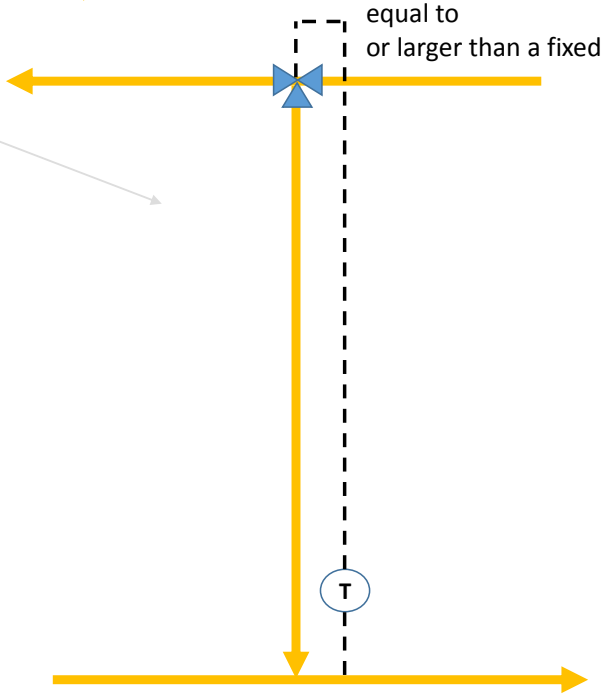


Maintain the temperature equal to or lower than a fixed set point

To Chiller

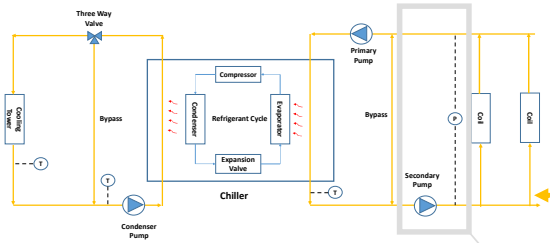
Water Side System – Bypass Valve



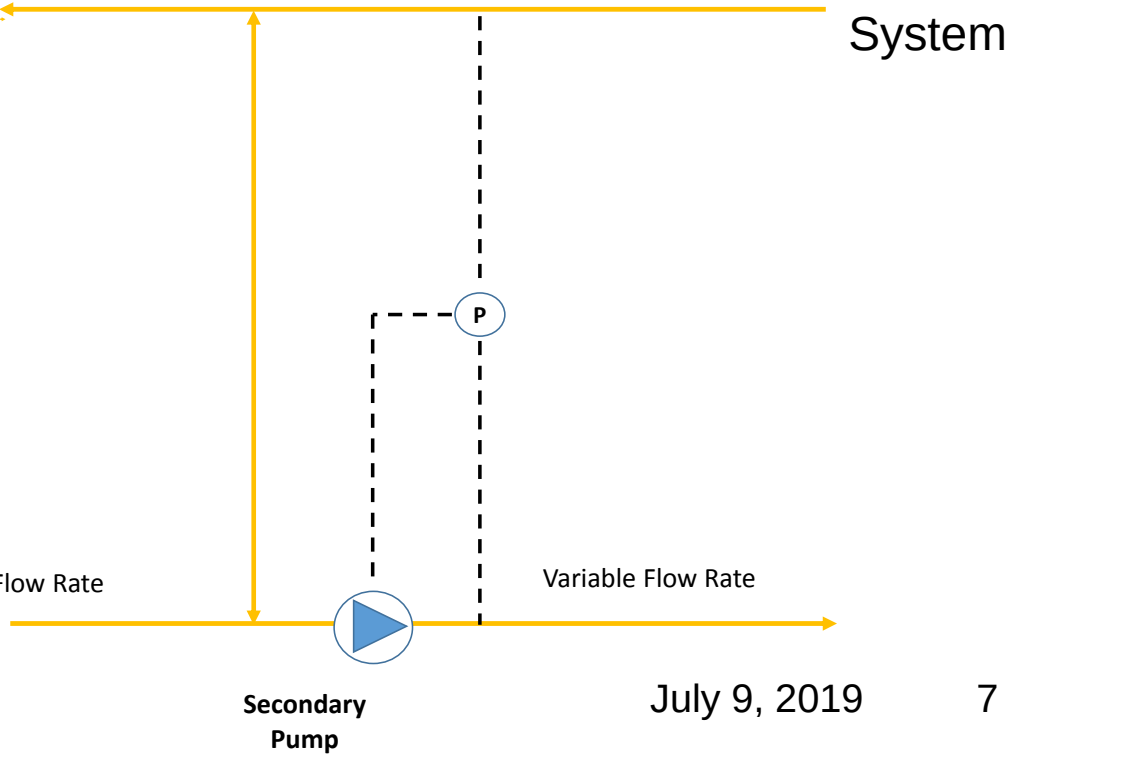


There is a physical bound for the temperature of the condenser water entering the chiller

Water Side System – Secondary Pump



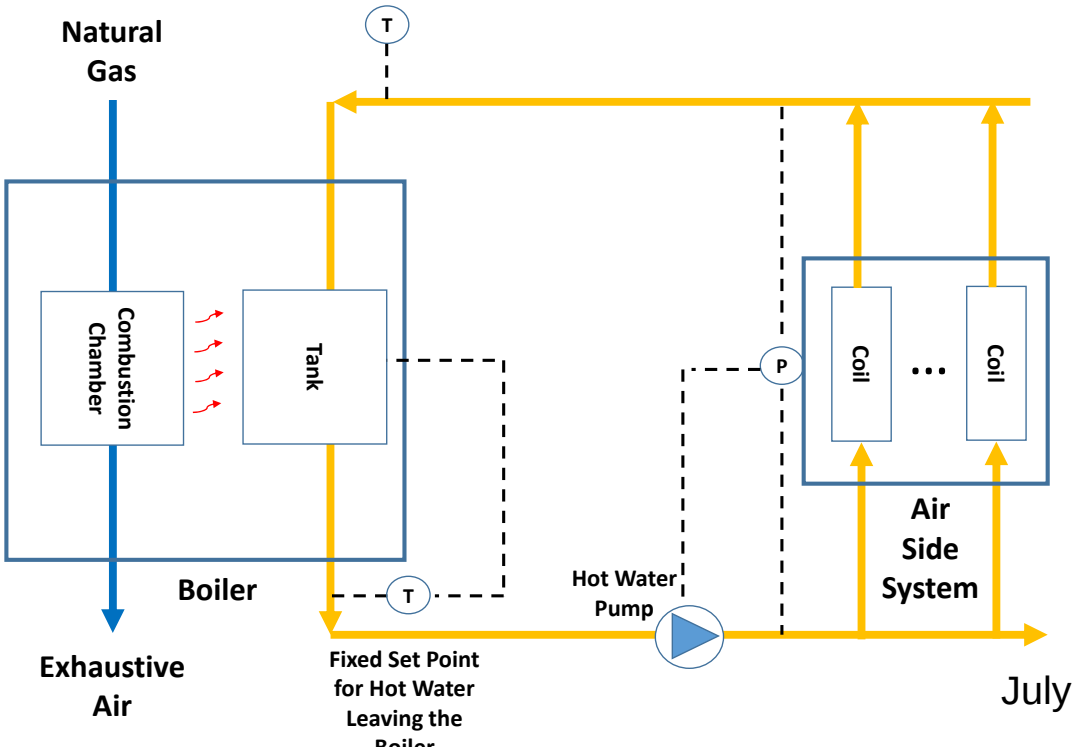
The power of the secondary pump is affected by the change of the pressure difference of the secondary loop due to the change of the coil valve position.



Water Side System – Hot Water Loop

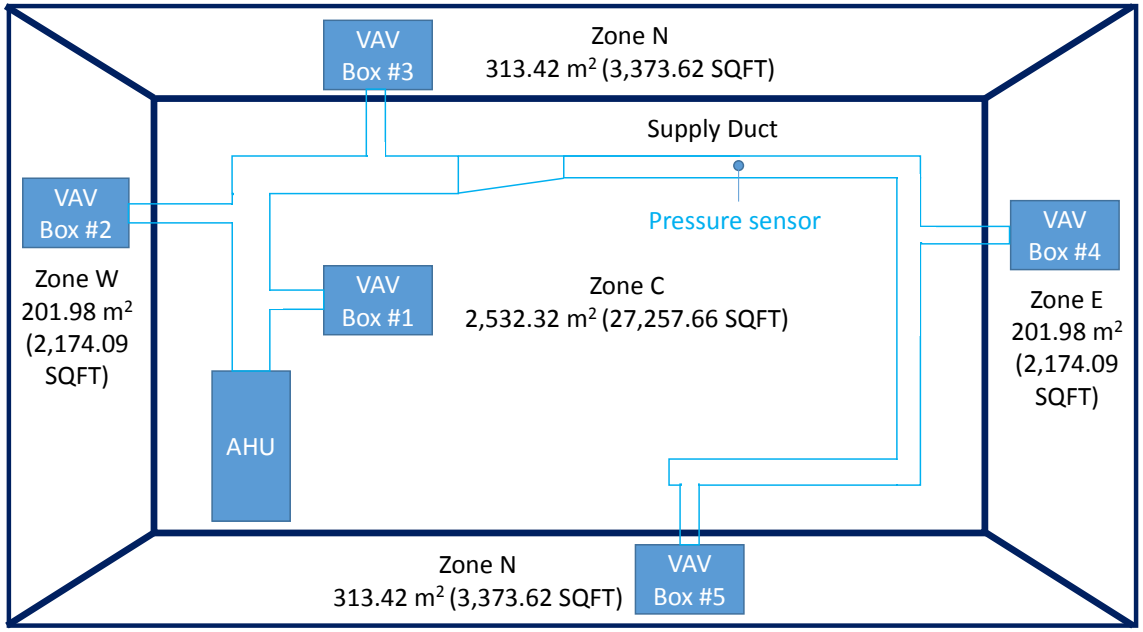
A typical hot water system with primary-only hot water loop

- One Boiler
- One Hot Water Pump



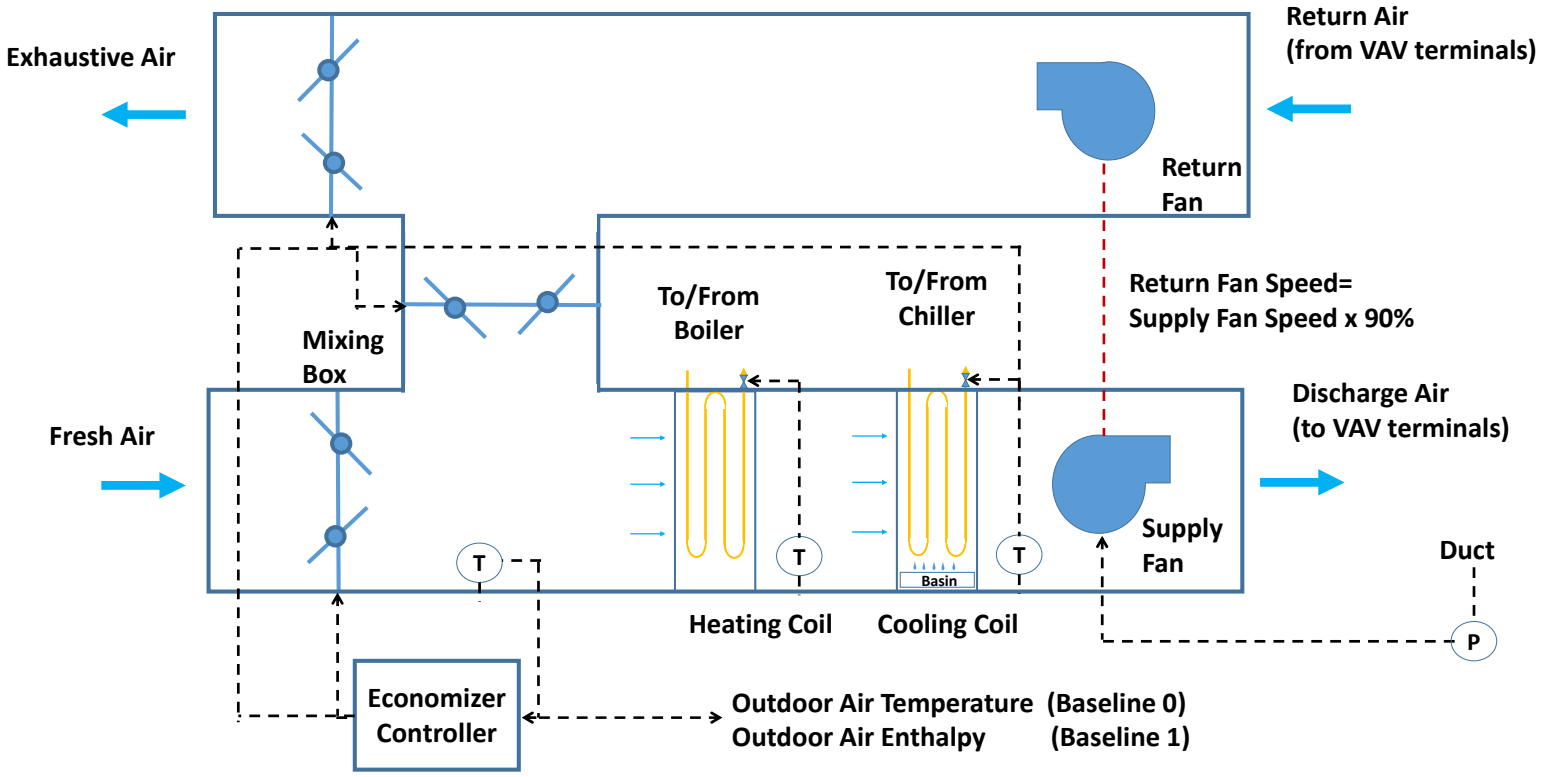
Air Side System

- One Air Handling Unit serves one floor
- For each floor, there are five VAV terminals and the layout is shown as follows

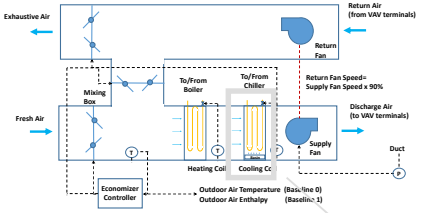


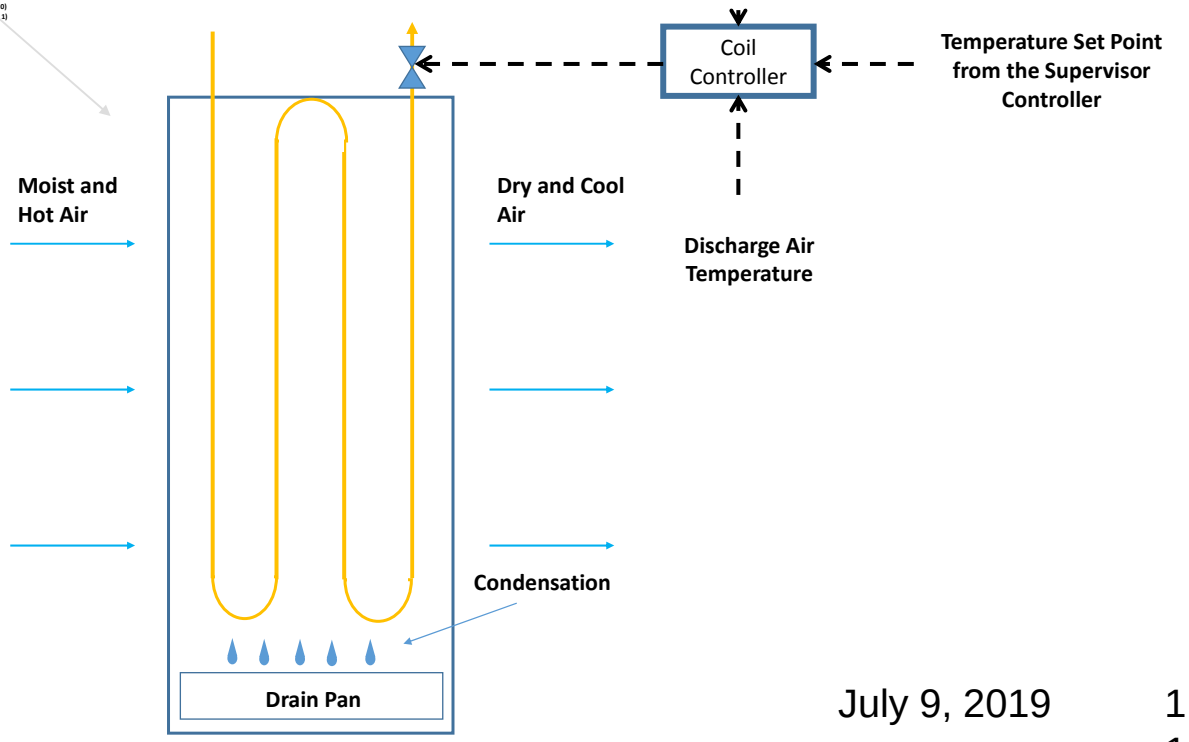
Total 3563.12 m² (38353.10 SQFT)

Air Side System – Air Handling Unit



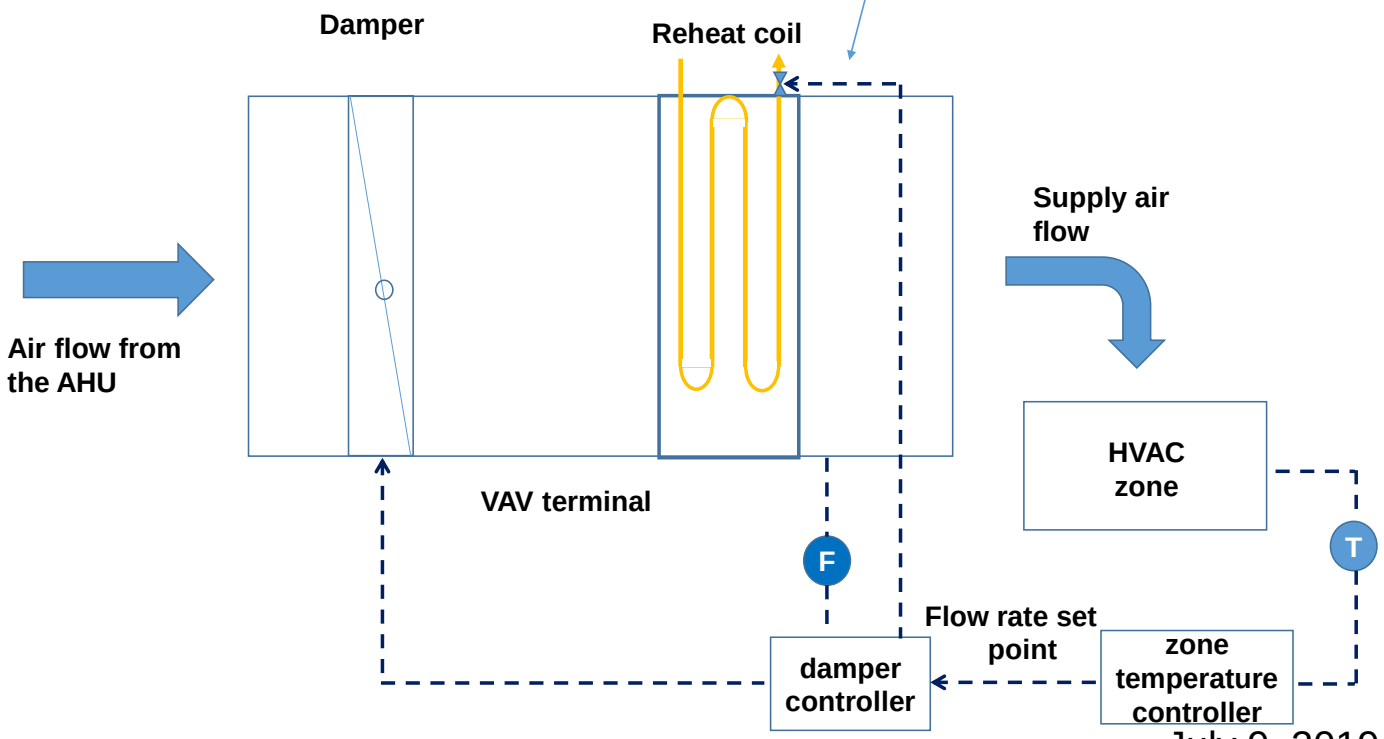
Air Side System – Air Handling Unit/Cooling Coil



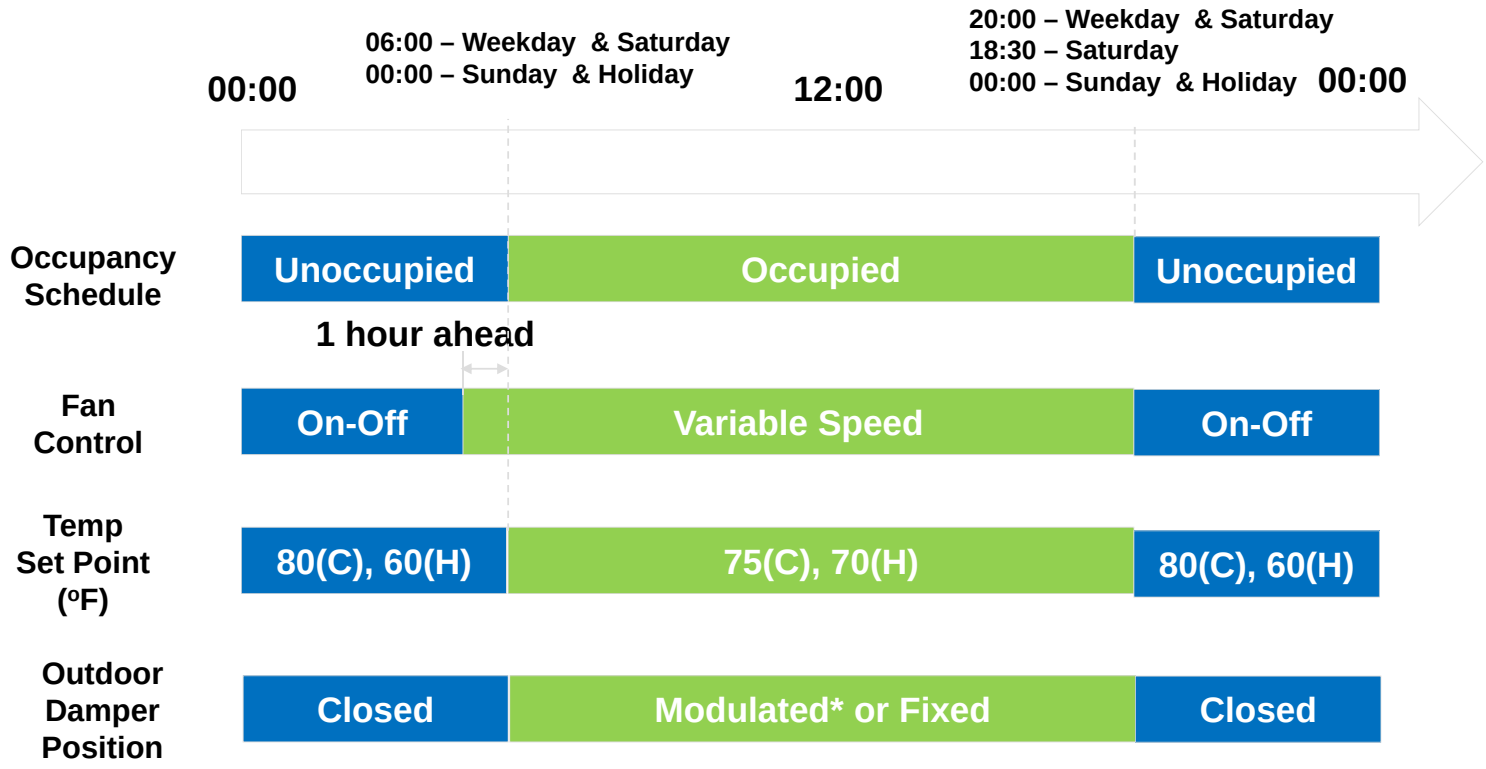


Air Side System – VAV Terminal

- Valve position signal (baseline 0)
- Leaving air temperature set point signal (baseline 1)



Supervisor Control - Mode Switch



* Economizer mode

Supervisor Control - Set Point Reset

Set Point	Baseline 0	Baseline 1
Discharge Air Temperature for Cooling Coil	Fixed (55^{o}F)	Modulate between 55^{o}F and 65^{o}F*
Static Pressure for the Supply Air Duct	Fixed (1 W.G.)	Modulate between 0.1 W.G. and 1 W.G.*
Minimum Flow Ratio for VAV terminal	Fixed (0.3)	Modulate between 0.1 and 0.3 **

* Based on the deviation of the zone temperature from the set points;
** Based on the co2 concentration