
Bringing it All Together

Purpose: This exercise is designed to practice creating a simple building employing the concepts learned during the course.

Note: Use the default values for any information not given. Begin with a new TRACE file.

For this exercise, you will be modeling a building that has been converted to an office/data center facility. Using what you have learned, model the building per the following information.

Methodology: CLTD (cooling), UATD (heating)

Location: Memphis, Tennessee

Use the following information to create templates for the building.

A building layout can be found at the end of this exercise prior to the review questions.

Note: Read through the template information prior to entering the data.
All information is per room unless noted otherwise.

Office Information:

Cooling Design Set Point:	75°F
Heating Design Set Point:	70°F
Relative Humidity:	50%
People Type:	General Office Space
People Quantity	2
People Schedule:	Cooling Only (Design)
Lighting Type:	Recessed florescent, not vented, 80% load to space
Lighting Power Density:	1.1 W/ft ²
Lighting Schedule:	Cooling Only (Design)
Miscellaneous Load Type:	Std Office Equipment
Miscellaneous Load Energy:	1.5 W/ft ²
Miscellaneous Schedule:	Cooling Only (Design)
Ventilation Rate:	General Office Space (20 cfm/person)
Infiltration:	None
VAV Minimum:	40% Cooling Airflow

Bringing it All Together (continued)**Break Room Information:**

Cooling Design Set Point:	75°F
Heating Design Set Point:	70°F
Relative Humidity:	50%
People Type:	General Office Space
People Quantity	3
People Schedule:	People- Break Room (created in Exercise 3)
Lighting Type:	Recessed florescent, not vented, 80% load to space
Lighting Power Density:	1.2 W/ft ²
Lighting Schedule:	Cooling Only (Design)
Miscellaneous Load Type:	Vending Machine (created in Exercise 3)
Miscellaneous Load Energy:	250 W
Miscellaneous Schedule:	Cooling Only (Design)
Ventilation Rate:	General Office Space (20 cfm/person)
Infiltration:	None
VAV Minimum:	40% Cooling Airflow

Restroom Information:

Cooling Design Set Point:	75°F
Heating Design Set Point:	70°F
Relative Humidity:	50%
People Type:	General Office Space
People Quantity	2
People Schedule:	Cooling Only (Design)
Lighting Type:	Recessed florescent, not vented, 80% load to space
Lighting Power Density:	0.9 W/ft ²
Lighting Schedule:	Cooling Only (Design)
Miscellaneous Load Type:	Std Office Equipment
Miscellaneous Load Energy:	0.5 W/ft ²
Miscellaneous Schedule:	Cooling Only (Design)
Main Supply:	0 cfm (for both Cooling and Heating)
Ventilation Rate:	0 cfm (for both Cooling and Heating)
Infiltration:	None
Room Exhaust:	50 cfm

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Adjacent air transfer from room: North Corridor (for Restroom 1)
South Corridor (for Restroom 2)
VAV Minimum: 40% Cooling Airflow

Corridor Information:

Cooling Design Set Point: 75°F
Heating Design Set Point: 70°F
Relative Humidity: 50%
People Type: General Office Space
People Quantity: 1
People Schedule: Cooling Only (Design)
Lighting Type: Recessed florescent, not vented,
80% load to space
Lighting Power Density: 0.5 W/ft²
Lighting Schedule: Cooling Only (Design)
Miscellaneous Load Type: None
Miscellaneous Load Energy: 0 W/ft²
Miscellaneous Schedule: Cooling Only (Design)
Ventilation Rate: Corridor (0.05 cfm/ft²)
Infiltration: None
VAV Minimum: 40% Cooling Airflow

Lobby Information:

Cooling Design Set Point: 75°F
Heating Design Set Point: 70°F
Relative Humidity: 50%
People Type: Reception Area
People Quantity: 4
People Schedule: Cooling Only (Design)
Lighting Type: Recessed florescent, not vented,
80% load to space
Lighting Power Density: 1.3 W/ft²
Lighting Schedule: Cooling Only (Design)
Miscellaneous Load Type: Std Office Equipment
Miscellaneous Load Energy: 0.5 W/ft²
Miscellaneous Schedule: Cooling Only (Design)
Ventilation Rate: Reception Area (15 cfm/person)
Infiltration: Neutral, Tight Construction (0.3 air changes/hour)

Bringing it All Together (continued)**Data Center Information:**

Cooling Design Set Point:	70°F
Heating Design Set Point:	65°F
Relative Humidity:	40%
People Type:	General Office Space
People Quantity	2
People Schedule:	Cooling Only (Design)
Lighting Type:	Recessed florescent, not vented, 80% load to space
Lighting Power Density:	5 W/ft ²
Lighting Schedule:	Cooling Only (Design)
Miscellaneous Load Type:	Std Office Equipment
Miscellaneous Load Energy:	25 W/ft ²
Miscellaneous Schedule:	Cooling Only (Design)
Data Center Equipment:	Yes
Ventilation Rate:	0.15 cfm/ft ²
Infiltration:	None

General Building Information:

Slab Construction:	6" HW Concrete
Roof Construction:	3" LW Block, 3" Ins (created in Exercise 3)
Wall Construction:	4" HW Block, 2" Ins
Partition Construction:	1" Wood Frame
Glass Type (Window):	Double Coated ¼"
Glass Type (Door):	Standard Door
Floor-to-Floor Height:	12 feet (Data Center 15 feet)
Wall Height:	12 feet (Data Center 15 feet)
Plenum:	3 feet (Data Center 6 feet)

Once complete with the templates, create the rooms per the building layout found on the last page of the exercise information.

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Remember: Apply templates.
Assume a flat roof for all rooms.
Add exterior walls to applicable spaces.
Apply any partitions necessary.
Add glass to all exterior walls except for the Data Center and Restrooms.
Do not model floors (Assume losses are negligible).
Break the Corridor into two equal spaces: North Corridor and South Corridor.
Once you have input all the rooms, create airside systems based on the following information:

Office System:

System Type:	VAV with Reheat (30% minimum default)
Primary Fan Static Pressure:	3"

Lobby System:

System Type:	Constant Volume – Single Zone
Primary Fan Static Pressure:	2"

Data Center System:

System Type:	Underfloor Air Distribution CV
Underfloor Plenum Height:	3 feet (Hint: Options > Advanced Options)
Primary Fan Static Pressure:	2"
Evaporative Cooling type:	Indirect
Heat Exchanger type:	Water-to-air HX w/Evap
Evaporative Cooling indirect efficiency:	70%

Through the Actions menu, select Change Load Parameters. Select "Force VAV minimum always >= nominal ventilation during design?"

Finally, assign each room to their appropriate system.

The Offices, Break Room, Corridors and Restrooms are part of the Office System.

- Assign the Office spaces and Break Room directly to the Office System.
- Create two zones on the Office System and assign the North Corridor and Restroom 1 to one of the zones and the South Corridor and Restroom 2 to the other.

Calculate the file when complete.

Bringing it All Together (continued)

