Technical Report 2 Mechanical

# **Building Load and Energy Analysis**

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## **Mechanical System Summary**

The Medical Office Building is located in North-East United States and is to house many medical offices as well as some examination rooms and a physical therapy area. The building is two stories with a total square footage of 72,706.

The main heating and cooling for the Medical Office Building will be provided by two roof top units supplying VAV boxes with reheat coils. The roof top units are self-contained, meaning that there are no hot or cold water lines running to the units. The units utilize a closed loop refrigerant system for cooling and a gas furnace system fueled by propane for heating. The VAV system utilizes electric resistance for the reheat system.

A few additional electric baseboard heating systems are utilized at the entrances to the building. There are also five ductless split system units that supply control rooms for important medical equipment.

## **Executive Summary**

The purpose of this technical report is to analyze the building loads and energy consumption of the Medical Office Building. The analysis was performed with the computer program Trane TRACE 700. This program is designed to provide an easy and detailed model for a building's loads and how much energy the building will consume. The program has many variables that can be modified to provide a very accurate model of a particular buildings systems.

The Medical Office Building has a very typical heating and cooling profile. There is a large heating period in the winter with almost no cooling necessary. In the summer there is a large amount of cooling needed as well as a small amount of heating due to the fact that the building has VAV boxes with reheat. The overall cooling and heating values are very reasonable for a building of this size.

Using the TRACE program, utility costs were also established. The overall cost for electricity for the building during a one year period is \$42,514 and the overall cost for gas is \$3,546. The gas value is most likely low due to the fact that TRACE did not have the exact type of fuel that will be used for heating as well as an accurate location of a fuel supplier. These values come to an overall cost of \$1.02 per square foot.

The Medical Office Building also has five ductless split system units that provide extra cooling to the rooms that house important medical equipment and the control rooms that accompany them. These systems were not considered in this analysis due to their small size and the low impact on the overall performance of the building.

## **Building Load Calculations**

The building analysis for technical report two was performed by the computer program Trane TRACE 700. This program is used to calculate load design as well as energy analysis. Pertinent building information was obtained from the construction documents and assumptions that were made came from the ASHRAE standards.

#### **Design Conditions**

The Medical Office Building is located in the North-East United States. This area is in zone 5A according to ASHREA 90.1 table B-1. This area is very humid in the summers and can be quite cold in the winters. Indoor and outdoor air conditions for the building were obtained from the ASHRAE Handbook of Fundamentals 2009.

The indoor design temperatures were designed to be  $72^{\circ}$ F for the winter and  $75^{\circ}$ F for the summer with a maintained relative humidity of 50%.

	Summer Design Cooling (0.4%)	Winter Design Heating (99.6%)
Outdoor Air Dry Bulb (°F)	92.4	9.4
Outdoor Air Wet Bulb (°F)	74.1	-
Indoor Air Design Temp (°F)	75	72

Table 1: Design temperatures

#### **Model Development**

The calculations in this report were done under the assumption of a block load procedure. Similar areas were designed and considered to be one block. For example, the offices in the building are all similar so they were considered to be one block. In TRACE a template was created for each block and then the template was modified for each individual room. In the Medical Office Building there were eight different blocks considered. These blocks were:

- Conference
- Corridor
- Lobby
- Office

- Physical Therapy
- Procedure
- Reception
- Storage

The Medical Office Building has 131 different rooms that need to be considered in the analysis of the loads. Each room was categorized into a different block. The breakdown of the building into the different blocks can be seen below.



Figure 1: Building breakdown into different blocks

TRACE uses the nomenclature of 0°, 90°, 180°, and 270° to represent North, East, South, and West respectively. The main entrance of the Medical Office Building is located on the North side.

#### Load Assumptions

Load information was taken from the mechanical drawings and schedules. Information that could not be found in the drawings or schedules was taken from ASHRAE standards.

#### **Occupancy Loads**

For the Medical Office Building, occupancy densities were given in the design documents so no assumptions needed to be made. These values also conveniently were the same as the values in the TRACE library since the Medical Office Building is compliant with ASHRAE standards.

Room Type	Occupancy Density (S.F. / person)
Conference	20
Corridor	0
Lobby	33.3
Office	143
Physical Therapy	0
Procedure Room	100
Reception	16.7
Storage	0

Table 2: Room occupancy density

#### **Ventilation Rates**

The Medical Office Building was designed to be compliant with AHSRAE standard 62.1. TRACE has a convenient feature where compliance to ASHRAE 62.1 can be selected and the type of room can also be selected, automatically filling in the correct outdoor air ventilation rates for people based and area based calculations.

Room Type	People-Based (CFM/Person)	Area-Based (CFM/S.F)			
Conference	5	0.06			
Corridor	0	0.06			
Lobby	5	0.06			
Office	5	0.06			
Physical Therapy	20	0.06			
Procedure Room	15	0.06			
Reception	5	0.06			
Storage	0	0.12			

Table 3: Room ventilation requirements

#### **Lighting and Electric Loads**

Lighting and electric loads were not given in the design documents so assumptions had to be made. The assumptions were based off of the ASHRAE standard 90.1 table 9-5. TRACE has the option to add extra load where it may be needed. This was done in the offices and reception areas where there will be extra load associated with printers and computers.

Room Type	Heat Gain (W/S.F.)
Conference	1.23
Corridor	0.99
Lobby	0.9
Office	1.66
Physical Therapy	0.91
Procedure Room	2.48
Reception	0.71
Storage	0.74
TT 1 1 4 D 1' 1 4' 1	

Table 4: Room lighting heat gain

#### Calculated Load vs. Designed Load

No load calculation data was provided with the mechanical drawings or the mechanical specifications to compare the TRACE data to. TRACE data will therefore be checked for logicality.

The total cooling load for the building was 115.1 tons and the heating load was 1380 MBh. These numbers are very logical due to the building size. It was expected that the cooling load for the building was going to be around 100 tons. The individual split for the cooling loads between the two roof top units

also corresponds well with the capacity of the roof top units that were selected to be installed in the building.

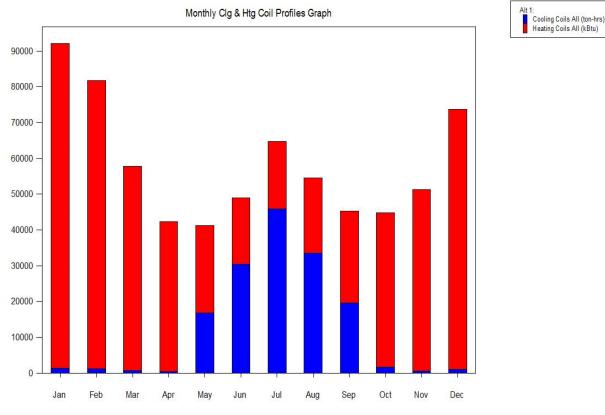


Figure 2: Monthly heating and cooling profiles

The figure above is exactly the shape of graph that was expected. There will naturally be a little cooling load in the winter to deal with some days that have a higher humidity. The VAV boxes in the building are equipped with electric heat so there will also be some heating load in the summer to bring the supply air up to the desired temperature.

It can be assumed that the mechanical designers for the Medical Office Building developed a much more detailed model for analysis of the building. A more detailed model would be necessary to show the owner and for bid documents. Other TRACE calculation outputs can be seen in Appendix A.

## **Building Energy and Cost Analysis**

#### **Energy Consumption**

The Trane TRACE program was used to do an energy analysis on the Medical Office Building. From this analysis, it was determined that the Medical Office Building would use an estimated 3.6 million kBtu per year.

Detailed information was not able to be obtained from the design documents regarding fuel costs, water and air flow rates and equipment performance characteristics so the default information provided by TRACE was utilized and gave a quite reasonable estimation for energy and cost analysis.

It is unknown if an energy analysis was performed by the designing engineers. If one was not performed, it would be most likely because this building was designed to be compliant with ASHRAE. ASHRAE standards are already designed to be energy efficient, therefore performing another analysis could be a waste of time and money. If one was performed, it can be speculated that the design engineer used a software that is very similar to Trane TRACE.

#### **Annual Cost Summary**

The following table provides an annual cost summary provided by TRACE. The actual summary sheet output from TRACE can be seen in Appendix A.

	Electric (kWh)	Gas (kBtu)	Total Building Energy
Heating	-	709,240	709,240
Cooling	204,744	-	698,791
Lighting	529,746	-	1,808,024
Receptacles	115,781	_	395,161

Table 5: Annual cost summary

The total cost per year for electricity is \$42,514 and the total cost per year for gas is \$3,546. The average cost per square foot is \$1.02.

#### **Environmental Impact**

Contributor	Amount
CO2	1,027,144 lbm/year
SO2	7,991 gm/year
NOX	1,536 gm/year

Table 6: Environmental impact summary

## **Appendix A: TRACE Calculation Outputs**

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RTU-1

## System/Checksums By ACADEMIC

System 5 - Packaged RTU VAV Reheat, DX & Hot Water

COOLING		CLG SPACE	E PEAK		HEATING CO	IL PEAK		TEMP	ERATURE	S		
Peaked at Time: Outside Air:		o/Hr:7/16 /HR:90/73/9	99	Mo/Hr: OADB:			Mo/Hr: Hea OADB: 14	ating Design		SADB	57.9	Heating 90.2
Spac			Percent		Percent		Space Peak	Coil Peak		Ra Plenum Return	78.4 78.4	65.5 65.5
Sens. + La			Of Total		Of Total		Space Sens	Tot Sens		Ret/OA Fn MtrTD	79.2 0.1	54.0 0.0
Btu/ Envelope Loads	n Btu/h	Btu/h	(%)	Btu/h	(%)	Envelope Loads	Btu/h	Btu/h	(%)	Fn BidTD	0.1	0.0
Skylite Solar 11,42	4 0	11,424	2	10,635	2	Skylite Solar	0	0	0.00	Fn Frict	0.4	0.0
	3,043	3,043	0	0	0	Skylite Cond	0	-15,035	3.76			0.0
	80,883	80,883	13	0	0	Roof Cond	0	-81,694	20.44			
Glass Solar 152,71		152,710	24	160,533	37	Glass Solar	0	0	0.00	All	RFLOWS	
Glass/Door Cond 28,82		28,820	4	27,529	6	Glass/Door Cond	-119,843	-119,843	29.99		Cooling	Heating
Wall Cond 6,69	- ,	13,265	2	6,531	2	Wall Cond	-11,365	-22,384	5.60	Diffuser	22,542	8,668
r artition/ Door	)	0	0	0	0	Partition/Door	0	0	0.00	Terminal	22,542	8.668
Floor Adjacent Floor	) 0	0	0	0	0	Floor Adjacent Floor	0	0	0.00	Main Fan	22,542	8,668
,	ט כ ר	0	0	0	0	Infiltration	0	0	0.00	Sec Fan	0	0
Sub Total ==> 199.65	5	290,145	45	205,228	48	Sub Total ==>	-131,207	-238,955	59.80	Nom Vent	3.199	3,199
	2 30,433	230,143		200,220	-0			200,000	00.00	AHU Vent	3,199	3,199
Internal Loads						Internal Loads				Infil	0,100	0
Lights 73,70	18,426	92,128	14	73.702	17	Lights	0	0	0.00	MinStop/Rh	8,668	8,668
People 151,60		151,602	24	91.033	21	People	ů ů	ŏ	0.00	Return	22,542	8,668
Misc 25,01		25,014	4	25,014	6	Misc	0	0	0.00	Exhaust	3,199	3,199
Sub Total ==> 250,31	18,426	268,744	42	189,749	44	Sub Total ==>	0	0	0.00	Rm Exh	0	0
			_							Auxiliary	0	0
Ceiling Load 23,55	-23,559	0	0	22,439	5	Ceiling Load	-44,751	0	0.00	Leakage Dwn	0	0
	0 0	70,608	11	0	0	Ventilation Load	0	-134,478	33.65	Leakage Ups	0	0
	0	0	0	0	0	Adj Air Trans Heat	0	0	0			
Dehumid. Ov Sizing		0	0			Ov/Undr Sizing	0	0	0.00			
Ov/Undr Sizing 11,92		11,924	2		3	Exhaust Heat		23,248	-5.82	ENGIN	EERING C	KS
Exhaust Heat Sup. Fan Heat	-12,238	-12,238 13.215	-2 2			OA Preheat Diff. RA Preheat Diff.		0 -49.400	0.00 12.36		Cooling	Heating
Ret. Fan Heat	0	13,215	2			Additional Reheat		-49,400 0	0.00	% OA	14.2	36.9
Duct Heat Pkup	0	0	0			Additional Neneal		0	0.00	cfm/ft <sup>2</sup>	1.04	0.40
Underfir Sup Ht Pkup	Ũ	Ő	õ			Underfir Sup Ht Pkup		0	0.00	cfm/ton	367.04	
Supply Air Leakage	0	0	0			Supply Air Leakage		0	0.00	ft²/ton	352.83	
										Btu/hr-ft <sup>2</sup>	34.01	-21.93
Grand Total ==> 485,45	3 73,122	642,397	100.00	429,497	100.00	Grand Total ==>	-175,959	-399,585	100.00	No. People	370	

COOLING COIL SELECTION Total Capacity Sens Cap. Coil Airflow Enter DB/WB/HR Leave DB/WB/HR								AREAS Gross Total Glass			HEATING COIL SELECTION Capacity Coil Airflow Ent Lyce				Lvg				
	ton	MBh	MBh	cfm	°F	°F	gr/lb	°F		gr/lb			ft²	(%)		MBh	cfm	°F	
Main Clg Aux Clg	61.4 0.0	737.0 0.0	543.2 0.0	22,300 0	79.2 0.0	64.5 0.0	67.4 0.0	57.4 0.0	53.5 0.0	55.1 0.0	Floor Part	21,669 0			Main Htg Aux Htg	-396.6 0.0	8,668 0	57.4 0.0	90.2 0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door ExFlr	0 0			Preheat Reheat	-78.7 -176.6	3,199 8,668		57.4 72.0
Total	61.4	737.0									Roof Wall	34,451 12,810	572 4,047	2 32	Humidif Opt Vent	0.0 0.0	0 0	0.0 0.0	0.0 0.0
											Ext Door	0	0	0	Total	-475.2			

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RTU-2

## System/Checksums By ACADEMIC

System 5 - Packaged RTU VAV Reheat, DX & Hot Water

COOLING COIL PEAK					CLG SPACE	PEAK		HEATING CO	IL PEAK		TEMPERATURES				
Peaked at Time			Hr: 7 / 17	24	Mo/Hr:				ating Design		0400		Heating		
Outside Air	r:	OADB/WB/F	IR: 88/72/9	94	OADB:	88		OADB: 14	ł		SADB Ra Plenum	58.8 78.2	82.2 68.1		
Sr	pace	Plenum	Net	Percent	Space	Percent		Space Peak	Coil Peak	Percent	Return	78.2	68.1		
Sens. +		Sens. + Lat		Of Total	Sensible			Space Sens	Tot Sens		Ret/OA	78.9	57.1		
E	Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)		Btu/h	Btu/h	(%)	Fn MtrTD	0.1	0.0		
Envelope Loads							Envelope Loads				Fn BldTD	0.1	0.0		
Skylite Solar	0	0	0	0	0	0	Skylite Solar	0	0	0.00	Fn Frict	0.4	0.0		
Skylite Cond	0	0	0	0	0	0	Skylite Cond	0	0	0.00					
Roof Cond	0	73,545	73,545	13	0	0	Roof Cond	0	-62,249	18.74	A 17				
	),821	0	150,821	27	150,821	39	Glass Solar	0	0	0.00	Alf	RFLOWS			
	5,024	0 5,283	16,024 10.601	3 2	16,024	4	Glass/Door Cond Wall Cond	-69,803 -6,987	-69,803	21.01		Cooling	Heating		
Partition/Door	5,318 0	5,283	10,601	2	5,318 0	0	Partition/Door	-6,987	-13,923 0	4.19 0.00	Diffuser	21,592	9,316		
Floor	0		0	0	0	0	Floor	0	0	0.00	Terminal	21,592	9.316		
Adjacent Floor	Ő	0	ů 0	Ő	ů 0	Ő	Adjacent Floor	0	0	0.00	Main Fan	21,592	9,316		
Infiltration	0	Ũ	0	0	0	Ő	Infiltration	0	0	0.00	Sec Fan	0	0		
Sub Total ==> 172	2,163	78,828	250,991	44	172.163	44	Sub Total ==>	-76,790	-145,974	43.94	Nom Vent	2,835	2,835		
	_,				,						AHU Vent	2,835	2,835		
Internal Loads							Internal Loads				Infil	0	0		
Lights 91	1,414	22.853	114.267	20	91,414	23	Lights	0	0	0.00	MinStop/Rh	9,316	9,316		
	7,085	0	97,085	17	56,645	14	People	0	0	0.00	Return	21,592	9,316		
	9,637	0	19,637	3	19,637	5	Misc	0	0	0.00	Exhaust	2,835	2,835		
Sub Total ==> 208	3,136	22,853	230,989	41	167,695	43	Sub Total ==>	0	0	0.00	Rm Exh	0	0		
	· /										Auxiliary	0	0		
	3,862	-23,862	0	0	23,862	6	Ceiling Load	-28,734	0	0.00	Leakage Dwn	0	0		
Ventilation Load	0	0	55,901	10	0	0	Ventilation Load	0	-127,147	38.27	Leakage Ups	0	0		
Adj Air Trans Heat	0		0	0	0	0	Adj Air Trans Heat	0	0	0					
Dehumid. Ov Sizing			0	0			Ov/Undr Sizing	0	0	0.00					
	7,425	10.000	27,425	5	27,425	7	Exhaust Heat		12,309	-3.70	ENGIN	EERING C	KS		
Exhaust Heat		-10,222	-10,222 12.795	-2 2			OA Preheat Diff.		0	0.00 21.50		Cooling	Heating		
Sup. Fan Heat Ret. Fan Heat		0	12,795	2			RA Preheat Diff. Additional Reheat		-71,427 0	0.00	% OA	13.1	30.4		
Duct Heat Pkup		0	0	0			Auditional Refleat		0	0.00	cfm/ft <sup>2</sup>	0.93	0.40		
Underfir Sup Ht Pkup		0	0	0			Underflr Sup Ht Pkup		0	0.00	cfm/ton	399.27			
Supply Air Leakage		0	0	0			Supply Air Leakage		0	0.00	ft²/ton	430.67			
		Ū	0	Ŭ					Ũ		Btu/hr-ft <sup>2</sup>	27.86	-16.26		
Grand Total ==> 431	1,585	67,599	567,880	100.00	391,145	100.00	Grand Total ==>	-105,524	-332,239	100.00	No. People	229			
									· · ·		· ·				

	COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION					
	Total (	Capacity	Sens Cap.	Coil Airflow	Ente	er DB/W	B/HR	Leav	e DB/	WB/HR	Gro	oss Total	Glas	S		Capacity C	oil Airflow	Ent	Lvg
	ton	MBh	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb			ft²	(%)		MBh	cfm	°F	°Ē
Main Clg	54.1	649.0	497.7	21,592	78.9	64.3	66.8	58.2	54.4	56.9	Floor	23,290			Main Htg	-310.8	9,316	58.2	82.2
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0			Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0			Preheat	-67.9	2,835	41.1	58.2
_											ExFlr	0			Reheat	-178.9	9,316	58.2	72.0
Total	54.1	649.0									Roof	24,563	0	0	Humidif	0.0	0	0.0	0.0
											Wall	7,672	2,357	31	Opt Vent	0.0	0	0.0	0.0
											Ext Door	0	0	0	Total	-378.7			

## Design Cooling Load Summary Medical Office Building

By ACADEMIC

#### System - RTU-1 Type - System 5 - Packaged RTU VAV Reheat, DX & Hot Water

#### **Coil Location - System**

Coil Peak Calculation Time: July, hour 16 Ambient DB/WB/HR: 90 / 73 / 99

#### COOLING COIL LOAD INFORMATION

Load Component	<b>Sensible</b> Btu/h	Latent Btu/h	<b>Total</b> Btu/h	Percent of Total
Solar Gain	164,134		164,134	25.6%
Glass Transmission	28,820		28,820	4.5%
Wall Transmission	6,698		6,698	1.0%
Roof Transmission	0		0	0.0%
Floor Transmission	0		0	0.0%
Adj Floor Transmission	0		0.00	0.0%
Partition Transmission	0		0	0.0%
Net Ceiling Load	0		0	0.0%
Lighting	73,702		73,702	11.5%
People	91,033	60,569	151,602	23.6%
Misc. Equipment Loads	25,014	0	25,014	3.9%
Cooling Infiltration	0	0	0	0.0%
Sub-Total ==>	389,401	60,569	449,970	70.0%
Ventilation Load	31,978	38,630	70,608	11.0%
Exhaust Heat	-12,238	0	-12,238	-1.9%
Supply Fan Load	13,215		13,215	2.1%
Return Fan Load	0		0	0.0%
Net Duct Heat Pickup	0		0	0.0%
Wall Load to Plenum	6,567		6,567	1.0%
Roof Load to Plenum	80,883		80,883	12.6%
Adj Floor to Plenum	0		0	0.0%
Lighting Load to Plenum	18,426		18,426	2.9%
Misc. Equip. Load to Plenum	0	0	0	0.0%
Glass Transmission to Plenum	3,043		3,043	0.5%
Glass Solar to Plenum	0		0	0.0%
Over/Under Sizing	11,924		11,924	1.9%
Reheat at Design	0	0	0	0.0%
Underfloor Sup Heat Pickup	0		0	0.0%
Supply Air Leakage	0	0	0	0.0%
Total Cooling Loads	543,198	99,199	642,397	100.0 %

#### COOLING COIL SELECTION

#### **Coil Selection Parameters**

Coil Entering Air (DB / WB)	79.2 / 64.5	°F
Coil Entering Humidity Ratio	67.35	gr/lb
Coil Leaving Air (DB / WB)	57.4 / 53.5	°F
Coil Leaving Humidity Ratio	55.05	gr/lb
Coil Sensible Load	543.20	MBh
Coil Total Load	736.97	MBh
Cooling Supply Air Temperature	57.91	°F
Total Cooling Airflow	22,299.57	cfm
Resulting Room Relative Humidity	49.74	%

#### **General Engineering Checks**

Total Cooling Load Area / Load	61.4 352.83	
Total Floor Area Cooling Airflow Airflow / Load Percent Outdoor Air	367.04 14.2	cfm/ft² cfm/ton %
Cooling Load Methodology	TETD	-TA1

#### Design Cooling Load Summary Medical Office Building

By ACADEMIC

#### System - RTU-2 Type - System 5 - Packaged RTU VAV Reheat, DX & Hot Water

#### **Coil Location - System**

Coil Peak Calculation Time: July, hour 17 Ambient DB/WB/HR: 88 / 72 / 94

#### COOLING COIL LOAD INFORMATION

Load Component	<b>Sensible</b> Btu/h	<b>Latent</b> Btu/h	<b>Total</b> Btu/h	Percent of Total
Solar Gain	150,821		150,821	26.6%
Glass Transmission	16,024		16,024	2.8%
Wall Transmission	5,318		5,318	0.9%
Roof Transmission	0		0	0.0%
Floor Transmission	0		0	0.0%
Adj Floor Transmission	0		0.00	0.0%
Partition Transmission	0		0	0.0%
Net Ceiling Load	0		0	0.0%
Lighting	91,414		91,414	16.1%
People	56,645	40,440	97,085	17.1%
Misc. Equipment Loads	19,637	0	19,637	3.5%
Cooling Infiltration	0	0	0	0.0%
Sub-Total ==>	339,858	40,440	380,299	67.0%
Ventilation Load	26,132	29,768	55,901	9.8%
Exhaust Heat	-10,222	0	-10,222	-1.8%
Supply Fan Load	12,795		12,795	2.3%
Return Fan Load	0		0	0.0%
Net Duct Heat Pickup	0		0	0.0%
Wall Load to Plenum	5,283		5,283	0.9%
Roof Load to Plenum	73,545		73,545	13.0%
Adj Floor to Plenum	0		0	0.0%
Lighting Load to Plenum	22,853		22,853	4.0%
Misc. Equip. Load to Plenum	0	0	0	0.0%
Glass Transmission to Plenum	0		0	0.0%
Glass Solar to Plenum	0		0	0.0%
Over/Under Sizing	27,425		27,425	4.8%
Reheat at Design	0	0	0	0.0%
Underfloor Sup Heat Pickup	0		0	0.0%
Supply Air Leakage	0	0	0	0.0%
Total Cooling Loads	497,671	70,209	567,880	100.0 %

#### COOLING COIL SELECTION

#### **Coil Selection Parameters**

Coil Entering Air (DB / WB)	78.9 / 64.3	°F
Coil Entering Humidity Ratio	66.82	gr/lb
Coil Leaving Air (DB / WB)	58.2 / 54.4	°F
Coil Leaving Humidity Ratio	56.91	gr/lb
Coil Sensible Load	497.67	MBh
Coil Total Load	648.95	MBh
Cooling Supply Air Temperature	58.75	°F
Total Cooling Airflow	21,591.90	cfm
Resulting Room Relative Humidity	49.59	%

#### **General Engineering Checks**

Total Cooling Load	54.1	ton
Area / Load	430.67	ft²/ton
Total Floor Area	23,290	ft²
Cooling Airflow	0.93	cfm/ft <sup>2</sup>
Airflow / Load	399.27	cfm/ton
Percent Outdoor Air	13.1	%
Cooling Load Methodology	TETD	-TA1

#### SYSTEM:SUMMARMIding

#### **DESIGN AIRFLOW QUANTITIES**

By ACADEMIC

			M	AIN SYSTEM			Auxiliary System	Room
		Outside	Cooling	Heating	Return	Exhaust	Supply	Exhaust
		Airflow	Airflow	Airflow	Airflow	Airflow	Airflow	Airflow
System Description	System Type	cfm	cfm	cfm	cfm	cfm	cfm	cfm
Alternative 1								
RTU-1	System 5 - Packaged RTU VAV Reheat, DX & Hot	3,199	22,542	8,668	22,542	22,542	0	0
RTU-2	System 5 - Packaged RTU VAV Reheat, DX & Hot	2,835	21,592	9,316	21,592	21,592	0	0
Totals		6,033	44,134	17,984	44,134	44,134	0	0

Note: Airflows on this report are not additive because they are each taken at the time of their respective peaks. To view the balanced system design airflows, see the appropriate Checksums report (Airflows section).



#### SYSTEMaSolMMARMing

#### **DESIGN COOLING CAPACITIES**

By ACADEMIC

#### Alternative 1

#### **Building Airside Systems and Plant Capacities**

				Peak	Plant Loa	ads						B	ock Plai	nt Loads			
	Main Coil	Aux Coil	Opt Vent Coil	Misc Load	Stg 1 Desic Cond	Stg 2 Desic Cond	Base Utility	Peak Total	Time Of Peak	Main Coil	Aux Coil	Opt Vent Coil	Misc Load	Stg 1 Desic Cond	Stg 2 Desic Cond	Base Utility	Block Total
Plant System	ton	ton	ton	ton	ton	ton	ton	ton	mo/hr	ton	ton	ton	ton	ton	ton	ton	ton
Cooling plant - 001	115.5	0.0	0.0	0.0	0.0	0.0	0.0	115.5	7/17	99.8	0.0	0.0	0.0	0.0	0.0	0.0	99.8
RTU-1	61.4	0.0	0.0	0.0	0.0	0.0	0.0	61.4	7/17	53.1	0.0	0.0	0.0	0.0	0.0	0.0	53.1
RTU-2	54.1	0.0	0.0	0.0	0.0	0.0	0.0	54.1	7/17	46.7	0.0	0.0	0.0	0.0	0.0	0.0	46.7
Building totals	115.5	0.0	0.0	0.0	0.0	0.0	0.0	115.5		99.8	0.0	0.0	0.0	0.0	0.0	0.0	99.8

Building peak load is 115.5 tons.

Building maximum block load of 99.8 tons occurs in July at hour 17 based on system simulation.

#### SYSTEM SUMMARY Building

#### **DESIGN HEATING CAPACITIES**

By ACADEMIC

Alternative 1

System Coil Capacities	$\mathbf{ICA}$	Main	Aux				Optional	Stg 1 Desic	Stg 2 Desic	Stg 1 Frost	Stg 2 Frost	Heating
		System	System	Preheat	Reheat	Humid.	Vent	Regen	Regen	Prevention	Prevention	Totals
System Description	System Type	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h
RTU-1	System 5 - Packaged RTU VAV Reheat, DX &	-396,561	0	-78,651	-176,610	0	0	0	0	0	0	-475,212
RTU-2	System 5 - Packaged RTU VAV Reheat, DX &	-310,807	0	-67,847	-178,898	0	0	0	0	0	0	-378,654
Totals		-707,368	0	-146,498	-355,508	0	0	0	0	0	0	-853,865

#### **Building Plant Capacities**

						Poak	Loads						
Plant System	Main Coil MBh	Preheat Coil MBh	Reheat Coil MBh	Humid. Coil MBh	Aux Coil MBh	Opt Vent Coil MBh	Misc Load MBh	Stg 1 Desic. Regen. MBh	Stg 2 Desic. Regen. MBh	Stg 1 Frost Prev. MBh	Stg 2 Frost Prev. MBh	Base Utility MBh	Absorption Load MBh
Heating plant - 002 RTU-1	707 397	147 79	0	0	0	0	0	0	0	0	0	0	0
RTU-2	311	68	0	0	0	0	0	0	0	0	0	0	0

Building peak load is 853.9 MBh.

Medical Office Building

### MONTHLY ENERGY CONSUMPTION

By ACADEMIC

------ Monthly Energy Consumption ------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1													
Electric On-Pk Cons. (kWh) On-Pk Demand (kW)	56,496 80	50,942 80	55,609 77	53,463 94	76,919 203	94,484 212	117,428 222	99,826 211	78,694 210	56,777 117	53,622 93	56,011 78	850,271 222
Gas													
On-Pk Cons. (therms)	1,179	1,046	741	545	317	242	247	274	335	562	661	945	7,092
On-Pk Demand (therms/hr)	3	3	2	1	1	1	0	1	1	1	1	2	3

Ene	ergy Consumption	Environ	mental Impact Analysis
Building	80,322 Btu/(ft2-year)	CO2	1,027,144 lbm/year
Source	210,266 Btu/(ft2-year)	SO2	7,991 gm/year
		NOX	1,536 gm/year
Floor Area	44,959 ft2		

Kale Mullikin		Medical Office Building			
		ENERGY CONSUMPTION SUMMARY By ACADEMIC			
	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 1					
Primary heating					
Primary heating		709,240	19.6 %	709,240	746,569
Other Htg Accessories			0.0 %	0	0
Heating Subtotal		709,240	<b>19.6</b> %	709,240	746,569
Primary cooling					
Cooling Compressor	179,489		17.0 %	612,595	1,837,969
Tower/Cond Fans	24,459		2.3 %	83,480	250,465
Condenser Pump			0.0 %	0	0
Other Clg Accessories	796		0.1 %	2,716	8,149
Cooling Subtotal	204,744		<b>19.4</b> %	698,791	2,096,583
Auxiliary					
Supply Fans			0.0 %	0	0
Pumps			0.0 %	0	0
Stand-alone Base Utilities			0.0 %	0	0
Aux Subtotal			0.0 %	0	0
Lighting					
Lighting	529,746		50.1 %	1,808,024	5,424,614
Receptacle					
Receptacles	115,781		10.9 %	395,161	1,185,601
			1010 70	000,101	.,,
Cogeneration				0	0
Cogeneration			0.0 %	0	0
Totals					

Medical Office Building

## MONTHLY UTILITY COSTS

By ACADEMIC

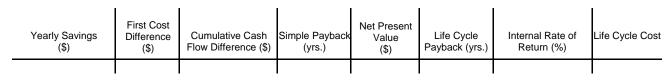
						Monthly U	tility Costs						
Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 1													
Electric On-Pk Cons. (\$)	2,825	2,547	2,780	2,673	3,846	4,724	5,871	4,991	3,935	2,839	2,681	2,801	42,514
Gas													
On-Pk Cons. (\$)	590	523	370	272	159	121	123	137	168	281	330	473	3,546
Monthly Total (\$):	3,414	3,070	3,151	2,946	4,005	4,845	5,995	5,128	4,102	3,120	3,011	3,273	46,060

Building Area =  $44,959 \text{ ft}^2$ Utility Cost Per Area =  $1.02 \text{ }/\text{ft}^2$ 

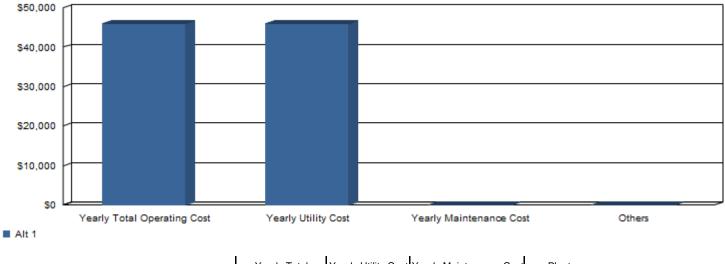


## Voo

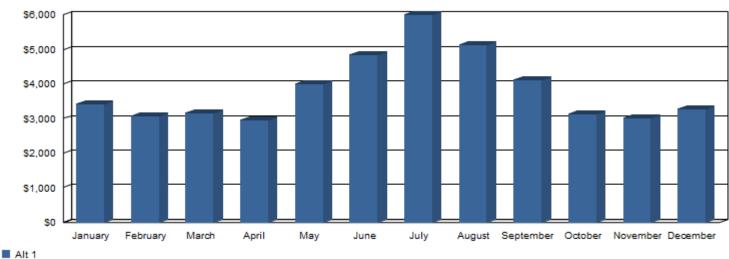
## **Economic Comparison of Alternatives**



### Annual Operating Costs



Yearly Total Operating Cost (\$)	Yearly Maintenance Cost (\$)	Plant kWh/ton-hr



## Monthly Utility Costs

Kale Mullikin

### **Project Information**

Location Project Name User Company Comments Economic Summary Medical Office Building

Cost of Capital: 10 %

20 years

Study Life:

Alternative 1:

## **Appendix B: TRACE Internal Load Inputs**

Alternative	Altern	ative 1	Ţ	]			Apply
Description	Confe	rence	-	]			Close
People							
Туре	Conferen	nce Room				•	New
Density	20	sq ft/person	▼ Sche	dule Cooling (	Inly (Design)	•	Сору
Sensible	245	Btu/h	Later	t 155	Btu/h		Delete
Workstation	IS						Add Globa
Density	1	workstation/person	•				
Lighting							
Туре	Recesse	d fluorescent, not ven	ted, 80% load	to space		•	
ASHRAE	Space/Are	еа Туре				v	
Heat gain	1.23	W/sq ft	▼ Sche	dule Cooling O	Inly (Design)	•	
Miscellaneo	us loade						
Type	None					•	
Energy	0	W/sq ft	<ul> <li>Sche</li> </ul>	dule Cooling (	Inly (Design)		
Energy	None	1	 				
Contract I was	Tanalat			hermostat	<u>C</u> onstruction		<u>R</u> oom
		es - Project	÷	1			
Alternative		ative 1			<u>Construction</u>	_]	
Alternative Description	Altern	ative 1		]		<u> </u>	Apply
Alternative Description People	Altern	ative 1					Apply
Alternative Description	Altern	ative 1 or	  ▼ Sche	]		•	Apply Close
Alternative Description People Type	Altern Corrido	ative 1		] ] dule Cooling 0	Inly (Design)		Apply Close New Copy
Alternative Description People Type Density Sensible	Altern Corride	ative 1 or People	▼ Sche	] ] dule Cooling 0	Inly (Design)		Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation	Altern Corrido	ative 1 pr People Btu/h	▼ Sche Later	] ] dule Cooling 0	Inly (Design)		Apply Close New Copy Delete
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Alternative Description People Type Density Sensible Workstation Density Lighting	Altern Corrido	ative 1 pr People Btu/h workstation/person	▼ Sche Later	] dule Cooling O t 0	Inly (Design)	<b>.</b>	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type	Altern Corrido	ative 1 pr People Btu/h workstation/person	▼ Sche Later	] dule Cooling O t 0	Inly (Design)	•	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE	Altern Corrido 0 0 18 1 1 Space/Are	ative 1 pr People Btu/h workstation/person d fluorescent, not ven ea Type	Sche Later  ted, 80% load	dule Cooling O t O	Inly (Design) Btu/h	•	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type	Altern Corrido 0 0 18 1 1 Space/Are	ative 1 pr People Btu/h workstation/person	Sche Later  ted, 80% load	] dule Cooling O t 0	Inly (Design) Btu/h	<b>v</b>	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain	Altern Corrido	ative 1 pr People Btu/h workstation/person d fluorescent, not ven ea Type	Sche Later  ted, 80% load	dule Cooling O t O	Inly (Design) Btu/h	• •	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain	Altern Corrido 0 0 1 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	ative 1 pr People Btu/h workstation/person d fluorescent, not ven ea Type W/sq ft	Sche Later  ted, 80% load  Sche	dule Cooling 0 t 0 1	Inly (Design) Btu/h Inly (Design)		Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain Miscellaneo Type Energy	Altern Corrido	ative 1 pr People Btu/h workstation/person d fluorescent, not ven ea Type	Sche Later  ted, 80% load  Sche	dule Cooling O t O	Inly (Design) Btu/h Inly (Design)	• •	Apply Close New Copy Delete
Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain Miscellaneo Type	Altern Corrido 0 0 1 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	ative 1 pr People Btu/h workstation/person d fluorescent, not ven ea Type W/sq ft	Sche Later  ted, 80% load  Sche	dule Cooling 0 t 0 1	Inly (Design) Btu/h Inly (Design)	• •	Apply Close New Copy Delete
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ternal Load	d Template	es - Project						
Alternative	Alterna	ative 1		•				Apply
Description	Lobby			•				Close
People								
Туре	Hotel/Mo	otel Lobby			-		<u> </u>	New
Density	33.3	sq ft/person	•	Schedule	Cooling On	ly (Design)	-	Сору
Sensible	250	Btu/h		Latent	200 B	tu/h		Delete
Workstation	IS							Add Global
Density	1	workstation/person	•					
Lighting								
Туре	Recesse	d fluorescent, not ver	nted, 80	% load to sp	iace		•	
ASHRAE	Space/Are	а Туре					*	
Heat gair	n 0.9	W/sq ft	•	Schedule	Cooling On	ly (Design)	-	
Miscellaneo	us loads							
Type	None						•	
Energy	0	W/sq ft	-	Schedule	Cooling On	ly (Design)	•	
Energy meter	None		-				17-26	
Internal	Load	Airflow		<u>I</u> herm	iostat	Constructio	on	<u>R</u> oom
0770 1		<u>A</u> irflow	_]_	<u>T</u> herm	iostat	Constructio	on J	
-		s - Project	]_	<u>I</u> herm	iostat	<u>C</u> onstructio	on	
ternal Load	I Template	s - Project			iostat	<u>C</u> onstructio	on	
ernal Load	I Template Alterna	s - Project		Iherm	iostat	<u>C</u> onstructio	on	Apply
ternal Load Alternative Description	I Template Alterna Office	s - Project		Iherm	iostat	<u>Constructio</u>	on	Apply
Alternative Description	I Template Alterna Office General C	s - Project ative 1		•	Cooling On		on	Apply Close
ternal Load Alternative Description People Type	I Template Alterna Office General C 143	stive 1		•	Cooling On		on	Apply Close New
ternal Load Alternative Description People Type Density Sensible	Alterna Office General C 143 250	ative 1 Office Space sq ft/person		Schedule	Cooling On	y (Design)	on	Apply Close New Copy Delete
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ernal Load Alternative Description People Type Density Sensible Workstation Density Lighting Type	I Template Alterna Office General C 143 250 s 1 Recessed	ative 1 Iffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven	•	Schedule Latent	Cooling On 200 Bt	y (Design)		Apply Close New Copy Delete
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ternal Load Alternative Description People Type Density Sensible Workstation Density .ighting Type ASHRAE Heat gain	I Template Alterna Office General C 143   250 s 1 250 s 1 Pecessed Space/Are 1 1 1 1 1 1 1	as - Project ative 1 Diffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven a Type	▼ nted, 80%	Schedule Latent	Cooling On 200 Bt	ly (Design) u/h		Apply Close New Copy Delete
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ternal Load Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain Miscellaneou Type Energy Energy	I Template Alterna Office General C 143 250 s 1 Recessed Space/Are 1.66 1.66 us loads Std Office 0.5	s - Project ative 1 Diffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven a Type W/sq ft W/sq ft	• ited, 807	Schedule Latent	Cooling On 200 Bt	y (Design) u/h y (Design)		Apply Close New Copy Delete
ternal Load Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain Miscellaneou Type Energy	I Template Alterna Office General O 143 250 s 1 Recessed Space/Are 1.66	s - Project ative 1 Diffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven a Type W/sq ft W/sq ft		Schedule Latent	Cooling On 200 Bt ace Cooling On	y (Design) u/h y (Design)		Apply Close New Copy Delete
ternal Load Alternative Description People Type Density Sensible Workstation Density .ighting Type ASHRAE Heat gain Miscellaneou Type Energy Energy	I Template Alterna Office General C 143 250 s 1 Recessed Space/Are 1.66 1.66 1.66 Std Office 0.5	s - Project ative 1 Diffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven a Type W/sq ft W/sq ft	• ited, 807	Schedule Latent	Cooling On 200 Bt ace Cooling On	y (Design) u/h y (Design)		Apply Close New Copy Delete
ternal Load Alternative Description People Type Density Sensible Workstation Density Lighting Type ASHRAE Heat gain Miscellaneou Type Energy Energy	I Template Alterna Office General O 143 250 s 1 Recessed Space/Are 1.66 1.66 1.66 0.5 Electricity	s - Project ative 1 Diffice Space sq ft/person Btu/h workstation/person d fluorescent, not ven a Type W/sq ft W/sq ft	• ited, 807	Schedule Latent	Cooling On 200 Bt ace Cooling On	y (Design) u/h y (Design)		Apply Close New Copy

Alternative	Alterna	tive 1		-			Apply
escription		I Therapy					Close
	1.190010	a morapy					0036
eople							New
Туре	None	21		o			
Density		sq ft/person	-		nly (Design)	-	Сору
Sensible	250 E	3tu/h		Latent 250 E	3tu/h		Delete
Vorkstation	s						Add Globa
Density	1	workstation/person	•				
ighting							
Туре	Recessed	fluorescent, not ver	nted, 80%	s load to space		•	
ASHRAE	Space/Area	а Туре				*	
Heat gain	0.91	w/sq ft	•	Schedule Cooling O	nly (Design)	-	
fiscellaneo	us loads						
Туре	None					•	
Energy	0	w/sq ft	-	Schedule Cooling 0	nly (Design)	-	
Energy meter	None		-				
Internal	Load	<u>A</u> irflow		<u>I</u> hermostat	Construction		<u>R</u> oom
	Load I Templates	_		<u>I</u> hermostat	<u>C</u> onstruction		
ernal Load		s - Project		Ihermostat	<u>C</u> onstruction		
ernal Load	I Template	s - Project		Ihermostat	Construction		
ernal Load Iternative Jescription	I Template	s - Project ive 1		Ihermostat	<u>C</u> onstruction		Apply
	I Template	s - Project ive 1 ure Room		Ihermostat	<u>Construction</u>		Apply
ernal Load Iternative Pescription	I Templates Alternal Procedi	s - Project ive 1 ure Room		- -	Construction		Apply
ernal Load Iternative Pescription People Type	Alternal Procedu Hospital R	s - Project ive 1 ure Room oom		Schedule Cooling 0			Apply.
ernal Load Iternative Pescription People Type Density Sensible	Alternal Procedu Hospital R 100 s 250 e	s - Project ive 1 ure Room oom sq ft/person		Schedule Cooling 0	nly (Design)		Apply Close New Copy Delete
ernal Load Iternative rescription leople Type Density Sensible	Alternal Procedu Hospital R 100 [250 E s	s - Project ive 1 ure Room oom sq ft/person Btu/h		Schedule Cooling 0	nly (Design)		Apply Close New Copy Delete
ernal Load lescription 'eople Type Density Sensible Vorkstation: Density	Alternal Procedu Hospital R 100 [250 E s	s - Project ive 1 ure Room oom sq ft/person	•	Schedule Cooling 0	nly (Design)		Apply Close New Copy Delete
ernal Load Jescription People Type Density Sensible Vorkstation: Density ighting	Alternal Procedu Hospital R 100 [2 250 E S 1 [1]	s - Project ive 1 ure Room oom sq ft/person Btu/h workstation/person	•	Schedule Cooling O Latent 200 f	nly (Design)		Apply Close New Copy Delete
ernal Load Iternative lescription eople Type Density Sensible /orkstation: Density ighting Type	I Templates Alternal Procedu Hospital R 100 [3 250 [6 5 1 [1] [7] Recessed	s - Project ive 1 ure Room oom sq ft/person Btu/h workstation/person fluorescent, not ver	•	Schedule Cooling O Latent 200 f	nly (Design)	•	Apply Close New Copy Delete
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ernal Load Iternative eoscription Density Sensible /orkstation: Density ighting Type ASHRAE Heat gain	Alternal Procedu Hospital R 100 [ 250 E s 1 [ Recessed Space/Area [2.48 ]	s - Project ive 1 ure Room oom sq ft/person Btu/h workstation/person fluorescent, not ver	•	Schedule Cooling O Latent 200 f	nly (Design) 3tu/h	• •	Apply Close New Copy Delete
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Туре	Reception	Area	-53			-	New
Density	16.7	sq ft/person	▼ Sche	dule Cooling O	inly (Design)	-	Сору
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orkstations.							Add Globa
Density	1	workstation/person	•				
ghting							
Туре	Recessed	fluorescent, not ver	nted, 80% load	to space		•	
ASHRAE S	Space/Area	і Туре				Ţ	
Heat gain	0.71	W/sq ft	▼ Sche	dule Cooling O	nly (Design)	•	
iscellaneou	s loads						
Туре		Equipment				-	
Energy	0.5	W/sq.ft	▼ Sche	dule Cooling O	Inly (Design)	•	
Energy meter	Electricity		-				
Internal I		<u>A</u> irflow	<u>] I</u>	hermostat	Construction		<u>R</u> oom
ernal Load	Templates	s - Project	<u> </u>	hermostat	<u>C</u> onstruction		
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## **Appendix C: TRACE Airflow Inputs**

A 1000000000000000000000000000000000000	Lu	a 1 - 2 a 2			Annha
Alternative	Alternat				Apply
Description	Confere	nce	_		Close
Main supply			Auxiliary supply		
Cooling		To be calculated 💌	Cooling	To be calculated	New
Heating		To be calculated 💌	Heating	To be calculated 💌	Сору
/entilation			Std 62.1-2004/2007		Delete
Apply ASHR	AE Std6:	2.1-2004/2007 Yes 💌	Clg Ez Ceiling o	clg supply, ceiling retu 💌 100	Add Glob
Туре	Confere	ence/meeting 📃 💌	Htg Ez Ceiling :	supply > trm+15°F(8°C ▼ 80	%
Peop-based	5	cfm/person 💌	Er Default	based on system type 💌	%
Area-based	0.06	cfm/sq ft 🗾 👻	DCV Min 0A Int	take None	•
Schedule	Availab	ıle (100%) 🔹 💌	Room exhaust		
Infiltration			Rate 0	air changes/hr 💌	
Туре	None	•	Schedule Avai	ilable (100%) 📃 💌	
Cooling	0	air changes/hr 💽	VAV control		
Heating	0	air changes/hr 💌	Clg VAV min	% Clg Airflow	•
Schedule	Availab	le (100%) 📃 💌	Htg VAV max	% Clg Airflow	•
			Schedule	Available (100%)	•
			Туре	Default	1
			<i>.</i>	1	_
Internal Loa rflow Templa		Airflow	<u>I</u> hermostat	<u>C</u> onstruction	<u>R</u> oom
Alternative	Alterna		<b>•</b>		Apply
Description	Corrido		-		Close
Main supply					01036
and subbly			Auxiliary sunnly		
Cooling		To be calculated 💌	Auxiliary supply	To be calculated 💌	New
			Cooling	To be calculated  To be calculated	New
Heating		To be calculated  To be calculated	Cooling Heating	To be calculated 💌	New Copy
Heating /entilation	IAE Std6	To be calculated 💌	Cooling Heating Std 62.1-2004/2007	To be calculated 💌	New Copy Delete
Heating /entilation Apply ASHF		To be calculated 2.1-2004/2007 Yes	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling	To be calculated clg supply, ceiling retu  100	New Copy Delete
Heating /entilation Apply ASHF Type	Corrido	To be calculated            2.1-2004/2007         Yes            rs	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling	To be calculated  clg supply, ceiling retu supply > trm+15°F(8°C 80	New Copy Delete % Add Glob
Heating /entilation Apply ASHF Type Peop-based	Corrido I 0	To be calculated 2.1-2004/2007 Yes rs cfm/person	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default	To be calculated ▼  clg supply, ceiling retu ▼ 100 supply > trm+15°F(8°C ▼ 80 based on system type ▼	New Copy Delete & Add Glob
Heating /entilation Apply ASHF Type Peop-based Area-based	Corrido I 0 0.06	To be calculated 2.1-2004/2007 Yes rs cfm/person cfm/sq ft	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int	To be calculated ▼  clg supply, ceiling retu ▼ 100 supply > trm+15°F(8°C ▼ 80 based on system type ▼	New Copy Delete % Add Glob
Heating /entilation Apply ASHF Type Peop-based Area-based Schedule	Corrido I 0 0.06	To be calculated 2.1-2004/2007 Yes rs cfm/person	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int Room exhaust	To be calculated ▼  clg supply, ceiling retu ▼ 100 supply > trm+15°F(8°C ▼ 80 based on system type ▼ take ■ None	New Copy Delete & Add Glob
Heating /entilation Apply ASHF Type Peop-based Area-based Schedule Infiltration	Corrido I 0 0.06 Availab	To be calculated 2.1-2004/2007 Yes rs cfm/person cfm/sq ft	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int Room exhaust Rate 0	To be calculated ▼ clg supply, ceiling retu ▼ 100 supply > trm+15*F(8*C ▼ 80 based on system type ▼ take None air changes/hr ▼	New Copy Delete & Add Glob
Heating /entilation Apply ASHF Type Peop-based Area-based Schedule Infiltration Type	Corrido I 0 0.06 Availab	To be calculated         2.1-2004/2007       Yes         rs          cfm/person          cfm/sq ft          ole (100%)	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int Room exhaust Rate 0 Schedule Avai	To be calculated ▼ clg supply, ceiling retu ▼ 100 supply > trm+15*F(8*C ▼ 80 based on system type ▼ take None air changes/hr ▼	New Copy Delete & Add Glob
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Heating Ventilation Apply ASHF Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Corrido 0.06 Availat	To be calculated 2.1-2004/2007 Yes rs cfm/person cfm/sq ft air changes/hr air changes/hr v	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int Room exhaust Rate 0 Schedule Avai VAV control	To be calculated ▼ To be calculated ■ To be calcul	New Copy 2 2 3 4 dd Glob
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Heating Ventilation Apply ASHF Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Corrido 0.06 Availat	To be calculated 2.1-2004/2007 Yes rs cfm/person cfm/sq ft air changes/hr air changes/hr v	Cooling Heating Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Default DCV Min OA Int Room exhaust Rate 0 Schedule Avai VAV control Clg VAV min Htg VAV max Schedule	To be calculated ▼ To be calculated To	New Copy Delete 2 2 4dd Glob 2 2
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A.11	1	197 <b>5</b> 9	100		Annia
Alternative	Alterna	tive 1			Apply
Description	Lobby		_		Close
Main supply		-	Auxiliary supply		
Cooling		To be calculated	▼ Cooling	To be calculated 💌	New
Heating		To be calculated	✓ Heating	To be calculated 💌	Сору
/entilation			Std 62.1-2004/2	and the second se	Delete
Apply ASHR	IAE Std6	2.1-2004/2007 Yes	Clg Ez   Cei	ling clg supply, ceiling retu 💌 100	Add Glob.
Туре	Lobbie	s	✓ Htg Ez Cei	ling supply > trm+15°F(8°C ▼ 80	%
Peop-based	5	cfm/person	✓ Er De	fault based on system type 💌	%
Area-based	0.06	cfm/sq ft	<ul> <li>DCV Min 0.</li> </ul>	A Intake None	•
Schedule	Availab	ole (100%)	<ul> <li>Room exhaust</li> </ul>		
Infiltration			Rate [	0 air changes/hr 💌	
Туре	None		✓ Schedule	Available (100%) 🔹 💌	
Cooling	0	air changes/hr	VAV control		
Heating	0	air changes/hr	<ul> <li>Clg VAV mi</li> </ul>	n 🛛 🛛 🕅 🕷 Clg Airflow	•
Schedule	Availab	le (100%)	✓ Htg VAV m.	ax 🛛 🛛 🕅 🖓 Clg Airflow	•
			 Schedule	Available (100%)	- -
			Туре	Default	=
rflow Templa	tes - Pro	Airflow			<u>B</u> oom
Alternative	Alterna	tive 1			
Description			<b>.</b>		Apply
	Office		<u> </u>		Apply Close
Main supply	Office		Auxiliary supply		
Main supply Cooling	Office	To be calculated	Auxiliary supply	To be calculated 💌	
	Office	_			Close
Cooling Heating	Office	To be calculated	Cooling	To be calculated  To be calculated  To be calculated	Close New Copy
Cooling Heating /entilation		To be calculated	<ul> <li>▼ Cooling  </li> <li>▼ Heating  </li> <li>Std 62.1-2004/2</li> </ul>	To be calculated  To be calculated  To be calculated	Close New Copy Delete
Cooling Heating /entilation		To be calculated To be calculated 2.1-2004/2007 Yes	Cooling     Heating     Std 62.1-2004/.     Clg Ez Ce	To be calculated  To be calculated  To be calculated  2007	Close New Copy Delete
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Cooling Heating Ventilation Apply ASHR Type Peop-based Area-based	AE Std6	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min D</li> <li>Room exhaust Rate</li> </ul>	To be calculated ▼ To be calculated ▼ 2007 ling clg supply, ceiling retu ▼ 100 ling supply > trm+15°F(8°C ▼ 80 fault based on system type ▼ 1 A Intake None	Close New Copy Delete & Add Glob
Cooling Heating Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration	AE Std6	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004/.</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min 0</li> <li>Room exhaust Rate</li> <li>Schedule</li> </ul>	To be calculated ▼ To be calculated ▼ 2007 ling clg supply, ceiling retu ▼ 100 ling supply > trm+15*F(8*C ▼ 80 fault based on system type ▼ 1 A Intake None  0 air changes/hr ▼	Close New Copy Delete & Add Glob
Cooling Heating Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type	AE Std6 Office = 5 0.06 Availab	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft ole (100%)	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min D</li> <li>Room exhaust</li> <li>Rate</li> <li>Schedule</li> <li>VAV control</li> </ul>	To be calculated ▼ To be calculated ▼ 2007 ling clg supply, ceiling retu ▼ 100 ling supply > trm+15*F(8*C ▼ 80 fault based on system type ▼ 1 A Intake None  0 air changes/hr ▼ Available (100%) ▼	Close New Copy Delete & Add Glob
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Heating Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	AE Std6 Office : 5 0.06 Availat None 0	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft ble (100%) air changes/hr air changes/hr	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min O</li> <li>Room exhaust Rate</li> <li>Schedule</li> <li>VAV control</li> <li>Clg VAV mi</li> </ul>	To be calculated ▼ To be calculated ▼ To be calculated ▼ 2007 ling clg supply, ceiling retu ▼ 100 ling supply > trm+15*F(8*C ▼ 80 fault based on system type ▼ 1 A Intake None  0 air changes/hr ▼ Available (100%) ▼ n 2 Clg Airflow ax 2 Clg Airflow	Close New Copy Delete & Add Glob
Cooling Heating Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	AE Std6 Office : 5 0.06 Availat None 0	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft ble (100%) air changes/hr air changes/hr	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min O</li> <li>Room exhaust Rate</li> <li>Schedule</li> <li>VAV control</li> <li>Clg VAV mi</li> <li>Htg VAV mi</li> <li>Schedule</li> </ul>	To be calculated       ▼         To be calculated       ▼         2007       100         ling clg supply, ceiling retu       100         ling supply > trm+15°F(8°C ▼       80         fault based on system type ▼       A         A Intake       None          0         air changes/hr       ▼         Available (100%)       ▼         n       % Clg Airflow         ax       % Clg Airflow	Close New Copy Delete & Add Glob
Cooling Heating Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	AE Std6 Office : 5 0.06 Availat None 0	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft ble (100%) air changes/hr air changes/hr	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min D</li> <li>Room exhaust</li> <li>Rate</li> <li>Schedule</li> <li>VAV control</li> <li>Clg VAV mi</li> <li>Htg VAV mi</li> </ul>	To be calculated ▼ To be calculated ▼ To be calculated ▼ 2007 ling clg supply, ceiling retu ▼ 100 ling supply > trm+15*F(8*C ▼ 80 fault based on system type ▼ 1 A Intake None  0 air changes/hr ▼ Available (100%) ▼ n 2 Clg Airflow ax 2 Clg Airflow	Close New Copy Delete & Add Glob
Cooling Heating /entilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	AE Std6 Office : 5 0.06 Availat	To be calculated To be calculated 2.1-2004/2007 Yes space cfm/person cfm/sq ft ble (100%) air changes/hr air changes/hr	<ul> <li>Cooling</li> <li>Heating</li> <li>Std 62.1-2004//</li> <li>Clg Ez Ce</li> <li>Htg Ez Ce</li> <li>Htg Ez Ce</li> <li>Er De</li> <li>DCV Min O</li> <li>Room exhaust Rate</li> <li>Schedule</li> <li>VAV control</li> <li>Clg VAV mi</li> <li>Htg VAV mi</li> <li>Schedule</li> </ul>	To be calculated       ▼         To be calculated       ▼         2007       100         ling clg supply, ceiling retu       100         ling supply > trm+15°F(8°C ▼       80         fault based on system type ▼       A         A Intake       None          0         air changes/hr       ▼         Available (100%)       ▼         n       % Clg Airflow         ax       % Clg Airflow	Close New Copy Delete & Add Glob

Alternative	Alternat	tive 1	-		Apply
Description		al Therapy			Close
	p nyolod	, ((io)op)			
Main supply Cooling		To be calculated 💌	Auxiliary supply	To be calculated 👻	New
1.000	-				
Heating Ventilation	1	To be calculated			Сору
		2.1-2004/2007 Yes 👻	Std 62.1-2004/200	(   clg supply, ceiling retu  ় [1]	Delete
				supply > trm+15°F(8°C - 8	Add Globa
Туре		club/weight rooms			
Peop-based	-	cfm/person	-	t based on system type	
Area-based	0.06	cfm/sq ft 👱		ntake   None	-
Schedule	Availab	ole (100%) 🔄			re:
Infiltration			Rate 0	air changes/hr 💌	
Туре	None		Schedule Ava	ailable (100%) 🔄 💌	
Cooling	0	air changes/hr 💌	VAV control		
Heating	0	air changes/hr 🔄		% Clg Airflow	<u> </u>
Schedule	Availab	le (100%) 📃 💌	Htg VAV max	% Clg Airflow	<b>•</b>
			Schedule	Available (100%)	•
			Туре	Default	<b>T</b>
Internal Lo flow Templa		<u>Airflow</u>	<u>T</u> hermostat	Construction	<u>R</u> oom
Alternative	Alternat		•		Apply
Description	Procede	ure Room	•		Close
Main supply			Auxiliary supply		L
Cooling		To be calculated 💌	Cooling	To be calculated 💌	New
Heating	<u> </u>				100 March 100 Ma
		To be calculated 🔹	Heating	To be calculated 💌	Conv
-		To be calculated		,	Copy
Ventilation	I AE Std62	To be calculated	Std 62.1-2004/2007		Delete
Ventilation Apply ASHR	-	2.1-2004/2007 Yes 💌	Std 62.1-2004/2007 Clg Ez Ceiling	7 clg supply, ceiling retu 💌 🕅	Delete
Ventilation Apply ASHR Type	Default	2.1-2004/2007 Yes 💌 Std62 💌	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling	7 clg supply, ceiling retu	Delete
Ventilation Apply ASHR Type Peop-based	Default 15	2.1-2004/2007 Yes Std62 cfm/person	Std 62.1-2004/2003 Clg Ez Ceiling Htg Ez Ceiling Er Defaul	7 clg supply, ceiling retu 💌 10 supply > trm+15°F(8°C 💌 80 t based on system type 💌	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based	Default 15 0.06	2.1-2004/2007 Yes Std62 cfm/person cfm/sq.ft	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In	7 clg supply, ceiling retu ↓ 10 supply > trm+15°F(8°C ↓ 80 t based on system type ↓	Delete
Ventilation Apply ASHR Type Peop-based Area-based Schedule	Default 15 0.06	2.1-2004/2007 Yes Std62 cfm/person	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ take None	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration	Default 15 0.06 Availab	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) *	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min 0A In Room exhaust Rate 0	7 clg supply, ceiling retu v 10 supply > trm+15°F(8°C v 80 t based on system type v take None air changes/hr v	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type	Default 15 0.06 Availab	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%)	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust Rate 0 Schedule Ava	7 clg supply, ceiling retu v 10 supply > trm+15°F(8°C v 80 t based on system type v take None air changes/hr v	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling	Default 15 0.06 Availab None	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust Rate 0 Schedule Ava VAV control	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ take None air changes/hr ▼ ailable (100%) ▼	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Default 15 0.06 Availab None 0	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust Rate 0 Schedule Ava VAV control Clg VAV min	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ 1 take None air changes/hr ▼ silable (100%) ▼	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling	Default 15 0.06 Availab None 0	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min DA In Room exhaust Rate 0 Schedule Ava VAV control Clg VAV min Htg VAV max	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ take None air changes/hr ▼ ailable (100%) ▼ % Clg Airflow	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Default 15 0.06 Availab None 0	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust Rate 0 Schedule Ava VAV control Clg VAV min Htg VAV max Schedule	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ 1 ttake None air changes/hr ▼ ailable (100%) ▼ % Clg Airflow % Clg Airflow Available (100%)	Delete Add Globa
Ventilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Default 15 0.06 Availab None 0	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min DA In Room exhaust Rate 0 Schedule Ava VAV control Clg VAV min Htg VAV max	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ take None air changes/hr ▼ ailable (100%) ▼ % Clg Airflow	Delete Add Globa
/entilation Apply ASHR Type Peop-based Area-based Schedule Infiltration Type Cooling Heating	Default 15 0.06 Availab 0 0 Availab	2.1-2004/2007 Yes Std62 cfm/person cfm/sq ft le (100%) air changes/hr air changes/hr	Std 62.1-2004/2007 Clg Ez Ceiling Htg Ez Ceiling Er Defaul DCV Min OA In Room exhaust Rate 0 Schedule Ava VAV control Clg VAV min Htg VAV max Schedule	7 clg supply, ceiling retu ▼ 10 supply > trm+15°F(8°C ▼ 80 t based on system type ▼ 1 ttake None air changes/hr ▼ ailable (100%) ▼ % Clg Airflow % Clg Airflow Available (100%)	Delete Add Globa

irflow Templat		Jean					
Alternative	Alterna	tive 1		•			Apply
Description	Recept	ion		•			Close
Main supply				Auxiliary supply			10
Cooling		To be calculated	•	Cooling 🗌	To be calculated 💌		New
Heating		To be calculated	•	Heating 🗌	To be calculated 💌		Сору
Ventilation				Std 62.1-2004/2007	7		Delete
Apply ASHR	AE Std6	2.1-2004/2007 Yes	•	Clg Ez Ceiling	clg supply, ceiling retu 💌 10	00 %	Add Globa
Туре	Recept	tion areas	•	Htg Ez Ceiling	supply > trm+15°F(8°C 💌 80	) %	Add Globa
Peop-based	5	cfm/person	•	Er Default	: based on system type 💌	~ %	
Area-based	0.06	cfm/sq ft	•	DCV Min OA In	take None	-	
Schedule	Availab	ile (100%)	•	Room exhaust			
Infiltration				Rate 0	air changes/hr 💌		
Туре	None		•	Schedule Ava	ilable (100%) 📃 💌		
Cooling	0	air changes/hr	•	VAV control			
Heating	0	air changes/hr	-	Clg VAV min	% Clg Airflow	•	
Schedule	Availab	le (100%)	•	Htg VAV max	% Clg Airflow	•	
				Schedule	Available (100%)	•	
				Туре	Default	-	
					15.5555		
Internal Loa	ad	Airflow	Г	Thermostat	<u>C</u> onstruction		Room
-				_	))		
irflow Templa	tes - Pro	oject					
Alternative	Alterna	tive 1		-			Apply
Description	Storage	9		•			Close
Main supply				Auxiliary supply			
Cooling		To be calculated	-	Cooling 🗌	To be calculated 💌		New
Heating		To be calculated	•	Heating	To be calculated 💌		Сору
Ventilation				Std 62.1-2004/2007	l		Delete
Apply ASHR	AE Std6	2.1-2004/2007 Yes	•	Clg Ez Ceiling	clg supply, ceiling retu 💌 10	)0 %	Add Globa
Туре	Storage	e rooms	•	Htg Ez Ceiling	supply > trm+15°F(8°C 💌 80	) %	
Peop-based	0	cfm/person	•	Er Default	based on system type 💌	~ %	
Area-based	0.12	cfm/sq ft	•	DCV Min OA In	take None	-	
Schedule	Availat	ole (100%)	•	Room exhaust			
Infiltration				Rate 0	air changes/hr 🔄		
Туре	None		•	Schedule Ava	ilable (100%) 🔹 💌		
Cooling	0	air changes/hr	•	VAV control			
Heating	0	air changes/hr	•	Clg VAV min	% Clg Airflow	-	
Schedule	Availab	le (100%)	•	Htg VAV max	% Clg Airflow	-	
				Schedule	Available (100%)	-	
				Туре	Default	Ţ	
Internal Loa		Airflow		<u>I</u> hermostat	Construction		Room