

the Oaks
Pinebrook Development
14066-Linton Residence
HVAC Load Analysis
for



Prepared By:

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General Project Data Input

General Project Information

Project file name:

Project title:

Designed by:

Project date:

Project location:

Company name:

Company representative

Company city:

Barometric pressure:

Altitude:

Latitude:

Mean daily temperature range:

Starting & ending time for HVAC load calculations. Floor heat loss coefficient.

Flood heat loss coefficient:

Number of unique zones in this project:

Building Default Values

Calculations performed:

Lighting requirements:

Equipment requirements:

People sensible load multiplier

People latent load multiplier:

Zone sensitive safety factor.

Zone latent safety factor:

People diversity factor:

Lighting profile number:

Equipment profile number:

People profile number:

Building default ceiling height:

Building default wall height:

Both heating and cooling loads

1.10	Watt
0.00	Watt
250	Btuh
200	Btuh
10%	%
10%	%
10%	%
100%	%
1	
1	
1	
10.0	feet
12.0	feet

[illegible]

General Project Data Input (cont'd)

Building-Level Design Conditions									
Design Month	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Diff	In/Outdoor Correction	August	Winter	
	92	77	50%	75	51.69				1

Master Roofs									
Roof No.	ASHRAE Roof#	U-Fac	Roof	Dark Color	No	Susp. Cell	No		
1	1	0.026							

Master Walls									
Wall No.	ASHRAE Group	U-Fac	Wall	Color	M				
1	C	0.067							

Master Glass									
Glass No.	Summer U-Factor	Winter U-Factor	Glass Shd.Coef.	Interior Shading	Interior Shd.Coef	Room Const	Glass Width	Glass Height	
1	0.310	0.310	0.300	2	0.000	M	1.000	1.000	

Master Shading Devices									
Shade No.	Dist Horiz Overh Projects	Dist Beyond Right W.Edge	Dist Beyond Left W.Edge	Dist Overh Above Wind	Dist Right Fin Beyond R-Fin W.Edge	Ht Of Right Fin	Dist Left Fin Beyond L-Fin W.Edge	Ht Of Left Fin	
1	12.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	
2	35.00	0.50	4.00	2.00	0.00	0.00	35.00	4.00	12.00



Building Summary Loads

Building peaks in August at 4pm.

Bldg Load	Area	Sen	%Tot	Lat	Sen	Net	%Net
Descriptions	Quan	Loss	Loss	Gain	Gain	Gain	Gain
Roof	6,275	6,640	7.49	0	6,331	6,331	3.21
Wall	7,330	19,988	22.55	0	8,613	8,613	4.37
Glass	3,924	49,509	55.84	0	82,187	82,187	41.68
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads	76,137	85.88	0	97,130	97,130	49.25	
Lighting	10,797	0	0.00	0	40,523	40,523	20.55
Equipment	4,250	0	0.00	0	15,952	15,952	8.09
People	50	0	0.00	11,000	13,750	24,750	12.55
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	315	0	0.00	11,362	5,514	16,876	8.56
Heat. Vent.	315	12,519	14.12	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	1,968	1,968	1.00
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals	88,656	100.00	22,362	174,837	197,199	100.00	

Building Summary	Sen	%Tot	Lat	Sen	Net	%Net
Ventilation	12,519	14.12	11,362	5,514	16,876	8.56
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	76,137	85.88	11,000	167,355	178,355	90.44
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	1,968	1,968	1.00
Building Totals	88,656	100.00	22,362	174,837	197,199	100.00

Total Building Supply Air (based on a 20° TD):
8,155 CFM

Total Building Vent. Air (3.86% of Supply):
315 CFM

Total Conditioned Air Space:
9,815 Sq.ft

Supply Air Per Unit Area:
0.8309 CFM/Sq.ft

Area Per Cooling Capacity:
597.2653 Sq.ft/Ton

Cooling Capacity Per Area:
0.0017 Tons/Sq.ft

Total Heating Required With Outside Air:
88,656 Btuh

Total Cooling Required With Outside Air:
16.43 Tons



Air Handler #1 - AHU-1 - Summary Loads

Zn	Description	Area	Htg.Loss	Sen.Gain	Lat.Gain	Htg.O.A.	Cig.O.A.
No	Peak Time	People	Htg.CFM	Cig.CFM	S.Exh	Req.CFM	Req.CFM
		Volume	CFM/Sqft	CFM/Sqft	W.Exh	Act.CFM	Act.CFM

2	Bedroom #2	313	1,163	2,974	220	Direct	10
	2pm August	1	43	136	0	Direct	10
3	Closet	98	0	405	0	Direct	1
	12am August	0	0	19	0	Direct	3
4	Bathroom	88	196	481	0	Direct	2
	8pm August	0	7	22	0	Direct	3
5	Bathroom	88	196	481	0	Direct	2
	8pm August	0	7	22	0	Direct	3
6	Bedroom #3	313	1,163	2,974	220	Direct	10
	2pm August	1	43	136	0	Direct	10
7	Closet	83	0	343	0	Direct	1
	12am August	0	0	16	0	Direct	3
8	Hallway	268	0	1,106	0	Direct	8
	12am August	0	0	51	0	Direct	8
9	Hallway	172	0	710	0	Direct	5
	12am August	0	0	33	0	Direct	5
10	Bathroom	74	345	466	0	Direct	2
	4pm August	0	13	21	0	Direct	2
11	Laundry	146	541	4,573	0	Direct	4
	6pm August	0	20	210	0	Direct	4
12	Bedroom #4	245	1,327	2,748	220	Direct	8
	2pm August	1	49	126	0	Direct	15
29	Hallway	71	345	633	0	Direct	2
	2pm August	0	13	29	0	Direct	2
Zone Peak Totals:		1,959	5,277	17,894	660		60
Total Zones: 12		3	197	820	0		60
Unique Zones: 12		19,590	0.10	0.42	0		60



Air Handler #1 - AHU-1 - Total Load Summary

Air Handler Description: AHU-1 Constant Volume - Proportion
 Supply Air Fan: Draw-Thru with program estimated horsepower of 0.08 HP
 Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
 Sensible Heat Ratio: 0.96 --- This system occurs 1 time(s) in the building. ---
 Air System Peak Time: 2pm in August
 Outdoor Conditions: 91° DB, 77° WB, 117.61 grains
 Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss: 5,277 Btuh
 Infiltration sensible loss: 0 Btuh
 Outside Air sensible loss: 2,385 Btuh
 Supply Duct sensible loss: 0 Btuh
 Return Duct sensible loss: 0 Btuh
 Return Plenum sensible loss: 0 Btuh
 Total System sensible loss: 7,661 Btuh

Heating Supply Air: $5,277 / (.995 \times 1.08 \times 25) =$
 Winter Vent Outside Air (30.5% of supply) =

197 CFM
 60 CFM

Zone space sensible gain: 17,736 Btuh
 Infiltration sensible gain: 0 Btuh
 Draw-thru fan sensible gain: 203 Btuh
 Supply duct sensible gain: 0 Btuh
 Reserve sensible gain: 0 Btuh
 Total sensible gain on supply side of coil:

17,940 Btuh

Cooling Supply Air: $17,940 / (.995 \times 1.1 \times 20) =$
 Summer Vent Outside Air (7.3% of supply) =

820 CFM
 60 CFM

Return duct sensible gain: 0 Btuh
 Return plenum sensible gain: 0 Btuh
 Outside air sensible gain: 1,050 Btuh
 Blow-thru fan sensible gain: 0 Btuh
 Total sensible gain on return side of coil:

1,050 Btuh

Total sensible gain on air handling system:

18,990 Btuh

Zone space latent gain: 660 Btuh

Infiltration latent gain: 0 Btuh

Outside air latent gain: 2,164 Btuh

Total latent gain on air handling system:

2,824 Btuh

Total system sensible and latent gain:

21,814 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):
 820 CFM

60 CFM

Total Air Handler Vent. Air (7.32% of Supply):

1,959 Sq.ft
 0.4185 CFM/Sq.ft
 1,077.6570 Sq.ft/Ton
 0.0009 Tons/Sq.ft

Total Conditioned Air Space:

Supply Air Per Unit Area:

Area Per Cooling Capacity:

Cooling Capacity Per Area:

Total Heating Required With Outside Air:

7,661 Btuh

Total Cooling Required With Outside Air:

1.82 Tons



Air Handler #2 - AHU-2 - Summary Loads

Zn	Description	Area	Htg. Loss	Sen. Gain	Lat. Gain	Htg. O.A.	Cig. O.A.
No	Peak Time	People	Htg. CFM	Cig. CFM	S. Exh	Req. CFM	Req. CFM
		Volume	CFM/Sqft	CFM/Sqft	W. Exh	Act. CFM	Act. CFM
13	Garage	1,028	6,928	12,151	0	None	None
	1 tam August	0	258	592	0	0	0
		10,280	0.25	0.58	0	0	0
	Zone Peak Totals:	1,028	6,928	12,151	0	0	0
	Total Zones: 1	0	258	592	0	0	0
	Unique Zones: 1	10,280	0.25	0.58	0	0	0



Air Handler #2 - AHU-2 - Total Load Summary

Air Handler Description: AHU-2 Constant Volume - Proportion
Supply Air Fan: Draw-Thru with program estimated horsepower of 0.06 HP
Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
Sensible Heat Ratio: 1.00 --- This system occurs 1 time(s) in the building. ---
Air System Peak Time: 11am in August.
Outdoor Conditions: 85° DB, 75° WB, 118.00 grains
Summer: Exhaust controls outside air, ---- Winter: Exhaust controls outside air.

Zone Space sensible loss: 6,928 Btuh
 Infiltration sensible loss: 0 Btuh
 Outside Air sensible loss: 0 Btuh
 Supply Duct sensible loss: 0 Btuh
 Return Duct sensible loss: 0 Btuh
 Return Plenum sensible loss: 0 Btuh
 Total System sensible loss: 6,928 Btuh

$$\text{Heating Supply Air: } 6,928 / (.995 \times 1.08 \times 25) =$$

258 CFM
 0 CFM

Zone space sensible gain: 12,151 Btuh

Infiltration sensible gain: 0 Btuh

Draw-thru fan sensible gain: 147 Btuh

Supply duct sensible gain: 0 Btuh

Reserve sensible gain: 0 Btuh

Total sensible gain on supply side of coil:

$$\text{Cooling Supply Air: } 12,297 / (.995 \times 1.1 \times 19) =$$

592 CFM
 0 CFM

Return duct sensible gain: 0 Btuh

Return plenum sensible gain: 0 Btuh

Outside air sensible gain: 0 Btuh

Blow-thru fan sensible gain: 0 Btuh

Total sensible gain on return side of coil:

Total latent gain on air handling system:

Zone space latent gain: 0 Btuh

Infiltration latent gain: 0 Btuh

Outside air latent gain: 0 Btuh

Total latent gain on air handling system:

Total system sensible and latent gain:

0 Btuh
 12,297 Btuh

Check Figures

Total Air Handler Supply Air (based on a 19° TD):
 592 CFM

0 CFM

Total Conditioned Air Space:

1,028 Sq.ft

0.5755 CFM/Sq.ft

Supply Air Per Unit Area:

1,003.1410 Sq.ft/Ton

Area Per Cooling Capacity:

0.0010 Tons/Sq.ft

Cooling Capacity Per Area:

6,928 Btuh

1.02 Tons

Total Heating Required With Outside Air:
 Total Cooling Required With Outside Air:



Air Handler #3 - AHU-3 - Summary Loads

Zn	Description	Area	Htg.Loss	Sen.Gain	Lat.Gain	Htg.O.A.	Cig.O.A.
No	Peak Time	People	Htg.CFM	Cig.CFM	S.Exh	Req.CFM	Req.CFM
		Volume	CFM/Sqft	CFM/Sqft	W.Exh	Act.CFM	Act.CFM
16	Great Room	961	6,910	17,491	2,200	Direct	Direct
	3pm August	10	257	809	0	30	30
		19,220	0.27	0.84	0	30	30
Zone Peak Totals:							
		961	6,910	17,491	2,200	30	30
	Total Zones: 1	10	257	809	0	30	30
	Unique Zones: 1	19,220	0.27	0.84	0	30	30



Air Handler #3 - AHU-3 - Total Load Summary

Air Handler Description: AHU-3 Constant Volume - Proportion
 Supply Air Fan: Draw-Thru with program estimated horsepower of 0.08 HP
 Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
 Sensible Heat Ratio: 0.89 --- This system occurs 1 time(s) in the building. ---
 Air System Peak Time: 3pm in August.
 Outdoor Conditions: 92° DB, 77° WB, 116.70 grains
 Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss: 6,910 Btuh
 Infiltration sensible loss: 0 Btuh
 Outside Air sensible loss: 1,192 Btuh
 Supply Duct sensible loss: 0 Btuh
 Return Duct sensible loss: 0 Btuh
 Return Plenum sensible loss: 0 Btuh
 Total System sensible loss: 8,103 Btuh

Heating Supply Air: $6,910 / (.995 \times 1.08 \times 25) =$
 Winter Vent Outside Air (11.7% of supply) =

Zone space sensible gain: 17,491 Btuh
 Infiltration sensible gain: 0 Btuh
 Draw-thru fan sensible gain: 201 Btuh
 Supply duct sensible gain: 0 Btuh
 Reserve sensible gain: 0 Btuh
 Total sensible gain on supply side of coil:

Cooling Supply Air: $17,692 / (.995 \times 1.1 \times 20) =$
 Summer Vent Outside Air (3.7% of supply) =

Return duct sensible gain: 0 Btuh
 Return plenum sensible gain: 0 Btuh
 Outside air sensible gain: 558 Btuh
 Blow-thru fan sensible gain: 0 Btuh
 Total sensible gain on return side of coil:

Total sensible gain on air handling system: 558 Btuh
 Zone space latent gain: 2,200 Btuh
 Infiltration latent gain: 0 Btuh
 Outside air latent gain: 1,049 Btuh
 Total latent gain on air handling system: 3,249 Btuh
 Total system sensible and latent gain: 21,499 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD): 809 CFM
 Total Air Handler Vent. Air (3.71% of Supply): 30 CFM
 Total Conditioned Air Space: 961 Sq.ft
 Supply Air Per Unit Area: 0.8414 CFM/Sq.ft
 Area Per Cooling Capacity: 536.4032 Sq.ft/Ton
 Cooling Capacity Per Area: 0.0019 Tons/Sq.ft
 Total Heating Required With Outside Air: 8,103 Btuh
 Total Cooling Required With Outside Air: 1.79 Tons



Air Handler #4 - AHU-4 - Summary Loads

Zn	Description	Area	Htg.Loss	Sen.Gain	Lat.Gain	Htg.O.A.	Cig.O.A.
No	Peak Time	People	Htg.CFM	Cig.CFM	S.Exh	Act.CFM	Req.CFM
		Volume	CFM/Sqft	CFM/Sqft	W.Exh	Act.CFM	Act.CFM

17	Kitchen/Dining Room	961	7,467	23,362	2,200	Direct	28
	4pm August	10	278	1,078	0	Direct	28
		19,220	0.29	1.12	0		
30	Pantry	156	1,376	1,292	0	Direct	2
	9pm August	0	51	60	0	Direct	2
		1,560	0.33	0.38	0		
	Zone Peak Totals:	1,117	8,843	24,654	2,200		
	Total Zones: 2	10	329	1,137	0		
	Unique Zones: 2	20,780	0.29	1.02	0		



Air Handler #4 - AHU-4 - Total Load Summary

Air Handler Description: AHU-4 Constant Volume - Proportion
Supply Air Fan: Draw-Thru with program estimated horsepower of 0.11 HP
Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
Sensible Heat Ratio: 0.92
Air System Peak Time: 4pm in August.
Outdoor Conditions: 91° DB, 77° WB, 117.61 grains
Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss: 8,843 Btuh
Infiltration sensible loss: 0 Btuh
Outside Air sensible loss: 1,192 Btuh
Supply Duct sensible loss: 0 Btuh
Return Duct sensible loss: 0 Btuh
Return Plenum sensible loss: 0 Btuh
Total System sensible loss: 0 Btuh
Heating Supply Air: $8,843 / (.995 \times 1.08 \times 25) =$
Winter Vent Outside Air (9.1% of supply) = 329 CFM
30 CFM

Zone space sensible gain: 24,601 Btuh
Infiltration sensible gain: 0 Btuh
Draw-thru fan sensible gain: 282 Btuh
Supply duct sensible gain: 0 Btuh
Reserve sensible gain: 0 Btuh
Total sensible gain on supply side of coil: 0 Btuh
Cooling Supply Air: $24,883 / (.995 \times 1.1 \times 20) =$
Summer Vent Outside Air (2.6% of supply) = 1,137 CFM
30 CFM

Return duct sensible gain: 0 Btuh
Return plenum sensible gain: 0 Btuh
Outside air sensible gain: 525 Btuh
Blow-thru fan sensible gain: 0 Btuh
Total sensible gain on return side of coil: 0 Btuh
Total sensible gain on air handling system: 525 Btuh
Zone space latent gain: 2,200 Btuh
Infiltration latent gain: 0 Btuh
Outside air latent gain: 1,082 Btuh
Total latent gain on air handling system: 1,082 Btuh

Total system sensible and latent gain: 3,282 Btuh
28,690 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD): 1,137 CFM
30 CFM
Total Air Handler Vent. Air (2.64% of Supply): 1,117 Sq.ft
1,0181 CFM/Sq.ft
467.1987 Sq.ft/Ton
0.0021 Tons/Sq.ft
10,035 Btuh
2.39 Tons
Total Heating Required With Outside Air:
Total Cooling Required With Outside Air:



Air Handler #5 - AHU-5 - Summary Loads

Zn	Description	Area	Htg. Loss	Sen. Gain	Lat. Gain	Htg. O.A.	Cig. O.A.
No	Peak Time	People	Htg. CFM	Cig. CFM	S. Exh	Req. CFM	Req. CFM
		Volume	CFM/Sqft	CFM/Sqft	W. Exh	Act. CFM	Act. CFM
15	Foyer	568	12,576	30,586	2,200	Direct	Direct
	5pm August	10	468	1,414	0	30	30
	Zone Peak Totals:	568	12,576	30,586	2,200	30	30
	Total Zones: 1	10	468	1,414	0	30	30
	Unique Zones: 1	13,632	0.82	2.49	0	30	30



Air Handler #5 - AHU-5 - Total Load Summary

Air Handler Description: AHU-5 Constant Volume - Proportion
 Supply Air Fan: Draw-Thru with program estimated horsepower of 0.14 HP
 Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
 Sensible Heat Ratio: 0.93 --- This system occurs 1 time(s) in the building. ---
 Air System Peak Time: 5pm in August.
 Outdoor Conditions: 90° DB, 77° WB, 119.76 grains
 Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss: 12,576 Btuh
 Infiltration sensible loss: 0 Btuh
 Outside Air sensible loss: 1,192 Btuh
 Supply Duct sensible loss: 0 Btuh
 Return Duct sensible loss: 0 Btuh
 Return Plenum sensible loss: 0 Btuh
 Total System sensible loss: 13,768 Btuh

Heating Supply Air: $12,576 / (.995 \times 1.08 \times 25) =$
 Winter Vent Outside Air (6.4% of supply) = 468 CFM
 30 CFM

Zone space sensible gain: 30,586 Btuh
 Infiltration sensible gain: 0 Btuh
 Draw-thru fan sensible gain: 351 Btuh
 Supply duct sensible gain: 0 Btuh
 Reserve sensible gain: 0 Btuh
 Total sensible gain on supply side of coil: 30,937 Btuh

Cooling Supply Air: $30,937 / (.995 \times 1.1 \times 20) =$
 Summer Vent Outside Air (2.1% of supply) = 1,414 CFM
 30 CFM

Return duct sensible gain: 0 Btuh
 Return plenum sensible gain: 0 Btuh
 Outside air sensible gain: 492 Btuh
 Blow-thru fan sensible gain: 0 Btuh
 Total sensible gain on return side of coil: 492 Btuh

Total latent gain on air handling system: 2,200 Btuh
 Outside air latent gain: 0 Btuh
 Infiltration latent gain: 1,115 Btuh
 Total latent gain on air handling system: 3,315 Btuh
 Total system sensible and latent gain: 34,744 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD): 1,414 CFM
 30 CFM
 Total Air Handler Vent. Air (2.12% of Supply): 568 Sq.ft
 2.4892 CFM/Sq.ft
 196.1767 Sq.ft/Ton
 0.0051 Tons/Sq.ft
 13,768 Btuh
 2.90 Tons
 Total Heating Required With Outside Air:
 Total Cooling Required With Outside Air:

**Air Handler #6 - AHU-6 - Summary Loads**

Zn	Description	Area	Htg. Loss	Sen. Gain	Lat. Gain	Htg. O.A.	Cig. O.A.
No	Peak Time	People	Htg. CFM	Cig. CFM	S. Exh	Req. CFM	Req. CFM
		Volume	CFM/Sqft	CFM/Sqft	W. Exh	Act. CFM	Act. CFM
1	Game Room	1,032	7,511	17,079	2,200	Direct	Direct
	6pm August	10	280	790	0	30	30
		20,640	0.27	0.77	0	30	30
	Zone Peak Totals:	1,032	7,511	17,079	2,200		
	Total Zones: 1	10	280	790	0	30	30
	Unique Zones: 1	20,640	0.27	0.77	0	30	30



Air Handler #6 - AHU-6 - Total Load Summary

Air Handler Description:

AHU-6 Constant Volume - Proportion

Supply Air Fan:

Draw-Thru with program estimated horsepower of 0.08 HP

Fan Input:

80% motor and fan efficiency with 0.5 in. water across the fan

Sensible Heat Ratio:

0.89

Air System Peak Time:

6pm in August.

Outdoor Conditions:

88° DB, 76° WB, 117.17 grains

Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss:

7,511 Btuh

Infiltration sensible loss:

0 Btuh

Outside Air sensible loss:

1,192 Btuh

Supply Duct sensible loss:

0 Btuh

Return Duct sensible loss:

0 Btuh

Return Plenum sensible loss:

0 Btuh

Total System sensible loss:

=

Heating Supply Air: $7,511 / (.995 \times 1.08 \times 25) =$

=

Winter Vent Outside Air (10.7% of supply) =

=

Zone space sensible gain:

17,079 Btuh

Infiltration sensible gain:

0 Btuh

Draw-thru fan sensible gain:

196 Btuh

Supply duct sensible gain:

0 Btuh

Reserve sensible gain:

0 Btuh

Total sensible gain on supply side of coil:

=

Cooling Supply Air: $17,275 / (.995 \times 1.1 \times 20) =$

=

Summer Vent Outside Air (3.8% of supply) =

=

Return duct sensible gain:

0 Btuh

Return plenum sensible gain:

0 Btuh

Outside air sensible gain:

427 Btuh

Blow-thru fan sensible gain:

0 Btuh

Total sensible gain on return side of coil:

=

Total sensible gain on air handling system:

2,200 Btuh

Zone space latent gain:

0 Btuh

Infiltration latent gain:

0 Btuh

Outside air latent gain:

1,053 Btuh

Total latent gain on air handling system:

=

Total system sensible and latent gain:

3,253 Btuh

20,954 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):

790 CFM

Total Air Handler Vent. Air (3.80% of Supply):

30 CFM

Total Conditioned Air Space:

1,032 Sq.ft

Supply Air Per Unit Area:

0.7650 CFM/Sq.ft

Area Per Cooling Capacity:

590.9985 Sq.ft/Ton

Cooling Capacity Per Area:

0.0017 Tons/Sq.ft

Total Heating Required With Outside Air:

8,704 Btuh

Total Cooling Required With Outside Air:

1.75 Tons



Air Handler #7 - AHU-7 - Summary Loads

Zn	Description	Area	Htg.Loss	Sen.Gain	Lat.Gain	Htg.O.A.	Cig.O.A.
No	Peak Time	People	Htg.CFM	Cig.CFM	S.Exh	Req.CFM	Req.CFM
		Volume	CFM/Sqft	CFM/Sqft	W.Exh	Act.CFM	Act.CFM
26	Office 2pm August	269	1,825	4,387	220	Direct	Direct
		1	68	193	0	9	9
		2,690	0.25	0.72	0	7	8
27	Hallway 4pm August	127	1,675	1,450	0	Direct	Direct
		0	62	64	0	4	4
		1,270	0.49	0.50	0	6	3
28	Office 10am August	489	8,380	17,674	220	Direct	Direct
		1	312	778	0	32	32
		9,780	0.64	1.59	0	32	34
	Zone Peak Totals:	885	11,881	23,511	440	45	45
	Total Zones: 3	2	442	1,035	0	45	45
	Unique Zones: 3	13,740	0.50	1.17	0	45	45



Air Handler #7 - AHU-7 - Total Load Summary

Air Handler Description:

AHU-7 Constant Volume - Proportion

Supply Air Fan:

Draw-Thru with program estimated horsepower of 0.10 HP

Fan Input:

80% motor and fan efficiency with 0.5 in. water across the fan

Sensible Heat Ratio:

0.98

--- This system occurs 1 time(s) in the building. ---

Air System Peak Time:

1pm in August.

Outdoor Conditions:

90° DB, 77° WB, 120.06 grains

Because of the diversity in zone, plenum and ventilation loads, the zone sensible peak time in August at 1 am is different from the total system peak time, hence the air system CFM was computed using a zone sensible load of 22,400.

Summer: Ventilation controls outside air, ----- Winter: Ventilation controls outside air.

Zone Space sensible loss:

11,881 Btuh

Infiltration sensible loss:

0 Btuh

Outside Air sensible loss:

1,788 Btuh

Supply Duct sensible loss:

0 Btuh

Return Duct sensible loss:

0 Btuh

Return Plenum sensible loss:

0 Btuh

Total System sensible loss:

11,881 Btuh

 $\text{Heating Supply Air: } 11,881 / (.995 \times 1.08 \times 25) =$

442 CFM

Winter Vent Outside Air (10.2% of supply) =

45 CFM

Zone space sensible gain:

22,230 Btuh

Infiltration sensible gain:

0 Btuh

Draw-thru fan sensible gain:

257 Btuh

Supply duct sensible gain:

0 Btuh

Reserve sensible gain:

0 Btuh

Total sensible gain on supply side of coil:

22,487 Btuh

 $\text{Cooling Supply Air: } 22,657 / (.995 \times 1.1 \times 20) =$

1,035 CFM

Summer Vent Outside Air (4.3% of supply) =

45 CFM

Return duct sensible gain:

0 Btuh

Return plenum sensible gain:

0 Btuh

Outside air sensible gain:

738 Btuh

Blow-thru fan sensible gain:

0 Btuh

Total sensible gain on return side of coil:

738 Btuh

Total sensible gain on air handling system:

23,226 Btuh

Zone space latent gain:

440 Btuh

Infiltration latent gain:

0 Btuh

Outside air latent gain:

1,673 Btuh

Total latent gain on air handling system:

2,113 Btuh

Total system sensible and latent gain:

25,339 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):

1,035 CFM

Total Air Handler Vent. Air (4.35% of Supply):

45 CFM

Total Conditioned Air Space:

885 Sq.ft

Supply Air Per Unit Area:

1.1700 CFM/Sq.ft

Area Per Cooling Capacity:

419.1250 Sq.ft/Ton

Cooling Capacity Per Area:

0.0024 Tons/Sq.ft

Total Heating Required With Outside Air:

13,669 Btuh

Total Cooling Required With Outside Air:

2.11 Tons



Air Handler #8 - AHU-8 - Summary Loads

Zn	Description	Area	Htg Loss	Sen Gain	Lat Gain	Htg O.A.	Cig O.A.
No	Peak Time	People	CFM/Sqft	Cig CFM	S.Exh	Req.CFM	Act.CFM

18	Master Bath	327	2,756	5,174	0	Direct	14
	5pm August	0	103	232	0	Direct	11
19	Master Bedroom	585	4,446	8,940	440	Direct	25
	5pm August	2	166	401	0	Direct	19
20	Closest	267	1,708	2,947	0	Direct	5
	2pm August	0	64	132	0	Direct	6
21	Closest	203	1,313	1,672	0	Direct	4
	3pm August	0	49	75	0	Direct	4
22	Laundry	41	272	4,077	0	Direct	1
	6pm August	0	10	183	0	Direct	1
23	Hallway	55	58	290	0	Direct	1
	2pm August	0	2	13	0	Direct	1
24	Nursery	268	1,593	3,390	220	Direct	5
	2pm August	1	59	152	0	Direct	7
25	Hallway	247	621	1,441	0	Direct	3
	3pm August	0	23	65	0	Direct	5
Zone Peak Totals:		1,993	12,767	27,929	660	60	60
Total Zones: 8		3	475	1,254	0	60	60
Unique Zones: 8		30,874	0.24	0.63	0	60	60

Air Handler #8 - AHU-8 - Total Load Summary

Air Handler Description: AHU-8 Constant Volume - Proportion
Supply Air Fan: Draw-Thru with program estimated horsepower of 0.12 HP
Fan Input: 80% motor and fan efficiency with 0.5 in. water across the fan
Sensible Heat Ratio: 0.98
Air System Peak Time: 5pm in August.
Outdoor Conditions: 90° DB, 77° WB, 119.76 grains
Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Zone Space sensible loss: 12,767 Btuh
Infiltration sensible loss: 0 Btuh
Outside Air sensible loss: 2,385 Btuh
Supply Duct sensible loss: 0 Btuh
Return Duct sensible loss: 0 Btuh
Return Plenum sensible loss: 0 Btuh
Total System sensible loss: 15,152 Btuh

Heating Supply Air: 12,767 / (.995 X 1.08 X 25) =
Winter Vent Outside Air (12.6% of supply) = 475 CFM
60 CFM

Zone space sensible gain: 27,123 Btuh
Infiltration sensible gain: 0 Btuh
Draw-thru fan sensible gain: 311 Btuh
Supply duct sensible gain: 0 Btuh
Reserve sensible gain: 0 Btuh
Total sensible gain on supply side of coil: 27,434 Btuh

Cooling Supply Air: 27,434 / (.995 X 1.1 X 20) =
Summer Vent Outside Air (4.8% of supply) = 1,254 CFM
60 CFM

Return duct sensible gain: 0 Btuh
Return plenum sensible gain: 0 Btuh
Outside air sensible gain: 985 Btuh
Blow-thru fan sensible gain: 0 Btuh
Total sensible gain on return side of coil: 985 Btuh

Zone space latent gain: 660 Btuh
Infiltration latent gain: 0 Btuh
Outside air latent gain: 2,231 Btuh
Total latent gain on air handling system: 2,891 Btuh

Total system sensible and latent gain: 31,309 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD): 1,254 CFM
60 CFM
1,993 Sq.ft
0.6291 CFM/Sq.ft
763.8701 Sq.ft/Ton
0.0013 Tons/Sq.ft
Total Air Handler Vent. Air (4.79% of Supply): 60 CFM
1,993 Sq.ft
0.6291 CFM/Sq.ft
763.8701 Sq.ft/Ton
0.0013 Tons/Sq.ft
Total Heating Required With Outside Air: 15,152 Btuh
2.61 Tons
Total Cooling Required With Outside Air: 2.61 Tons



Air Handler #9 - A/C-1 - Summary Loads

Zn	Description	Area	Htg.Loss	Sen.Gain	Lat.Gain	Htg.O.A.	Cig.O.A.
No	Peak Time	People	Htg.CFM	Cig.CFM	S.Exh	Req.CFM	Req.CFM
		Volume	CFM/Sqft	CFM/Sqft	W.Exh	Act.CFM	Act.CFM
14	Exercise	272	3,444	6,662	440	Direct	Direct
	1 pm August	2	128	305	0	30	30
		2,720	0.47	1.12	0	30	30
	Zone Peak Totals:	272	3,444	6,662	440	30	30
	Total Zones: 1	2	128	305	0	30	30
	Unique Zones: 1	2,720	0.47	1.12	0	30	30

Air Handler #9 - A/C-1 - Total Load Summary

Air Handler Description: A/C-1 Constant Volume - Proportion
Supply Air Fan: Draw-Thru with program estimated horsepower of 0.01 HP
Fan Input: 80% motor and fan efficiency with 0.13 in. water across the fan
Sensible Heat Ratio: 0.94
Air System Peak Time: 1pm in August.
Outdoor Conditions: 90° DB, 77° WB, 120.06 grains
Summer: Ventilation controls outside air, ----- Winter: Ventilation controls outside air.

Zone Space sensible loss: 3,444 Btuh
Infiltration sensible loss: 0 Btuh
Outside Air sensible loss: 1,192 Btuh
Supply Duct sensible loss: 0 Btuh
Return Duct sensible loss: 0 Btuh
Return Plenum sensible loss: 0 Btuh
Total System sensible loss: 0 Btuh

Heating Supply Air: $3,444 / (.995 \times 1.08 \times 25) =$
Winter Vent Outside Air (23.4% of supply) =
Zone space sensible gain: 6,662 Btuh
Infiltration sensible gain: 0 Btuh
Draw-thru fan sensible gain: 20 Btuh
Supply duct sensible gain: 0 Btuh
Reserve sensible gain: 0 Btuh
Total sensible gain on supply side of coil:

Cooling Supply Air: $6,682 / (.995 \times 1.1 \times 20) =$
Summer Vent Outside Air (9.8% of supply) =
Return duct sensible gain: 0 Btuh
Return plenum sensible gain: 0 Btuh
Outside air sensible gain: 492 Btuh
Blow-thru fan sensible gain: 0 Btuh
Total sensible gain on return side of coil:
Total system sensible gain on air handling system: 492 Btuh

Zone space latent gain: 440 Btuh
Infiltration latent gain: 0 Btuh
Outside air latent gain: 1,115 Btuh
Total latent gain on air handling system: 1,555 Btuh
Total system sensible and latent gain: 8,730 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD): 305 CFM
Total Air Handler Vent. Air (9.82% of Supply): 30 CFM
Total Conditioned Air Space: 272 Sq.ft
Supply Air Per Unit Area: 1.1228 CFM/Sq.ft
Area Per Cooling Capacity: 373.8977 Sq.ft/Ton
Cooling Capacity Per Area: 0.0027 Tons/Sq.ft
Total Heating Required With Outside Air: 4,637 Btuh
Total Cooling Required With Outside Air: 0.73 Tons



Air System #1 (AHU-1) Psychrometric Analysis

System Load Analysis					Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition					63.795	203	0.227	55.000	9
Draw-Thru Fan									0
Misc Load on Supply Side									0
Supply Air Duct									0
Zone Loads									811
Sensible Reserve					660	1.190	17,736	19,774	0.000
Zone Condition					660	64.985	17,940	75.000	820
Return Air Duct									0.000
Return Air Plenum									0.000
Misc Load on Return Side									0.000
Vent Air 60 CFM					2,164	3.904	1,050	1.171	0.000
Blow-Thru Fan									0
Entering Coil Condition					2,824	68.889	18,990	76.171	820

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	820	x	(	76.171	-	55.000	)	=	18, Btuh
TLH	=	0.995	x	0.68	x	820	x	(	68.889	-	63.795	)	=	2,899 Btuh
SUM	=													21, Btuh
GTH	=	0.995	x	4.50	x	820	x	(	29.057	-	23.094	)	=	883 Btuh
Total System Load														814 Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	21,883	/	(	0.00	x	500	)	=	0.0 GPM
Heating GPM	=	7,661	/	(	0.00	x	500	)	=	0.0 GPM
Steam Req.	=	7,661	/		0				=	0.0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature:	76.17
Wet bulb temperature:	63.75
Relative humidity:	50.92
Enthalpy:	29.06 Btu/lbm

Leaving Cooling Coil Conditions

Dry bulb temperature:	55.00
Wet bulb temperature:	54.77
Relative humidity:	98.60
Enthalpy:	23.09 Btu/lbm

Leaving Heating Coil Conditions
Dry bulb temperature: 95.00



Air System #2 (AHU-2) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	64.999		56.000		
Draw-Thru Fan	147		0.227		7
Misc Load on Supply Side	0		0.000		0
Supply Air Duct	0		0.000		0
Zone Loads	0	0.000	12,151	18.774	585
Sensible Reserve			0	0.000	0
Zone Condition	0	64.999	12,297	75.000	592
Return Air Duct			0	0.000	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 0 CFM	0	0.000	0	0.000	
Blow-Thru Fan			0		
Entering Coil Condition	0	64.999	12,297	75.000	592

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	592	x	(	75.000	-	56.000	)	=	12,297	Btuh
TLH	=	0.995	x	0.68	x	592	x	(	64.999	-	64.999	)	=	0	Btuh
SUM	=														
GTH	=	0.995	x	4.50	x	592	x	(	28.163	-	23.525	)	=	281	Btuh
Total System Load															

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	12,281	/	(	0.00	x	500	)	=	0.0	GPM
Heating GPM	=	6,928	/	(	0.00	x	500	)	=	0.0	GPM
Steam Req.	=	6,928	/	0					=	0.0	lb./hr

Entering Cooling Coil Conditions	Dry bulb temperature:	75.00	Wet bulb temperature:	62.52	Relative humidity:	49.99	Enthalpy:	28.16	Btu/lbm
Entering Heating Coil Conditions	Dry bulb temperature:	70.00							

Leaving Cooling Coil Conditions	Dry bulb temperature:	56.00	Wet bulb temperature:	55.47	Relative humidity:	96.84	Enthalpy:	23.52	Btu/lbm
Leaving Heating Coil Conditions	Dry bulb temperature:	95.00							

Air System #3 (AHU-3) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	60.930		201	55.000	9
Draw-Thru Fan			0	0.227	0
Misc Load on Supply Side			0	0.000	0
Supply Air Duct			0	0.000	0
Zone Loads			0	0.000	0
Sensible Reserve	2,200	4.023	17,491	19.774	799
Zone Condition	2,200	64.953	17,692	75.000	809
Return Air Duct			0	0.000	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 30 CFM	1,049	1.920	558	0.631	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	3,249	66.873	18,250	75.631	809

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	809	x	(	75.631	-	55.000	)	=	18, Btuh
TLH	=	0.995	x	0.68	x	809	x	(	66.873	-	60.930	)	=	249, Btuh
SUM	=													
GTH	=	0.995	x	4.50	x	809	x	(	28.610	-	22.650	)	=	570, Btuh
Total System Load														499, Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	21,570	/	(	0.00	x	500	)	=	0.0 GPM	
Heating GPM	=	8,103	/	(	0.00	x	500	)	=	0.0 GPM	
Steam Req.	=	8,103	/	0						=	0.0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature: 75.63
 Wet bulb temperature: 63.14
 Relative humidity: 50.36
 Enthalpy: 28.61 Btu/lbm

Leaving Cooling Coil Conditions

Dry bulb temperature: 55.00
 Wet bulb temperature: 54.04
 Relative humidity: 94.23
 Enthalpy: 22.65 Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature: 65.69
 Wet bulb temperature: 50.36
 Relative humidity: 50.36
 Enthalpy: 28.61 Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature: 95.00
 Wet bulb temperature: 54.04
 Relative humidity: 94.23
 Enthalpy: 22.65 Btu/lbm



Air System #4 (AHU-4) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	62.106		55.000		
Draw-Thru Fan		282	0.227		13
Misc Load on Supply Side		0	0.000		0
Supply Air Duct		0	0.000		0
Zone Loads		24,601	19.774		1,124
Sensible Reserve		0	0.000		0
Zone Condition	2,200	64,966	24,883	75.000	1,137
Return Air Duct		0	0.000		0
Return Air Plenum		0	0.000		0
Misc Load on Return Side		0	0.000		0
Vent Air 30 CFM	1,082	1,408	525	0.422	0
Blow-Thru Fan		0	0.000		0
Entering Coil Condition	3,282	66,374	25,408	75.422	1,137

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	1,137	x	(	75.422	-	55.000	)	=	25,407	Btuh
TLH	=	0.995	x	0.68	x	1,137	x	(	66.374	-	62.106	)	=	3,240	Btuh
SUM	=														
GTH	=	0.995	x	4.50	x	1,137	x	(	28.481	-	22.832	)	=	752,752	Btuh
Total System Load															

PR = 28.752 / (0.00 x 500)
 Cooling GPM = 28.752 / (0.00 x 500)
 Heating GPM = 10.035 / (0.00 x 500)
 Steam Req. = 10.035 / 0

Entering Cooling Coil Conditions

Dry bulb temperature: 75.42
 Wet bulb temperature: 62.97
 Relative humidity: 50.34
 Enthalpy: 28.48 Btu/lbm

Leaving Cooling Coil Conditions

Dry bulb temperature: 55.00
 Wet bulb temperature: 54.34
 Relative humidity: 96.03
 Enthalpy: 22.83 Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature: 66.63
 Wet bulb temperature: 55.00
 Relative humidity: 95.00
 Enthalpy: 22.83 Btu/lbm

Leaving Heating Coil Conditions



Air System #5 (AHU-5) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	62.672		55.000		
Draw-Thru Fan			351	0.227	16
Misc Load on Supply Side			0	0.000	0
Supply Air Duct			0	0.000	0
Zone Loads			0	0.000	0
Sensible Reserve	2,200	2,301	30,586	19.774	1,398
Zone Condition	2,200	64,972	30,937	75.000	1,414
Return Air Duct			0	0.000	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 30 CFM	1,115	1.167	492	0.318	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	3,315	66.139	31,429	75.318	1,414

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	1,414	x	(	75.318	-	55.000	)	=	31,428	Btuh
TLH	=	0.995	x	0.68	x	1,414	x	(	66.139	-	62.672	)	=	3,316	Btuh
SUM	=														
GTH	=	0.995	x	4.50	x	1,414	x	(	28.419	-	22.920	)	=	799	Btuh
Total System Load															

Chilled and Hot Water Flow Rates and Steam Requirement
 Cooling GPM = 34,799 / (0.00 x 500)
 Heating GPM = 13,768 / (0.00 x 500)
 Steam Req. = 13,768 / 0

Entering Cooling Coil Conditions	Dry bulb temperature:	75.32	Wet bulb temperature:	62.88	Relative humidity:	50.33	Enthalpy:	28.42 Btu/lbm
Entering Heating Coil Conditions	Dry bulb temperature:	67.63						

Leaving Cooling Coil Conditions	Dry bulb temperature:	55.00	Wet bulb temperature:	54.49	Relative humidity:	96.91	Enthalpy:	22.92 Btu/lbm
Leaving Heating Coil Conditions	Dry bulb temperature:	95.00						

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
1.0	0.000	0.000	0.000	0.000	0.000

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	60.832		55.000		
Draw-Thru Fan			196	0.227	9
Misc Load on Supply Side			0	0.000	0
Supply Air Duct			0	0.000	0
Zone Loads	2,200	4.120	17,079	19,774	781
Sensible Reserve			0	0.000	0
Zone Condition	2,200	64.952	17,275	75.000	790
Return Air Duct			0	0.000	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 30 CFM	1,053	1.973	427	0.494	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	3,253	66.925	17,702	75.494	790

PR	=	(Barometric pressure of site / Standard ASHRAE pressure of 29.921)
TSH	=	PR x 1.10 x CFM x (DB entering - DB leaving)
TLH	=	PR x 0.68 x CFM x (Grains entering - Grains leaving)
GTH	=	PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

Total System Load														
TSH	=	0.995	x	1.10	x	790	x	(	75.494	-	55.000	) =	17, Btuh	701
TLH	=	0.995	x	0.68	x	790	x	(	66.925	-	60.832	) =	3.2 Btuh	54
SUM	=												20, Btuh	955
GTH	=	0.995	x	4.50	x	790	x	(	28.585	-	22.634	) =	21, Btuh	026
												=	20, Btuh	954

Cooling GPM	=	21,026 / (	0.00	x	500	)	=	0.0 GPM
Heating GPM	=	8,704 / (	0.00	x	500	)	=	0.0 GPM
Steam Req.	=	8,704 /	0					= 0.0 lb./hr

Entering Cooling Coil Conditions	Dry bulb temperature:	75.49	Dry bulb temperature:	66.03
	Wet bulb temperature:	63.11		
	Relative humidity:	50.62		
	Enthalpy:	28.58 Btu/lbm		
Entering Heating Coil Conditions				

Leaving Cooling Coil Conditions	Dry bulb temperature:	55.00	Dry bulb temperature:	95.00
	Wet bulb temperature:	54.02		
	Relative humidity:	94.07		
	Enthalpy:	22.63 Btu/lbm		
Leaving Heating Coil Conditions				

Air System #7 (AHU-7) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	64.363		257	55.000	12
Draw-Thru Fan				0.227	0
Misc Load on Supply Side				0.000	0
Supply Air Duct				0.000	0
Zone Loads				19.774	1,024
Sensible Reserve	440	0.628	22,400	0.000	0
Zone Condition	440	64.992	22,657	75.000	1,035
Return Air Duct				0.000	
Return Air Plenum				0.000	
Misc Load on Return Side				0.000	
Vent Air 45 CFM	1,673	2.389	738	0.652	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	2,113	67.381	23,395	75.652	1,035

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	1,035	x	(	75.652	-	55.000	)	=	23,395	Btuh
TLH	=	0.995	x	0.68	x	1,035	x	(	67.381	-	64.363	)	=	395	Btuh
														13	
SUM	=														
GTH	=	0.995	x	4.50	x	1,035	x	(	28.695	-	23.182	)	=	547	Btuh
														25,	
Total System Load														339	

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	25,547	/	(	0.00	x	500	)	=	0.0	GPM
Heating GPM	=	13,669	/	(	0.00	x	500	)	=	0.0	GPM
Steam Req.	=	13,669	/	0					=	0.0	lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature: 75.65
 Wet bulb temperature: 63.26
 Relative humidity: 50.69
 Enthalpy: 28.69 Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature: 66.24

Leaving Cooling Coil Conditions

Dry bulb temperature: 55.00
 Wet bulb temperature: 54.91
 Relative humidity: 99.48
 Enthalpy: 23.18 Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature: 95.00



Air System #8 (AHU-8) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	64.211		55.000		
Draw-Thru Fan		311	0.227		14
Misc Load on Supply Side		0	0.000		0
Supply Air Duct		0	0.000		0
Zone Loads		0	0.000		0
Sensible Reserve	660	0.778	27,123	19.774	1,240
Zone Condition	660	64.990	27,434	75.000	1,254
Return Air Duct		0	0.000		0
Return Air Plenum		0	0.000		0
Misc Load on Return Side		0	0.000		0
Vent Air 60 CFM	2,231	2.631	985	0.718	0.000
Blow-Thru Fan			0		
Entering Coil Condition	2,891	67.621	28,418	75.718	1,254

General Psychrometric Equations Used in Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
 TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
 TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
 GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.995	x	1.10	x	1,254	x	(	75.718	-	55.000	)	=	28, Bluh
TLH	=	0.995	x	0.68	x	1,254	x	(	67.621	-	64.211	)	=	418 Bluh
SUM	=													
GTH	=	0.995	x	4.50	x	1,254	x	(	28.748	-	23.158	)	=	367 Bluh
Total System Load														309 Bluh

PR = 31,367 / (0.00 x 500) = 0.0 GPM
 Heating GPM = 15,152 / (0.00 x 500) = 0.0 GPM
 Steam Req. = 15,152 / 0 = 0.0 lb./hr

Entering Cooling Coil Conditions	Dry bulb temperature:	75.72	Wet bulb temperature:	63.33	Relative humidity:	50.76	Enthalpy:	28.75 Btu/lbm
Entering Heating Coil Conditions	Dry bulb temperature:	65.33						

Leaving Cooling Coil Conditions	Dry bulb temperature:	55.00	Wet bulb temperature:	54.87	Relative humidity:	99.23	Enthalpy:	23.16 Btu/lbm
Leaving Heating Coil Conditions	Dry bulb temperature:	95.00						

Air System #9 (A/C-1) Psychrometric Analysis

System Load Analysis		Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition	62.863			55.000		
Draw-Thru Fan				20		1
Misc Load on Supply Side				0		0
Supply Air Duct				0		0
Zone Loads				0		0
Sensible Reserve	440	2.130	6,662	0	19.941	304
Zone Condition	440	64.993	6,682	75.000		305
Return Air Duct				0		
Return Air Plenum				0		
Misc Load on Return Side				0		
Vent Air 30 CFM	1,115	5.401	492	1.474		
Blow-Thru Fan				0		
Entering Coil Condition	1,555	70.394	7,174	76.474		305

General Psychometric Equations Used In Analysis:

[illegible]

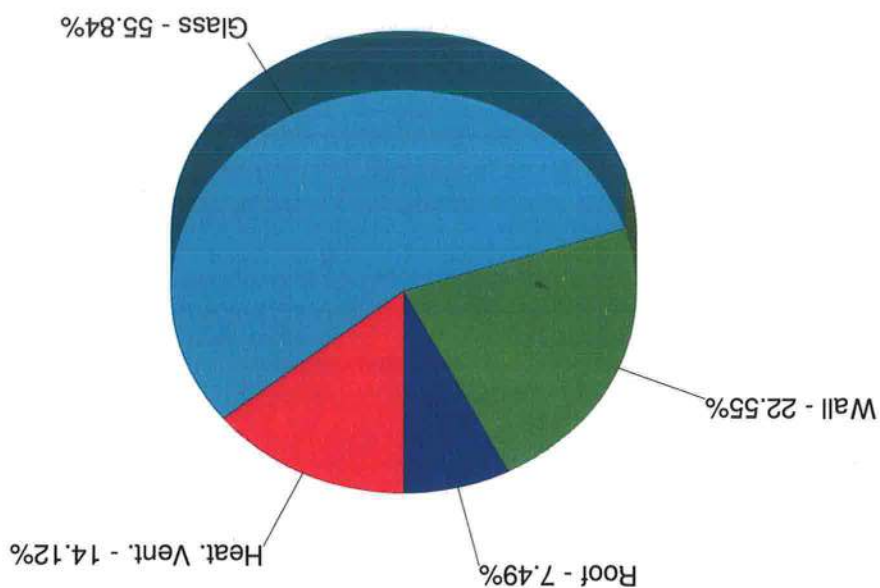
Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	8,771	/	(	0.00	x	500	)	=	0.0 GPM
Heating GPM	=	4,637	/	(	0.00	x	500	)	=	0.0 GPM
Steam Req.	=	4,637	/		0				=	0.0 lb./hr

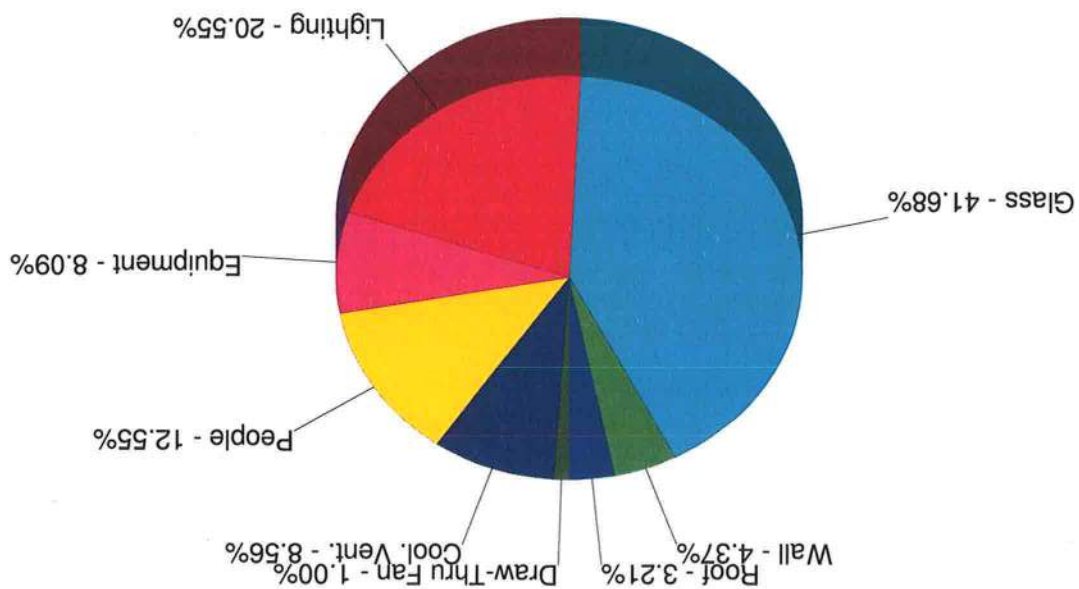
Entering Cooling Coil Conditions	Dry bulb temperature:	76.47	Dry bulb temperature:	61.35
	Wet bulb temperature:	64.16		
	Relative humidity:	51.49		
	Enthalpy:	29.37 Btu/lbm		
Entering Heating Coil Conditions				

Leaving Cooling Coil Conditions	55.00	Dry bulb temperature:	95.00
	54.53	Wet bulb temperature:	
	97.16	Relative humidity:	
	22.95	Enthalpy:	
Leaving Heating Coil Conditions		Dry bulb temperature:	

Building
Loss
88,656
Btu/h



Building
Net
Gain
197,199
Btu/h



Building peaks in August at 4pm.

Building Pie Charts

Chvac - Full Commercial HVAC Loads Calculation Program



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