

Air System Sizing Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

Air System Information

Air System Name HVAC 1
Equipment Class SPLT AHU
Air System Type SZCAV

Number of zones 1
Floor Area 2437.0 ft²
Location Annandale, Virginia

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load 6.3 Tons
Total coil load 75.1 MBH
Sensible coil load 66.4 MBH
Coil CFM at Aug 1800 4103 CFM
Max block CFM 4103 CFM
Sum of peak zone CFM 4103 CFM
Sensible heat ratio 0.884
CFM/Ton 655.7
ft²/Ton 389.5
BTU/(hr-ft²) 30.8
Water flow @ 10.0 °F rise N/A

Load occurs at Aug 1800
OA DB / WB 89.2 / 73.0 °F
Entering DB / WB 76.6 / 65.9 °F
Leaving DB / WB 61.1 / 60.0 °F
Coil ADP 59.3 °F
Bypass Factor 0.100
Resulting RH 58 %
Design supply temp. 58.0 °F
Zone T-stat Check 1 of 1 OK
Max zone temperature deviation 0.0 °F

Central Heating Coil Sizing Data

Max coil load 72.3 MBH
Coil CFM at Des Htg 4103 CFM
Max coil CFM 4103 CFM
Water flow @ 20.0 °F drop N/A

Load occurs at Des Htg
BTU/(hr-ft²) 29.7
Ent. DB / Lvg DB 66.7 / 83.5 °F

Supply Fan Sizing Data

Actual max CFM 4103 CFM
Standard CFM 3965 CFM
Actual max CFM/ft² 1.68 CFM/ft²

Fan motor BHP 0.00 BHP
Fan motor kW 0.00 kW
Fan static 0.00 in wg

Outdoor Ventilation Air Data

Design airflow CFM 174 CFM
CFM/ft² 0.07 CFM/ft²

CFM/person 5.80 CFM/person

Zone Sizing Summary for HVAC 1

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Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft ²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	4103	4103	1.68	0.0	-	0.0	-	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft ²)
Zone 1	68.9	Jul 1800	65.0	2437.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft ²)	Space CFM/ft ²
Zone 1							
Bath 2	1	1.6	Jul 2000	89	1.8	44.0	2.01
Bath 3	1	1.5	Jul 2000	85	1.7	44.0	1.93
Bath 4	1	1.7	Jul 2000	97	1.9	47.0	2.07
Bedroom 2	1	6.5	Sep 1400	365	4.8	182.0	2.01
Bedroom 3	1	6.2	Sep 1400	349	4.4	160.0	2.18
Bedroom 4	1	5.3	Jul 1800	298	5.0	186.0	1.60
Dinning & living room	1	11.2	Jul 1800	629	10.9	400.0	1.57
Foyer	1	5.7	Aug 1800	321	6.7	245.0	1.31
Kitchen	1	8.5	Jul 1800	481	6.8	352.0	1.37
Laundry	1	2.0	Jul 2000	111	2.0	56.0	1.97
Master Bath	1	3.6	Jul 1800	204	3.5	132.0	1.54
Master Bedroom	1	9.0	Jul 1800	507	6.9	295.0	1.72
Office	1	6.3	Sep 1400	353	4.4	167.0	2.12
WIC 1	1	2.3	Jul 1900	127	2.6	85.0	1.50
WIC 2	1	1.5	Aug 2000	86	1.7	42.0	2.05

Ventilation Sizing Summary for HVAC 1

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11/18/2024
04:02PM

1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **174** CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
Bath 2	1	44.0	1.0	88.6	0.00	0.00	0.0	0.0	0.0
Bath 3	1	44.0	1.0	85.1	0.00	0.00	0.0	0.0	0.0
Bath 4	1	47.0	1.0	97.1	0.00	0.00	0.0	0.0	0.0
Bedroom 2	1	182.0	2.0	365.4	5.00	0.06	0.0	0.0	20.9
Bedroom 3	1	160.0	2.0	349.3	5.00	0.06	0.0	0.0	19.6
Bedroom 4	1	186.0	2.0	298.4	5.00	0.06	0.0	0.0	21.2
Dinning & living room	1	400.0	5.0	628.9	0.00	0.00	0.0	0.0	0.0
Foyer	1	245.0	5.0	320.8	0.00	0.00	0.0	0.0	0.0
Kitchen	1	352.0	3.0	480.5	7.50	0.12	0.0	0.0	64.7
Laundry	1	56.0	1.0	110.5	0.00	0.00	0.0	0.0	0.0
Master Bath	1	132.0	1.0	203.9	0.00	0.00	0.0	0.0	0.0
Master Bedroom	1	295.0	2.0	507.3	5.00	0.06	0.0	0.0	27.7
Office	1	167.0	2.0	353.4	5.00	0.06	0.0	0.0	20.0
WIC 1	1	85.0	1.0	127.3	0.00	0.00	0.0	0.0	0.0
WIC 2	1	42.0	1.0	86.0	0.00	0.00	0.0	0.0	0.0
Totals (incl. Space Multipliers)				4102.5					174.1

Air System Design Load Summary for HVAC 1

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11/18/2024
04:02PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	353 ft²	7729	-	353 ft²	-	-
Wall Transmission	6013 ft²	13917	-	6013 ft²	32978	-
Roof Transmission	2433 ft²	4059	-	2433 ft²	4422	-
Window Transmission	353 ft²	2630	-	353 ft²	12022	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	895 ft²	3407	-	895 ft²	15573	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	3900 ft²	0	-	3900 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2437 W	7312	-	0	0	-
Task Lighting	2437 W	7758	-	0	0	-
Electric Equipment	1700 W	5488	-	0	0	-
People	30	6242	6150	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	8781	308	0%	0	0
>> Total Zone Loads	-	67323	6458	-	64995	0
Zone Conditioning	-	64009	6458	-	61892	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	4103 CFM	0	-	4103 CFM	0	-
Ventilation Load	174 CFM	2396	2202	174 CFM	10377	0
Supply Fan Load	4103 CFM	0	-	4103 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	66405	8659	-	72269	0
Central Cooling Coil	-	66405	8673	-	0	0
Central Heating Coil	-	0	-	-	72269	-
Terminal Reheat Coils	-	0	-	-	0	-
>> Total Conditioning	-	66405	8673	-	72269	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for HVAC 1

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11/18/2024
04:02PM

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 89.2 °F / 73.0 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	353 ft²	8821	-	353 ft²	-	-
Wall Transmission	6013 ft²	13791	-	6013 ft²	32978	-
Roof Transmission	2433 ft²	4459	-	2433 ft²	4422	-
Window Transmission	353 ft²	2630	-	353 ft²	12022	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	895 ft²	3407	-	895 ft²	15573	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	3900 ft²	0	-	3900 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2437 W	7312	-	0	0	-
Task Lighting	2437 W	7758	-	0	0	-
Electric Equipment	1700 W	5488	-	0	0	-
People	30	6242	6150	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	8986	308	0%	0	0
>> Total Zone Loads	-	68893	6458	-	64995	0

Space Design Load Summary for HVAC 1

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04:02PM

TABLE 1.1.A. Component Loads For Space "Bath 2" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 84.4 °F / 71.7 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	256 ft²	606	-	256 ft²	1404	-
Roof Transmission	44 ft²	59	-	44 ft²	80	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	220 ft²	0	-	220 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	44 W	134	-	0	0	-
Task Lighting	44 W	141	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	205	10	0%	0	0
>> Total Zone Loads	-	1573	215	-	1797	0

TABLE 1.1.B. Envelope Loads For Space "Bath 2" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	87	0.095	-	150	-	477
S EXPOSURE						
WALL	69	0.095	-	161	-	378
DOOR	18	0.300	-	52	-	313
E EXPOSURE						
WALL	50	0.095	-	143	-	274
W EXPOSURE						
WALL	50	0.095	-	152	-	274
H EXPOSURE						
ROOF	44	0.031	-	59	-	80

Space Design Load Summary for HVAC 1

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04:02PM

TABLE 1.2.A. Component Loads For Space "Bath 3" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 84.4 °F / 71.7 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	232 ft²	557	-	232 ft²	1272	-
Roof Transmission	40 ft²	53	-	40 ft²	73	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	250 ft²	0	-	250 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	44 W	134	-	0	0	-
Task Lighting	44 W	141	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	197	10	0%	0	0
>> Total Zone Loads	-	1510	215	-	1658	0

TABLE 1.2.B. Envelope Loads For Space "Bath 3" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	75	0.095	-	130	-	411
S EXPOSURE						
WALL	57	0.095	-	133	-	313
DOOR	18	0.300	-	52	-	313
E EXPOSURE						
WALL	50	0.095	-	143	-	274
W EXPOSURE						
WALL	50	0.095	-	152	-	274
H EXPOSURE						
ROOF	40	0.031	-	53	-	73

Space Design Load Summary for HVAC 1

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04:02PM

TABLE 1.3.A. Component Loads For Space "Bath 4" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 84.4 °F / 71.7 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	266 ft²	714	-	266 ft²	1459	-
Roof Transmission	47 ft²	63	-	47 ft²	85	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	192 ft²	0	-	192 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	47 W	143	-	0	0	-
Task Lighting	47 W	151	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	225	10	0%	0	0
>> Total Zone Loads	-	1723	215	-	1858	0

TABLE 1.3.B. Envelope Loads For Space "Bath 4" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	32	0.095	-	55	-	176
DOOR	18	0.300	-	52	-	313
S EXPOSURE						
WALL	50	0.095	-	117	-	274
E EXPOSURE						
WALL	92	0.095	-	263	-	505
W EXPOSURE						
WALL	92	0.095	-	279	-	505
H EXPOSURE						
ROOF	47	0.031	-	63	-	85

Space Design Load Summary for HVAC 1

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11/18/2024
04:02PM

TABLE 1.4.A. Component Loads For Space "Bedroom 2" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1400 COOLING OA DB / WB 88.3 °F / 71.7 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	38 ft²	2570	-	38 ft²	-	-
Wall Transmission	465 ft²	598	-	465 ft²	2548	-
Roof Transmission	182 ft²	251	-	182 ft²	331	-
Window Transmission	38 ft²	219	-	38 ft²	1279	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	107	-	36 ft²	626	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	269 ft²	0	-	269 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	182 W	556	-	0	0	-
Task Lighting	182 W	585	-	0	0	-
Electric Equipment	100 W	325	-	0	0	-
People	2	426	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	846	21	0%	0	0
>> Total Zone Loads	-	6485	431	-	4784	0

TABLE 1.4.B. Envelope Loads For Space "Bedroom 2" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	95	0.095	-	43	-	521
DOOR	36	0.300	-	107	-	626
S EXPOSURE						
WALL	94	0.095	-	175	-	513
WINDOW 1	38	0.588	0.811	219	2570	1279
E EXPOSURE						
WALL	138	0.095	-	255	-	757
W EXPOSURE						
WALL	138	0.095	-	125	-	757
H EXPOSURE						
ROOF	182	0.031	-	251	-	331

Space Design Load Summary for HVAC 1

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11/18/2024
04:02PM

TABLE 1.5.A. Component Loads For Space "Bedroom 3" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1400			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 88.3 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	38 ft²	2570	-	38 ft²	-	-
Wall Transmission	453 ft²	572	-	453 ft²	2482	-
Roof Transmission	160 ft²	221	-	160 ft²	291	-
Window Transmission	38 ft²	219	-	38 ft²	1279	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	54	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	390 ft²	0	-	390 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	160 W	489	-	0	0	-
Task Lighting	160 W	514	-	0	0	-
Electric Equipment	100 W	325	-	0	0	-
People	2	426	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	809	21	0%	0	0
>> Total Zone Loads	-	6199	431	-	4365	0

TABLE 1.5.B. Envelope Loads For Space "Bedroom 3" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING	COOLING	HEATING
				TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	98	0.095	-	45	-	538
DOOR	18	0.300	-	54	-	313
S EXPOSURE						
WALL	79	0.095	-	147	-	431
WINDOW 1	38	0.588	0.811	219	2570	1279
E EXPOSURE						
WALL	138	0.095	-	255	-	757
W EXPOSURE						
WALL	138	0.095	-	125	-	757
H EXPOSURE						
ROOF	160	0.031	-	221	-	291

Space Design Load Summary for HVAC 1

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11/18/2024
04:02PM

TABLE 1.6.A. Component Loads For Space "Bedroom 4" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	38 ft²	762	-	38 ft²	-	-
Wall Transmission	509 ft²	1197	-	509 ft²	2789	-
Roof Transmission	186 ft²	341	-	186 ft²	338	-
Window Transmission	38 ft²	280	-	38 ft²	1279	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	137	-	36 ft²	626	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	582 ft²	0	-	582 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	186 W	558	-	0	0	-
Task Lighting	186 W	592	-	0	0	-
Electric Equipment	100 W	323	-	0	0	-
People	2	416	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	691	21	0%	0	0
>> Total Zone Loads	-	5296	431	-	5032	0

TABLE 1.6.B. Envelope Loads For Space "Bedroom 4" In Zone "Zone 1"

		U-Value	Shade	COOLING	COOLING	HEATING
	Area			TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	81	0.095	-	124	-	442
WINDOW 1	38	0.588	0.811	280	762	1279
S EXPOSURE						
WALL	82	0.095	-	179	-	450
DOOR	36	0.300	-	137	-	626
E EXPOSURE						
WALL	125	0.095	-	362	-	686
W EXPOSURE						
WALL	221	0.095	-	531	-	1212
H EXPOSURE						
ROOF	186	0.031	-	341	-	338

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.7.A. Component Loads For Space "Dinning & living room" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 89.2 °F / 73.0 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	105 ft²	2133	-	105 ft²	-	-
Wall Transmission	495 ft²	1059	-	495 ft²	2715	-
Roof Transmission	400 ft²	733	-	400 ft²	727	-
Window Transmission	105 ft²	783	-	105 ft²	3581	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	220 ft²	838	-	220 ft²	3828	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	240 ft²	0	-	240 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	400 W	1200	-	0	0	-
Task Lighting	400 W	1273	-	0	0	-
Electric Equipment	200 W	646	-	0	0	-
People	5	1040	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1456	51	0%	0	0
>> Total Zone Loads	-	11161	1076	-	10851	0

TABLE 1.7.B. Envelope Loads For Space "Dinning & living room" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	145	0.095	-	224	-	795
WINDOW 1	30	0.588	0.811	224	609	1023
WINDOW 2	75	0.588	0.811	560	1523	2558
S EXPOSURE						
WALL	140	0.095	-	306	-	768
DOOR	110	0.300	-	419	-	1914
E EXPOSURE						
WALL	50	0.095	-	145	-	274
DOOR	110	0.300	-	419	-	1914
W EXPOSURE						
WALL	160	0.095	-	384	-	878
H EXPOSURE						
ROOF	400	0.031	-	733	-	727

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.8.A. Component Loads For Space "Foyer" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	388 ft²	919	-	388 ft²	2128	-
Roof Transmission	245 ft²	409	-	245 ft²	445	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	238 ft²	906	-	238 ft²	4141	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	100 ft²	0	-	100 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	245 W	735	-	0	0	-
Task Lighting	245 W	780	-	0	0	-
Electric Equipment	50 W	161	-	0	0	-
People	5	1040	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	743	51	0%	0	0
>> Total Zone Loads	-	5693	1076	-	6715	0

TABLE 1.8.B. Envelope Loads For Space "Foyer" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	TRANS (BTU/hr)	SOLAR (BTU/hr)	TRANS (BTU/hr)
N EXPOSURE						
WALL	58	0.095	-	79	-	318
DOOR	110	0.300	-	419	-	1914
S EXPOSURE						
WALL	168	0.095	-	445	-	921
E EXPOSURE						
WALL	35	0.095	-	98	-	192
DOOR	110	0.300	-	419	-	1914
W EXPOSURE						
WALL	127	0.095	-	298	-	697
DOOR	18	0.300	-	69	-	313
H EXPOSURE						
ROOF	245	0.031	-	409	-	445

Space Design Load Summary for HVAC 1

Project Name: 109
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11/18/2024
04:02PM

TABLE 1.9.A. Component Loads For Space "Kitchen" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	15 ft²	305	-	15 ft²	-	-
Wall Transmission	625 ft²	1451	-	625 ft²	3428	-
Roof Transmission	352 ft²	645	-	352 ft²	640	-
Window Transmission	15 ft²	112	-	15 ft²	512	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	128 ft²	487	-	128 ft²	2227	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	160 ft²	0	-	160 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	352 W	1056	-	0	0	-
Task Lighting	352 W	1121	-	0	0	-
Electric Equipment	500 W	1614	-	0	0	-
People	3	624	615	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1112	31	0%	0	0
>> Total Zone Loads	-	8527	646	-	6807	0

TABLE 1.9.B. Envelope Loads For Space "Kitchen" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	149	0.095	-	230	-	817
WINDOW 1	15	0.588	0.811	112	305	512
S EXPOSURE						
WALL	146	0.095	-	319	-	801
DOOR	18	0.300	-	69	-	313
E EXPOSURE						
WALL	220	0.095	-	638	-	1207
W EXPOSURE						
WALL	110	0.095	-	264	-	603
DOOR	110	0.300	-	419	-	1914
H EXPOSURE						
ROOF	352	0.031	-	645	-	640

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.10.A. Component Loads For Space "Laundry" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	284 ft²	690	-	284 ft²	1558	-
Roof Transmission	56 ft²	75	-	56 ft²	102	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	300 ft²	0	-	300 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	56 W	171	-	0	0	-
Task Lighting	56 W	180	-	0	0	-
Electric Equipment	100 W	325	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	256	10	0%	0	0
>> Total Zone Loads	-	1961	215	-	1973	0

TABLE 1.10.B. Envelope Loads For Space "Laundry" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	86	0.095	-	149	-	472
S EXPOSURE						
WALL	68	0.095	-	159	-	373
DOOR	18	0.300	-	52	-	313
E EXPOSURE						
WALL	65	0.095	-	186	-	357
W EXPOSURE						
WALL	65	0.095	-	197	-	357
H EXPOSURE						
ROOF	56	0.031	-	75	-	102

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.11.A. Component Loads For Space "Master Bath" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	15 ft²	305	-	15 ft²	-	-
Wall Transmission	447 ft²	1072	-	447 ft²	2452	-
Roof Transmission	132 ft²	242	-	132 ft²	240	-
Window Transmission	15 ft²	112	-	15 ft²	512	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	69	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	240 ft²	0	-	240 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	132 W	396	-	0	0	-
Task Lighting	132 W	420	-	0	0	-
Electric Equipment	100 W	323	-	0	0	-
People	1	208	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	472	10	0%	0	0
>> Total Zone Loads	-	3618	215	-	3516	0

TABLE 1.11.B. Envelope Loads For Space "Master Bath" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	70	0.095	-	108	-	384
WINDOW 1	15	0.588	0.811	112	305	512
S EXPOSURE						
WALL	85	0.095	-	186	-	466
E EXPOSURE						
WALL	155	0.095	-	449	-	850
W EXPOSURE						
WALL	137	0.095	-	329	-	751
DOOR	18	0.300	-	69	-	313
H EXPOSURE						
ROOF	132	0.031	-	242	-	240

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.12.A. Component Loads For Space "Master Bedroom" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	68 ft²	2680	-	68 ft²	-	-
Wall Transmission	558 ft²	1323	-	558 ft²	3058	-
Roof Transmission	295 ft²	541	-	295 ft²	536	-
Window Transmission	68 ft²	504	-	68 ft²	2302	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	57 ft²	217	-	57 ft²	992	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	145 ft²	0	-	145 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	295 W	885	-	0	0	-
Task Lighting	295 W	939	-	0	0	-
Electric Equipment	100 W	323	-	0	0	-
People	2	416	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1174	21	0%	0	0
>> Total Zone Loads	-	9002	431	-	6888	0

TABLE 1.12.B. Envelope Loads For Space "Master Bedroom" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	93	0.095	-	143	-	507
WINDOW 1	38	0.588	0.811	280	762	1279
S EXPOSURE						
WALL	109	0.095	-	238	-	598
DOOR	21	0.300	-	80	-	365
E EXPOSURE						
WALL	175	0.095	-	507	-	960
DOOR	36	0.300	-	137	-	626
W EXPOSURE						
WALL	181	0.095	-	435	-	993
WINDOW 1	30	0.588	0.811	224	1919	1023
H EXPOSURE						
ROOF	295	0.031	-	541	-	536

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.13.A. Component Loads For Space "Office" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1400			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 88.3 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	38 ft²	2570	-	38 ft²	-	-
Wall Transmission	461 ft²	581	-	461 ft²	2526	-
Roof Transmission	167 ft²	230	-	167 ft²	304	-
Window Transmission	38 ft²	219	-	38 ft²	1279	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	54	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	258 ft²	0	-	258 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	167 W	510	-	0	0	-
Task Lighting	167 W	537	-	0	0	-
Electric Equipment	100 W	325	-	0	0	-
People	2	426	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	818	21	0%	0	0
>> Total Zone Loads	-	6271	431	-	4421	0

TABLE 1.13.B. Envelope Loads For Space "Office" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	102	0.095	-	46	-	559
DOOR	18	0.300	-	54	-	313
S EXPOSURE						
WALL	83	0.095	-	154	-	452
WINDOW 1	38	0.588	0.811	219	2570	1279
E EXPOSURE						
WALL	138	0.095	-	255	-	757
W EXPOSURE						
WALL	138	0.095	-	125	-	757
H EXPOSURE						
ROOF	167	0.031	-	230	-	304

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.14.A. Component Loads For Space "WIC 1" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1900 COOLING OA DB / WB 86.8 °F / 72.3 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	332 ft²	805	-	332 ft²	1821	-
Roof Transmission	85 ft²	136	-	85 ft²	154	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	121	-	36 ft²	626	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	292 ft²	0	-	292 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	85 W	257	-	0	0	-
Task Lighting	85 W	272	-	0	0	-
Electric Equipment	50 W	162	-	0	0	-
People	1	211	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	295	10	0%	0	0
>> Total Zone Loads	-	2259	215	-	2602	0

TABLE 1.14.B. Envelope Loads For Space "WIC 1" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	76	0.095	-	125	-	417
S EXPOSURE						
WALL	76	0.095	-	173	-	417
E EXPOSURE						
WALL	90	0.095	-	261	-	494
DOOR	18	0.300	-	60	-	313
W EXPOSURE						
WALL	90	0.095	-	247	-	494
DOOR	18	0.300	-	60	-	313
H EXPOSURE						
ROOF	85	0.031	-	136	-	154

Space Design Load Summary for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.15.A. Component Loads For Space "WIC 2" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	244 ft²	587	-	244 ft²	1338	-
Roof Transmission	42 ft²	49	-	42 ft²	76	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	262 ft²	0	-	262 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	42 W	128	-	0	0	-
Task Lighting	42 W	135	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	199	10	0%	0	0
>> Total Zone Loads	-	1526	215	-	1728	0

TABLE 1.15.B. Envelope Loads For Space "WIC 2" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	76	0.095	-	115	-	417
S EXPOSURE						
WALL	76	0.095	-	213	-	417
E EXPOSURE						
WALL	55	0.095	-	151	-	302
W EXPOSURE						
WALL	37	0.095	-	108	-	203
DOOR	18	0.300	-	52	-	313
H EXPOSURE						
ROOF	42	0.031	-	49	-	76

System Psychrometrics for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

August DESIGN COOLING DAY, 1800

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	89.2	0.01430	174	400	2396	2202
Vent - Return Mixing	Outlet	76.6	0.01166	4103	1716	-	-
Central Cooling Coil	Outlet	61.1	0.01120	4103	1716	66405	8673
Central Heating Coil	Outlet	61.1	0.01120	4103	1716	0	-
Supply Fan	Outlet	61.1	0.01120	4103	1716	0	-
Cold Supply Duct	Outlet	61.1	0.01120	4103	1716	-	-
Zone Air	-	76.0	0.01154	4103	1774	64009	6458
Return Plenum	Outlet	76.0	0.01154	4103	1774	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.044 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4587.9 BTU/(hr-CFM)

Site Altitude = 938.0 ft

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	67323	Cooling	64009	76.0	4103	1774	0	0

System Psychrometrics for HVAC 1

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	12.0	0.00075	174	400	-10377	0
Vent - Return Mixing	Outlet	66.7	0.00075	4103	618	-	-
Central Cooling Coil	Outlet	66.7	0.00075	4103	618	0	0
Central Heating Coil	Outlet	83.5	0.00075	4103	618	72269	-
Supply Fan	Outlet	83.5	0.00075	4103	618	0	-
Cold Supply Duct	Outlet	83.5	0.00075	4103	618	-	-
Zone Air	-	69.1	0.00075	4103	628	-61892	0
Return Plenum	Outlet	69.1	0.00075	4103	628	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.044 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4587.9 BTU/(hr-CFM)
Site Altitude = 938.0 ft

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	-64995	Heating	-61892	69.1	4103	628	0	0

System Psychrometrics for HVAC 1

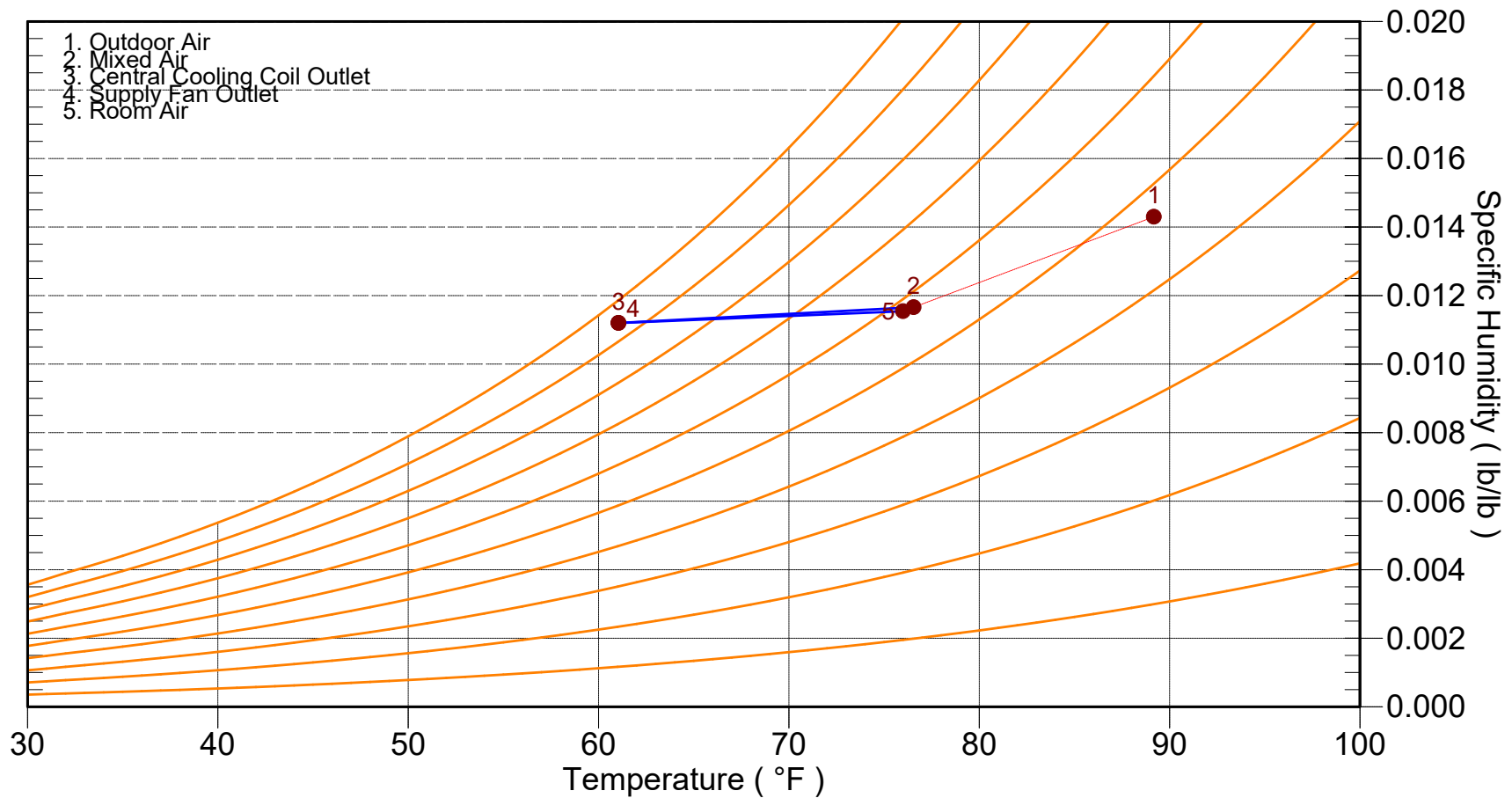
Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

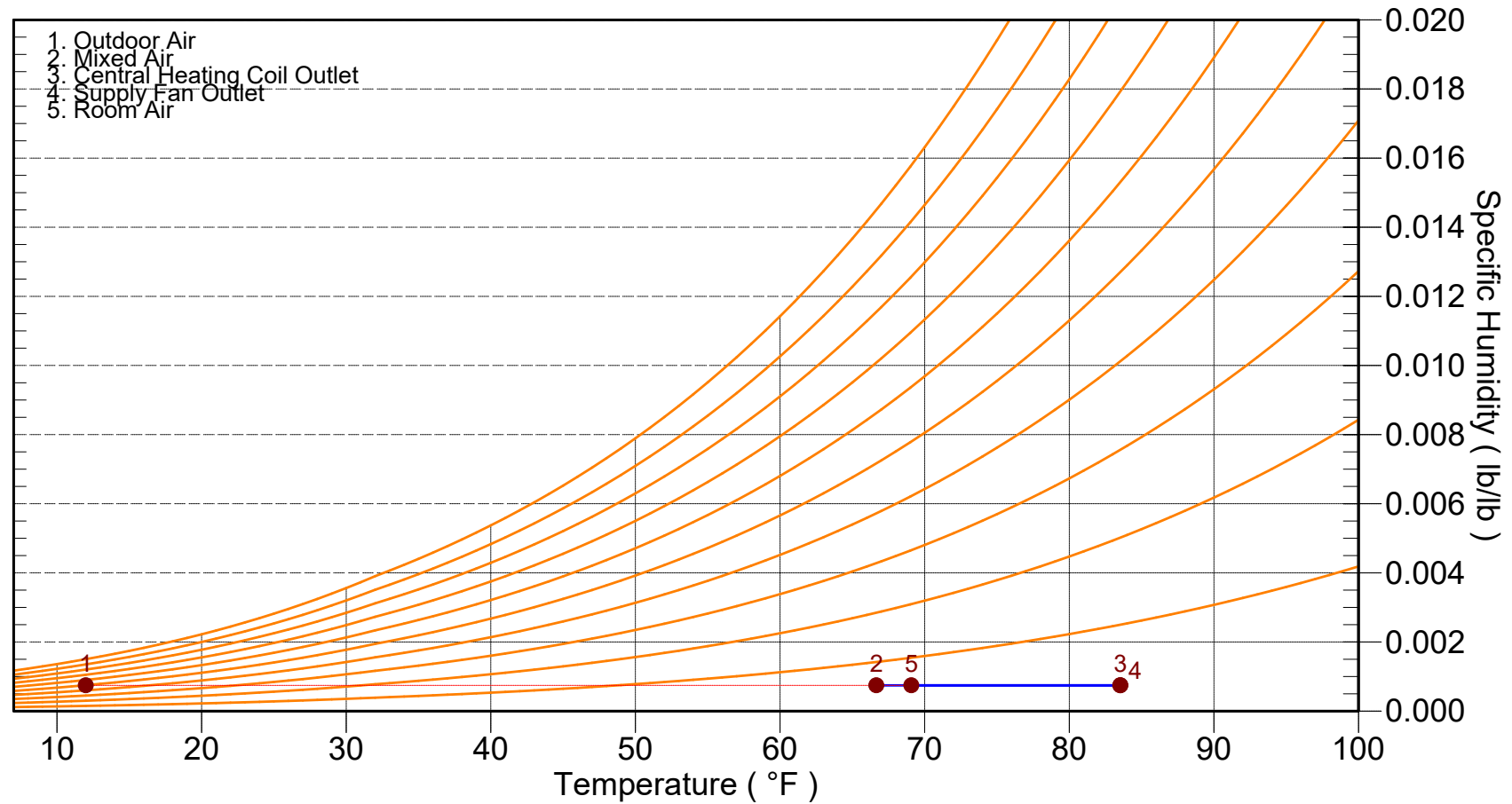
Location: Annandale, Virginia

Altitude: 938.0 ft.

Data for: August DESIGN COOLING DAY, 1800



Location: Annandale, Virginia
Altitude: 938.0 ft.
Data for: WINTER DESIGN HEATING



Air System Sizing Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

Air System Information

Air System Name HVAC 2
Equipment Class SPLT AHU
Air System Type SZCAV

Number of zones 1
Floor Area 2225.0 ft²
Location Annandale, Virginia

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load 4.8 Tons
Total coil load 57.3 MBH
Sensible coil load 48.6 MBH
Coil CFM at Jul 2000 2431 CFM
Max block CFM 2431 CFM
Sum of peak zone CFM 2431 CFM
Sensible heat ratio 0.849
CFM/Ton 509.2
ft²/Ton 466.1
BTU/(hr-ft²) 25.7
Water flow @ 10.0 °F rise N/A

Load occurs at Jul 2000
OA DB / WB 84.4 / 71.7 °F
Entering DB / WB 76.6 / 64.1 °F
Leaving DB / WB 57.5 / 56.0 °F
Coil ADP 54.8 °F
Bypass Factor 0.120
Resulting RH 51 %
Design supply temp. 55.0 °F
Zone T-stat Check 1 of 1 OK
Max zone temperature deviation 0.0 °F

Central Heating Coil Sizing Data

Max coil load 47.3 MBH
Coil CFM at Des Htg 2431 CFM
Max coil CFM 2431 CFM
Water flow @ 20.0 °F drop N/A

Load occurs at Des Htg
BTU/(hr-ft²) 21.3
Ent. DB / Lvg DB 65.1 / 83.8 °F

Supply Fan Sizing Data

Actual max CFM 2431 CFM
Standard CFM 2349 CFM
Actual max CFM/ft² 1.09 CFM/ft²

Fan motor BHP 0.00 BHP
Fan motor kW 0.00 kW
Fan static 0.00 in wg

Outdoor Ventilation Air Data

Design airflow CFM 167 CFM
CFM/ft² 0.07 CFM/ft²

CFM/person 6.67 CFM/person

Zone Sizing Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

Air System Information

Air System Name HVAC 2
Equipment Class SPLT AHU
Air System Type SZCAV

Number of zones 1
Floor Area 2225.0 ft²
Location Annandale, Virginia

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft ²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	2431	2431	1.09	0.0	-	0.0	-	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft ²)
Zone 1	50.5	Jul 1800	39.9	2225.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft ²)	Space CFM/ft ²
Zone 1							
Bath 5	1	1.6	Jul 2000	75	1.8	43.0	1.74
Bath 6	1	1.6	Aug 2000	76	1.8	43.0	1.76
Bath 7	1	2.3	Aug 2000	110	2.6	90.0	1.22
Bedroom 5	1	5.2	Jul 1800	250	4.2	182.0	1.38
Bedroom 6	1	5.2	Jul 1800	249	4.2	182.0	1.37
Gym/theatre	1	8.0	Jul 1900	383	5.8	420.0	0.91
KITCHENETTE & Game	1	12.4	Jul 1800	592	8.8	688.0	0.86
Livingroom	1	7.5	Jul 1400	359	5.9	255.0	1.41
Mechanical/Storage	1	7.0	Jul 1900	337	4.9	322.0	1.05

Ventilation Sizing Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **167** CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
Bath 5	1	43.0	1.0	74.7	0.00	0.00	0.0	0.0	0.0
Bath 6	1	43.0	1.0	75.7	0.00	0.00	0.0	0.0	0.0
Bath 7	1	90.0	1.0	109.7	0.00	0.00	0.0	0.0	0.0
Bedroom 5	1	182.0	2.0	250.4	5.00	0.06	0.0	0.0	20.9
Bedroom 6	1	182.0	2.0	249.1	5.00	0.06	0.0	0.0	20.9
Gym/theatre	1	420.0	5.0	383.3	5.00	0.06	0.0	0.0	50.2
KITCHENETTE & Game	1	688.0	5.0	592.5	0.00	0.00	0.0	0.0	0.0
Livingroom	1	255.0	3.0	358.7	5.00	0.06	0.0	0.0	30.3
Mechanical/Storage	1	322.0	5.0	336.6	5.00	0.06	0.0	0.0	44.3
Totals (incl. Space Multipliers)				2430.6					166.7

Air System Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	45 ft²	1790	-	45 ft²	-	-
Wall Transmission	4809 ft²	11706	-	4809 ft²	26377	-
Roof Transmission	2276 ft²	3037	-	2276 ft²	4137	-
Window Transmission	45 ft²	254	-	45 ft²	1535	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	454 ft²	1308	-	454 ft²	7900	-
Floor Transmission	2178 ft²	0	-	2178 ft²	0	-
Partitions	3138 ft²	0	-	3138 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2225 W	6792	-	0	0	-
Task Lighting	2225 W	7147	-	0	0	-
Electric Equipment	1750 W	5690	-	0	0	-
People	25	5319	5125	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	6457	256	0%	0	0
>> Total Zone Loads	-	49502	5381	-	39948	0
Zone Conditioning	-	47186	5381	-	37378	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2431 CFM	0	-	2431 CFM	0	-
Ventilation Load	167 CFM	1460	3254	167 CFM	9927	0
Supply Fan Load	2431 CFM	0	-	2431 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	48647	8635	-	47305	0
Central Cooling Coil	-	48647	8638	-	0	0
Central Heating Coil	-	0	-	-	47305	-
>> Total Conditioning	-	48647	8638	-	47305	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 89.2 °F / 73.0 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	45 ft²	2460	-	45 ft²	-	-
Wall Transmission	4809 ft²	10635	-	4809 ft²	26377	-
Roof Transmission	2276 ft²	4171	-	2276 ft²	4137	-
Window Transmission	45 ft²	336	-	45 ft²	1535	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	454 ft²	1728	-	454 ft²	7900	-
Floor Transmission	2178 ft²	0	-	2178 ft²	0	-
Partitions	3138 ft²	0	-	3138 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	2225 W	6676	-	0	0	-
Task Lighting	2225 W	7083	-	0	0	-
Electric Equipment	1750 W	5650	-	0	0	-
People	25	5202	5125	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	6591	256	0%	0	0
>> Total Zone Loads	-	50531	5381	-	39948	0

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.1.A. Component Loads For Space "Bath 5" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	254 ft²	602	-	254 ft²	1393	-
Roof Transmission	43 ft²	57	-	43 ft²	78	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	43 ft²	0	-	43 ft²	0	-
Partitions	220 ft²	0	-	220 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	43 W	131	-	0	0	-
Task Lighting	43 W	138	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	203	10	0%	0	0
>> Total Zone Loads	-	1559	215	-	1785	0

TABLE 1.1.B. Envelope Loads For Space "Bath 5" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	86	0.095	-	149	-	472
S EXPOSURE						
WALL	68	0.095	-	159	-	373
DOOR	18	0.300	-	52	-	313
E EXPOSURE						
WALL	50	0.095	-	143	-	274
W EXPOSURE						
WALL	50	0.095	-	152	-	274
H EXPOSURE						
ROOF	43	0.031	-	57	-	78

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.2.A. Component Loads For Space "Bath 6" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	254 ft²	627	-	254 ft²	1393	-
Roof Transmission	43 ft²	50	-	43 ft²	78	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	43 ft²	0	-	43 ft²	0	-
Partitions	220 ft²	0	-	220 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	43 W	131	-	0	0	-
Task Lighting	43 W	138	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	206	10	0%	0	0
>> Total Zone Loads	-	1580	215	-	1785	0

TABLE 1.2.B. Envelope Loads For Space "Bath 6" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	68	0.095	-	103	-	373
DOOR	18	0.300	-	52	-	313
S EXPOSURE						
WALL	86	0.095	-	240	-	472
E EXPOSURE						
WALL	50	0.095	-	138	-	274
W EXPOSURE						
WALL	50	0.095	-	146	-	274
H EXPOSURE						
ROOF	43	0.031	-	50	-	78

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.3.A. Component Loads For Space "Bath 7" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 84.4 °F / 71.7 °F			HEATING OA DB / WB 12.0 °F / 9.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	410 ft²	950	-	410 ft²	2249	-
Roof Transmission	43 ft²	50	-	43 ft²	78	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	52	-	18 ft²	313	-
Floor Transmission	43 ft²	0	-	43 ft²	0	-
Partitions	157 ft²	0	-	157 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	90 W	275	-	0	0	-
Task Lighting	90 W	289	-	0	0	-
Electric Equipment	50 W	163	-	0	0	-
People	1	213	205	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	299	10	0%	0	0
>> Total Zone Loads	-	2290	215	-	2640	0

TABLE 1.3.B. Envelope Loads For Space "Bath 7" In Zone "Zone 1"

	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	TRANS	SOLAR	TRANS
				(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	157	0.095	-	238	-	861
S EXPOSURE						
WALL	139	0.095	-	389	-	762
DOOR	18	0.300	-	52	-	313
E EXPOSURE						
WALL	57	0.095	-	157	-	313
W EXPOSURE						
WALL	57	0.095	-	167	-	313
H EXPOSURE						
ROOF	43	0.031	-	50	-	78

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.4.A. Component Loads For Space "Bedroom 5" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	15 ft²	959	-	15 ft²	-	-
Wall Transmission	489 ft²	1140	-	489 ft²	2682	-
Roof Transmission	182 ft²	334	-	182 ft²	331	-
Window Transmission	15 ft²	112	-	15 ft²	512	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	137	-	36 ft²	626	-
Floor Transmission	182 ft²	0	-	182 ft²	0	-
Partitions	269 ft²	0	-	269 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	182 W	546	-	0	0	-
Task Lighting	182 W	579	-	0	0	-
Electric Equipment	100 W	323	-	0	0	-
People	2	416	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	682	21	0%	0	0
>> Total Zone Loads	-	5228	431	-	4151	0

TABLE 1.4.B. Envelope Loads For Space "Bedroom 5" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	91	0.095	-	141	-	499
DOOR	36	0.300	-	137	-	626
S EXPOSURE						
WALL	127	0.095	-	277	-	697
E EXPOSURE						
WALL	143	0.095	-	415	-	784
W EXPOSURE						
WALL	128	0.095	-	307	-	702
WINDOW 1	15	0.588	0.811	112	959	512
H EXPOSURE						
ROOF	182	0.031	-	334	-	331

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.5.A. Component Loads For Space "Bedroom 6" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	15 ft²	959	-	15 ft²	-	-
Wall Transmission	489 ft²	1117	-	489 ft²	2682	-
Roof Transmission	182 ft²	334	-	182 ft²	331	-
Window Transmission	15 ft²	112	-	15 ft²	512	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	137	-	36 ft²	626	-
Floor Transmission	182 ft²	0	-	182 ft²	0	-
Partitions	269 ft²	0	-	269 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	182 W	546	-	0	0	-
Task Lighting	182 W	579	-	0	0	-
Electric Equipment	100 W	323	-	0	0	-
People	2	416	410	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	678	21	0%	0	0
>> Total Zone Loads	-	5202	431	-	4151	0

TABLE 1.5.B. Envelope Loads For Space "Bedroom 6" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	127	0.095	-	196	-	697
S EXPOSURE						
WALL	91	0.095	-	199	-	499
DOOR	36	0.300	-	137	-	626
E EXPOSURE						
WALL	143	0.095	-	415	-	784
W EXPOSURE						
WALL	128	0.095	-	307	-	702
WINDOW 1	15	0.588	0.811	112	959	512
H EXPOSURE						
ROOF	182	0.031	-	334	-	331

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.6.A. Component Loads For Space "Gym/theatre" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1900 COOLING OA DB / WB 86.8 °F / 72.3 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	804 ft²	1848	-	804 ft²	4410	-
Roof Transmission	420 ft²	674	-	420 ft²	763	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	36 ft²	121	-	36 ft²	626	-
Floor Transmission	420 ft²	0	-	420 ft²	0	-
Partitions	585 ft²	0	-	585 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	420 W	1272	-	0	0	-
Task Lighting	420 W	1343	-	0	0	-
Electric Equipment	200 W	648	-	0	0	-
People	5	1053	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1044	51	0%	0	0
>> Total Zone Loads	-	8002	1076	-	5800	0

TABLE 1.6.B. Envelope Loads For Space "Gym/theatre" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	TRANS (BTU/hr)	SOLAR (BTU/hr)	TRANS (BTU/hr)
N EXPOSURE						
WALL	255	0.095	-	418	-	1399
S EXPOSURE						
WALL	219	0.095	-	499	-	1201
DOOR	36	0.300	-	121	-	626
E EXPOSURE						
WALL	165	0.095	-	478	-	905
W EXPOSURE						
WALL	165	0.095	-	452	-	905
H EXPOSURE						
ROOF	420	0.031	-	674	-	763

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.7.A. Component Loads For Space "KITCHENETTE & Game" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 89.2 °F / 73.0 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	910 ft²	2031	-	910 ft²	4991	-
Roof Transmission	688 ft²	1261	-	688 ft²	1251	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	146 ft²	556	-	146 ft²	2540	-
Floor Transmission	688 ft²	0	-	688 ft²	0	-
Partitions	590 ft²	0	-	590 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	688 W	2064	-	0	0	-
Task Lighting	688 W	2190	-	0	0	-
Electric Equipment	500 W	1614	-	0	0	-
People	5	1040	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1613	51	0%	0	0
>> Total Zone Loads	-	12370	1076	-	8782	0

TABLE 1.7.B. Envelope Loads For Space "KITCHENETTE & Game" In Zone "Zone 1"						
	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	233	0.095	-	360	-	1278
S EXPOSURE						
WALL	215	0.095	-	470	-	1179
DOOR	18	0.300	-	69	-	313
E EXPOSURE						
WALL	185	0.095	-	536	-	1015
DOOR	110	0.300	-	419	-	1914
W EXPOSURE						
WALL	277	0.095	-	665	-	1519
DOOR	18	0.300	-	69	-	313
H EXPOSURE						
ROOF	688	0.031	-	1261	-	1251

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.8.A. Component Loads For Space "Livingroom" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1400 COOLING OA DB / WB 92.5 °F / 73.9 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	15 ft²	689	-	15 ft²	-	-
Wall Transmission	497 ft²	822	-	497 ft²	2726	-
Roof Transmission	255 ft²	469	-	255 ft²	463	-
Window Transmission	15 ft²	125	-	15 ft²	512	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	128 ft²	543	-	128 ft²	2227	-
Floor Transmission	255 ft²	0	-	255 ft²	0	-
Partitions	300 ft²	0	-	300 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	255 W	779	-	0	0	-
Task Lighting	255 W	820	-	0	0	-
Electric Equipment	500 W	1626	-	0	0	-
People	3	639	615	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	977	31	0%	0	0
>> Total Zone Loads	-	7488	646	-	5928	0

TABLE 1.8.B. Envelope Loads For Space "Livingroom" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr-ft²-°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
N EXPOSURE						
WALL	170	0.095	-	201	-	932
S EXPOSURE						
WALL	170	0.095	-	250	-	932
E EXPOSURE						
WALL	117	0.095	-	309	-	642
WINDOW 1	15	0.588	0.811	125	689	512
DOOR	18	0.300	-	76	-	313
W EXPOSURE						
WALL	40	0.095	-	62	-	219
DOOR	110	0.300	-	467	-	1914
H EXPOSURE						
ROOF	255	0.031	-	469	-	463

Space Design Load Summary for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

TABLE 1.9.A. Component Loads For Space "Mechanical/Storage" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1900 COOLING OA DB / WB 86.8 °F / 72.3 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 12.0 °F / 9.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	702 ft²	1670	-	702 ft²	3850	-
Roof Transmission	420 ft²	674	-	420 ft²	763	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	18 ft²	60	-	18 ft²	313	-
Floor Transmission	322 ft²	0	-	322 ft²	0	-
Partitions	528 ft²	0	-	528 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	322 W	975	-	0	0	-
Task Lighting	322 W	1030	-	0	0	-
Electric Equipment	200 W	648	-	0	0	-
People	5	1053	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	917	51	0%	0	0
>> Total Zone Loads	-	7027	1076	-	4927	0

TABLE 1.9.B. Envelope Loads For Space "Mechanical/Storage" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	174	0.095	-	286	-	954
DOOR	18	0.300	-	60	-	313
S EXPOSURE						
WALL	192	0.095	-	438	-	1053
E EXPOSURE						
WALL	168	0.095	-	486	-	921
W EXPOSURE						
WALL	168	0.095	-	460	-	921
H EXPOSURE						
ROOF	420	0.031	-	674	-	763

System Psychrometrics for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

July DESIGN COOLING DAY, 2000

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	84.4	0.01430	167	400	1460	3254
Vent - Return Mixing	Outlet	76.6	0.01034	2431	1768	-	-
Central Cooling Coil	Outlet	57.5	0.00956	2431	1768	48647	8638
Central Heating Coil	Outlet	57.5	0.00956	2431	1768	0	-
Supply Fan	Outlet	57.5	0.00956	2431	1768	0	-
Cold Supply Duct	Outlet	57.5	0.00956	2431	1768	-	-
Zone Air	-	76.1	0.01004	2431	1869	47186	5381
Return Plenum	Outlet	76.1	0.01004	2431	1869	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.044 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4587.9 BTU/(hr-CFM)
Site Altitude = 938.0 ft

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	49502	Cooling	47186	76.1	2431	1869	0	0

System Psychrometrics for HVAC 2

Project Name: 109
Prepared by: E Lab

11/18/2024
04:02PM

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	12.0	0.00075	167	400	-9927	0
Vent - Return Mixing	Outlet	65.1	0.00075	2431	528	-	-
Central Cooling Coil	Outlet	65.1	0.00075	2431	528	0	0
Central Heating Coil	Outlet	83.8	0.00075	2431	528	47305	-
Supply Fan	Outlet	83.8	0.00075	2431	528	0	-
Cold Supply Duct	Outlet	83.8	0.00075	2431	528	-	-
Zone Air	-	69.1	0.00075	2431	538	-37378	0
Return Plenum	Outlet	69.1	0.00075	2431	538	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.044 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4587.9 BTU/(hr-CFM)
Site Altitude = 938.0 ft

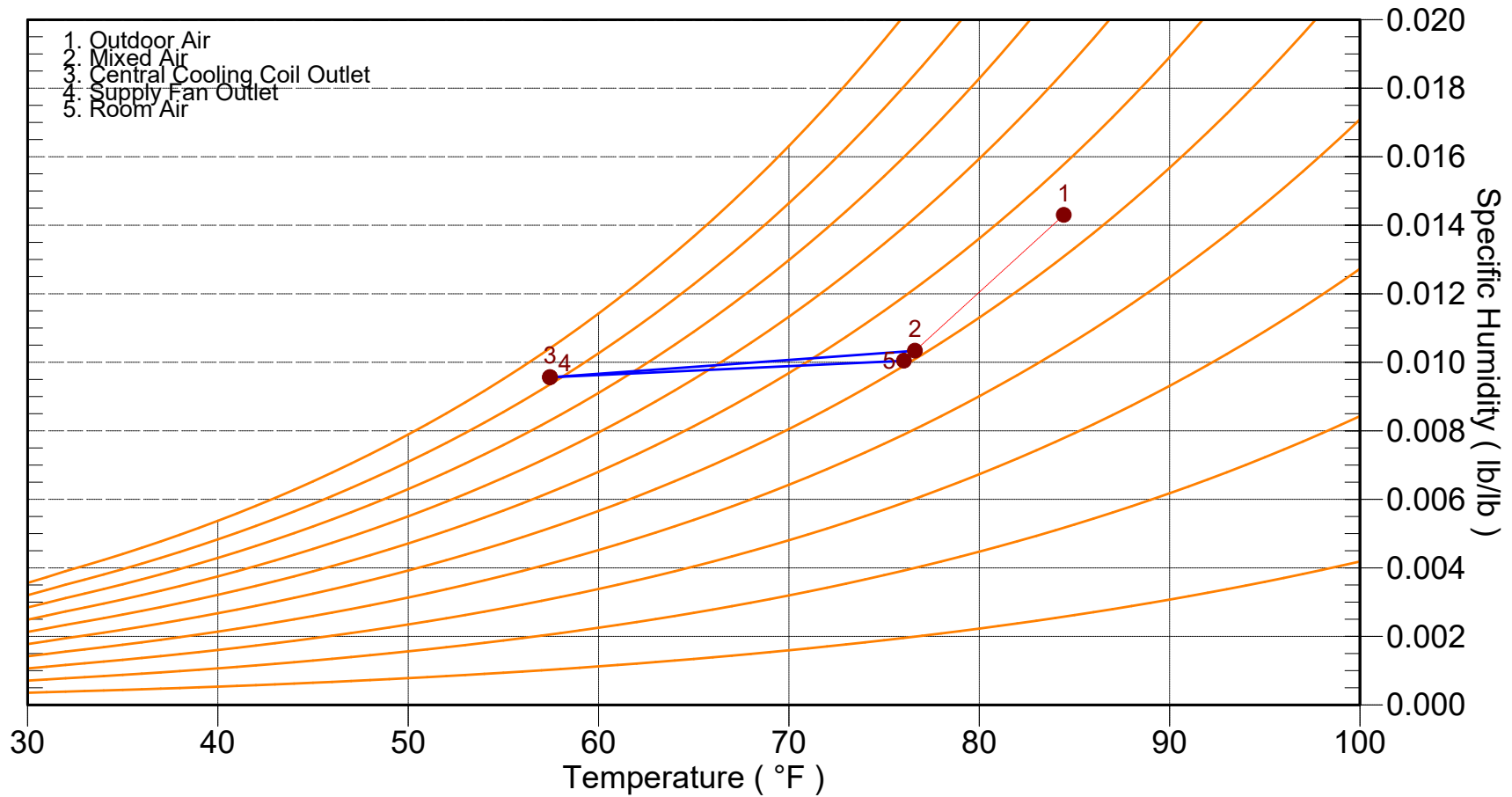
TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	-39948	Heating	-37378	69.1	2431	538	0	0

Location: Annandale, Virginia

Altitude: 938.0 ft.

Data for: July DESIGN COOLING DAY, 2000



Location: Annandale, Virginia
Altitude: 938.0 ft.
Data for: WINTER DESIGN HEATING

