

Air System Sizing Summary for AHU-1

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: **AHU-1**
Air System Type: **Single Zone CAV**

Number of zones: **1**
Floor Area: **1206.0** sqft
Location: **Miami, Florida**

Sizing Calculation Information

Calculation Months: **Aug to Aug**

Calculation method: **Transfer Function Method**

Central Cooling Coil Sizing Data

Total coil load: **2.7** Tons
Total coil load: **32.6** MBH
Sensible coil load: **28.0** MBH
Coil airflow: **1200** CFM
Sensible heat ratio: **0.859**
Area per unit load: **444.0** sqft/Ton
Load per unit area: **27.0** BTU/(hr-sqft)

Load occurs at: **Aug 1600**
OA DB / WB: **90.7/76.9** F
Entering DB / WB: **75.3/62.2** F
Leaving DB / WB: **53.7/52.5** F
Coil ADP: **51.3** F
Bypass Factor: **0.100**
Resulting RH: **.47** %
Design supply temp: **53.3** F

Central Heating Coil Sizing Data

Max coil load: **20.0** MBH
Coil airflow: **1200** CFM
Load per unit area: **16.6** BTU/(hr-sqft)

Load occurs at: **Des Htg**
Ent DB / Lvg DB: **68.4/83.8** F

Supply Fan Sizing Data

Actual max airflow: **1200** CFM
Standard airflow: **1199** CFM
Actual max airflow per unit area: **1.00** CFM/sqft

Fan motor BHP: **0.17** BHP
Fan motor kW: **0.13** kW
Fan static: **0.50** in wg

Outdoor Ventilation Air Data

Design airflow: **65** CFM
Airflow per unit floor area: **0.05** CFM/sqft

Airflow per person: **65.00** CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
01-STAFF	4.0	180	Aug 1600	2.7	147.0	1.22
02-STAFF BATH	1.5	66	Aug 1700	0.9	73.0	0.91
03-STAFF&LAUNDRY CLOSET	0.4	20	Aug 1500	0.1	71.0	0.28
04-LAUNDRY	4.1	183	Aug 1700	2.3	122.0	1.50
05-HALL1	2.0	91	Aug 1400	1.1	158.0	0.58
05-HALL2	7.7	344	Aug 1400	6.3	295.0	1.17
06-PANTRY	0.8	36	Aug 2300	0.0	148.0	0.24
10-BREAKFAST	5.6	251	Aug 1400	4.6	132.0	1.90
11-POWDER BATH	1.3	57	Aug 1800	1.1	60.0	0.94
Zone	26.8	1200	Aug 1500	19.2	1206.0	1.00

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis: **Peak space load**

Zone sizing basis: **Peak zone load**

System Design Load Summary for AHU-1

Project Name: 24-0407 NEW-2 STORY RESIDENCE
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	DESIGN COOLING			DESIGN HEATING		
	Aug 1600 OA DB / WB 90.7 F / 76.9 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	619 sqft	6133	-	619 sqft	-	-
Wall Transmission	873 sqft	2425	-	873 sqft	2452	-
Roof Transmission	0 sqft	0	-	0 sqft	0	-
Window Transmission	619 sqft	9200	-	619 sqft	14859	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	40 sqft	1045	-	40 sqft	902	-
Floor Transmission	1206 sqft	0	-	1206 sqft	944	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	985 W	3361	-	0 W	0	-
Electric Equipment	985 W	3361	-	0 W	0	-
People	1	230	120	0	0	0
Infiltration	-	54	118	-	78	0
Miscellaneous	-	1000	1800	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	26808	2038	-	19235	0
Thermostat and Pulldown Adjustment	-	-401	0	-	-464	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	65 CFM	1138	2565	65 CFM	1660	0
Supply Fan Load	1200 CFM	445	-	1200 CFM	-445	-
>> Total System Loads	-	27989	4603	-	19986	0
Central Cooling Coil	-	27989	4605	-	0	0
Central Heating Coil	-	0	-	-	19986	-
>> Total Coil Loads	-	27989	4605	-	19986	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-1
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1200.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
01-STAFF

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-2

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: **AHU-2**
Air System Type: **Single Zone CAV**

Number of zones: **1**
Floor Area: **1163.0** sqft
Location: **Miami, Florida**

Sizing Calculation Information

Calculation Months: **Aug to Aug**

Calculation method: **Transfer Function Method**

Central Cooling Coil Sizing Data

Total coil load: **2.7** Tons
Total coil load: **32.4** MBH
Sensible coil load: **27.5** MBH
Coil airflow: **1200** CFM
Sensible heat ratio: **0.848**
Area per unit load: **430.4** sqft/Ton
Load per unit area: **27.9** BTU/(hr-sqft)

Load occurs at: **Aug 1700**
OA DB / WB: **89.9/76.7** F
Entering DB / WB: **75.1/62.3** F
Leaving DB / WB: **53.8/52.7** F
Coil ADP: **51.5** F
Bypass Factor: **0.100**
Resulting RH: **48** %
Design supply temp: **53.8** F

Central Heating Coil Sizing Data

Max coil load: **16.4** MBH
Coil airflow: **1200** CFM
Load per unit area: **14.1** BTU/(hr-sqft)

Load occurs at: **Des Htg**
Ent DB / Lvg DB: **68.6/81.3** F

Supply Fan Sizing Data

Actual max airflow: **1200** CFM
Standard airflow: **1199** CFM
Actual max airflow per unit area: **1.03** CFM/sqft

Fan motor BHP: **0.17** BHP
Fan motor kW: **0.13** kW
Fan static: **0.50** in wg

Outdoor Ventilation Air Data

Design airflow: **65** CFM
Airflow per unit floor area: **0.06** CFM/sqft

Airflow per person: **13.00** CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
06-BUTLERS PANTRY	2.5	116	Aug 1500	2.4	93.0	1.25
07-DINING ROOM	11.5	530	Aug 1500	8.8	315.0	1.68
08-KITCHEN	5.2	240	Aug 2300	0.0	400.0	0.60
09-FAMILY ROOM	6.8	313	Aug 1500	3.7	355.0	0.88
Zone	26.1	1200	Aug 1500	14.9	1163.0	1.03

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis: **Peak space load**

Zone sizing basis: **Peak zone load**

System Design Load Summary for AHU-2

Project Name: 24-0407 NEW-2 STORY RESIDENCE
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	DESIGN COOLING			DESIGN HEATING		
	Aug 1700 OA DB / WB 89.9 F / 76.7 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	503 sqft	3270	-	503 sqft	-	-
Wall Transmission	378 sqft	1105	-	378 sqft	1061	-
Roof Transmission	315 sqft	235	-	315 sqft	227	-
Window Transmission	503 sqft	7254	-	503 sqft	12062	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	40 sqft	868	-	40 sqft	902	-
Floor Transmission	1163 sqft	0	-	1163 sqft	632	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	1111 W	3790	-	0 W	0	-
Electric Equipment	1191 W	4063	-	0 W	0	-
People	5	1150	600	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	4000	1800	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	25736	2400	-	14884	0
Thermostat and Pulldown Adjustment	-	219	0	-	284	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	65 CFM	1097	2527	65 CFM	1679	0
Supply Fan Load	1200 CFM	445	-	1200 CFM	-445	-
>> Total System Loads	-	27497	4927	-	16402	0
Central Cooling Coil	-	27497	4928	-	0	0
Central Heating Coil	-	0	-	-	16402	-
>> Total Coil Loads	-	27497	4928	-	16402	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-2
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1200.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
06-BUTLERS PANTRY

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-3

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: **AHU-3**
Air System Type: **Single Zone CAV**

Number of zones: **1**
Floor Area: **1420.0** sqft
Location: **Miami, Florida**

Sizing Calculation Information

Calculation Months: **Aug to Aug**

Calculation method: **Transfer Function Method**

Central Cooling Coil Sizing Data

Total coil load: **3.0** Tons
Total coil load: **36.3** MBH
Sensible coil load: **31.9** MBH
Coil airflow: **1400** CFM
Sensible heat ratio: **0.877**
Area per unit load: **469.0** sqft/Ton
Load per unit area: **25.6** BTU/(hr-sqft)

Load occurs at: **Aug 1500**
OA DB / WB: **91.0/77.0** F
Entering DB / WB: **75.3/62.2** F
Leaving DB / WB: **54.3/53.0** F
Coil ADP: **51.9** F
Bypass Factor: **0.100**
Resulting RH: **.47** %
Design supply temp: **53.9** F

Central Heating Coil Sizing Data

Max coil load: **19.3** MBH
Coil airflow: **1400** CFM
Load per unit area: **13.6** BTU/(hr-sqft)

Load occurs at: **Des Htg**
Ent DB / Lvg DB: **68.7/81.5** F

Supply Fan Sizing Data

Actual max airflow: **1400** CFM
Standard airflow: **1399** CFM
Actual max airflow per unit area: **0.99** CFM/sqft

Fan motor BHP: **0.20** BHP
Fan motor kW: **0.15** kW
Fan static: **0.50** in wg

Outdoor Ventilation Air Data

Design airflow: **75** CFM
Airflow per unit floor area: **0.05** CFM/sqft

Airflow per person: **37.50** CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
12-ENTRY GALLERY	6.1	282	Aug 1500	3.1	315.0	0.89
13-CLUB ROOM	12.6	579	Aug 1500	7.2	615.0	0.94
14-STAIR LANDING	6.5	300	Aug 1600	4.6	242.0	1.24
15-HALL	5.5	251	Aug 1000	2.9	248.0	1.01
Zone	30.4	1400	Aug 1500	17.8	1420.0	0.99

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis: **Peak space load**

Zone sizing basis: **Peak zone load**

System Design Load Summary for AHU-3

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

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	DESIGN COOLING			DESIGN HEATING		
	Aug 1500 OA DB / WB 91 F / 77 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	385 sqft	3420	-	385 sqft	-	-
Wall Transmission	963 sqft	2779	-	963 sqft	2704	-
Roof Transmission	0 sqft	0	-	0 sqft	0	-
Window Transmission	385 sqft	5758	-	385 sqft	9238	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	188 sqft	5230	-	188 sqft	4241	-
Floor Transmission	1420 sqft	0	-	1420 sqft	1182	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	1531 W	5222	-	0 W	0	-
Electric Equipment	1408 W	4803	-	0 W	0	-
People	2	460	240	0	0	0
Infiltration	-	275	589	-	389	0
Miscellaneous	-	2500	700	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	30446	1529	-	17755	0
Thermostat and Pulldown Adjustment	-	-450	0	-	96	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	75 CFM	1340	2944	75 CFM	1943	0
Supply Fan Load	1400 CFM	519	-	1400 CFM	-519	-
>> Total System Loads	-	31855	4473	-	19274	0
Central Cooling Coil	-	31855	4476	-	0	0
Central Heating Coil	-	0	-	-	19274	-
>> Total Coil Loads	-	31855	4476	-	19274	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-3
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1400.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
12-ENTRY GALLERY

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-4

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: AHU-4
Air System Type: Single Zone CAV

Number of zones: 1
Floor Area: 1840.0 sqft
Location: Miami, Florida

Sizing Calculation Information

Calculation Months: Aug to Aug

Calculation method: Transfer Function Method

Central Cooling Coil Sizing Data

Total coil load: 3.7 Tons
Total coil load: 44.6 MBH
Sensible coil load: 38.3 MBH
Coil airflow: 1600 CFM
Sensible heat ratio: 0.858
Area per unit load: 494.8 sqft/Ton
Load per unit area: 24.3 BTU/(hr-sqft)

Load occurs at: Aug 1500
OA DB / WB: 91.0/77.0 F
Entering DB / WB: 75.5/62.1 F
Leaving DB / WB: 53.4/52.1 F
Coil ADP: 50.9 F
Bypass Factor: 0.100
Resulting RH: .46 %
Design supply temp: 52.7 F

Central Heating Coil Sizing Data

Max coil load: 26.6 MBH
Coil airflow: 1600 CFM
Load per unit area: 14.4 BTU/(hr-sqft)

Load occurs at: Des Htg
Ent DB / Lvg DB: 68.3/83.6 F

Supply Fan Sizing Data

Actual max airflow: 1600 CFM
Standard airflow: 1599 CFM
Actual max airflow per unit area: 0.87 CFM/sqft

Fan motor BHP: 0.23 BHP
Fan motor kW: 0.17 kW
Fan static: 0.50 in wg

Outdoor Ventilation Air Data

Design airflow: 100 CFM
Airflow per unit floor area: 0.05 CFM/sqft

Airflow per person: 33.33 CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
01-BEDROOM1	6.3	276	Aug 1600	4.3	235.5	1.17
02-BATH 1&2	3.5	151	Aug 1700	2.7	155.0	0.97
03-WIC 1&2	1.5	66	Aug 1500	0.8	148.0	0.45
04-BEDROOM2	4.0	176	Aug 1500	2.8	220.0	0.80
05-BATH 3	0.8	36	Aug 1500	0.7	70.5	0.50
06-BEDROOM3	4.0	174	Aug 1500	2.5	248.0	0.70
07-WIC 3	0.6	24	Aug 2000	0.1	90.0	0.27
08-LAUNDRY	1.5	66	Aug 2000	0.0	68.0	0.97
09-HALL	7.3	317	Aug 1400	5.3	375.0	0.85
10-READING NOOK	7.5	328	Aug 1400	6.1	230.0	1.43
Zone	36.7	1600	Aug 1500	25.2	1840.0	0.87

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis: Peak space load

Zone sizing basis: Peak zone load

System Design Load Summary for AHU-4

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
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	DESIGN COOLING			DESIGN HEATING		
	Aug 1500 OA DB / WB 91 F / 77 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	897 sqft	7863	-	897 sqft	-	-
Wall Transmission	834 sqft	1945	-	834 sqft	2341	-
Roof Transmission	1840 sqft	1296	-	1840 sqft	1325	-
Window Transmission	897 sqft	13411	-	897 sqft	21518	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	0 sqft	0	-	0 sqft	0	-
Floor Transmission	0 sqft	0	-	0 sqft	0	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	1559 W	5318	-	0 W	0	-
Electric Equipment	1523 W	5198	-	0 W	0	-
People	3	690	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	1000	1950	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	36721	2310	-	25184	0
Thermostat and Pulldown Adjustment	-	-811	0	-	-599	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	100 CFM	1782	4030	100 CFM	2562	0
Supply Fan Load	1600 CFM	593	-	1600 CFM	-593	-
>> Total System Loads	-	38286	6340	-	26554	0
Central Cooling Coil	-	38286	6336	-	0	0
Central Heating Coil	-	0	-	-	26554	-
>> Total Coil Loads	-	38286	6336	-	26554	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-4
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1600.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
01-BEDROOM1

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-5

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: **AHU-5**
Air System Type: **Single Zone CAV**

Number of zones: **1**
Floor Area: **1589.0** sqft
Location: **Miami, Florida**

Sizing Calculation Information

Calculation Months: **Aug to Aug**

Calculation method: **Transfer Function Method**

Central Cooling Coil Sizing Data

Total coil load: **3.5** Tons
Total coil load: **42.2** MBH
Sensible coil load: **36.9** MBH
Coil airflow: **1600** CFM
Sensible heat ratio: **0.876**
Area per unit load: **452.3** sqft/Ton
Load per unit area: **26.5** BTU/(hr-sqft)

Load occurs at: **Aug 1600**
OA DB / WB: **90.7/76.9** F
Entering DB / WB: **75.3/62.1** F
Leaving DB / WB: **54.0/52.7** F
Coil ADP: **51.6** F
Bypass Factor: **0.100**
Resulting RH: **.46** %
Design supply temp: **53.7** F

Central Heating Coil Sizing Data

Max coil load: **24.4** MBH
Coil airflow: **1600** CFM
Load per unit area: **15.4** BTU/(hr-sqft)

Load occurs at: **Des Htg**
Ent DB / Lvg DB: **68.5/82.6** F

Supply Fan Sizing Data

Actual max airflow: **1600** CFM
Standard airflow: **1599** CFM
Actual max airflow per unit area: **1.01** CFM/sqft

Fan motor BHP: **0.23** BHP
Fan motor kW: **0.17** kW
Fan static: **0.50** in wg

Outdoor Ventilation Air Data

Design airflow: **95** CFM
Airflow per unit floor area: **0.06** CFM/sqft

Airflow per person: **23.75** CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
11-UPSTAIRS FAMILY	5.3	240	Aug 1500	3.4	314.0	0.77
12-STUDY NOOK	6.0	271	Aug 1500	3.0	285.0	0.95
13- WIC/IT CLOSET	2.2	98	Aug 1900	0.3	172.0	0.57
14-JR SUITE	9.3	425	Aug 1500	6.8	375.0	1.13
15-JR BATH	1.8	81	Aug 1500	1.4	96.0	0.84
16-STAIR/SITTING AREA	10.7	486	Aug 1600	7.5	347.0	1.40
Zone	35.1	1600	Aug 1500	22.4	1589.0	1.01

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis: **Peak space load**

Zone sizing basis: **Peak zone load**

System Design Load Summary for AHU-5

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

	DESIGN COOLING			DESIGN HEATING		
	Aug 1600 OA DB / WB 90.7 F / 76.9 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	792 sqft	8050	-	792 sqft	-	-
Wall Transmission	810 sqft	2282	-	810 sqft	2274	-
Roof Transmission	1551 sqft	1126	-	1551 sqft	1116	-
Window Transmission	753 sqft	11195	-	753 sqft	18083	-
Skylight Transmission	38 sqft	571	-	38 sqft	922	-
Door Loads	0 sqft	0	-	0 sqft	0	-
Floor Transmission	0 sqft	0	-	0 sqft	0	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	1632 W	5567	-	0 W	0	-
Electric Equipment	1297 W	4426	-	0 W	0	-
People	4	920	480	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	800	950	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	34937	1430	-	22394	0
Thermostat and Pulldown Adjustment	-	-266	0	-	163	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	95 CFM	1670	3794	95 CFM	2454	0
Supply Fan Load	1600 CFM	593	-	1600 CFM	-593	-
>> Total System Loads	-	36934	5224	-	24418	0
Central Cooling Coil	-	36934	5229	-	0	0
Central Heating Coil	-	0	-	-	24418	-
>> Total Coil Loads	-	36934	5229	-	24418	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-5
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1600.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
11-UPSTAIRS FAMILY

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-6

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name:.....**AHU-6**
Air System Type:.....**Single Zone CAV**

Number of zones:.....**1**
Floor Area:.....**1361.0** sqft
Location:.....**Miami, Florida**

Sizing Calculation Information

Calculation Months:.....**Aug to Aug**

Calculation method:.....**Transfer Function Method**

Central Cooling Coil Sizing Data

Total coil load:.....**3.0** Tons
Total coil load:.....**36.3** MBH
Sensible coil load:.....**32.5** MBH
Coil airflow:.....**1400** CFM
Sensible heat ratio:.....**0.895**
Area per unit load:.....**449.6** sqft/Ton
Load per unit area:.....**26.7** BTU/(hr-sqft)

Load occurs at:.....**Aug 1700**
OA DB / WB:.....**89.9/76.7** F
Entering DB / WB:.....**75.2/61.7** F
Leaving DB / WB:.....**53.6/52.4** F
Coil ADP:.....**51.2** F
Bypass Factor:.....**0.100**
Resulting RH:.....**.45** %
Design supply temp:.....**53.4** F

Central Heating Coil Sizing Data

Max coil load:.....**21.8** MBH
Coil airflow:.....**1400** CFM
Load per unit area:.....**16.0** BTU/(hr-sqft)

Load occurs at:.....**Des Htg**
Ent DB / Lvg DB:.....**68.5/83.0** F

Supply Fan Sizing Data

Actual max airflow:.....**1400** CFM
Standard airflow:.....**1399** CFM
Actual max airflow per unit area:.....**1.03** CFM/sqft

Fan motor BHP:.....**0.20** BHP
Fan motor kW:.....**0.15** kW
Fan static:.....**0.50** in wg

Outdoor Ventilation Air Data

Design airflow:.....**75** CFM
Airflow per unit floor area:.....**0.06** CFM/sqft

Airflow per person:.....**37.50** CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
17-MASTER SUITE	19.0	855	Aug 1600	12.5	493.0	1.73
18-WIC VESTIBULE	1.3	59	Aug 1900	0.5	150.0	0.39
19-HIS WIC	1.3	57	Aug 1300	0.6	158.0	0.36
20-HER WIC	3.7	167	Aug 1500	2.3	355.0	0.47
21-MASTER BATH	6.0	270	Aug 1600	4.8	205.0	1.32
Zone	31.2	1400	Aug 1600	20.6	1361.0	1.03

Note: Table contains data for all spaces controlled by a single thermostat:

Space sizing basis:.....**Peak space load**

Zone sizing basis:.....**Peak zone load**

System Design Load Summary for AHU-6

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

	DESIGN COOLING			DESIGN HEATING		
	Aug 1700 OA DB / WB 89.9 F / 76.7 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	639 sqft	10342	-	639 sqft	-	-
Wall Transmission	1069 sqft	3283	-	1069 sqft	3003	-
Roof Transmission	1361 sqft	1016	-	1361 sqft	980	-
Window Transmission	639 sqft	9223	-	639 sqft	15336	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	0 sqft	0	-	0 sqft	0	-
Floor Transmission	1361 sqft	0	-	1361 sqft	1289	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	961 W	3279	-	0 W	0	-
Electric Equipment	961 W	3279	-	0 W	0	-
People	2	460	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	500	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	30883	740	-	20607	0
Thermostat and Pulldown Adjustment	-	-143	0	-	-226	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	75 CFM	1258	3063	75 CFM	1929	0
Supply Fan Load	1400 CFM	519	-	1400 CFM	-519	-
>> Total System Loads	-	32517	3803	-	21791	0
Central Cooling Coil	-	32517	3806	-	0	0
Central Heating Coil	-	0	-	-	21791	-
>> Total Coil Loads	-	32517	3806	-	21791	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-6
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....1400.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
17-MASTER SUITE

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-7.1

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: AHU-7.1
Air System Type: Single Zone CAV

Number of zones: 1
Floor Area: 508.0 sqft
Location: Miami, Florida

Sizing Calculation Information

Calculation Months: Aug to Aug

Calculation method: Transfer Function Method

Central Cooling Coil Sizing Data

Total coil load: 1.5 Tons
Total coil load: 17.8 MBH
Sensible coil load: 14.5 MBH
Coil airflow: 600 CFM
Sensible heat ratio: 0.814
Area per unit load: 343.2 sqft/Ton
Load per unit area: 35.0 BTU/(hr-sqft)

Load occurs at: Aug 1500
OA DB / WB: 91.0/77.0 F
Entering DB / WB: 76.2/63.1 F
Leaving DB / WB: 53.9/52.7 F
Coil ADP: 51.4 F
Bypass Factor: 0.100
Resulting RH: 48 %
Design supply temp: 53.5 F

Central Heating Coil Sizing Data

Max coil load: 10.9 MBH
Coil airflow: 600 CFM
Load per unit area: 21.4 BTU/(hr-sqft)

Load occurs at: Des Htg
Ent DB / Lvg DB: 68.6/85.4 F

Supply Fan Sizing Data

Actual max airflow: 600 CFM
Standard airflow: 600 CFM
Actual max airflow per unit area: 1.18 CFM/sqft

Fan motor BHP: 0.09 BHP
Fan motor kW: 0.07 kW
Fan static: 0.50 in wg

Outdoor Ventilation Air Data

Design airflow: 30 CFM
Airflow per unit floor area: 0.06 CFM/sqft

Airflow per person: 15.00 CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
01-GYM	13.9	600	Aug 1600	10.4	508.0	1.18

System Design Load Summary for AHU-7.1

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

	DESIGN COOLING			DESIGN HEATING		
	Aug 1500 OA DB / WB 91 F / 77 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	315 sqft	3101	-	315 sqft	-	-
Wall Transmission	777 sqft	1869	-	777 sqft	2181	-
Roof Transmission	508 sqft	343	-	508 sqft	366	-
Window Transmission	315 sqft	4398	-	315 sqft	7563	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	0 sqft	0	-	0 sqft	0	-
Floor Transmission	208 sqft	0	-	208 sqft	314	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	406 W	1387	-	0 W	0	-
Electric Equipment	406 W	1387	-	0 W	0	-
People	2	1420	2180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	13905	2180	-	10425	0
Thermostat and Pulldown Adjustment	-	-164	0	-	-94	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	30 CFM	503	1115	30 CFM	771	0
Supply Fan Load	600 CFM	222	-	600 CFM	-222	-
>> Total System Loads	-	14466	3295	-	10879	0
Central Cooling Coil	-	14466	3296	-	0	0
Central Heating Coil	-	0	-	-	10879	-
>> Total Coil Loads	-	14466	3296	-	10879	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-7.1
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....600.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
01-GYM

Thermostats Data:

Cooling T-stat: Occ:.....75.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %

Air System Sizing Summary for AHU-7.2

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

Air System Information

Air System Name: AHU-7.2
Air System Type: Single Zone CAV

Number of zones: 1
Floor Area: 590.0 sqft
Location: Miami, Florida

Sizing Calculation Information

Calculation Months: Aug to Aug

Calculation method: Transfer Function Method

Central Cooling Coil Sizing Data

Total coil load: 1.8 Tons
Total coil load: 21.2 MBH
Sensible coil load: 18.3 MBH
Coil airflow: 741 CFM
Sensible heat ratio: 0.863
Area per unit load: 333.4 sqft/Ton
Load per unit area: 36.0 BTU/(hr-sqft)

Load occurs at: Aug 1600
OA DB / WB: 90.7/76.9 F
Entering DB / WB: 75.0/61.3 F
Leaving DB / WB: 52.0/50.8 F
Coil ADP: 49.5 F
Bypass Factor: 0.100
Resulting RH: .45 %
Design supply temp: 52.4 F

Central Heating Coil Sizing Data

Max coil load: 11.1 MBH
Coil airflow: 741 CFM
Load per unit area: 18.7 BTU/(hr-sqft)

Load occurs at: Des Htg
Ent DB / Lvg DB: 68.6/82.5 F

Supply Fan Sizing Data

Actual max airflow: 741 CFM
Standard airflow: 741 CFM
Actual max airflow per unit area: 1.26 CFM/sqft

Fan motor BHP: 0.11 BHP
Fan motor kW: 0.08 kW
Fan static: 0.50 in wg

Outdoor Ventilation Air Data

Design airflow: 35 CFM
Airflow per unit floor area: 0.06 CFM/sqft

Airflow per person: 17.50 CFM/person

Space Sizing Data

Space Name	Maximum Cooling Sensible Load MBH	Design Airflow CFM	Time of Peak Load	Maximum Heating Load MBH	Space Floor Area sqft	Space CFM/sqft
01-GUEST SUITE	17.3	741	Aug 1600	10.6	590.0	1.26

System Design Load Summary for AHU-7.2

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
12:03PM

	DESIGN COOLING			DESIGN HEATING		
	Aug 1600 OA DB / WB 90.7 F / 76.9 F			Design Heating Day OA DB / WB 46 F / 38.6 F		
Zone Loads based on TFM	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	332 sqft	4237	-	332 sqft	-	-
Wall Transmission	788 sqft	2196	-	788 sqft	2212	-
Roof Transmission	590 sqft	429	-	590 sqft	425	-
Window Transmission	332 sqft	4939	-	332 sqft	7978	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	0 sqft	0	-	0 sqft	0	-
Floor Transmission	0 sqft	0	-	0 sqft	0	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	590 W	2013	-	0 W	0	-
Electric Equipment	590 W	2013	-	0 W	0	-
People	2	460	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	1000	1200	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>>Total Zone Loads	-	17287	1440	-	10614	0
Thermostat and Pulldown Adjustment	-	151	0	-	-175	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	35 CFM	622	1460	35 CFM	898	0
Supply Fan Load	741 CFM	275	-	741 CFM	-275	-
>> Total System Loads	-	18335	2900	-	11062	0
Central Cooling Coil	-	18335	2901	-	0	0
Central Heating Coil	-	0	-	-	11062	-
>> Total Coil Loads	-	18335	2901	-	11062	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Input Data

Project Name: 24-0407 NEW-2 STORY RESIDENCE
Prepared by: ARPE Engineering, Inc.

04/19/2024
09:34AM

General Details:

Air System Name:.....AHU-7.2
Air System Type:.....Single Zone CAV
Number of zones:.....1
System Startup:.....6
Duration of Operation:.....24

Central Cooling Coil Data:

Used?:.....YES
Supply Air Temperature:.....741.0 F
Coil Bypass Factor:.....0.100

Central Heating Coil Data:

Used?:.....YES
Supply Temperature:.....110.0 F

Supply Fan Data:

Configuration:.....Draw-thru
Fan Performance:.....0.50 in wg

Ceiling Return Air Plenum Data:

Return Air Via:.....Ducted Return

Zones Included:

Zone Names
01-GUEST SUITE

Thermostats Data:

Cooling T-stat: Occ:.....74.0 F
Cooling T-stat: Unocc:.....85.0 F
Heating T-stat: Occ:.....70.0 F
Heating T-stat: Unocc:.....60.0 F

Safety Factors:

Cooling Sensible Safety Factor:.....0 %
Cooling Latent Safety Factor:.....0 %
Heating Safety Factor:.....0 %