Air System Sizing Summary for CAFETERIA

Project Name: UMI SAN RAFAEL TUNJA 01/10/2024
Prepared by: TERMICA 02:59p. m.

Air System Information

Air System Name	**CAFETERIA**		Number of zones	**1**
Equipment Class	**SPLT AHU**		Floor Area	**775.0** ft²
Air System Type	**SZCAV**		Location	**Tunja, Colombia**

Sizing Calculation Information

Calculation Months	**Jan to Dec**		Zone CFM Sizing	**Sum of space airflow rates**
Sizing Data	**Calculated**		Space CFM Sizing	**Individual peak space loads**

Central Cooling Coil Sizing Data

Total coil load	**2.6**	Tons	Load occurs at	**Jun 1600**	
Total coil load	**31.5**	MBH	OA DB / WB	**62.9 / 55.8**	°F
Sensible coil load	**29.4**	MBH	Entering DB / WB	**71.9 / 65.0**	°F
Coil CFM at Jun 1600	**4391**	CFM	Leaving DB / WB	**63.2 / 62.5**	°F
Max block CFM	**4391**	CFM	Coil ADP	**62.2**	°F
Sum of peak zone CFM	**4391**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.934**		Resulting RH	**72**	%
CFM/Ton	**1671.6**		Design supply temp.	**62.0**	°F
ft²/Ton	**295.1**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**40.7**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**N/A**				

Supply Fan Sizing Data

Actual max CFM	**4391**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**3126**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**5.67**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**440**	CFM	CFM/person	**10.99**	CFM/person
CFM/ft²	**0.57**	CFM/ft²			

Zone Sizing Summary for CAFETERIA

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Air System Information

Air System Name ..... **CAFETERIA**
Equipment Class ..... **SPLT AHU**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **775.0** ft²
Location ..... **Tunja, Colombia**

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/ft²	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	4391	4391	5.67	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 (ft²)
Zone 1	33.8	Jul 1600	14.1	775.0

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 (ft²)	Space CFM/ft²
Zone 1							
P1 CAFETERIA	1	33.8	Jul 1600	4391	14.1	775.0	5.67

Air System Design Load Summary for CAFETERIA

Project Name: UMI SAN RAFAEL TUNJA 01/10/2024
Prepared by: TERMICA 02:59p. m.

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1600 COOLING OA DB / WB 62.9 °F / 55.8 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 36.0 °F / 29.2 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	399 ft²	22375	-	399 ft²	-	-
Wall Transmission	107 ft²	-349	-	107 ft²	956	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	399 ft²	-5150	-	399 ft²	12466	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	151 ft²	-684	-	151 ft²	698	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1163 W	3966	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	600 W	2047	-	0	0	-
People	40	11200	10800	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	**-**	**33406**	**10800**	**-**	**14121**	**0**
Zone Conditioning	-	32816	10800	-	-349	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	4391 CFM	0	-	4391 CFM	0	-
Ventilation Load	440 CFM	-3383	-8720	440 CFM	455	0
Supply Fan Load	4391 CFM	0	-	4391 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**29433**	**2080**	**-**	**107**	**0**
Central Cooling Coil	-	29433	2086	-	0	0
>> Total Conditioning	**-**	**29433**	**2086**	**-**	**0**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

TABLE 1.1.A. Component Loads For Space "P1 CAFETERIA" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 63.9 °F / 55.8 °F OCCUPIED T-STAT 72.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 36.0 °F / 29.2 °F OCCUPIED T-STAT 65.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	**Details**	**(BTU/hr)**	**(BTU/hr)**	**Details**	**(BTU/hr)**	**(BTU/hr)**
Window & Skylight Solar Loads	399 ft²	22232	-	399 ft²	-	-
Wall Transmission	107 ft²	-321	-	107 ft²	956	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	399 ft²	-4720	-	399 ft²	12466	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	151 ft²	-644	-	151 ft²	698	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1163 W	3966	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	600 W	2047	-	0	0	-
People	40	11200	10800	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	**-**	**33759**	**10800**	**-**	**14121**	**0**

TABLE 1.1.B. Envelope Loads For Space "P1 CAFETERIA" 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)
WNW EXPOSURE						
WALL	107	0.309	-	-321	-	956
WINDOW 1	399	1.077	0.622	-4720	22232	12466

June DESIGN COOLING DAY, 1600

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	62.9	0.01177	440	400	-3383	-8720
Vent - Return Mixing	Outlet	71.9	0.01706	4391	1504	-	-
Central Cooling Coil	Outlet	63.2	0.01692	4391	1504	29433	2086
Supply Fan	Outlet	63.2	0.01692	4391	1504	0	-
Cold Supply Duct	Outlet	63.2	0.01692	4391	1504	-	-
Zone Air	-	72.9	0.01765	4391	1627	32816	10800
Return Plenum	Outlet	72.9	0.01765	4391	1627	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 0.769 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 3379.3 BTU/(hr-CFM)
Site Altitude = 9104.3 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	33406	Cooling	32816	72.9	4391	1627	0	0

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	36.0	0.00314	440	400	-455	0
Vent - Return Mixing	Outlet	37.2	0.00314	4391	482	-	-
Central Cooling Coil	Outlet	37.2	0.00314	4391	482	0	0
Supply Fan	Outlet	37.2	0.00314	4391	482	0	-
Cold Supply Duct	Outlet	37.2	0.00314	4391	482	-	-
Zone Air	-	37.3	0.00314	4391	491	349	0
Return Plenum	Outlet	37.3	0.00314	4391	491	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 0.769 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 3379.3 BTU/(hr-CFM)
Site Altitude = 9104.3 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	-14121	Deadband	349	37.3	4391	491	0	0