DOE Challenge Home Montage Builders
HVAC Load Calculations

for

Elite Software

RHVAC Residential HVAC Loads

Prepared By:

Saturday, March 15, 2014

Rhvac is an ACCA approved Manual J and Manual D computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

Project Report

General Project Information

Project Title:	DOE Challenge Home Montage Builders
Designed By:	Montage Builders - Northern Forest
Project Date:	Friday, March 14, 2014

Design Data

Reference City:		Syracuse, New York
Building Orientation:		Front door faces West
Daily Temperature Range:		Medium
Latitude:	43	Degrees
Elevation:	410	ft.
Altitude Factor:	0.985	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	2	1.28	n/a	n/a	70	n/a
Summer:	87	71	46%	50%	75	24

Check Figures

Total Building Supply CFM:	652	CFM Per Square ft.:	0.217
Square ft. of Room Area:	3,004	Square ft. Per Ton:	2,153
Volume (ft³) of Cond. Space:	26,213		

Building Loads

Total Heating Required Including Ventilation Air:	13,979	Btuh	13.979	MBH
Total Sensible Gain:	14,314	Btuh	85	%
Total Latent Gain:	2,429	Btuh	15	%
Total Cooling Required Including Ventilation Air:	16,743	Btuh	1.40	Tons (Based On Sensible + Latent)

Notes

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Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Miscellaneous Report

System 1 Main Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	2	1.28	80%	n/a	70	n/a
Summer:	87	71	46%	50%	75	24.33

Duct Sizing Inputs

	Main Trunk		Runouts	
Calculate:	Yes		Yes	
Use Schedule:	No		No	
Roughness Factor:	0.00300		0.01000	
Pressure Drop:	0.1000	in.wg./100 ft.	0.1000	in.wg./100 ft.
Minimum Velocity:	650	ft./min	450	ft./min
Maximum Velocity:	900	ft./min	750	ft./min
Minimum Height:	0	in.	0	in.
Maximum Height:	0	in.	0	in.

Outside Air Data

	Winter		Summer	
Infiltration Specified:	0.061	AC/hr	0.061	AC/hr
	27	CFM	27	CFM
Infiltration Actual:	0.000	AC/hr	0.000	AC/hr
Above Grade Volume:	X 26,213	Cu.ft.	X 26,213	Cu.ft.
	0	Cu.ft./hr	0	Cu.ft./hr
	X 0.0167		X 0.0167	
Total Building Infiltration:	0	CFM	0	CFM
Total Building Ventilation:	67	CFM	67	CFM

---System 1---

Infiltration & Ventilation Sensible Gain Multiplier: 13.01 = (1.10 X 0.985 X 12.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 16.30 = (0.68 X 0.985 X 24.33 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 73.70 = (1.10 X 0.985 X 68.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.061 AC/hr (27 CFM)
Summer Infiltration Specified: 0.061 AC/hr (27 CFM)

Load Preview Report

Scope	Net Ton	ft.² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	1.40	2,153	3,004	14,314	2,429	16,743	13,979	171	652	652	
System 1	1.40	2,153	3,004	14,314	2,429	16,743	13,979	171	652	652	10x14
Ventilation				174	1,092	1,266	988				
Zone 1			3,004	14,140	1,337	15,477	12,991	171	652	652	10x14
1-Living Room / Kitchen			406	3,986	937	4,923	958	13	184	184	2--6
2-Dining Room			168	1,620	0	1,620	1,680	22	75	75	1--5
3-Away Room			122	708	0	708	1,084	14	33	33	1--3
4-Bath 1			102	34	0	34	98	1	2	2	1--1
5-Mud Room			97	441	0	441	804	11	20	20	1--3
6-Entry Way			193	286	0	286	808	11	13	13	1--2
7-Bedroom - 1			133	691	0	691	652	9	32	32	1--3
8-Bedroom 2			137	867	0	867	1,046	14	40	40	1--4
9-Bedroom 3			269	1,530	400	1,930	1,365	18	71	71	1--5
10-Bath Master			50	267	0	267	346	5	12	12	1--2
11-Bath Shared			85	91	0	91	212	3	4	4	1--2
12-Stair 2nd Floor			49	112	0	112	292	4	5	5	1--2
13-Hall Way 2nd Floor			101	107	0	107	246	3	5	5	1--2
14-Basement			1,092	3,400	0	3,400	3,400	45	157	157	2--5

Duct Size Preview

Room or Duct Name	Source	Minimum Velocity	Maximum Velocity	Rough. Factor	Design L/100	SP Loss	Duct Velocity	Duct Length	Htg Flow	Clg Flow	Act. Flow	Duct Size
System 1												
Supply Runouts												
Zone 1												
1-Living Room / Kitchen	Built-In	450	750	0.01	0.1		468.3		13	184	184	2--6
2-Dining Room	Built-In	450	750	0.01	0.1		548.1		22	75	75	1--5
3-Away Room	Built-In	450	750	0.01	0.1		665.4		14	33	33	1--3
4-Bath 1	Built-In	450	750	0.01	0.1		287.6		1	2	2	1--1
5-Mud Room	Built-In	450	750	0.01	0.1		414.5		11	20	20	1--3
6-Entry Way	Built-In	450	750	0.01	0.1		604.8		11	13	13	1--2
7-Bedroom - 1	Built-In	450	750	0.01	0.1		649.4		9	32	32	1--3
8-Bedroom 2	Built-In	450	750	0.01	0.1		458.4		14	40	40	1--4
9-Bedroom 3	Built-In	450	750	0.01	0.1		517.7		18	71	71	1--5
10-Bath Master	Built-In	450	750	0.01	0.1		564.6		5	12	12	1--2
11-Bath Shared	Built-In	450	750	0.01	0.1		192.4		3	4	4	1--2
12-Stair 2nd Floor	Built-In	450	750	0.01	0.1		236.8		4	5	5	1--2
13-Hall Way 2nd Floor	Built-In	450	750	0.01	0.1		226.3		3	5	5	1--2
14-Basement	Built-In	450	750	0.01	0.1		575.2		45	157	157	2--5
Other Ducts in System 1												
Supply Main Trunk	Built-In	650	900	0.003	0.1		671		171	652	652	10x14

Summary

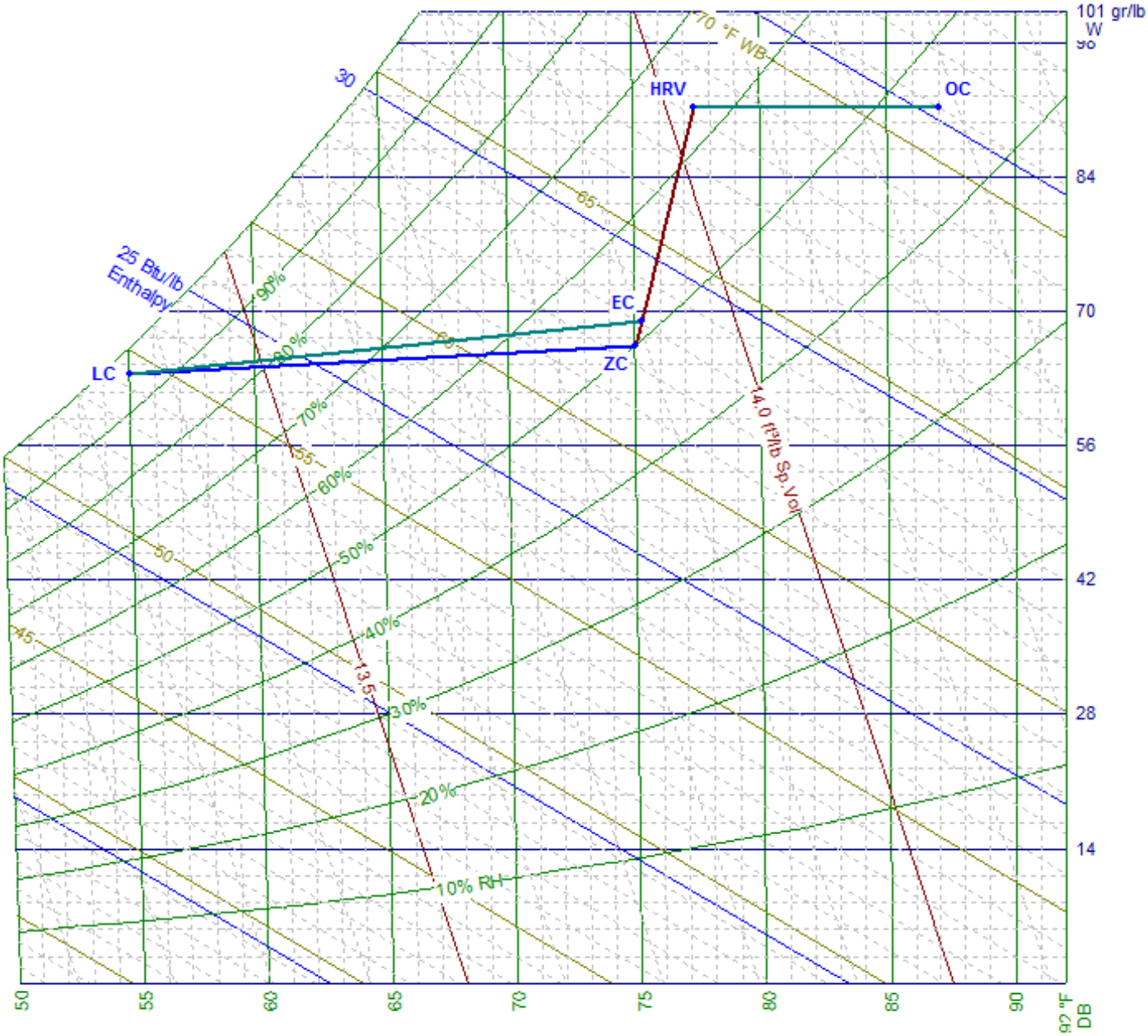
System 1

Heating Flow: 171

Cooling Flow: 652

System 1 - Main - Psychrometric Chart

ZC	Zone (Room) Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	DTF	Draw Through Fan Sensible Gain
HRV	Heat Recovery Ventilator		



Project Bill of Materials

Part No.	Description	Req. Qty.	Qty. Unit	Unit Matl. Cost	Matl. Cost	Unit Shop Labor Hours	Unit Field Labor Hours	Total Labor Cost	Total Cost
	Ductwork Accessories								
	Subtotal - Ductwork Accessories				**$0.00**			**$0.00**	**$0.00**
	HVAC Equipment								
	Subtotal - HVAC Equipment				**$0.00**			**$0.00**	**$0.00**
	Grand Total				**$0.00**			**$0.00**	**$0.00**

Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Window: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, u-value 0.3, SHGC 0.35	99.2	2,026	0	2,402	2,402
Window: Glazing-	43.2	883	0	495	495
Window - DS: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, u-value 0.3, SHGC 0.35	28	571	0	363	363
Window - DE: Glazing-	28	571	0	1,019	1,019
Window - W: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, u-value 0.3, SHGC 0.35	27.6	564	0	366	366
Window - S: Glazing-	13.5	276	0	258	258
Window: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, in partition wall, u-value 0.3, SHGC 0.35	9	54	0	54	54
Window: Glazing-	9	54	0	54	54
Door: Door-Metal - Polystyrene Core With Storm	42	600	0	202	202
AGW 2x6 CE w/4" Poly: Wall-	1863.6	2,788	0	962	962
SW: Part-	1206	1,108	0	1,108	1,108
Ceiling: Roof/Ceiling-	265	415	0	225	225
R-60 CE: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, R-56 insulation	824.3	897	0	488	488
CustomFloor4: Partition Floor (STD=20, WTD=20)-Basement, Custom, My fourth example custom floor	1092	2,184	0	2,184	2,184
Subtotals for structure:		12,991	0	10,180	10,180
People:	4		800	920	1,720
Equipment:			537	3,040	3,577
Lighting:	0			0	0
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 0, Summer CFM: 0		0	0	0	0
Ventilation: Winter CFM: 67, Summer CFM: 67		988	1,092	174	1,266
Total Building Load Totals:		13,979	2,429	14,314	16,743

Check Figures

Total Building Supply CFM:	652	CFM Per Square ft.:	0.217
Square ft. of Room Area:	3,004	Square ft. Per Ton:	2,153
Volume (ft³) of Cond. Space:	26,213		

Building Loads

Total Heating Required Including Ventilation Air:	13,979	Btuh	13.979	MBH
Total Sensible Gain:	14,314	Btuh	85	%
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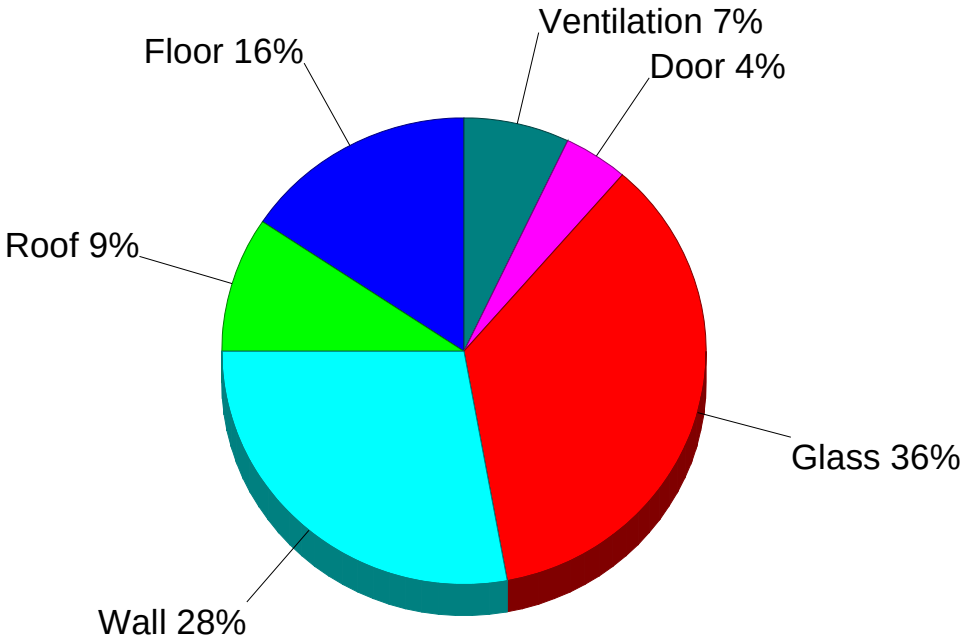
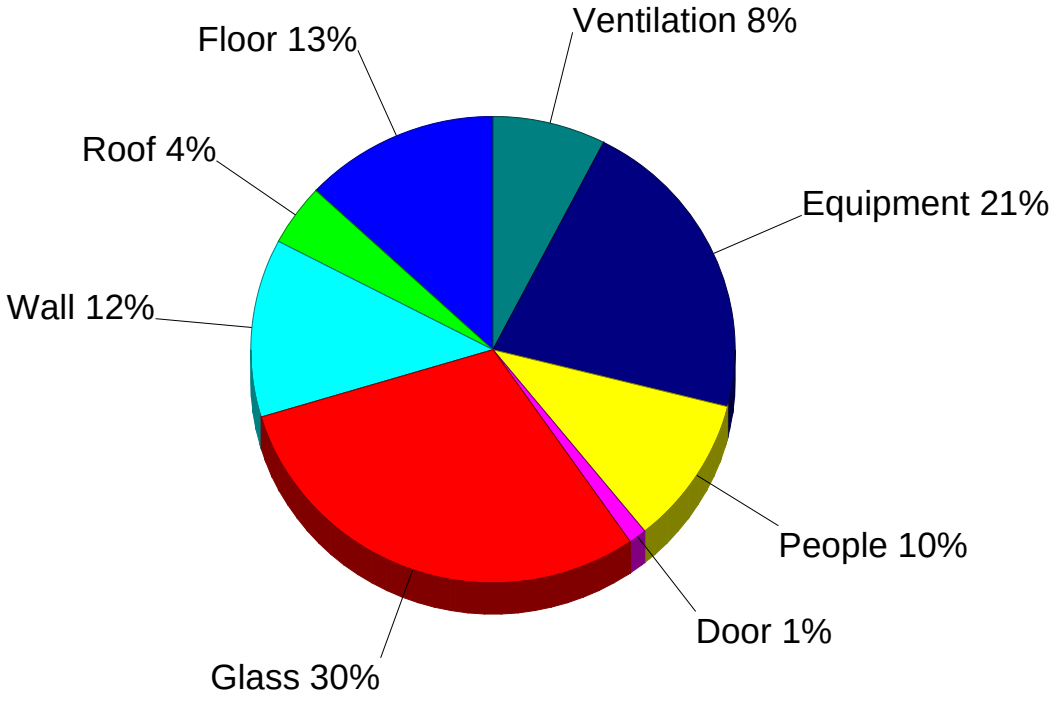
Building Pie Chart

Building Loss 13,979 Btuh



Building Gain 16,743 Btuh



System 1 Main Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Window: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, u-value 0.3, SHGC 0.35	99.2	2,026	0	2,402	2,402
Window: Glazing-	43.2	883	0	495	495
Window - DS: Glazing-operable window, e=0.20 on surface 2, metal frame no break, light color blinds at 45° with 25% coverage, u-value 0.3, SHGC 0.35	28	571	0	363	363
Window - DE: Glazing-	28	571	0	1,019	1,019
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Window: Glazing-	9	54	0	54	54
Door: Door-Metal - Polystyrene Core With Storm	42	600	0	202	202
AGW 2x6 CE w/4" Poly: Wall-	1863.6	2,788	0	962	962
SW: Part-	1206	1,108	0	1,108	1,108
Ceiling: Roof/Ceiling-	265	415	0	225	225
R-60 CE: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, R-56 insulation	824.3	897	0	488	488
CustomFloor4: Partition Floor (STD=20, WTD=20)-Basement, Custom, My fourth example custom floor	1092	2,184	0	2,184	2,184
Subtotals for structure:		12,991	0	10,180	10,180
People:	4		800	920	1,720
Equipment:			537	3,040	3,577
Lighting:	0			0	0
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 0, Summer CFM: 0		0	0	0	0
Ventilation: Winter CFM: 67, Summer CFM: 67		988	1,092	174	1,266
System 1 Main Load Totals:		13,979	2,429	14,314	16,743

Check Figures

Supply CFM:	652	CFM Per Square ft.:	0.217
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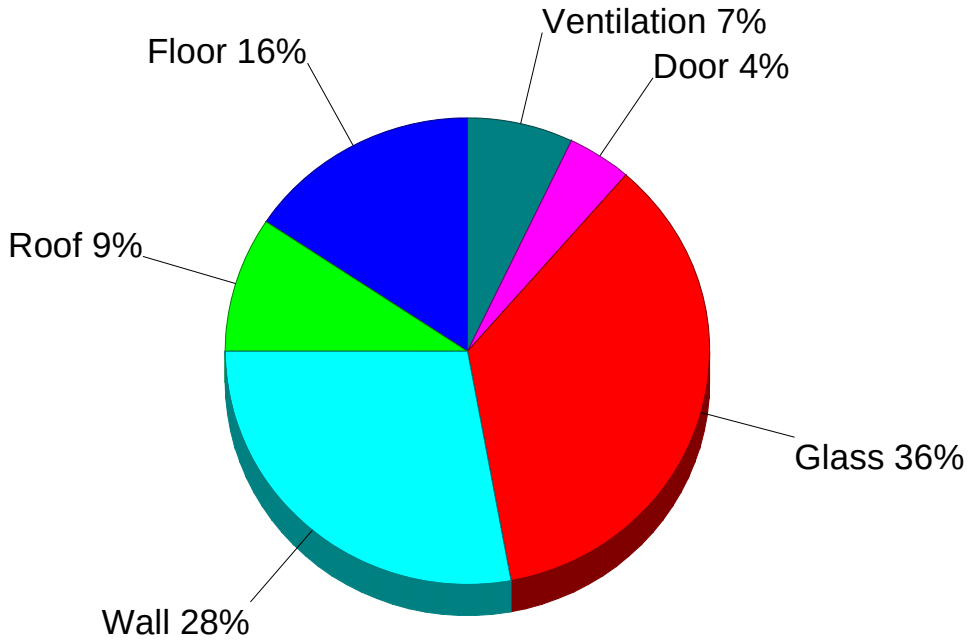
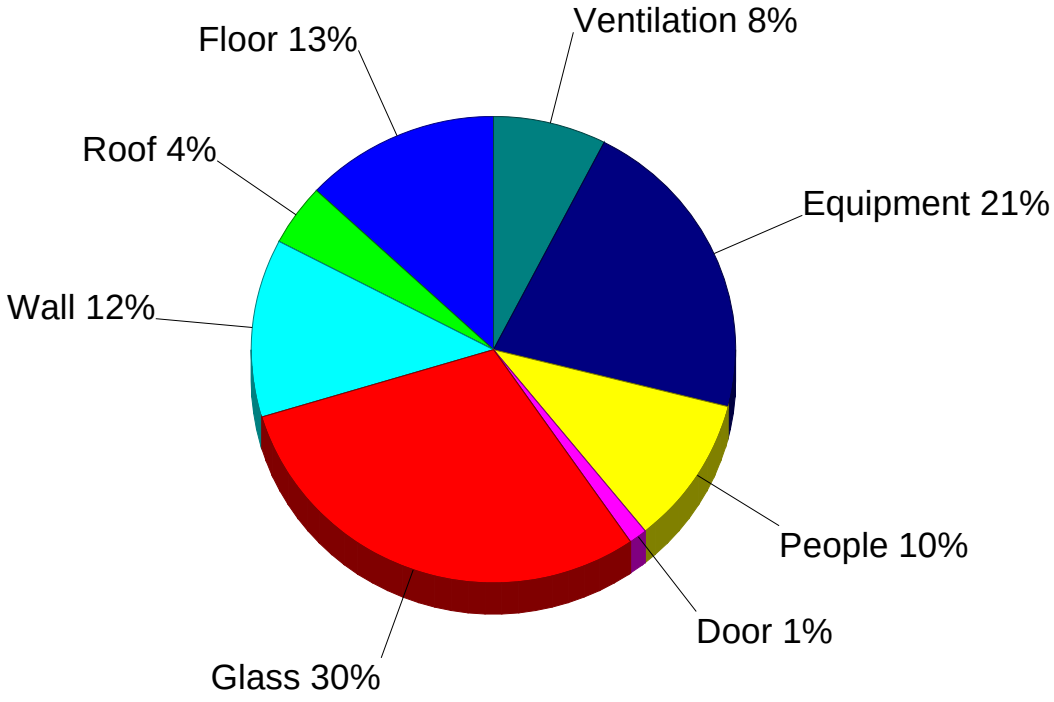
System 1 Main Pie Chart

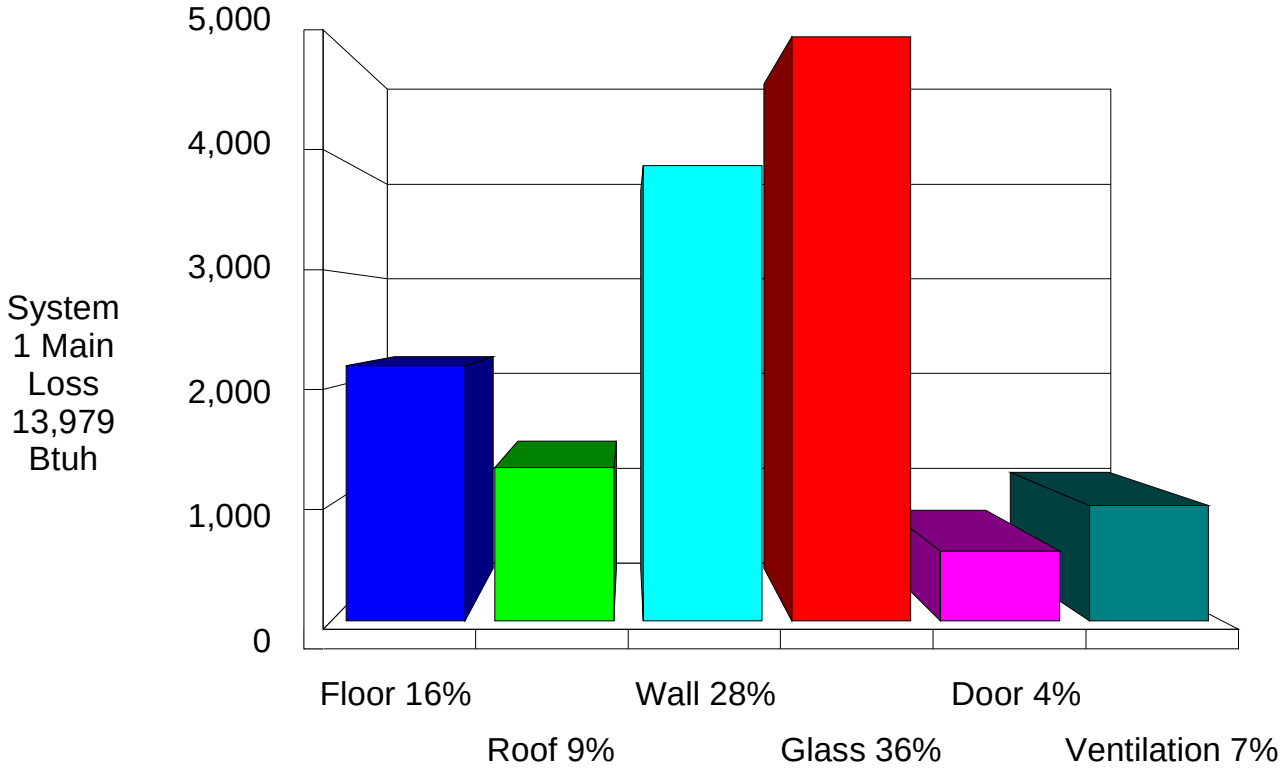
System 1 Main Loss 13,979 Btuh

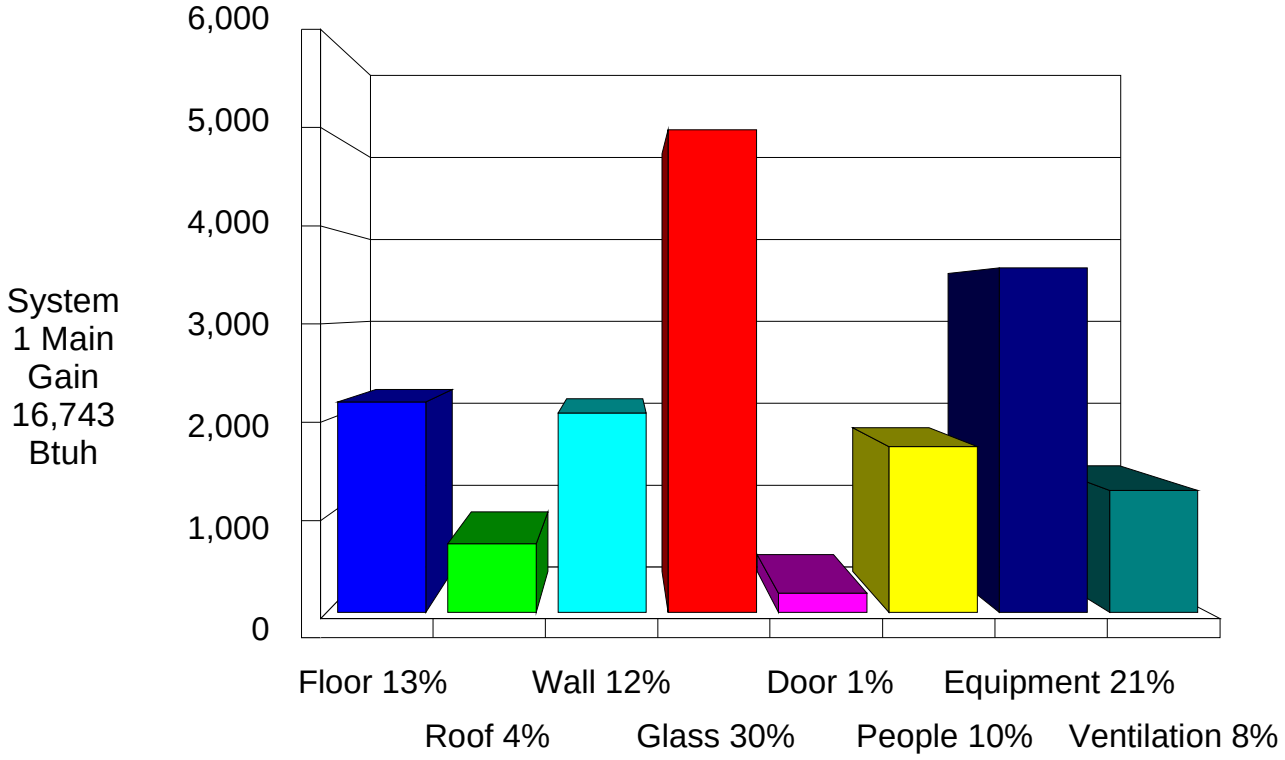


System 1 Main Gain 16,743 Btuh



System 1 Main Bar Graph





Detailed Room Loads - Room 1 - Living Room / Kitchen (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	15.6	ft.	System Number:	1	
Room Width:	26.0	ft.	Zone Number:	1	
Area:	405.6	sq.ft.	Supply Air:	184	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	3.0	AC/hr
Volume:	3,650.4	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	2		Actual Winter Vent.:	5	CFM
Runout Air:	92	CFM	Percent of Supply.:	3	%
Runout Duct Size:	6	in.	Actual Summer Vent.:	19	CFM
Runout Air Velocity:	468	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	468	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.139	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Wall-AGW 2x6 CE w/4" Poly 15.6 X 9	127.9	0.022	1.5	191	0.5	0	66
S -Wall-AGW 2x6 CE w/4" Poly 15.6 X 9	124.4	0.022	1.5	186	0.5	0	64
S -Gls-Window shgc-0.35 0%S (2)	16	0.300	20.4	326	14.3	0	228
N -Gls-Window shgc-0.35 100%S	12.5	0.300	20.4	255	10.2	0	128
Subtotals for Structure:				958		0	486
Infil.: Win.: 0.0, Sum.: 0.0	281		0.000	0	0.000	0	0
People: 200 lat/per, 230 sen/per:	2					400	460
Equipment:						537	3,040
Room Totals:				958		937	3,986

Equipment Cooling Loads

Item Name	Continuous Output Sensible Btuh	Continuous Output Latent Btuh	Average In-Use Output	Percent Used per Hour	Sensible Load Btuh	Latent Load Btuh
Refrigerator or freezer - 16 cubic feet	1000	0	100	100	1000	0
Coffee maker - brewer	1331	717	100	25	333	179
Dishwasher	4096	1433	100	25	1024	358
Color television	683	0	100	100	683	0
Cooking range with hood - four burners on high heat	0	0	100	100	0	0
Total					3040	537

Detailed Room Loads - Room 2 - Dining Room (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	10.3	ft.	System Number:	1	
Room Width:	16.4	ft.	Zone Number:	1	
Area:	168.1	sq.ft.	Supply Air:	75	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	3.0	AC/hr
Volume:	1,512.9	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	9	CFM
Runout Air:	75	CFM	Percent of Supply.:	12	%
Runout Duct Size:	5	in.	Actual Summer Vent.:	8	CFM
Runout Air Velocity:	548	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	548	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.244	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
S -Wall-AGW 2x6 CE w/4" Poly 10.2 X 9	64.2	0.022	1.5	96	0.5	0	33
E -Wall-AGW 2x6 CE w/4" Poly 16.4 X 9	119.6	0.022	1.5	179	0.5	0	62
S -Gls-Window - DS shgc-0.35 19%S	28	0.300	20.4	571	13.0	0	363
E -Gls-Window - DE shgc-0.35 0%S	28	0.300	20.4	571	36.4	0	1,019
UP-Ceil-Ceiling 10.2 X 16.4	168.1	0.023	1.6	263	0.9	0	143
Subtotals for Structure:				1,680		0	1,620
Infil.: Win.: 0.0, Sum.: 0.0	240		0.000	0	0.000	0	0
Room Totals:				1,680		0	1,620

Detailed Room Loads - Room 3 - Away Room (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	8.7	ft.	System Number:	1	
Room Width:	14.0	ft.	Zone Number:	1	
Area:	121.8	sq.ft.	Supply Air:	33	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	1.8	AC/hr
Volume:	1,096.2	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	6	CFM
Runout Air:	33	CFM	Percent of Supply.:	17	%
Runout Duct Size:	3	in.	Actual Summer Vent.:	3	CFM
Runout Air Velocity:	665	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	665	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.739	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
W -Wall-AGW 2x6 CE w/4" Poly 14 X 9	98.4	0.022	1.5	147	0.5	0	51
S -Wall-AGW 2x6 CE w/4" Poly 8.7 X 9	64.8	0.022	1.5	97	0.5	0	33
W -Gls-Window - W shgc-0.35 72%S (2)	27.6	0.300	20.4	564	13.3	0	366
S -Gls-Window - S shgc-0.35 0%S (2)	13.5	0.300	20.4	276	19.1	0	258
Subtotals for Structure:				1,084		0	708
Infil.: Win.: 0.0, Sum.: 0.0	204		0.000	0	0.000	0	0
Room Totals:				1,084		0	708

Detailed Room Loads - Room 4 - Bath 1 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	7.3	ft.	System Number:	1	
Room Width:	14.0	ft.	Zone Number:	1	
Area:	102.2	sq.ft.	Supply Air:	2	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	0.1	AC/hr
Volume:	919.8	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	1	CFM
Runout Air:	2	CFM	Percent of Supply.:	32	%
Runout Duct Size:	1	in.	Actual Summer Vent.:	0	CFM
Runout Air Velocity:	288	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	288	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.743	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
S -Wall-AGW 2x6 CE w/4" Poly 7.3 X 9	65.7	0.022	1.5	98	0.5	0	34
Subtotals for Structure:				98		0	34
Infil.: Win.: 0.0, Sum.: 0.0	66		0.000	0	0.000	0	0
Room Totals:				98		0	34

Detailed Room Loads - Room 5 - Mud Room (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	10.2	ft.	System Number:	1	
Room Width:	9.5	ft.	Zone Number:	1	
Area:	96.9	sq.ft.	Supply Air:	20	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	1.4	AC/hr
Volume:	872.1	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	4	CFM
Runout Air:	20	CFM	Percent of Supply.:	20	%
Runout Duct Size:	3	in.	Actual Summer Vent.:	2	CFM
Runout Air Velocity:	414	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	414	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.291	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Wall-AGW 2x6 CE w/4" Poly 10.2 X 9	91.8	0.022	1.5	137	0.5	0	47
E -Wall-AGW 2x6 CE w/4" Poly 9.5 X 9	58.2	0.022	1.5	87	0.5	0	30
E -Door-Door 3 X 7	21	0.210	14.3	300	4.8	0	101
E -Gls-Window shgc-0.35 0%S	6.2	0.300	20.4	128	29.0	0	181
UP-Ceil-Ceiling 10.2 X 9.5	96.9	0.023	1.6	152	0.9	0	82
Subtotals for Structure:				804		0	441
Infil.: Win.: 0.0, Sum.: 0.0	177		0.000	0	0.000	0	0
Room Totals:				804		0	441

Detailed Room Loads - Room 6 - Entry Way (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	16.1	ft.	System Number:	1	
Room Width:	12.0	ft.	Zone Number:	1	
Area:	193.2	sq.ft.	Supply Air:	13	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	0.5	AC/hr
Volume:	1,738.8	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	4	CFM
Runout Air:	13	CFM	Percent of Supply.:	32	%
Runout Duct Size:	2	in.	Actual Summer Vent.:	1	CFM
Runout Air Velocity:	605	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	605	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	1.108	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Wall-AGW 2x6 CE w/4" Poly 16.1 X 9	142.7	0.022	1.5	213	0.5	0	74
W -Wall-AGW 2x6 CE w/4" Poly 12 X 9	80.8	0.022	1.5	121	0.5	0	42
W -Door-Door 3 X 7	21	0.210	14.3	300	4.8	0	101
W -Gls-Window shgc-0.35 100%S	6.2	0.300	20.4	128	7.4	0	46
N -Gls-Window shgc-0.35 100%S	2.2	0.300	20.4	46	10.2	0	23
Subtotals for Structure:				808		0	286
Infil.: Win.: 0.0, Sum.: 0.0	253		0.000	0	0.000	0	0
Room Totals:				808		0	286

Detailed Room Loads - Room 7 - Bedroom - 1 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	12.3	ft.	System Number:	1	
Room Width:	10.8	ft.	Zone Number:	1	
Area:	132.8	sq.ft.	Supply Air:	32	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	1.8	AC/hr
Volume:	1,062.7	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	3	CFM
Runout Air:	32	CFM	Percent of Supply.:	11	%
Runout Duct Size:	3	in.	Actual Summer Vent.:	3	CFM
Runout Air Velocity:	649	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	649	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.705	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
W -Wall-AGW 2x6 CE w/4" Poly 10.8 X 8	66.4	0.022	1.5	99	0.5	0	34
W -Gls-Window shgc-0.35 0%S (2)	20	0.300	20.4	408	28.9	0	578
UP-Ceil-R-60 CE 12.3 X 10.8	132.8	0.016	1.1	145	0.6	0	79
Subtotals for Structure:				652		0	691
Infil.: Win.: 0.0, Sum.: 0.0	86		0.000	0	0.000	0	0
Room Totals:				652		0	691

Detailed Room Loads - Room 8 - Bedroom 2 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	12.3	ft.	System Number:	1	
Room Width:	11.2	ft.	Zone Number:	1	
Area:	137.1	sq.ft.	Supply Air:	40	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	2.2	AC/hr
Volume:	1,097.2	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	5	CFM
Runout Air:	40	CFM	Percent of Supply.:	13	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	4	CFM
Runout Air Velocity:	458	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	458	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.235	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
W -Wall-AGW 2x6 CE w/4" Poly 11.1 X 8	69.2	0.022	1.5	104	0.5	0	36
S -Wall-AGW 2x6 CE w/4" Poly 12.3 X 8	85.9	0.022	1.5	129	0.5	0	44
W -Gls-Window shgc-0.35 0%S (2)	20	0.300	20.4	408	28.9	0	578
S -Gls-Window shgc-0.35 100%S (2)	12.5	0.300	20.4	256	10.2	0	128
UP-Ceil-R-60 CE 12.3 X 11.1	137.1	0.016	1.1	149	0.6	0	81
Subtotals for Structure:				1,046		0	867
Infil.: Win.: 0.0, Sum.: 0.0	188		0.000	0	0.000	0	0
Room Totals:				1,046		0	867

Detailed Room Loads - Room 9 - Bedroom 3 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	15.8	ft.	System Number:	1	
Room Width:	17.0	ft.	Zone Number:	1	
Area:	268.6	sq.ft.	Supply Air:	71	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	2.0	AC/hr
Volume:	2,148.8	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	7	CFM
Runout Air:	71	CFM	Percent of Supply.:	10	%
Runout Duct Size:	5	in.	Actual Summer Vent.:	7	CFM
Runout Air Velocity:	518	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	518	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.218	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
E -Wall-AGW 2x6 CE w/4" Poly 17 X 8	116	0.022	1.5	174	0.5	0	60
S -Wall-AGW 2x6 CE w/4" Poly 15.8 X 8	110.4	0.022	1.5	165	0.5	0	57
E -Gls-Window shgc-0.35 0%S (2)	20	0.300	20.4	408	28.9	0	578
S -Gls-Window shgc-0.35 63%S (2)	16	0.300	20.4	326	13.5	0	216
UP-Ceil-R-60 CE 15.8 X 17	268.6	0.016	1.1	292	0.6	0	159
Subtotals for Structure:				1,365		0	1,070
Infil.: Win.: 0.0, Sum.: 0.0	262		0.000	0	0.000	0	0
People: 200 lat/per, 230 sen/per:	2					400	460
Room Totals:				1,365		400	1,530

Detailed Room Loads - Room 10 - Bath Master (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	5.9	ft.	System Number:	1	
Room Width:	8.5	ft.	Zone Number:	1	
Area:	50.2	sq.ft.	Supply Air:	12	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	1.8	AC/hr
Volume:	401.2	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	2	CFM
Runout Air:	12	CFM	Percent of Supply.:	14	%
Runout Duct Size:	2	in.	Actual Summer Vent.:	1	CFM
Runout Air Velocity:	565	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	565	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.967	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
E -Wall-AGW 2x6 CE w/4" Poly 8.5 X 8	61.8	0.022	1.5	92	0.5	0	32
N -Wall-AGW 2x6 CE w/4" Poly 5.9 X 8	47.2	0.022	1.5	71	0.5	0	24
E -Gls-Window shgc-0.35 0%S	6.2	0.300	20.4	128	29.0	0	181
UP-Ceil-R-60 CE 5.9 X 8.5	50.2	0.016	1.1	55	0.6	0	30
Subtotals for Structure:				346		0	267
Infil.: Win.: 0.0, Sum.: 0.0	115		0.000	0	0.000	0	0
Room Totals:				346		0	267

Detailed Room Loads - Room 11 - Bath Shared (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	10.0	ft.	System Number:	1	
Room Width:	8.5	ft.	Zone Number:	1	
Area:	85.0	sq.ft.	Supply Air:	4	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.4	AC/hr
Volume:	680.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	1	CFM
Runout Air:	4	CFM	Percent of Supply.:	26	%
Runout Duct Size:	2	in.	Actual Summer Vent.:	0	CFM
Runout Air Velocity:	192	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	192	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.118	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Wall-AGW 2x6 CE w/4" Poly 10 X 8	80	0.022	1.5	120	0.5	0	41
UP-Ceil-R-60 CE 10 X 8.5	85	0.016	1.1	92	0.6	0	50
Subtotals for Structure:				212		0	91
Infil.: Win.: 0.0, Sum.: 0.0	80		0.000	0	0.000	0	0
Room Totals:				212		0	91

Detailed Room Loads - Room 12 - Stair 2nd Floor (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	12.3	ft.	System Number:	1	
Room Width:	4.0	ft.	Zone Number:	1	
Area:	49.2	sq.ft.	Supply Air:	5	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.8	AC/hr
Volume:	393.6	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	2	CFM
Runout Air:	5	CFM	Percent of Supply.:	29	%
Runout Duct Size:	2	in.	Actual Summer Vent.:	1	CFM
Runout Air Velocity:	237	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	237	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.176	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
W -Wall-AGW 2x6 CE w/4" Poly 4 X 8	32	0.022	1.5	48	0.5	0	17
N -Wall-AGW 2x6 CE w/4" Poly 12.3 X 8	96.2	0.022	1.5	144	0.5	0	50
N -Gls-Window shgc-0.35 100%S	2.2	0.300	20.4	46	7.1	0	16
UP-Ceil-R-60 CE 12.3 X 4	49.2	0.016	1.1	54	0.6	0	29
Subtotals for Structure:				292		0	112
Infil.: Win.: 0.0, Sum.: 0.0	130		0.000	0	0.000	0	0
Room Totals:				292		0	112

Detailed Room Loads - Room 13 - Hall Way 2nd Floor (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	26.0	ft.	System Number:	1	
Room Width:	3.9	ft.	Zone Number:	1	
Area:	101.4	sq.ft.	Supply Air:	5	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.4	AC/hr
Volume:	811.2	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	1	CFM
Runout Air:	5	CFM	Percent of Supply.:	26	%
Runout Duct Size:	2	in.	Actual Summer Vent.:	1	CFM
Runout Air Velocity:	226	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	226	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.161	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Wall-AGW 2x6 CE w/4" Poly 3.9 X 8	29	0.022	1.5	43	0.5	0	15
S -Wall-AGW 2x6 CE w/4" Poly 3.9 X 8	31.2	0.022	1.5	47	0.5	0	16
N -Gls-Window shgc-0.35 100%S	2.2	0.300	20.4	46	7.1	0	16
UP-Ceil-R-60 CE 26 X 3.9	101.4	0.016	1.1	110	0.6	0	60
Subtotals for Structure:				246		0	107
Infil.: Win.: 0.0, Sum.: 0.0	62		0.000	0	0.000	0	0
Room Totals:				246		0	107

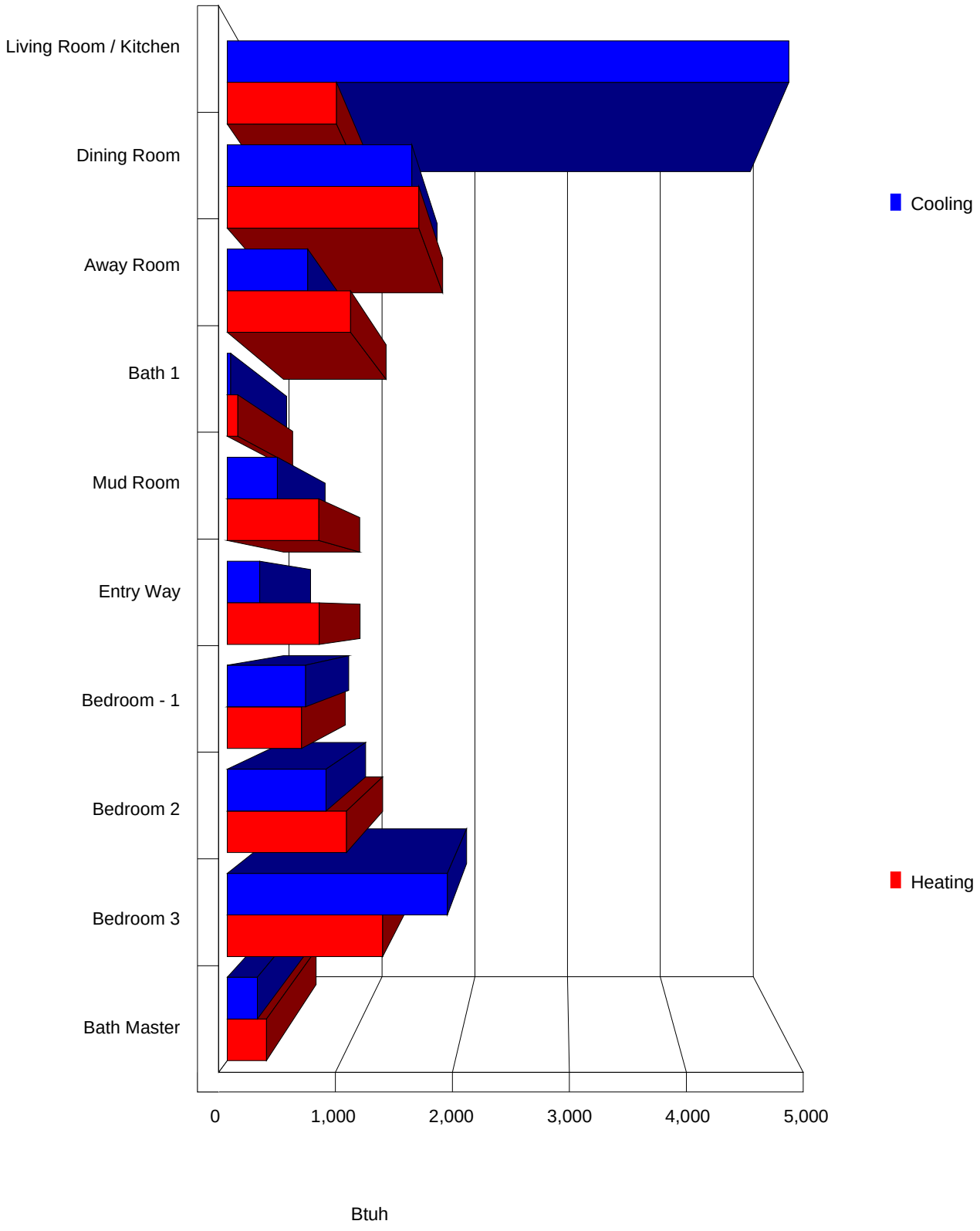
Detailed Room Loads - Room 14 - Basement (Average Load Procedure)

General

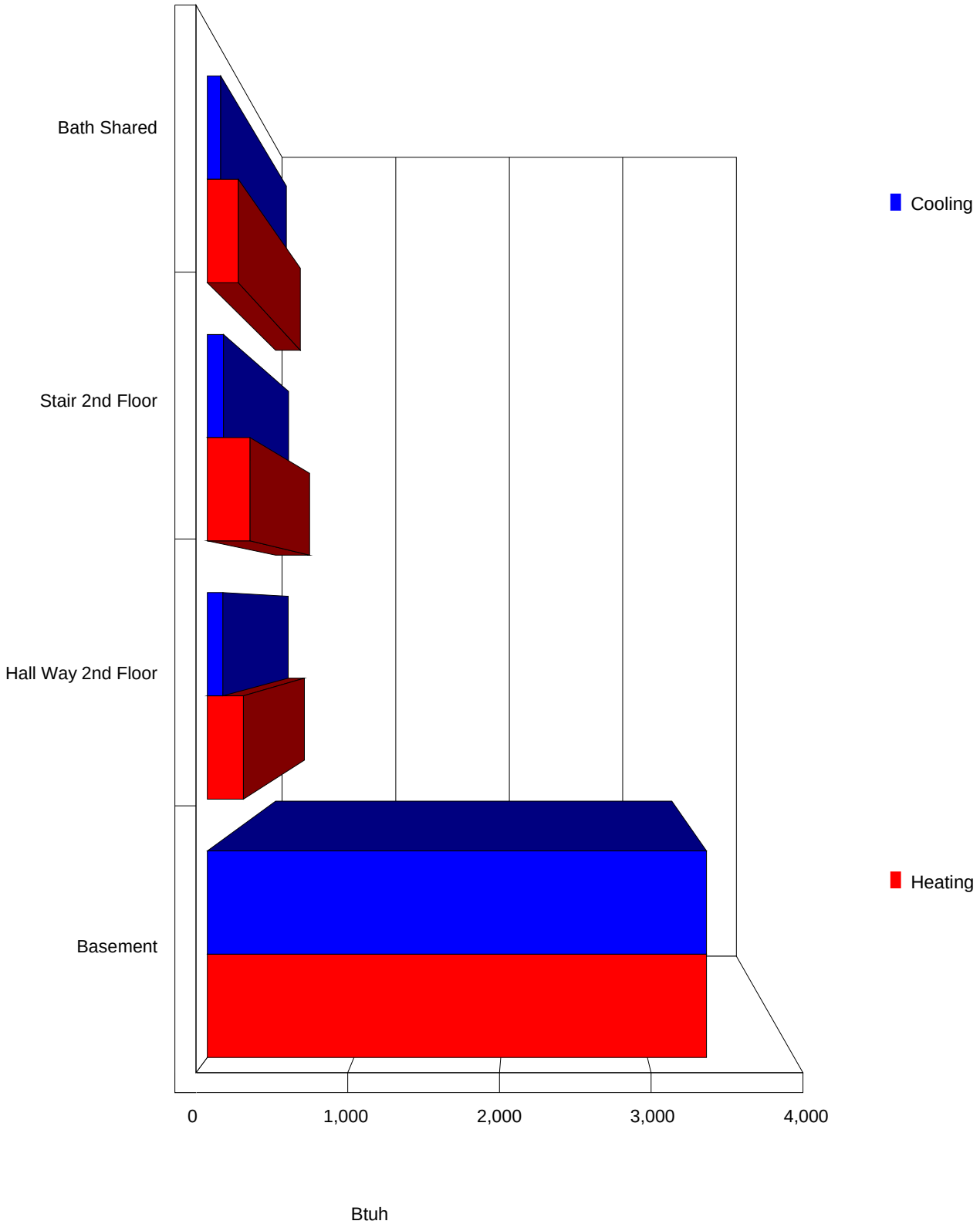
Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	42.0	ft.	System Number:	1	
Room Width:	26.0	ft.	Zone Number:	1	
Area:	1,092.0	sq.ft.	Supply Air:	157	CFM
Ceiling Height:	9.0	ft.	Supply Air Changes:	1.0	AC/hr
Volume:	9,828.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	2		Actual Winter Vent.:	18	CFM
Runout Air:	78	CFM	Percent of Supply.:	11	%
Runout Duct Size:	5	in.	Actual Summer Vent.:	16	CFM
Runout Air Velocity:	575	ft./min.	Percent of Supply:	10	%
Runout Air Velocity:	575	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.269	in.wg./100 ft.	Actual Summer Infil.:	0	CFM

Item Description	Area Quantity	-U- Value	Htg HTM	Sen Loss	Clg HTM	Lat Gain	Sen Gain
N -Part-20°/20°-SW 42 X 9	369	0.046	0.9	339	0.9	0	339
S -Part-20°/20°-SW 42 X 9	369	0.046	0.9	339	0.9	0	339
W -Part-20°/20°-SW 26 X 9	234	0.046	0.9	215	0.9	0	215
E -Part-20°/20°-SW 26 X 9	234	0.046	0.9	215	0.9	0	215
N -Gls-Window in partition (2)	9	0.300	6.0	54	6.0	0	54
S -Gls-Window in partition (2)	9	0.300	6.0	54	6.0	0	54
Floor-Part-CustomFloor4 26 X 42	1092	0.100	2.0	2,184	2.0	0	2,184
Subtotals for Structure:				3,400		0	3,400
Infil.: Win.: 0.0, Sum.: 0.0	1,224		0.000	0	0.000	0	0
Room Totals:				3,400		0	3,400

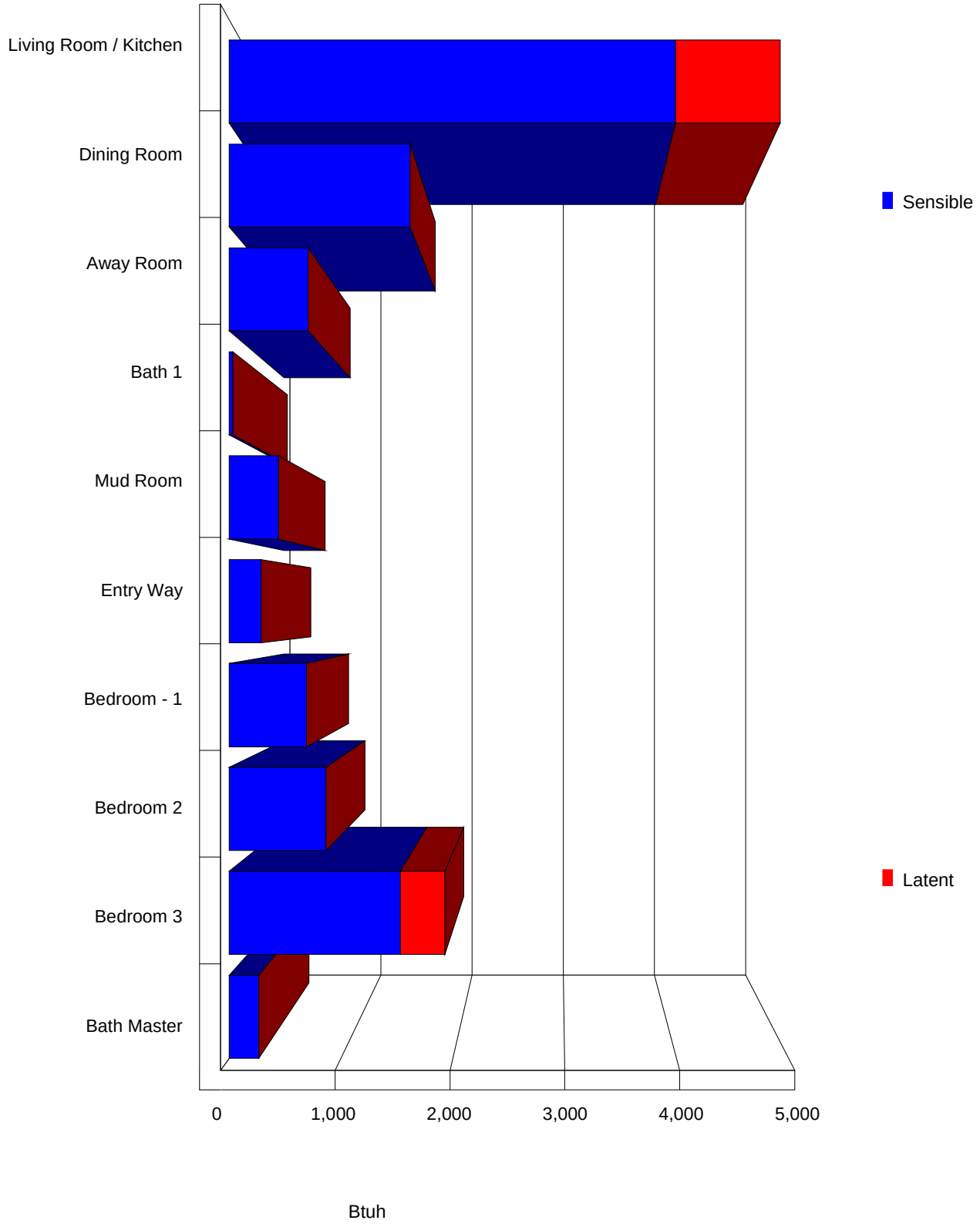
Room Cooling and Heating Loads Bar Graphs



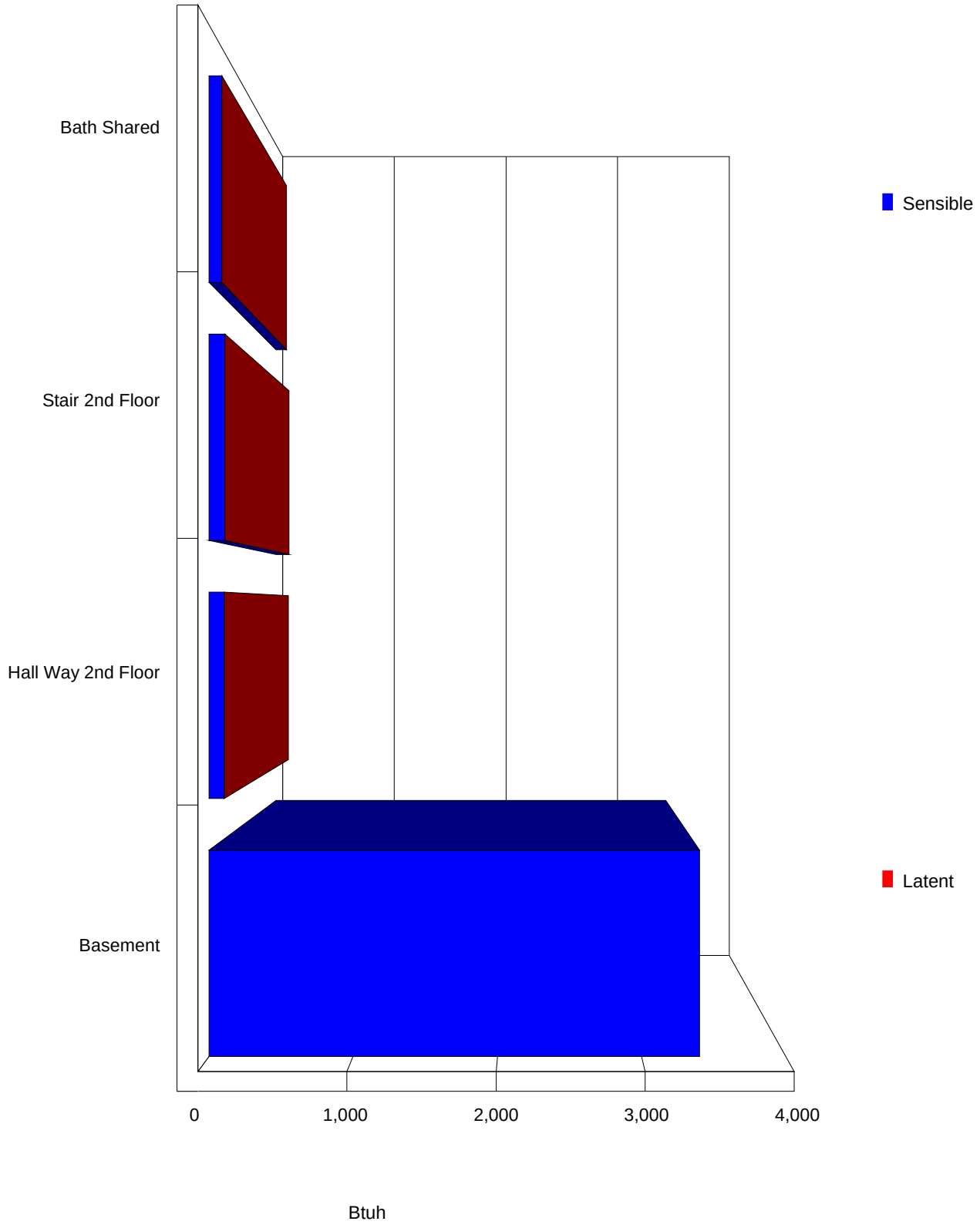
Room Cooling and Heating Loads Bar Graphs



Room Cooling Loads Bar Graphs



Room Cooling Loads Bar Graphs



System 1 Room Load Summary

No	Room Name	Area SF	Htg Sens Btuh	Min Htg CFM	Run Duct Size	Run Duct Vel	Clg Sens Btuh	Clg Lat Btuh	Min Clg CFM	Act Sys CFM
---Zone 1---										
1	Living Room / Kitchen	406	958	13	2-6	468	3,986	937	184	184
2	Dining Room	168	1,680	22	1-5	548	1,620	0	75	75
3	Away Room	122	1,084	14	1-3	665	708	0	33	33
4	Bath 1	102	98	1	1-1	288	34	0	2	2
5	Mud Room	97	804	11	1-3	414	441	0	20	20
6	Entry Way	193	808	11	1-2	605	286	0	13	13
7	Bedroom - 1	133	652	9	1-3	649	691	0	32	32
8	Bedroom 2	137	1,046	14	1-4	458	867	0	40	40
9	Bedroom 3	269	1,365	18	1-5	518	1,530	400	71	71
10	Bath Master	50	346	5	1-2	565	267	0	12	12
11	Bath Shared	85	212	3	1-2	192	91	0	4	4
12	Stair 2nd Floor	49	292	4	1-2	237	112	0	5	5
13	Hall Way 2nd Floor	101	246	3	1-2	226	107	0	5	5
14	Basement	1,092	3,400	45	2-5	575	3,400	0	157	157
	Ventilation		988				174	1,092		
	System 1 total	3,004	13,979	171			14,314	2,429	652	652

System 1 Main Trunk Size:	10x14	in.
Velocity:	671	ft./min
Loss per 100 ft.:	0.082	in.wg

Cooling System Summary

	Cooling Tons	Sensible/Latent Split	Sensible Btuh	Latent Btuh	Total Btuh
Net Required:	1.40	85% / 15%	14,314	2,429	16,743
Actual:	1.50	75% / 25%	13,500	4,500	18,000

Equipment Data

	Heating System	Cooling System
Type:	Air Source Heat Pump	Air Source Heat Pump
Model:	DZ14SA0181A*	DZ14SA0181A*
Indoor Model:		CHPF2430B6C*+TXV
Brand:	DAIKIN	DAIKIN
Description:	Air Source Heat Pump	Air Source Heat Pump
Efficiency:	8.1 HSPF	15 SEER
Sound:	0	0
Capacity:	16,800 Btuh	18,000 Btuh
Sensible Capacity:	n/a	13,500 Btuh
Latent Capacity:	n/a	4,500 Btuh
AHRI Reference No.:	n/a	6547452

This system's equipment was selected in accordance with ACCA Manual S.
Manual S equipment sizing data: SODB: 87F, SOWB: 71F, WODB: 2F, SIDB: 75F, SIRH: 50%, WIDB: 70F, Sen. gain: 14,314 Btuh, Lat. gain: 2,429 Btuh, Sen. loss: 13,979 Btuh, Entering clg. coil DB: 75.3F, Entering clg. coil WB: 63.1F, Entering htg. coil DB: 64.7F, Clg. coil TD: 20F, Htg. coil TD: 70F, Req. clg. airflow: 652 CFM, Req. htg. airflow: 171 CFM

Residential Plans Examiner Review Form for HVAC System Design (Loads, Equipment, Ducts)

Form RPER 1.01
8 Mar 10

County, Town, Municipality, Jurisdiction
Header Information

Contractor _____

Mechanical License # _____

Building Plan # _____

Home Address (Street or Lot#, Block, Subdivision) _____

REQUIRED ATTACHMENTS[1]	ATTACHED	
Manual J1 Form (and supporting worksheets):	Yes ☐	No ☒
or MJ1AE Form[2] (and supporting worksheets):	Yes ☐	No ☒
OEM performance data (heating, cooling, blower):	Yes ☐	No ☒
Manual D Friction Rate Worksheet:	Yes ☐	No ☒
Duct distribution system sketch:	Yes ☐	No ☒

HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

Winter Design Conditions

Outdoor temperature	2	°F
Indoor temperature	70	°F
Total heat loss	13979	Btu/h

Summer Design Conditions

Outdoor temperature	87	°F
Indoor temperature	75	°F
Grains difference	24 △ Gr @ 50	% Rh
Sensible heat gain	14314	Btu/h
Latent heat gain	2429	Btu/h
Total heat gain	16743	Btu/h

Building Construction Information

Building

Orientation (Front door faces) West
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms 3

Conditioned floor area 3004 Sq Ft

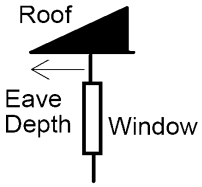
Number of occupants 4

Windows

Eave overhang depth 2.6 Ft

Internal shade Blinds
Blinds, drapes, etc

Number of skylights 0



HVAC EQUIPMENT SELECTION (IRC M1401.3)

Heating Equipment Data

Equipment type Heat pump
Furnace, Heat pump, Boiler, etc.

Model DZ14SA0181A*

Heating output capacity 16800 Btu/h
Heat pumps - capacity at winter design outdoor conditions

Auxiliary heat output capacity _____ Btu/h

Cooling Equipment Data

Equipment type Heat pump
Air Conditioner, Heat pump, etc

Model DZ14SA0181A*

Sensible cooling capacity 13500 Btu/h

Latent cooling capacity 4500 Btu/h

Total cooling capacity 18000 Btu/h

Blower Data

Heating CFM 652 CFM

Cooling CFM 652 CFM

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow _____ CFM

External Static Pressure (ESP) _____ IWC

Component Pressure Losses (CPL) _____ IWC

Available Static Pressure (ASP) _____ IWC
ASP = ESP - CPL

Longest supply duct: _____ Ft

Longest return duct: _____ Ft

Total Effective Length (TEL) _____ Ft

Friction Rate: _____ IWC
Friction Rate = (ASP × 100) ÷ TEL

Duct Materials Used (circle)

Trunk Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

Branch Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

I declare the load calculation, equipment selection, and duct system design were rigorously performed based on the building plan listed above, I understand the claims made on these forms will be subject to review and verification.

Contractor's Printed Name _____ Date _____

Contractor's Signature _____

Reserved for use by County, Town, Municipality, or Authority having jurisdiction.

[1] The AHJ shall have the discretion to accept Required Attachments printed from approved ACCA software vendors, see list on page 2 of instructions.
[2] If abridged version of Manual J is used for load calculation, then verify residence meets requirements, see Abridged Edition Checklist on page 13 of instructions.

Form generated by ACCA-approved Manual J Eighth Edition Version 2 Elite Software Rhvac program.