REC
HVAC Load Calculations

for

Builder Bob
200 Hawk Rd
AnyTown NY, 11788

Residential Energy Conservation

Energy Efficient Construction Consulting

Prepared By:

Glenn Hooper
Residential Energy Conservation
3771 Nsconset Hwy Suite 101A
S. Setauket NY 11720
751-7911
Wednesday, August 26, 2009

Project Report

General Project Information

Project Filename:	C:\Program Files\Elite\Rhvacw\Projects\REC.rhv
Project Title:	REC
Designed By:	Glenn Hooper
Project Date:	Thursday, October 23, 2008
Project Comment:	
Client Name:	Builder Bob
Client Address:	200 Hawk Rd
Client City:	AnyTown NY, 11788
Client Comment:	From Plan number 02342-1 dated 1-1-09
Company Name:	Residential Energy Conservation
Company Representative:	Glenn Hooper
Company Address:	3771 Nsconset Hwy Suite 101A
Company City:	S. Setauket NY 11720
Company Phone:	751-7911
Company Fax:	751-7902
Company Website:	http://www.energy-experts.net

Design Data

Reference City:		Suffolk County, New York
Building Orientation:		Front door faces West
Daily Temperature Range:		Medium
Latitude:	40	Degrees
Elevation:	67	ft.
Altitude Factor:	0.998	
Elevation Sensible Adj. Factor:	1.000	
Elevation Total Adj. Factor:	1.000	
Elevation Heating Adj. Factor:	1.000	
Elevation Heating Adj. Factor:	1.000	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	10	9	80%	n/a	72	n/a
Summer:	83	71	56%	50%	75	30

Check Figures

Total Building Supply CFM:	833	CFM Per Square ft.:	0.531
Square ft. of Room Area:	1,568	Square ft. Per Ton:	755
Volume (ft³) of Cond. Space:	13,687		

Building Loads

Total Heating Required Including Ventilation Air:	27,802	Btuh	27.802	MBH
Total Sensible Gain:	18,699	Btuh	83	%
Total Latent Gain:	3,850	Btuh	17	%

Project Report (cont'd)

Building Loads

Total Cooling Required Including Ventilation Air:	22,549	Btuh	1.88	Tons (Based On Sensible + Latent)
			2.08	Tons (Based On 75% Sensible Capacity)

Notes

Calculations are based on 8th edition of ACCA Manual J.
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.

Miscellaneous Report

System 1 1st Floor Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	10	9	80%	n/a	72	n/a
Summer:	83	71	56%	50%	75	30.17

Duct Sizing Inputs

	Main Trunk		Runouts	
Calculate:	Yes		Yes	
Use Schedule:	Yes		Yes	
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:	0.160	AC/hr	0.000	AC/hr
	36	CFM	0	CFM
Infiltration Actual:	0.160	AC/hr	0.000	AC/hr
Above Grade Volume:	X 13,687	Cu.ft.	X 13,687	Cu.ft.
	2,190	Cu.ft./hr	0	Cu.ft./hr
	X 0.0167		X 0.0167	
Total Building Infiltration:	36	CFM	0	CFM
Total Building Ventilation:	48	CFM	48	CFM

---System 1---

Infiltration & Ventilation Sensible Gain Multiplier: 8.78 = (1.10 X 0.998 X 8.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 20.47 = (0.68 X 0.998 X 30.17 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 68.04 = (1.10 X 0.998 X 62.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.160 AC/hr (36 CFM), Construction: Tight
Summer Infiltration Specified: 0.000 AC/hr (0 CFM), Construction: Unknown

Duct Load Factor Scenarios for System 1

No.	Type	Description	Location	Attic Ceiling	Duct Leakage	Duct Insulation	Surface Area	From MDD
1	Supply	Main	Basement	-	0.06	8	573	No
1	Return	Main	Basement	-	0.06	8	106	No

Load Preview Report

Scope	Has AED	Net Ton	Rec Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Min Htg CFM	Min Clg CFM	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building		1.88	2.08	755	1,568	18,699	3,850	22,549	27,802	319	833	319	833	833	
System 1	Yes	1.88	2.08	755	1,568	18,699	3,850	22,549	27,802	319	833	319	833	833	10x16
Ventilation						421	982	1,404	3,266						
Duct Latent							700	700							
HW Piping									1,155						
Zone 1					1,568	18,278	2,167	20,445	23,381	319	833	319	833	833	10x16
1-Family Room					290	3,538	0	3,538	6,510	89	161	89	161	161	1--8
2-Kitchen-Breakfast					280	6,934	947	7,881	4,262	58	316	58	316	316	3--6
3-Master Bath					63	580	0	580	871	12	26	12	26	26	1--4
4-WIC					68	170	0	170	1,276	17	8	17	8	8	1--4
5-Master Bedroom					213	1,407	400	1,807	2,242	31	64	31	64	64	1--5
6-Bedroom 3					159	1,418	200	1,618	2,554	35	65	35	65	65	1--5
7-Bedroom 2					100	1,025	200	1,225	1,361	19	47	19	47	47	1--4
8-Bath 1					66	99	200	299	264	4	5	4	5	5	1--4
9-Hall					77	205	200	405	391	5	9	5	9	9	1--4
10-Living Room					252	2,902	20	2,922	3,650	50	132	50	132	132	1--7

Duct Size Preview

Room or Duct Name	Source	Minimum Velocity	Maximum Velocity	Rough. Factor	Design L/100	Actual L/100	SP Loss	Duct Velocity	Duct Length	Htg Flow	Clg Flow	Act. Flow	Duct Size
System 1													
Supply Runouts													
Zone 1													
1-Family Room	Built-In	450	750	0	0.1	0.1		461.8		89	161	161	1--8
2-Kitchen-Breakfast	Built-In	450	750	0	0.1	0.2		536.4		58	316	316	3--6
3-Master Bath	Built-In	450	750	0	0.1	0.1		303		12	26	26	1--4
4-WIC	Built-In	450	750	0	0.1	0		88.9		17	8	8	1--4
5-Master Bedroom	Built-In	450	750	0	0.1	0.2		470.1		31	64	64	1--5
6-Bedroom 3	Built-In	450	750	0	0.1	0.2		473.9		35	65	65	1--5
7-Bedroom 2	Built-In	450	750	0	0.1	0.3		535.2		19	47	47	1--4
8-Bath 1	Built-In	450	750	0	0.1	0		51.6		4	5	5	1--4
9-Hall	Built-In	450	750	0	0.1	0		107		5	9	9	1--4
10-Living Room	Built-In	450	750	0	0.1	0.1		494.7		50	132	132	1--7
Other Ducts													
Supply Main Trunk	Built-In	650	900	0	0.1	0.1		749.6		319	833	833	10x16

Summary

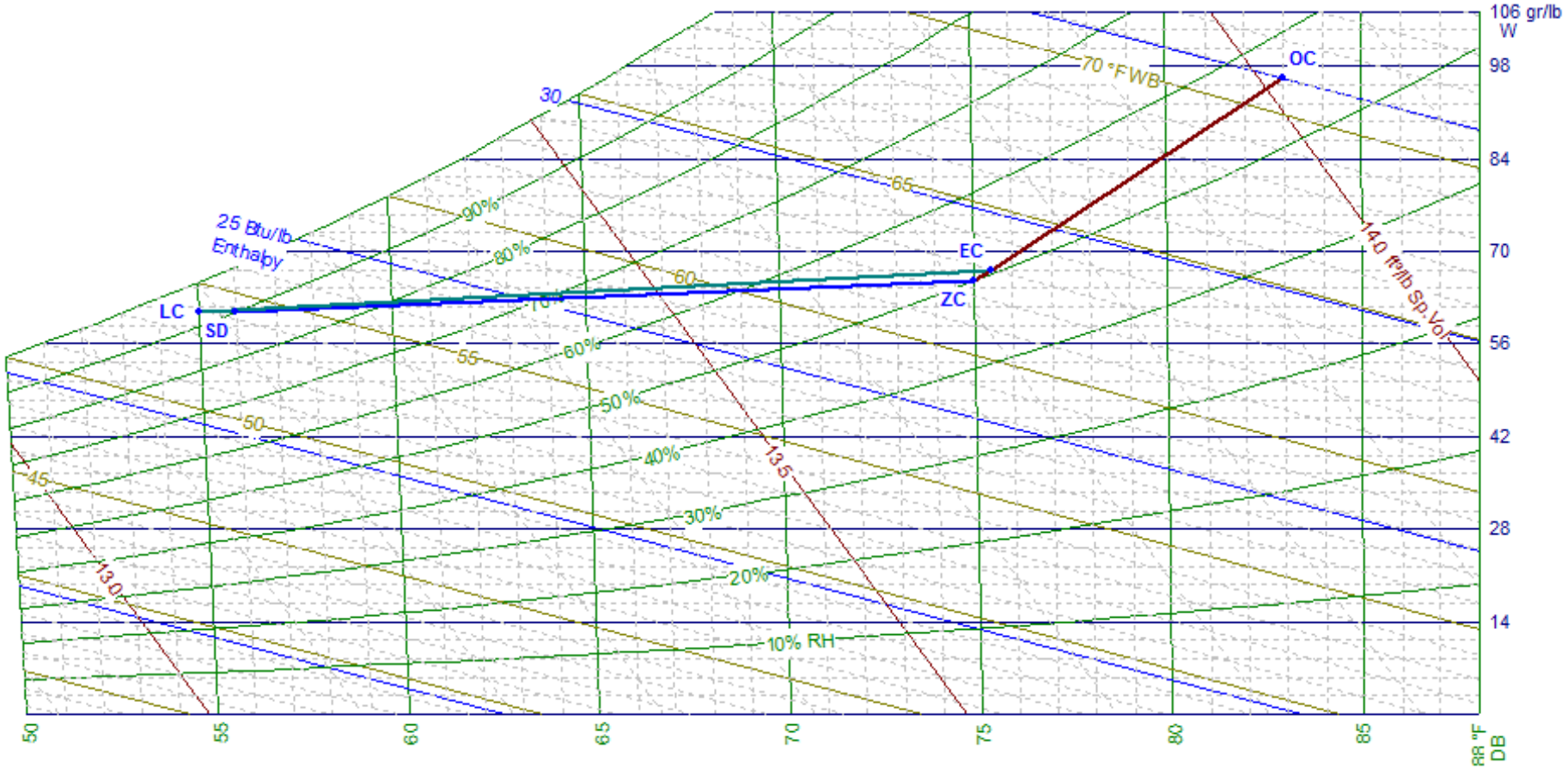
System 1

Heating Flow: 319

Cooling Flow: 833

System 1 - 1st Floor - 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		



Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Low E2: Glazing-	240	5,206	0	7,291	7,291
11N: Door-Metal - Polystyrene Core	53.3	1,158	0	355	355
12C-0bw: Wall-Frame, R-13 insulation in 2 x 4 stud cavity, no board insulation, brick finish, wood studs	1406.3	7,935	0	641	641
18A-30: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, R-30 blanket or loose fill	406.7	858	0	248	248
16B-38: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-38 insulation	1191.4	1,920	0	1,332	1,332
16A-7: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Unvented Attic, No Radiant Barrier, Any Roofing Material, Any Roof Color, R-7 insulation	12	83	0	85	85
19A-19p: Floor-Over enclosed unconditioned crawl space, No insulation on exposed walls, sealed or vented space, passive, R-19 blanket	1570.2	3,739	0	483	483
Subtotals for structure:		20,899	0	10,435	10,435
People:	4		800	920	1,720
Equipment:			1,367	6,031	7,398
Lighting:	0			0	0
Ductwork:		0	700	892	1,593
Infiltration: Winter CFM: 36, Summer CFM: 0		2,482	0	0	0
Ventilation: Winter CFM: 48, Summer CFM: 48		3,266	982	421	1,404
Hot Water Piping, 50 ft. Total:		1,155	0	0	0
Total Building Load Totals:		27,802	3,850	18,699	22,549

Check Figures

Total Building Supply CFM:	833	CFM Per Square ft.:	0.531
Square ft. of Room Area:	1,568	Square ft. Per Ton:	755
Volume (ft³) of Cond. Space:	13,687		

Building Loads

Total Heating Required Including Ventilation Air:	27,802	Btuh	27.802	MBH
Total Sensible Gain:	18,699	Btuh	83	%
Total Latent Gain:	3,850	Btuh	17	%
Total Cooling Required Including Ventilation Air:	22,549	Btuh	1.88	Tons (Based On Sensible + Latent)

Total Building Summary Loads (cont'd)

Building Loads

2.08 Tons (Based On 75% Sensible Capacity)

Notes

Calculations are based on 8th edition of ACCA Manual J.
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.

Building Pie Chart

System 1 1st Floor Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Low E2: Glazing-	240	5,206	0	7,291	7,291
11N: Door-Metal - Polystyrene Core	53.3	1,158	0	355	355
12C-0bw: Wall-Frame, R-13 insulation in 2 x 4 stud cavity, no board insulation, brick finish, wood studs	1406.3	7,935	0	641	641
18A-30: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, R-30 blanket or loose fill	406.7	858	0	248	248
16B-38: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-38 insulation	1191.4	1,920	0	1,332	1,332
16A-7: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Unvented Attic, No Radiant Barrier, Any Roofing Material, Any Roof Color, R-7 insulation	12	83	0	85	85
19A-19p: Floor-Over enclosed unconditioned crawl space, No insulation on exposed walls, sealed or vented space, passive, R-19 blanket	1570.2	3,739	0	483	483
Subtotals for structure:		20,899	0	10,435	10,435
People:	4		800	920	1,720
Equipment:			1,367	6,031	7,398
Lighting:	0			0	0
Ductwork:		0	700	892	1,593
Infiltration: Winter CFM: 36, Summer CFM: 0		2,482	0	0	0
Ventilation: Winter CFM: 48, Summer CFM: 48		3,266	982	421	1,404
Hot Water Piping, 50 ft. Total:		1,155	0	0	0
System 1 1st Floor Load Totals:		27,802	3,850	18,699	22,549

Check Figures

Supply CFM:	833	CFM Per Square ft.:	0.531
Square ft. of Room Area:	1,568	Square ft. Per Ton:	755
Volume (ft³) of Cond. Space:	13,687		

System Loads

Total Heating Required Including Ventilation Air:	27,802	Btuh	27.802	MBH
Total Sensible Gain:	18,699	Btuh	83	%
Total Latent Gain:	3,850	Btuh	17	%
Total Cooling Required Including Ventilation Air:	22,549	Btuh	1.88	Tons (Based On Sensible + Latent)

System 1 1st Floor Summary Loads (cont'd)

System Loads

2.08 Tons (Based On 75% Sensible Capacity)

Notes

Calculations are based on 8th edition of ACCA Manual J.
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.

System 1 1st Floor Pie Chart

Equipment Data - System 1 - 1st Floor

Heating

System Type:	Natural Gas Furnace
Model:	GMH950453BX
Tradename:	Goodman, Xenon
Manufacturer:	GOODMAN MANUFACTURING CO., LP.
Description:	Natural Gas or Propane Furnace
Comment:	890292
Capacity:	44,000 Btuh
Efficiency:	95 AFUE

System 1, Zone 1 Summary Loads (Average Load Procedure for Rooms)

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Low E2: Glazing-	240	5,206	0	7,291	7,291
11N: Door-Metal - Polystyrene Core	53.3	1,158	0	355	355
12C-0bw: Wall-Frame, R-13 insulation in 2 x 4 stud cavity, no board insulation, brick finish, wood studs	1406.3	7,935	0	641	641
18A-30: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, R-30 blanket or loose fill	406.7	858	0	248	248
16B-38: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-38 insulation	1191.4	1,920	0	1,332	1,332
16A-7: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Unvented Attic, No Radiant Barrier, Any Roofing Material, Any Roof Color, R-7 insulation	12	83	0	85	85
19A-19p: Floor-Over enclosed unconditioned crawl space, No insulation on exposed walls, sealed or vented space, passive, R-19 blanket	1570.2	3,739	0	483	483
Subtotals for structure:		20,899	0	10,435	10,435
People:	4		800	920	1,720
Equipment:			1,367	6,031	7,398
Lighting:	0			0	0
Ductwork:		0	0	892	892
Infiltration: Winter CFM: 36, Summer CFM: 0		2,482	0	0	0
System 1, Zone 1 Load Totals:		23,381	2,167	18,278	20,445

Check Figures

Supply CFM:	833	CFM Per Square ft.:	0.531
Square ft. of Room Area:	1,568	Square ft. Per Ton:	864
Volume (ft^3) of Cond. Space:	13,687		

Zone Loads

Total Heating Required:	23,381 Btuh	23.381 MBH	
Total Sensible Gain:	18,278 Btuh	89 %	
Total Latent Gain:	2,167 Btuh	11 %	
Total Cooling Required:	20,445 Btuh	1.70	Tons (Based On Sensible + Latent)
		1.82	Tons (Based On 75% Sensible Capacity)

Notes

System 1, Zone 1 Summary Loads (Average Load Procedure for Rooms) (cont'd)

Notes

Calculations are based on 8th edition of ACCA Manual J.
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.

System 1, Zone 1 Pie Chart

Detailed Room Loads - Room 1 - Family Room (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	14.3	ft.	System Number:	1	
Room Width:	20.3	ft.	Zone Number:	1	
Area:	290.0	sq.ft.	Supply Air:	161	CFM
Ceiling Height:	10.0	ft.	Supply Air Changes:	3.3	AC/hr
Volume:	2,897.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	13	CFM
Runout Air:	161	CFM	Percent of Supply.:	8	%
Runout Duct Size:	8	in.	Actual Summer Vent.:	9	CFM
Runout Air Velocity:	462	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	462	ft./min.	Actual Winter Infil.:	11	CFM
Actual Loss:	0.092	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-12C-0bw 14.2 X 10	142.5	0.091	5.6	804	0.5	0	65
E -Wall-12C-0bw 22.3 X 8	106.7	0.091	5.6	602	0.5	0	49
W -Wall-12C-0bw 2 X 8	16	0.091	5.6	90	0.5	0	7
N -Wall-12C-0bw 20.3 X 8	129.3	0.091	5.6	730	0.5	0	59
N -Door-11N 2.5 X 6.7	16.7	0.350	21.7	362	6.7	0	111
N -Door-11N 2.5 X 6.7	16.7	0.350	21.7	362	6.7	0	111
E -Gls-Low E2 shgc-0.36 0%S (4)	72	0.350	21.7	1,564	36.8	0	2,648
E -Roof-18A-30 10 X 20.3	203.3	0.034	2.1	429	0.6	0	124
UP-Ceil-16B-38 4.5 X 20.3	91.5	0.026	1.6	147	1.1	0	102
Floor-19A-19p 20.3 X 14.2	289.7	0.049	2.4	690	0.3	0	89
Subtotals for Structure:				5,780		0	3,365
Infil.: Win.: 10.7, Sum.: 0.0	500		1.461	730	0.000	0	0
Ductwork:				0			173
Room Totals:				6,510		0	3,538

Detailed Room Loads - Room 2 - Kitchen-Breakfast (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	13.7	ft.	System Number:	1	
Room Width:	20.5	ft.	Zone Number:	1	
Area:	280.0	sq.ft.	Supply Air:	316	CFM
Ceiling Height:	10.0	ft.	Supply Air Changes:	6.8	AC/hr
Volume:	2,802.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	3		Actual Winter Vent.:	9	CFM
Runout Air:	105	CFM	Percent of Supply.:	3	%
Runout Duct Size:	6	in.	Actual Summer Vent.:	18	CFM
Runout Air Velocity:	536	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	536	ft./min.	Actual Winter Infil.:	7	CFM
Actual Loss:	0.184	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-12C-0bw 14.2 X 10	142.5	0.091	5.6	804	0.5	0	65
E -Wall-12C-0bw 22.3 X 8	132.7	0.091	5.6	748	0.5	0	60
E -Gls-Low E2 shgc-0.36 0%S	6	0.350	21.7	130	36.8	0	221
E -Gls-Low E2 shgc-0.36 0%S	40	0.350	21.7	868	36.8	0	1,471
E -Roof-18A-30 10 X 20.3	203.3	0.034	2.1	429	0.6	0	124
UP-Ceil-16B-38 4.5 X 20.3	91.5	0.026	1.6	147	1.1	0	102
Floor-19A-19p 20.5 X 13.7	280.2	0.049	2.4	667	0.3	0	86
Subtotals for Structure:				3,793		0	2,129
Infil.: Win.: 6.9, Sum.: 0.0	321		1.460	469	0.000	0	0
Ductwork:				0			338
Equipment:						947	4,467
Room Totals:				4,262		947	6,934

Detailed Room Loads - Room 3 - Master Bath (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	10.8	ft.	System Number:	1	
Room Width:	5.8	ft.	Zone Number:	1	
Area:	63.0	sq.ft.	Supply Air:	26	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	3.1	AC/hr
Volume:	506.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	2	CFM
Runout Air:	26	CFM	Percent of Supply.:	7	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	2	CFM
Runout Air Velocity:	303	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	303	ft./min.	Actual Winter Infil.:	1	CFM
Actual Loss:	0.106	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-12C-0bw 5.8 X 8	34.7	0.091	5.6	196	0.5	0	16
N -Wall-12C-0bw 2 X 8	16	0.091	5.6	90	0.5	0	7
E -Gls-Low E2 shgc-0.36 0%S	12	0.350	21.7	260	36.8	0	441
UP-Ceil-16B-38 10.8 X 5.8	63.2	0.026	1.6	102	1.1	0	71
Floor-19A-19p 5.1 X 10.8	55.1	0.049	2.4	131	0.3	0	17
Subtotals for Structure:				779		0	552
Infil.: Win.: 1.3, Sum.: 0.0	63		1.468	92	0.000	0	0
Ductwork:				0			28
Room Totals:				871		0	580

Detailed Room Loads - Room 4 - WIC (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	5.7	ft.	System Number:	1	
Room Width:	12.0	ft.	Zone Number:	1	
Area:	68.0	sq.ft.	Supply Air:	8	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.9	AC/hr
Volume:	544.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	3	CFM
Runout Air:	8	CFM	Percent of Supply.:	34	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	0	CFM
Runout Air Velocity:	89	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	89	ft./min.	Actual Winter Infil.:	3	CFM
Actual Loss:	0.010	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-12C-0bw 12 X 8	96	0.091	5.6	542	0.5	0	44
S -Wall-12C-0bw 5.7 X 8	45.3	0.091	5.6	256	0.5	0	21
UP-Ceil-16B-38 5.7 X 12	68	0.026	1.6	110	1.1	0	76
Floor-19A-19p 12 X 5.7	68	0.049	2.4	162	0.3	0	21
Subtotals for Structure:				1,070		0	162
Infil.: Win.: 3.0, Sum.: 0.0	141		1.458	206	0.000	0	0
Ductwork:				0			8
Room Totals:				1,276		0	170

Detailed Room Loads - Room 5 - Master Bedroom (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	16.0	ft.	System Number:	1	
Room Width:	13.3	ft.	Zone Number:	1	
Area:	213.0	sq.ft.	Supply Air:	64	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	2.3	AC/hr
Volume:	1,707.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	5	CFM
Runout Air:	64	CFM	Percent of Supply.:	7	%
Runout Duct Size:	5	in.	Actual Summer Vent.:	4	CFM
Runout Air Velocity:	470	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	470	ft./min.	Actual Winter Infil.:	3	CFM
Actual Loss:	0.183	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-12C-0bw 16 X 8	98	0.091	5.6	553	0.5	0	45
S -Gls-Low E2 shgc-0.36 0%S (2)	30	0.350	21.7	650	17.6	0	528
UP-Ceil-16B-38 16 X 13.3	213.3	0.026	1.6	344	1.1	0	239
Floor-19A-19p 13.3 X 16	213.3	0.049	2.4	508	0.3	0	66
Subtotals for Structure:				2,055		0	878
Infil.: Win.: 2.7, Sum.: 0.0	128		1.461	187	0.000	0	0
Ductwork:				0			69
People: 200 lat/per, 230 sen/per:	2					400	460
Room Totals:				2,242		400	1,407

Detailed Room Loads - Room 6 - Bedroom 3 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	14.0	ft.	System Number:	1	
Room Width:	11.3	ft.	Zone Number:	1	
Area:	159.0	sq.ft.	Supply Air:	65	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	3.1	AC/hr
Volume:	1,269.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	5	CFM
Runout Air:	65	CFM	Percent of Supply.:	8	%
Runout Duct Size:	5	in.	Actual Summer Vent.:	4	CFM
Runout Air Velocity:	474	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	474	ft./min.	Actual Winter Infil.:	4	CFM
Actual Loss:	0.186	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-12C-0bw 14 X 8	97	0.091	5.6	547	0.5	0	44
W -Wall-12C-0bw 11.3 X 8	75.7	0.091	5.6	427	0.5	0	34
S -Gls-Low E2 shgc-0.36 0%S	15	0.350	21.7	325	17.6	0	264
W -Gls-Low E2 shgc-0.36 0%S	15	0.350	21.7	325	36.7	0	551
UP-Ceil-16B-38 14 X 11.3	158.7	0.026	1.6	256	1.1	0	177
Floor-19A-19p 11.3 X 14	158.7	0.049	2.4	378	0.3	0	49
Subtotals for Structure:				2,258		0	1,119
Infil.: Win.: 4.4, Sum.: 0.0	203		1.461	296	0.000	0	0
Ductwork:				0			69
People: 200 lat/per, 230 sen/per:	1					200	230
Room Totals:				2,554		200	1,418

Detailed Room Loads - Room 7 - Bedroom 2 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	10.0	ft.	System Number:	1	
Room Width:	10.0	ft.	Zone Number:	1	
Area:	100.0	sq.ft.	Supply Air:	47	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	3.5	AC/hr
Volume:	800.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	3	CFM
Runout Air:	47	CFM	Percent of Supply.:	6	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	3	CFM
Runout Air Velocity:	535	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	535	ft./min.	Actual Winter Infil.:	2	CFM
Actual Loss:	0.323	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-12C-0bw 12 X 8	81	0.091	5.6	457	0.5	0	37
W -Gls-Low E2 shgc-0.36 0%S	15	0.350	21.7	325	36.7	0	551
UP-Ceil-16B-38 11 X 10	110	0.026	1.6	177	1.1	0	123
Floor-19A-19p 10 X 11	110	0.049	2.4	262	0.3	0	34
Subtotals for Structure:				1,221		0	745
Infil.: Win.: 2.1, Sum.: 0.0	96		1.458	140	0.000	0	0
Ductwork:				0			50
People: 200 lat/per, 230 sen/per:	1					200	230
Room Totals:				1,361		200	1,025

Detailed Room Loads - Room 8 - Bath 1 (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	11.3	ft.	System Number:	1	
Room Width:	5.8	ft.	Zone Number:	1	
Area:	66.0	sq.ft.	Supply Air:	5	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.5	AC/hr
Volume:	529.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	1	CFM
Runout Air:	5	CFM	Percent of Supply.:	12	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	0	CFM
Runout Air Velocity:	52	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	52	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.004	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
UP-Ceil-16B-38 11.3 X 5.8	66.1	0.026	1.6	107	1.1	0	74
Floor-19A-19p 5.8 X 11.3	66.1	0.049	2.4	157	0.3	0	20
Subtotals for Structure:				264		0	94
Infil.: Win.: 0.0, Sum.: 0.0	0		0	0	0	0	0
Ductwork:				0			5
Equipment:						200	0
Room Totals:				264		200	99

Detailed Room Loads - Room 9 - Hall (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	6.3	ft.	System Number:	1	
Room Width:	12.3	ft.	Zone Number:	1	
Area:	77.0	sq.ft.	Supply Air:	9	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	0.9	AC/hr
Volume:	617.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	1	CFM
Runout Air:	9	CFM	Percent of Supply.:	9	%
Runout Duct Size:	4	in.	Actual Summer Vent.:	1	CFM
Runout Air Velocity:	107	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	107	ft./min.	Actual Winter Infil.:	0	CFM
Actual Loss:	0.014	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
UP-Ceil-16B-38 6.2 X 12.3	77.1	0.026	1.6	124	1.1	0	86
UP-Ceil-16A-7 2 X 6	12	0.112	6.9	83	7.1	0	85
Floor-19A-19p 12.3 X 6.2	77.1	0.049	2.4	184	0.3	0	24
Subtotals for Structure:				391		0	195
Infil.: Win.: 0.0, Sum.: 0.0	0		0	0	0	0	0
Ductwork:				0			10
Equipment:						200	0
Room Totals:				391		200	205

Detailed Room Loads - Room 10 - Living Room (Average Load Procedure)

General

Calculation Mode:	Htg. & clg.		Occurrences:	1	
Room Length:	18.0	ft.	System Number:	1	
Room Width:	14.0	ft.	Zone Number:	1	
Area:	252.0	sq.ft.	Supply Air:	132	CFM
Ceiling Height:	8.0	ft.	Supply Air Changes:	3.9	AC/hr
Volume:	2,016.0	cu.ft.	Req. Vent. Clg:	0	CFM
Number of Registers:	1		Actual Winter Vent.:	7	CFM
Runout Air:	132	CFM	Percent of Supply.:	6	%
Runout Duct Size:	7	in.	Actual Summer Vent.:	8	CFM
Runout Air Velocity:	495	ft./min.	Percent of Supply:	6	%
Runout Air Velocity:	495	ft./min.	Actual Winter Infil.:	5	CFM
Actual Loss:	0.127	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-12C-0bw 14 X 8	57	0.091	5.6	322	0.5	0	26
N -Wall-12C-0bw 17 X 8	136	0.091	5.6	767	0.5	0	62
W -Door-11N 3 X 6.7	20	0.350	21.7	434	6.7	0	133
W -Gls-Low E2 shgc-0.36 70%S (2)	20	0.350	21.7	434	17.6	0	352
W -Gls-Low E2 shgc-0.36 70%S	15	0.350	21.7	325	17.6	0	264
UP-Ceil-16B-38 18 X 14	252	0.026	1.6	406	1.1	0	282
Floor-19A-19p 14 X 18	252	0.049	2.4	600	0.3	0	77
Subtotals for Structure:				3,288		0	1,196
Infil.: Win.: 5.3, Sum.: 0.0	248		1.460	362	0.000	0	0
Ductwork:				0			142
Equipment:						20	1,564
Room Totals:				3,650		20	2,902

Room Cooling and Heating Loads Bar Graphs

Room Cooling Loads Bar Graphs

System 1 Room Load Summary

No	Room Name	Area SF	Htg Sens Btuh	Htg Rad Len	Run Duct Size	Run Duct Vel	Clg Sens Btuh	Clg Lat Btuh	Clg Nom CFM	Air Sys CFM
---Zone 1---										
1	Family Room	290	6,510	14.2	1-8	462	3,538	0	161	161
2	Kitchen-Breakfast	280	4,262	9.3	3-6	536	6,934	947	316	316
3	Master Bath	63	871	1.9	1-4	303	580	0	26	26
4	WIC	68	1,276	2.8	1-4	89	170	0	8	8
5	Master Bedroom	213	2,242	4.9	1-5	470	1,407	400	64	64
6	Bedroom 3	159	2,554	5.6	1-5	474	1,418	200	65	65
7	Bedroom 2	100	1,361	3.0	1-4	535	1,025	200	47	47
8	Bath 1	66	264	0.6	1-4	52	99	200	5	5
9	Hall	77	391	0.9	1-4	107	205	200	9	9
10	Living Room	252	3,650	7.9	1-7	495	2,902	20	132	132
	Ventilation		3,266				421	982		
	HW Piping		1,155							
	Duct Latent							700		
	System 1 total	1,568	27,802	50.8			18,699	3,850	833	833

System 1 Main Trunk Size:	10x16	in.
Velocity:	750	ft./min
Loss per 100 ft.:	0.097	in.wg

Cooling System Summary

	Cooling Tons	Sensible/Latent Split	Sensible Btuh	Latent Btuh	Total Btuh
Net Required:	1.88	83% / 17%	18,699	3,850	22,549
Recommended:	2.08	75% / 25%	18,699	6,233	24,933

Radiant Floor Report

Building Rotation Report

All rotation degree values in this report are clockwise with respect to the project's original orientation.
Building orientation as entered (zero degrees rotation): Front door faces West

Individual Rooms

Rm. No.	Room Name	0° Rot. CFM	45° Rot. CFM	90° Rot. CFM	135° Rot. CFM	180° Rot. CFM	225° Rot. CFM	270° Rot. CFM	315° Rot. CFM	High Duct Size
System 1:										
Zone 1:										
1	Family Room	161	142	99	157	*176	125	69	122	1-8
2	Kitchen-Breakfast	316	304	285	337	*345	300	260	291	3-6
3	Master Bath	26	23	16	26	*29	20	11	20	1-4
4	WIC	8	8	8	*9	8	8	8	8	1-4
5	Master Bedroom	64	84	*95	83	58	78	93	84	1-6
6	Bedroom 3	65	66	61	68	64	68	65	*71	1-5
7	Bedroom 2	47	38	28	43	*51	44	33	43	1-4
8	Bath 1	5	5	5	*5	5	5	5	5	1-4
9	Hall	9	9	10	*10	10	10	9	9	1-4
10	Living Room	132	145	124	*161	145	123	121	120	1-8

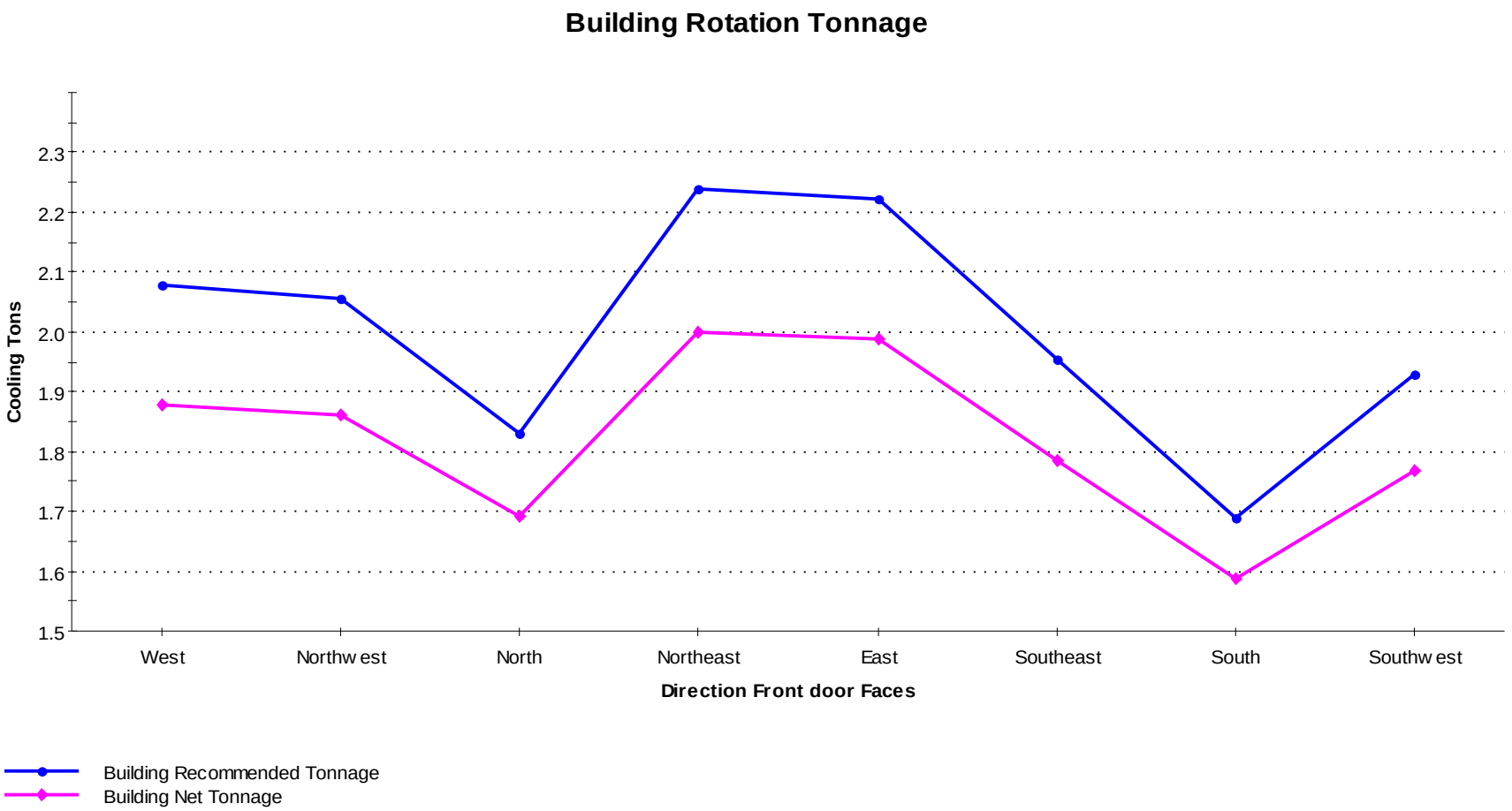
* Indicates highest CFM of all rotations.

Whole Building

Rotation Degrees	Front door Faces	Supply CFM	Sensible Gain	Latent Gain	Net Tons	Recommended Tons
0°	West	833	18,699	3,850	1.88	2.08
45°	Northwest	824	18,495	3,847	1.86	2.06
90°	North	731	16,470	3,848	1.69	1.83
135°	Northeast	*899	*20,155	3,849	*2.00	*2.24
180°	East	892	19,995	3,848	1.99	2.22
225°	Southeast	782	17,585	3,850	1.79	1.95
270°	South	673	15,198	*3,851	1.59	1.69
315°	Southwest	772	17,359	3,849	1.77	1.93

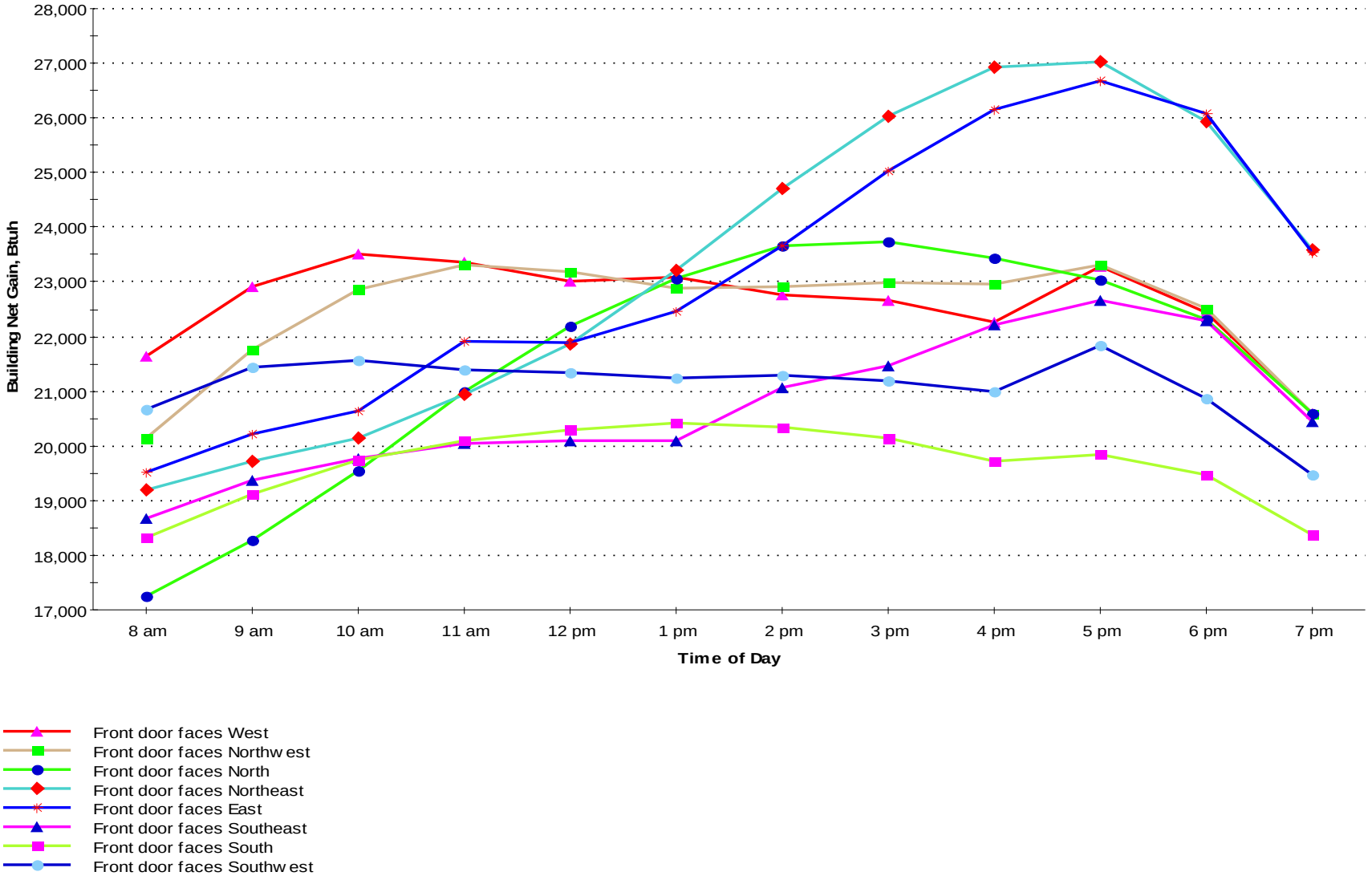
* Indicates highest value of all rotations.

Building Rotation Report (cont'd)



Building Rotation Report (cont'd)

Building Rotation Hourly Net Gain



Building Rotation Duct Sizes

Room or Duct Name	Direction Front door Faces																Max Duct Size
	W		NW		N		NE		E		SE		S		SW		
	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	Htg Flow	Clg Flow	
System 1																	
Supply Runouts																	
Zone 1																	
1-Family Room	89	161	89	142	89	99	89	157	89	176	89	125	89	69	89	122	2--5
2-Kitchen-Breakfast	58	316	58	304	58	285	58	337	58	345	58	300	58	260	58	291	3--6
3-Master Bath	12	26	12	23	12	16	12	26	12	29	12	20	12	11	12	20	1--4
4-WIC	17	8	17	8	17	8	17	9	17	8	17	8	17	8	17	8	1--4
5-Master Bedroom	31	64	31	84	31	95	31	83	31	58	31	78	31	93	31	84	1--6
6-Bedroom 3	35	65	35	66	35	61	35	68	35	64	35	68	35	65	35	71	1--5
7-Bedroom 2	19	47	19	38	19	28	19	43	19	51	19	44	19	33	19	43	1--4
8-Bath 1	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	1--4
9-Hall	5	9	5	9	5	10	5	10	5	10	5	10	5	9	5	9	1--4
10-Living Room	50	132	50	145	50	124	50	161	50	145	50	123	50	121	50	120	1--8
Other Ducts																	
Supply Main Trunk	319	833	319	824	319	731	319	899	319	892	319	782	319	673	319	772	10x17
Bldg. High Dir.: Northeast																	
Sensible Gain: 20,155																	
Latent Gain: 3,849																	

Summary

System 1

Heating Flow:	319
Cooling Flow:	833

Project Information

Project title:	REC
Designed by:	Glenn Hooper
Project date:	Thursday, October 23, 2008
Project comment:	
Client name:	Builder Bob
Client address:	200 Hawk Rd
Client city:	AnyTown NY, 11788
Client phone:	
Client fax:	
Client comment:	From Plan number 02342-1 dated 1-1-09
Company name:	Residential Energy Conservation
Company representative:	Glenn Hooper
Company address:	3771 Nsconset Hwy Suite 101A
Company city:	S. Setauket NY 11720
Company phone:	751-7911
Company fax:	751-7902
Company comment:	

Item	System 1
Air Handler Name	1st Floor
Cooling Description	
Cooling Model Type	Standard Air Conditioner
Cooling Model Number	
Cooling Capacity	0 Btuh
Cooling Efficiency	0 SEER
Heating Description	Natural Gas or Propane Furnace
Heating Model Type	Natural Gas Furnace
Heating Model Number	GMH950453BX
Heating Capacity	44,000 Btuh
Heating Efficiency	95 AFUE

Item	System 2
Air Handler Name	
Cooling Description	
Cooling Model Type	
Cooling Model Number	
Cooling Capacity	
Cooling Efficiency	
Heating Description	
Heating Model Type	
Heating Model Number	
Heating Capacity	
Heating Efficiency	