



Load Short Form
Entire House
Carstairs Energy

Job: 13-0508
 Date: May 08, 2013
 By: Timothy Carstairs

P.O. Box 4736, San Luis Obispo, CA 93403 Phone: (805) 904-9048 Fax: (805) 620-3774 Email: title24@yahoo.com Web: www.carstairsenergy.com

Project Information

For: Sample
 123 Sesame St., Anywhere, CA

Design Information

	Htg	Clg		Infiltration
Outside db (°F)	46	81	Method	Simplified
Inside db (°F)	70	75	Construction quality	Semi-tight
Design TD (°F)	24	6	Fireplaces	1 (Average)
Daily range	-	L		
Inside humidity (%)	50	50		
Moisture difference (gr/lb)	18	11		

HEATING EQUIPMENT

Make American Standard
 Trade Freedom 80 Two Stage
 Model ADD040R924F*
 GAMA ID 2016481

Efficiency 80 AFUE
 Heating input 40000 Btuh
 Heating output 32000 Btuh
 Temperature rise 36 °F
 Actual air flow 800 cfm
 Air flow factor 0.063 cfm/Btuh
 Static pressure 0.50 in H2O
 Space thermostat

COOLING EQUIPMENT

Make AAON
 Trade AAON
 Cond CBA024-1B100
 Coil AU024-W20A
 ARI ref no. 1401172

Efficiency 11.8 EER, 13.6 SEER
 Sensible cooling 16800 Btuh
 Latent cooling 7200 Btuh
 Total cooling 24000 Btuh
 Actual air flow 800 cfm
 Air flow factor 0.075 cfm/Btuh
 Static pressure 0.50 in H2O
 Load sensible heat ratio 0.98

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Master Bedroom	227	2165	1771	137	133
Master Bath	90	793	400	50	30
Living Room	204	2070	1431	131	107
Kitchen	181	2249	1648	143	124
Laundry	30	47	52	3	4
Bathroom 2	35	528	184	33	14
Bedroom 2	180	1379	2099	88	158
Hall	88	0	0	0	0
Bathroom 3	44	489	1093	31	82
Bedroom 3	181	2884	1981	183	149

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Entire House	d	1260	12602	10660	800	800
Other equip loads			0	0		
Equip. @ 0.86 RSM				9210		
Latent cooling				254		
TOTALS		1260	12602	9464	800	800

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Building Analysis

Entire House

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Project Information

For: Sample
 123 Sesame St., Anywhere, CA

Design Conditions

Location:

San Diego Intl AP, CA, US
 Elevation: 30 ft
 Latitude: 33°N

Outdoor:

Dry bulb (°F)
 Daily range (°F)
 Wet bulb (°F)
 Wind speed (mph)

Heating

46
 -
 -
 15.0

Cooling

81
 9 (L)
 67
 7.5

Indoor:

Indoor temperature (°F)
 Design TD (°F)
 Relative humidity (%)
 Moisture difference (gr/lb)

Heating

70
 24
 50
 18.0

Cooling

75
 6
 50
 11.0

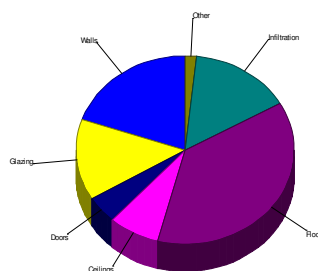
Infiltration:

Method
 Construction quality
 Fireplaces

Simplified
 Semi-tight
 1 (Average)

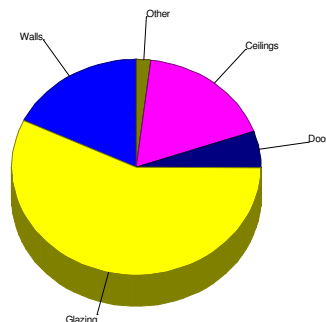
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	2.2	2483	19.7
Glazing	13.7	1751	13.9
Doors	9.4	590	4.7
Ceilings	0.8	968	7.7
Floors	3.7	4701	37.3
Infiltration	1.4	1901	15.1
Ducts		208	1.7
Piping		0	0
Humidification		0	0
Ventilation		0	0
Adjustments		0	0
Total		12602	100.0



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.7	1909	17.9
Glazing	47.5	6080	57.0
Doors	9.1	576	5.4
Ceilings	1.5	1893	17.8
Floors	0	0	0
Infiltration	0.1	189	1.8
Ducts		13	0.1
Ventilation		0	0
Internal gains		0	0
Blower		0	0
Adjustments		0	0
Total		10660	100.0



Latent Cooling Load = 254 Btuh
 Overall U-value = 0.114 Btuh/ft²-°F

Data entries checked.



Component Constructions
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Project Information

For: Sample
 123 Sesame St., Anywhere, CA

Design Conditions

Location: San Diego Intl AP, CA, US Elevation: 30 ft Latitude: 33 °N		Indoor: Indoor temperature (°F) Design TD (°F) Relative humidity (%) Moisture difference (gr/lb)	Heating 70 24 50 18.0	Cooling 75 6 50 11.0
Outdoor: Dry bulb (°F) Daily range (°F) Wet bulb (°F) Wind speed (mph)	Heating 46 - - 15.0	Cooling 81 9 (L) 67 7.5	Infiltration: Method Construction quality Fireplaces	Simplified Semi-tight 1 (Average)

Construction descriptions

Walls

12C-0sw: Frm wall, stucco ext, r-13 cav ins, 1/2" gypsum board int
 fnsh, 2"x4" wood frm

Or	Area ft²	U-value Btuh/ft²-°F	Insul R ft²-°F/Btuh	Htg HTM Btuh/ft²	Loss Btuh	Clg HTM Btuh/ft²	Gain Btuh
n	276	0.091	13.0	2.18	603	1.68	463
e	286	0.091	13.0	2.18	625	1.68	480
s	279	0.091	13.0	2.18	609	1.68	468
w	296	0.091	13.0	2.18	646	1.68	497
all	1137	0.091	13.0	2.18	2483	1.68	1909

Partitions

(none)

Windows

1D-c2ov: 2 glazing, clr outr, air gas, vnl frm mat, clr innr, 1/4" gap, 1/4"
 thk

n	36	0.570	0	13.7	492	15.1	545
e	24	0.570	0	13.7	328	57.3	1374
s	12	0.570	0	13.7	164	21.4	256
w	56	0.570	0	13.7	766	57.3	3207
all	128	0.570	0	13.7	1751	42.1	5383

Doors

11D0: Door, wd sc type

e	42	0.390	0	9.36	393	9.15	384
s	21	0.390	0	9.36	197	9.15	192
all	63	0.390	0	9.36	590	9.15	576

Ceilings

16B-30ad: Attic ceiling, asphalt shingles roof mat, r-30 ceil ins, 1/2"
 gypsum board int fnsh

	1260	0.032	30.0	0.77	968	1.50	1893
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Floors

22A-cpm: Bg floor, heavy dry or light damp soil, carpet flr fnsh

	166	1.180	0	28.3	4701	0	0
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Project Information

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 123 Sesame St., Anywhere, CA

Notes:

Design Information

Weather: San Diego Intl AP, CA, US

Winter Design Conditions

Outside db 46 °F
 Inside db 70 °F
 Design TD 24 °F

Summer Design Conditions

Outside db 81 °F
 Inside db 75 °F
 Design TD 6 °F
 Daily range L
 Relative humidity 50 %
 Moisture difference 11 gr/lb

Heating Summary

Structure 12394 Btuh
 Ducts 208 Btuh
 Central vent (0 cfm) 0 Btuh
 Humidification 0 Btuh
 Piping 0 Btuh
 Equipment load 12602 Btuh

Sensible Cooling Equipment Load Sizing

Structure 10647 Btuh
 Ducts 13 Btuh
 Central vent (0 cfm) 0 Btuh
 Blower 0 Btuh
 Use manufacturer's data n
 Rate/swing multiplier 0.86
 Equipment sensible load 9210 Btuh

Infiltration

Method Simplified
 Construction quality Semi-tight
 Fireplaces 1 (Average)

	Heating	Cooling
Area (ft ²)	1260	1260
Volume (ft ³)	10080	10080
Air changes/hour	0.43	0.16
Equiv. AVF (cfm)	72	27

Latent Cooling Equipment Load Sizing

Structure 200 Btuh
 Ducts 53 Btuh
 Central vent (0 cfm) 0 Btuh
 Equipment latent load 254 Btuh
 Equipment total load 9464 Btuh
 Req. total capacity at 0.70 SHR 1.1 ton

Heating Equipment Summary

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 GAMA ID 2016481

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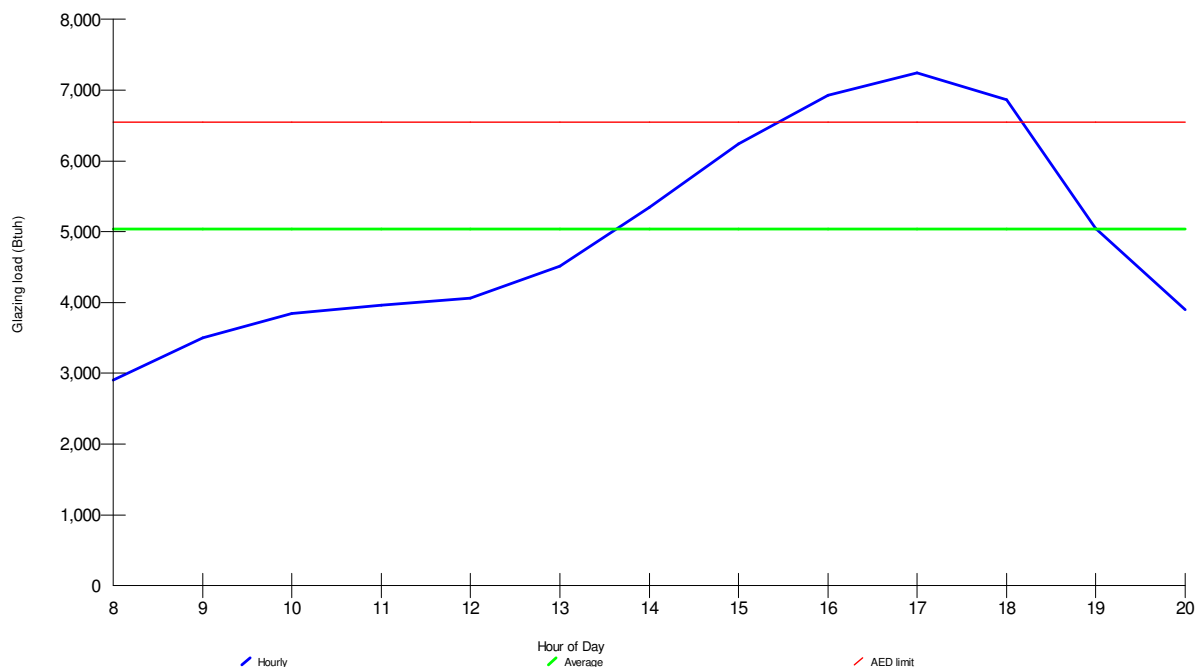
For: Sample
 123 Sesame St., Anywhere, CA

Design Conditions

Location:		Indoor:		Heating	Cooling
San Diego Intl AP, CA, US		Indoor temperature (°F)		70	75
Elevation: 30 ft		Design TD (°F)		24	6
Latitude: 33°N		Relative humidity (%)		50	50
Outdoor:		Heating	Cooling	Infiltration:	
Dry bulb (°F)	46	81		18.0	11.0
Daily range (°F)	-	9 (L)			
Wet bulb (°F)	-	67			
Wind speed (mph)	15.0	7.5			

Test for Adequate Exposure Diversity

Hourly Glazing Load



Maximum hourly glazing load exceeds average by 43.8%.

House does not have adequate exposure diversity (AED), based on AED limit of 30%.

AED excursion: 697 Btuh (PGF - 1.3*AFG)



Right-J® Worksheet

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1 Room name		Entire House							Master Bedroom					
2 Exposed wall		166.0 ft							28.0 ft					
3 Ceiling height		8.0 ft							8.0 ft					
4 Room dimensions		1260.0 ft ²							1.0 x 227.0 ft					
5 Room area									227.0 ft ²					
	Ty	Construction number	U-value (Btuh/ft ² -°F)	Or	HTM (Btuh/ft ²)		Area (ft ²) or perimeter (ft)		Load (Btuh)		Area (ft ²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	312	276	603	463	120	108	236	181
	G	1D-c2ov	0.570	n	13.68	15.15	36	0	492	545	12	0	164	182
	W	12C-0sw	0.091	e	2.18	1.68	352	286	625	480	0	0	0	0
	G	1D-c2ov	0.570	e	13.68	15.15	24	0	328	1374	0	0	0	0
11	D	11D0	0.390	e	9.36	9.15	42	42	393	384	0	0	0	0
	W	12C-0sw	0.091	s	2.18	1.68	312	279	609	468	0	0	0	0
	G	1D-c2ov	0.570	s	13.68	15.15	12	0	164	256	0	0	0	0
	D	11D0	0.390	s	9.36	9.15	21	21	197	192	0	0	0	0
	W	12C-0sw	0.091	w	2.18	1.68	352	296	646	497	104	92	201	154
	G	1D-c2ov	0.570	w	13.68	15.15	56	0	766	3207	12	0	164	687
	C	16B-30ad	0.032	-	0.77	1.50	1260	1260	968	1893	227	227	174	341
	F	22A-cpm	1.180	-	28.32	0.00	1260	166	4701	0	227	28	793	0
6	c) AED excursion									697				154
	Envelope loss/gain								10493	10458			1732	1700
12	a) Infiltration								1901	189			321	32
	b) Room ventilation								0	0			0	0
13	Internal gains:		Occupants @	230			0			0	0			0
			Appliances/other							0				0
	Subtotal (lines 6 to 13)								12394	10647			2053	1732
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			76	37
14	Subtotal								12394	10647			2129	1769
15	Duct loads						2%	0%	208	13	2%	0%	36	2
	Total room load								12602	10660			2165	1771
	Air required (cfm)								800	800			137	133

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1 Room name				Master Bath 10.0 ft				Living Room 28.0 ft						
2 Exposed wall				8.0 ft 10.0 x 9.0 ft heat/cool				8.0 ft 1.0 x 204.0 ft heat/cool						
3 Ceiling height				90.0 ft²				204.0 ft²						
4 Room dimensions														
5 Room area														
	Ty	Construction number	U-value (Btuh/ft²·°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	80	68	149	114	112	100	218	168
	G	1D-c2ov	0.570	n	13.68	15.15	12	0	164	182	12	0	164	182
	W	12C-0sw	0.091	e	2.18	1.68	0	0	0	0	112	100	218	168
	G	1D-c2ov	0.570	e	13.68	15.15	0	0	0	0	12	0	164	182
11	D	11D0	0.390	e	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	s	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	s	13.68	15.15	0	0	0	0	0	0	0	0
	D	11D0	0.390	s	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	w	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	w	13.68	15.15	0	0	0	0	0	0	0	0
	C	16B-30ad	0.032	-	0.77	1.50	90	90	69	135	204	204	157	306
	F	22A-cpm	1.180	-	28.32	0.00	90	10	283	0	204	28	793	0
6	c) AED excursion									-43				-114
	Envelope loss/gain								665	388			1715	1398
12	a) Infiltration								115	11			321	32
	b) Room ventilation								0	0			0	0
13	Internal gains:		Occupants @	230			0			0	0			0
			Appliances/other							0				0
	Subtotal (lines 6 to 13)								780	400			2035	1430
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								780	400			2035	1430
15	Duct loads						2%	0%	13	0	2%	0%	34	2
	Total room load								793	400			2070	1431
	Air required (cfm)								50	30			131	107

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1 Room name				Kitchen				Laundry						
2 Exposed wall				28.0 ft				0 ft						
3 Ceiling height				8.0 ft				8.0 ft						
4 Room dimensions				1.0 x 181.0 ft				6.0 x 5.0 ft						
5 Room area				181.0 ft²				30.0 ft²						
	Ty	Construction number	U-value (Btuh/ft²·°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	n	13.68	15.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	e	2.18	1.68	88	55	120	92	0	0	0	0
	G	1D-c2ov	0.570	e	13.68	57.27	12	0	164	687	0	0	0	0
11	D	11D0	0.390	e	9.36	9.15	21	21	197	192	0	0	0	0
	W	12C-0sw	0.091	s	2.18	1.68	136	115	251	193	0	0	0	0
	G	1D-c2ov	0.570	s	13.68	21.36	0	0	0	0	0	0	0	0
	D	11D0	0.390	s	9.36	9.15	21	21	197	192	0	0	0	0
	W	12C-0sw	0.091	w	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	w	13.68	57.27	0	0	0	0	0	0	0	0
	C	16B-30ad	0.032	-	0.77	1.50	181	181	139	272	30	30	23	45
	F	22A-cpm	1.180	-	28.32	0.00	181	28	793	0	30	0	0	0
6	c) AED excursion									-29				-4
	Envelope loss/gain								1861	1599			23	41
12	a) Infiltration								321	32			0	0
	b) Room ventilation								0	0			0	0
13	Internal gains:		Occupants @	230			0		0	0			0	0
			Appliances/other						0	0			0	0
	Subtotal (lines 6 to 13)								2181	1631			23	41
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								30	15			23	11
14	Subtotal								2212	1646			46	52
15	Duct loads						2%	0%	37	2	2%	0%	1	0
	Total room load								2249	1648			47	52
	Air required (cfm)								143	124			3	4

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1 Room name				Bathroom 2				Bedroom 2						
2 Exposed wall				7.0 ft				15.0 ft						
3 Ceiling height				8.0 ft				8.0 ft						
4 Room dimensions				7.0 x 5.0 ft				12.0 x 15.0 ft						
5 Room area				35.0 ft²				180.0 ft²						
	Ty	Construction number	U-value (Btuh/ft²·°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	n	13.68	15.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	e	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	e	13.68	57.27	0	0	0	0	0	0	0	0
11	D	11D0	0.390	e	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	s	2.18	1.68	56	56	122	94	0	0	0	0
	G	1D-c2ov	0.570	s	13.68	21.36	0	0	0	0	0	0	0	0
	D	11D0	0.390	s	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	w	2.18	1.68	0	0	0	0	120	100	218	168
	G	1D-c2ov	0.570	w	13.68	57.27	0	0	0	0	20	0	274	1145
	C	16B-30ad	0.032	-	0.77	1.50	35	35	27	53	180	180	138	270
	F	22A-cpm	1.180	-	28.32	0.00	35	7	198	0	180	15	425	0
6	c) AED excursion													433
	Envelope loss/gain								347	132			1055	2017
12	a) Infiltration								80	8			172	17
	b) Room ventilation								0	0			0	0
13	Internal gains:		Occupants @	230			0			0	0			0
			Appliances/other							0				0
	Subtotal (lines 6 to 13)								428	140			1227	2034
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								91	44			129	62
14	Subtotal								519	184			1356	2097
15	Duct loads						2%	0%	9	0	2%	0%	23	3
	Total room load								528	184			1379	2099
	Air required (cfm)								33	14			88	158

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Entire House

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1 Room name				Hall		Bathroom 3								
2 Exposed wall				8.0 ft 6.0 ft		8.0 ft 5.0 ft								
3 Ceiling height				heat/cool		heat/cool								
4 Room dimensions				88.0 ft ² 1.0 x 88.0 ft		44.0 ft ² 1.0 x 44.0 ft								
5 Room area														
	Ty	Construction number	U-value (Btuh/ft ² -°F)	Or	HTM (Btuh/ft ²)		Area (ft ²) or perimeter (ft)		Load (Btuh)		Area (ft ²) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	n	13.68	15.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	e	2.18	1.68	48	48	105	81	0	0	0	0
	G	1D-c2ov	0.570	e	13.68	57.27	0	0	0	0	0	0	0	0
11	D	11D0	0.390	e	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	s	2.18	1.68	0	0	0	0	0	0	0	0
	G	1D-c2ov	0.570	s	13.68	21.36	0	0	0	0	0	0	0	0
	D	11D0	0.390	s	9.36	9.15	0	0	0	0	0	0	0	0
	W	12C-0sw	0.091	w	2.18	1.68	0	0	0	0	40	28	61	47
	G	1D-c2ov	0.570	w	13.68	57.27	0	0	0	0	12	0	164	687
	C	16B-30ad	0.032	-	0.77	1.50	88	88	68	132	44	44	34	66
	F	22A-cpm	1.180	-	28.32	0.00	88	6	170	0	44	5	142	0
6	c) AED excursion									-21				275
	Envelope loss/gain								342	192			401	1075
12	a) Infiltration								69	7			57	6
	b) Room ventilation								0	0			0	0
13	Internal gains:		Occupants @	230			0			0	0			0
			Appliances/other							0				0
	Subtotal (lines 6 to 13)								411	198			458	1081
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								-411	-198			23	11
14	Subtotal								0	0			481	1092
15	Duct loads						2%	0%	0	0	2%	0%	8	1
	Total room load								0	0			489	1093
	Air required (cfm)								0	0			31	82

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Right-J® Worksheet

Entire House

Carstairs Energy

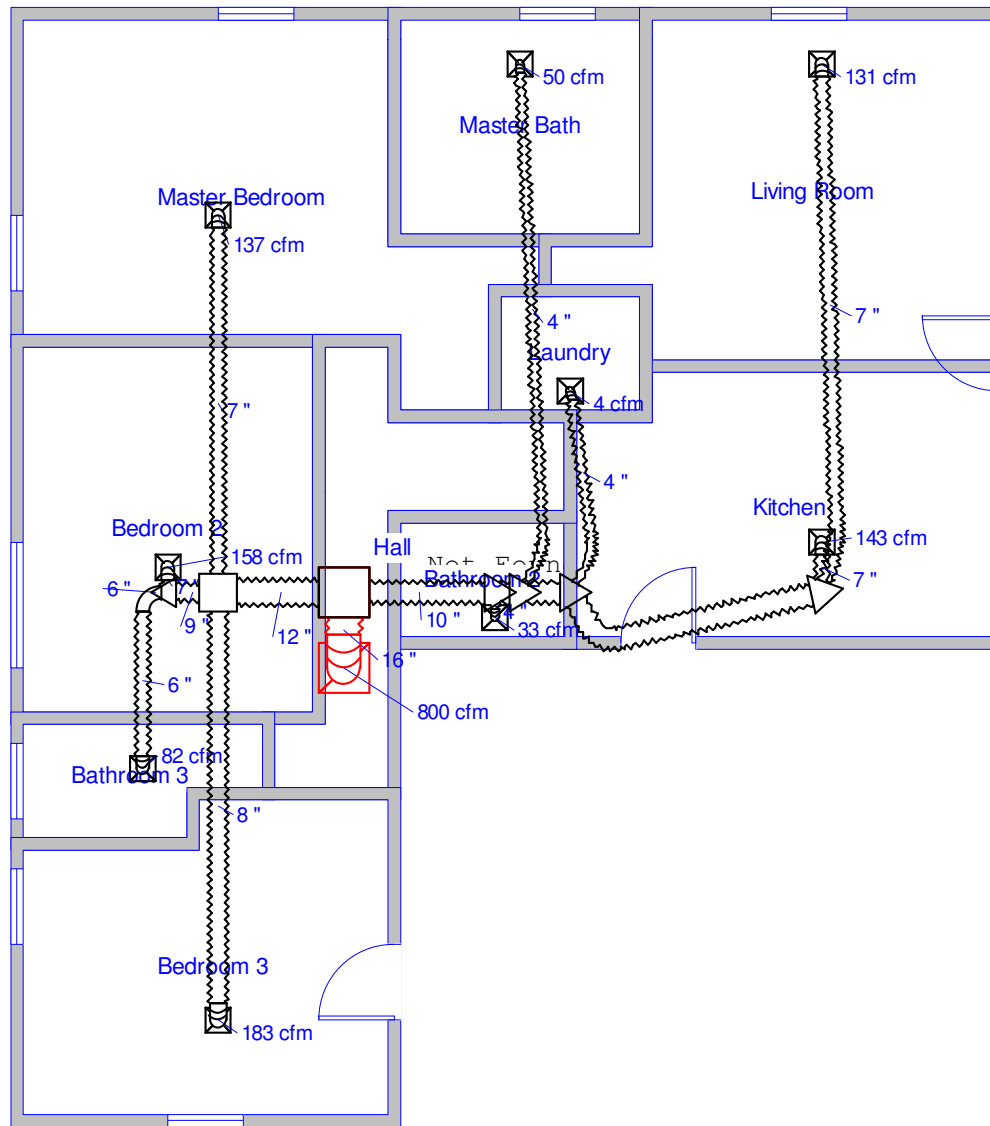
Job: 13-0508
 Date: May 08, 2013
 By: Timothy Carstairs

P.O. Box 4736, San Luis Obispo, CA 93403 Phone: (805) 904-9048 Fax: (805) 620-3774 Email: title24@yahoo.com Web: www.carstairsenergy.com

1 Room name				Bedroom 3										
2 Exposed wall				8.0 ft		39.0 ft								
3 Ceiling height				1.0		x		181.0 ft						
4 Room dimensions														
5 Room area				181.0 ft²										
	Ty	Construction number	U-value (Btuh/ft²·°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area or perimeter		Load	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12C-0sw	0.091	n	2.18	1.68	0	0	0	0				
	G	1D-c2ov	0.570	n	13.68	15.15	0	0	0	0				
	W	12C-0sw	0.091	e	2.18	1.68	104	83	181	139				
	G	1D-c2ov	0.570	e	13.68	57.27	0	0	0	0				
11	D	11D0	0.390	e	9.36	9.15	21	21	197	192				
	W	12C-0sw	0.091	s	2.18	1.68	120	108	236	181				
	G	1D-c2ov	0.570	s	13.68	21.36	12	0	164	256				
	D	11D0	0.390	s	9.36	9.15	0	0	0	0				
	W	12C-0sw	0.091	w	2.18	1.68	88	76	166	128				
	G	1D-c2ov	0.570	w	13.68	57.27	12	0	164	687				
	C	16B-30ad	0.032	-	0.77	1.50	181	181	139	272				
	F	22A-cpm	1.180	-	28.32	0.00	181	39	1104	0				
6	c) AED excursion									60				
	Envelope loss/gain								2351	1916				
12	a) Infiltration								447	44				
	b) Room ventilation								0	0				
13	Internal gains:		Occupants @	230			0			0				
			Appliances/other							0				
	Subtotal (lines 6 to 13)								2798	1961				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								38	18				
14	Subtotal								2836	1979				
15	Duct loads						2%	0%	48	2				
	Total room load								2884	1981				
	Air required (cfm)								183	149				

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Level 1



Job #: 13-0508
Performed by Timothy Carstairs for:
 Sample
 123 Sesame St.
 Anywhere, CA

Carstairs Energy
 P.O. Box 4736
 San Luis Obispo, CA 93403
 Phone: (805) 904-9048 Fax: (805) 620-3774
 www.carstairsenergy.com title24@yahoo.com

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