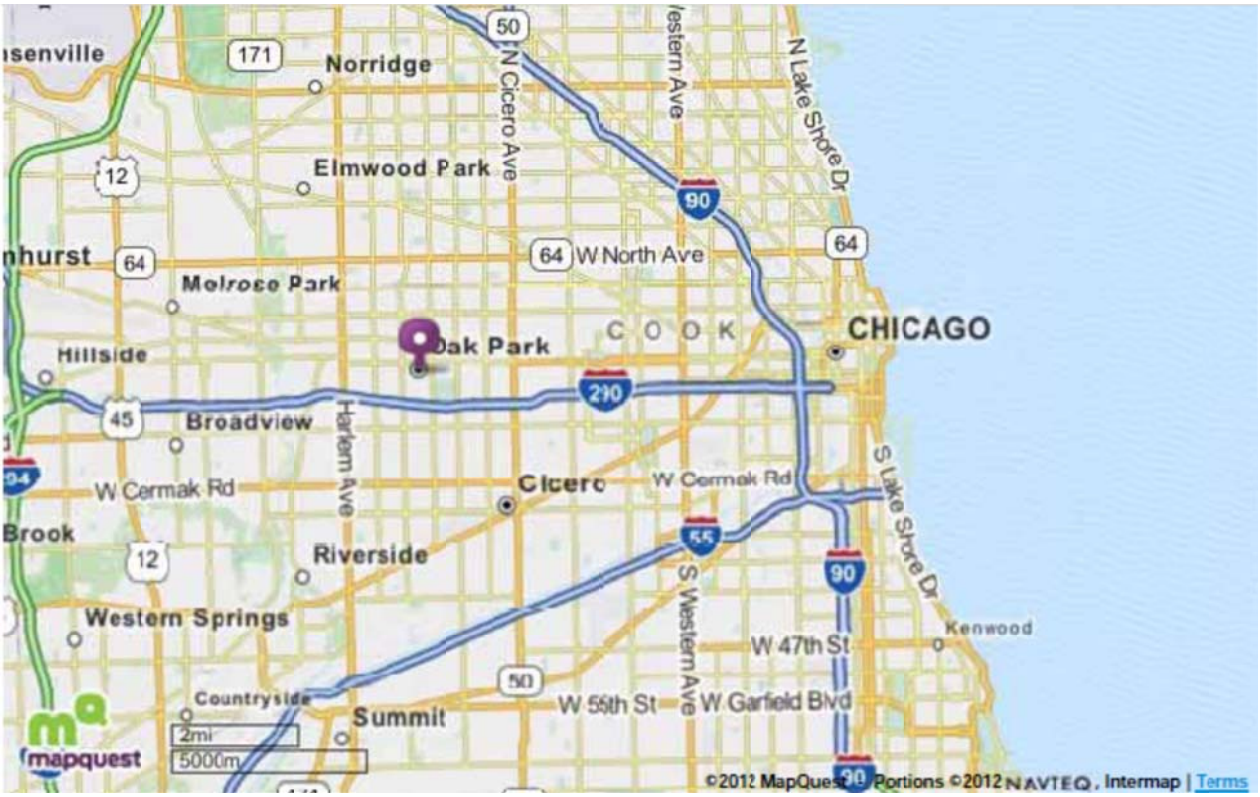
SAVOY ENGINEERING GROUP
Quality ACCA Manual J load calculations &
Manual D duct designs since 2005

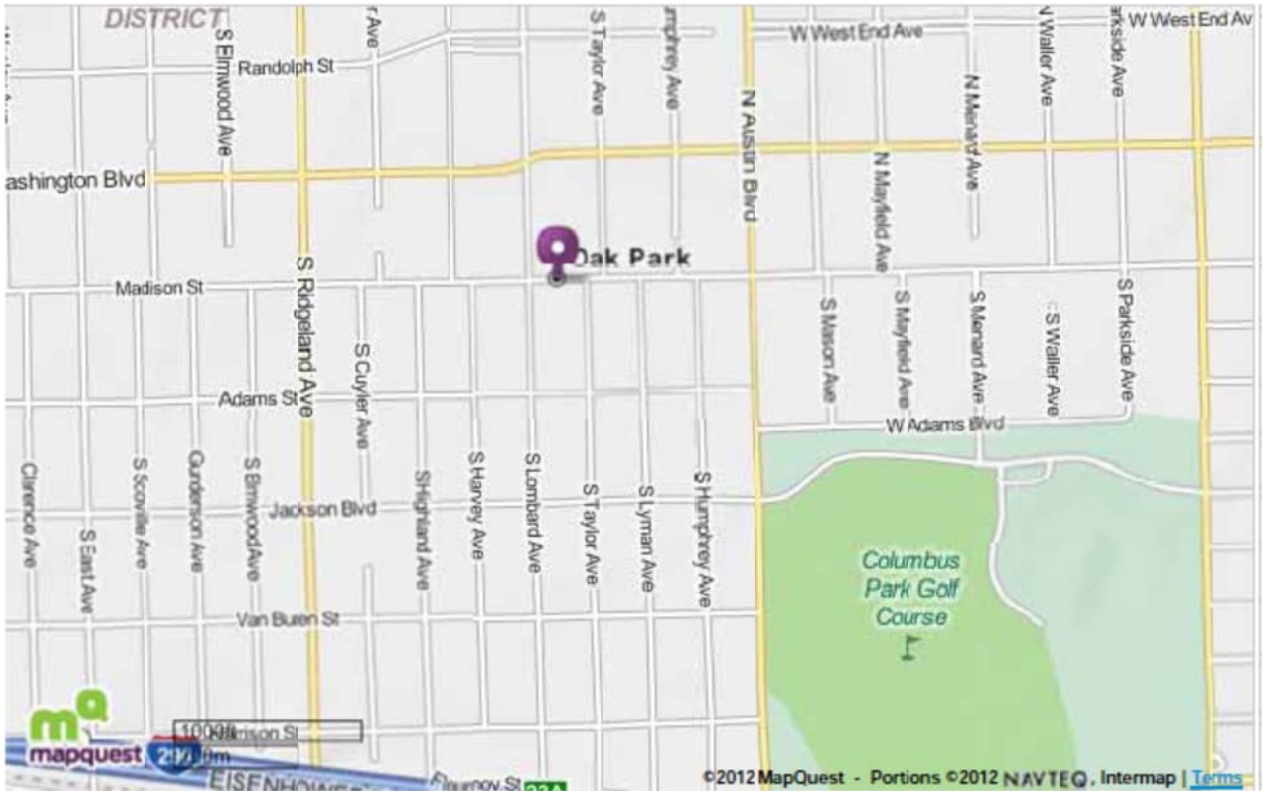
Report SEG 0314-077W / March 2014

Right-Sized Residence

Manual J Street, Oak Park, IL 60301

Prepared by: Tracy Savoy





DISCLAIMER

The following pages summarize the heat gain and heat loss of the building using the ACCA Manual J8 calculation procedure. The calculations are based on the information given to Savoy Engineering Group in the form of drawings, sketches, and interviews. In certain cases, Savoy Engineering Group may make assumptions about design conditions that may or may not be accurate for the location of concern. It is the responsibility of the installing HVAC contractor to verify the design conditions **before** equipment purchase and installation.

Any load calculations provided in the following pages are based upon information provided by the party submitting a particular project to Savoy Engineering Group. Savoy Engineering Group has not and does not independently verify that the data provided to Savoy Engineering Group is correct or complete, and any calculations made by Savoy Engineering Group are based upon the information provided by third parties. Savoy Engineering Group makes no claim that the information given to us is correct or complete.

Savoy Engineering Group utilizes WrightSoft Residential 13.0 which is an ACCA Certified and ASHRAE recommended computer program to determine the heating and cooling loads presented in this report, and is therefore very accurate. If the information given to Savoy Engineering Group is accurate, and the building is built as per the plans submitted, then the load calculations presented in this report can be assumed to be accurate. A licensed mechanical contractor may use these calculations as a starting point in system sizing and selection.

Savoy Engineering Group does not provide architectural or engineering plans or diagrams for the public or for use by contractors or construction companies as final "construction documents". Savoy Engineering Group works with architectural and engineering firms and with contractors in connection with their designs of heating and air conditioning systems.

If the HVAC duct layout installed on-site DOES NOT match the Manual D duct design prepared by Savoy Engineering Group, then Savoy Engineering Group cannot and will not guarantee the performance of any altered duct design.

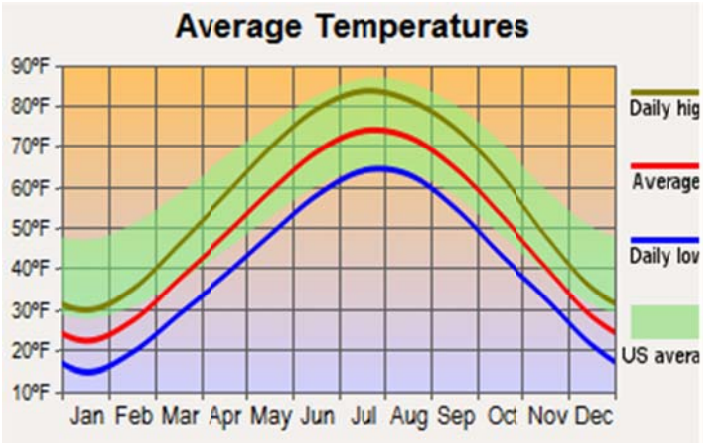
Final HVAC sizing and selection should be done by a licensed HVAC contractor. Many factors beyond the scope of this report must be considered prior to final system selection and design, such as: exact equipment availability and selections, system controls and location of controls, system air distribution and cycling, Uniform Building Code requirements, Uniform Mechanical Code requirements, and many other standard design conventions as listed by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE).

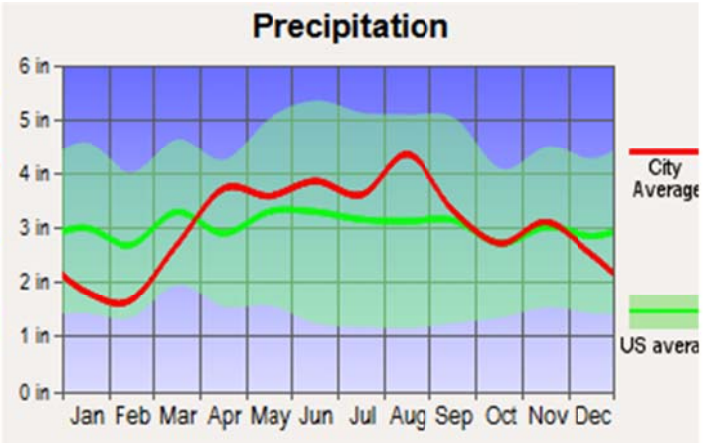
Savoy Engineering Group therefore assumes no liability for final equipment selection or final system design. Various modifications to the information provided to Savoy Engineering Group may have occurred after this Design Support information was prepared, which would require that this Design Support information be modified in order to be accurate. After reviewing Savoy Engineering Group's report, and prior to any system purchase or installation, please inform Savoy Engineering Group in writing of any changes which may alter the assumptions and calculations contained in this report.

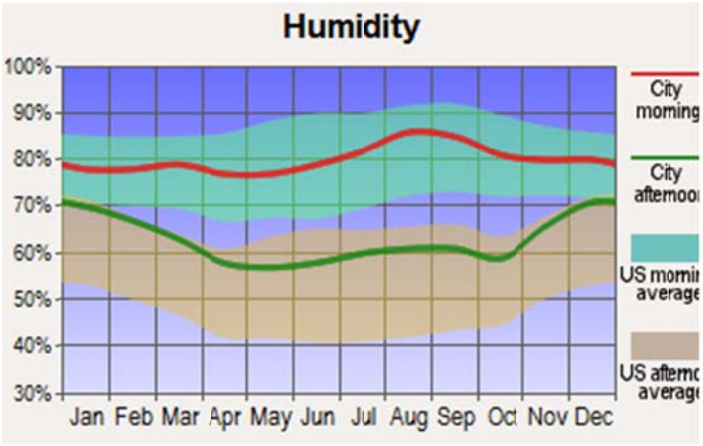
Elevation: 620 feet

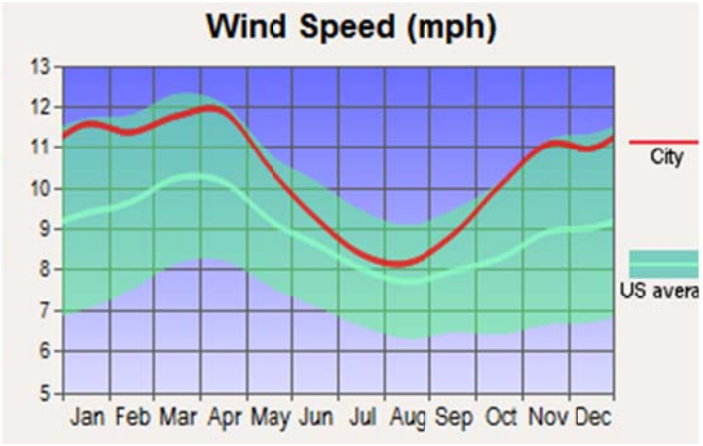
Average climate in Oak Park, Illinois

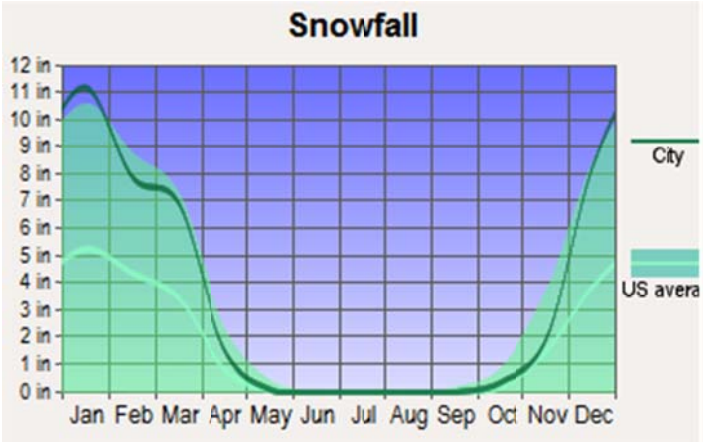
Based on data reported by over 4,000 weather stations

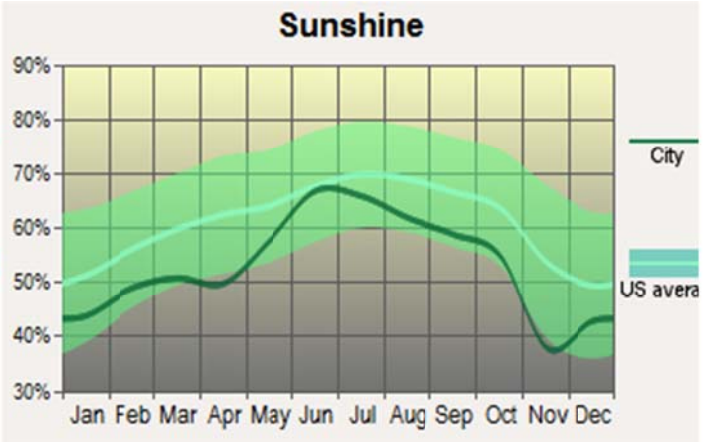


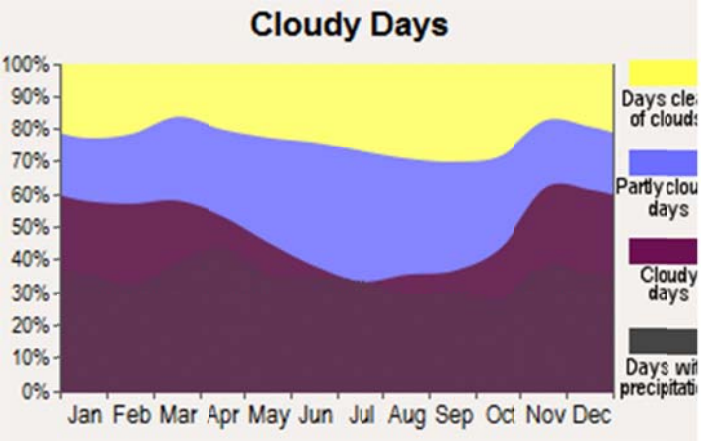












http://www.city-data.com/city/Oak-Park-Illinois.html

SUMMARY

ACCA Certified Manual J Load Calculation – Design Data Summary

Mode	Total Load BTUh	Sensible Load BTUh	Latent Load BTUh	A/C Cooling Tons	Design Outdoor Conditions	Indoor Conditions
Entire House						
Heating	42,397	N/A	N/A	N/A	4 ^{o}F	70 ^{o}F
Cooling	21,064	16,454	4,609	1.8	90 ^{o}F	75 ^{o}F, 50% RH

The ACCA Certified Load Analysis includes:
- **SHR of 0.78 (Sensible/Total)**

- The Load Analysis includes people 4 (# of Bedrooms + 1) and a 1,200 BTUh appliance load

- The Load Analysis includes a duct loss:
  - OPEN UNCONDITIONED CRAWLSPACE duct location

Per Energy Star:

- AC cooling equipment should be sized at 95-115% of Design Total Heat Gain, or the next nominal size that is available to satisfy the latent and sensible requirements.
- Heat pump cooling equipment should be sized at 100-115% (cooling dominant climate) or 100-125% (heating dominant climate) of Design Total Heat Gain, or the next nominal size that is available to satisfy the latent and sensible requirements unless a larger size is dictated by the heating equipment selection.
- Listed Output Heat Capacity must be sized at 100-140% of Design Total Heat Loss, or next nominal size unless a larger size is dictated by the cooling equipment selection.

Building Analysis
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

Location:
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

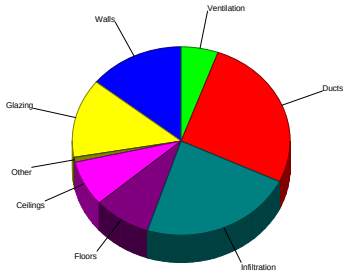
Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

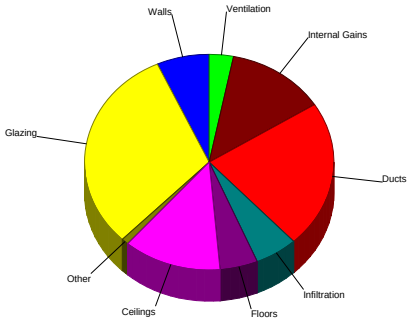
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.3	6033	14.2
Glazing	23.0	5735	13.5
Doors	17.1	359	0.8
Ceilings	1.7	3310	7.8
Floors	1.9	3632	8.6
Infiltration	5.8	9719	22.9
Ducts		11276	26.6
Piping		0	0
Humidification		0	0
Ventilation		2335	5.5
Adjustments		0	
Total		**42397**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	0.8	1125	6.8
Glazing	20.4	5080	30.9
Doors	7.3	154	0.9
Ceilings	1.1	2098	12.8
Floors	0.4	807	4.9
Infiltration	0.5	914	5.6
Ducts		3638	22.1
Ventilation		519	3.2
Internal gains		2120	12.9
Blower		0	0
Adjustments		0	
Total		**16454**	**100.0**



Latent Cooling Load = 4609 Btuh
Overall U-value = 0.054 Btuh/ft²-°F

Data entries checked.

AED Assessment
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

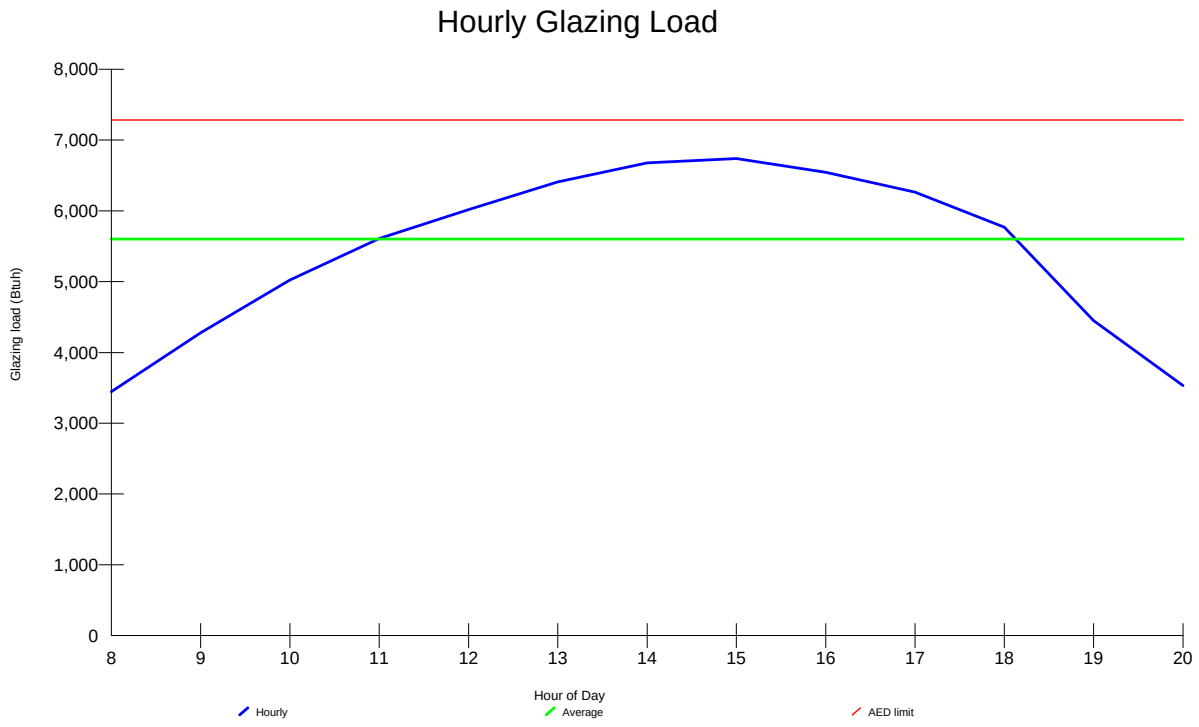
Location:
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42 °N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 20.3%.

House has adequate exposure diversity (AED), based on AED limit of 30%.

AED excursion: 0 Btuh

Component Constructions
Entire House
Savoy Engineering Group

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Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Conditions

Location:
Chicago Midway AP, IL, US
Elevation: 617 ft
Latitude: 42°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	4	90
Daily range (°F)	-	16 (L)
Wet bulb (°F)	-	73
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	66	15
Relative humidity (%)	30	50
Moisture difference (gr/lb)	27.8	34.1

Infiltration:

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

Construction descriptions	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
Walls								
12F-0bw: Frm wall, brk 4" ext, 1/2" wood shth, r-21 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm	n	472	0.065	21.0	4.27	2014	0.80	376
	e	234	0.065	21.0	4.27	999	0.80	186
	s	467	0.065	21.0	4.27	1996	0.80	372
	w	240	0.065	21.0	4.27	1023	0.80	191
	all	1413	0.065	21.0	4.27	6033	0.80	1125
Partitions								
(none)								
Windows								
10D-c: 2 glazing, clr low-e outr, air gas, clad wd frm mat, clr innr, 1/4" gap, 1/8" thk; NFRC rated (SHGC=0.31)	n	54	0.350	0	23.0	1251	7.73	421
	n	37	0.350	0	23.0	839	11.0	403
	e	45	0.350	0	23.0	1035	34.2	1541
	s	74	0.350	0	23.0	1705	18.5	1369
	w	39	0.350	0	23.0	904	34.2	1347
	all	249	0.350	0	23.0	5735	20.4	5080
Doors								
11E0: Door, wd sc type, wd strm	s	21	0.260	0	17.1	359	7.32	154
Ceilings								
16C-38aw: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		1938	0.026	38.0	1.71	3310	1.08	2098
Floors								
19A-30bstp: Flr floor, frm flr, 10" thkns, r-30 cav ins, tight bsmt ovr		1938	0.034	30.0	1.87	3632	0.42	807

Load Short Form
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
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Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Design Information

	Htg	Clg
Outside db (°F)	4	90
Inside db (°F)	70	75
Design TD (°F)	66	15
Daily range	-	L
Inside humidity (%)	30	50
Moisture difference (gr/lb)	28	34

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

HEATING EQUIPMENT

Make	Goodman Mfg.
Trade	GOODMAN
Model	GCH950453BX**
AHRI ref	3653909

Efficiency	95 AFUE	
Heating input	46000	Btuh
Heating output	44000	Btuh
Temperature rise	51	°F
Actual air flow	800	cfm
Air flow factor	0.020	cfm/Btuh
Static pressure	0.60	in H2O
Space thermostat		

COOLING EQUIPMENT

Make	Goodman Mfg.
Trade	GOODMAN
Cond	SSX160241B*
Coil	CA*F3636*6D*
AHRI ref	4652177

Efficiency	13.2 EER, 16 SEER	
Sensible cooling	18720	Btuh
Latent cooling	5280	Btuh
Total cooling	24000	Btuh
Actual air flow	800	cfm
Air flow factor	0.050	cfm/Btuh
Static pressure	0.60	in H2O
Load sensible heat ratio	0.78	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Master Bedroom	240	7575	2618	151	131
Master Bath	112	2734	590	55	30
Master Wic	98	0	0	0	0
Den	150	2507	644	50	32
Dining	129	2095	506	42	25
Kitchen	176	4861	3265	97	164
Living Room	394	9296	4527	186	227
CL 2	34	0	0	0	0
Bedroom 2	192	5733	2242	114	113
Hall	126	0	0	0	0
Bath 2	90	1481	312	30	16
Bedroom 3	198	3780	1232	75	62

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Entire House	d	1939	40063	15935	800	800
Other equip loads			2335	519		
Equip. @ 1.00	RSM			16454		
Latent cooling				4609		
TOTALS		1939	42397	21064	800	800

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name						Entire House				Master Bedroom			
2	Exposed wall						187.0 ft				31.0 ft			
3	Room height						9.0 ft		d		9.0 ft		heat/cool	
4	Room dimensions										16.0 x 15.0 ft			
5	Room area						1938.9 ft²				240.0 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	12F-0bw	0.065	n	4.27	0.80	563	472	2014	376	144	90	383	71
.	└G	10D-c	0.350	n	22.99	7.73	54	0	1251	421	54	0	1251	421
.	└G	4A5-2oc	0.350	n	22.99	11.05	37	0	839	403	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	279	234	999	186	0	0	0	0
11	└G	4A5-2oc	0.350	e	22.99	34.24	45	0	1035	1541	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	563	467	1996	372	0	0	0	0
	└G	4A5-2oc	0.350	s	22.99	18.46	74	0	1705	1369	0	0	0	0
	└D	11E0	0.260	s	17.08	7.32	21	21	359	154	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	279	240	1023	191	135	115	493	92
	└G	4A5-2oc	0.350	w	22.99	34.24	39	0	904	1347	20	0	452	673
	C	16C-38aw	0.026	-	1.71	1.08	1938	1938	3310	2098	240	240	410	260
	F	19A-30bstp	0.034	-	1.87	0.42	1938	1938	3632	807	240	240	450	100
6	c) AED excursion									0				144
	Envelope loss/gain								19068	9264			3438	1761
12	a) Infiltration								9719	914			1611	151
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					4			920	0			0
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								28787	12298			5049	1912
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			393	108
14	Subtotal								28787	12298			5443	2020
15	Duct loads						39%	30%	11276	3638	39%	30%	2132	598
	Total room load								40063	15935			7575	2618
	Air required (cfm)								800	800			151	131

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name						Master Bath					Master Wic			
2	Exposed wall						14.0 ft					0 ft			
3	Room height						9.0 ft		heat/cool			9.0 ft		heat/cool	
4	Room dimensions						14.0 x 8.0 ft					14.0 x 7.0 ft			
5	Room area						112.0 ft²					98.0 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	12F-0bw	0.065	n	4.27	0.80	126	120	510	95	0	0	0	0
.	└G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	└G	4A5-2oc	0.350	n	22.99	11.05	7	0	149	72	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	└G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	└D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	112	112	191	121	98	98	167	106
	F	19A-30bstp	0.034	-	1.87	0.42	112	112	210	47	98	98	184	41
6	c) AED excursion									-18				-7
	Envelope loss/gain								1061	317			351	140
12	a) Infiltration								728	68			0	0
	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)								1789	385			351	140
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								176	70			-351	-140
14	Subtotal								1964	455			0	0
15	Duct loads						39%	30%	769	135	39%	30%	0	0
	Total room load								2734	590			0	0
	Air required (cfm)								55	30			0	0

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
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1	Room name						Den					Dining			
2	Exposed wall						10.0 ft					9.5 ft			
3	Room height						9.0 ft		heat/cool			9.0 ft		heat/cool	
4	Room dimensions						10.0 x 15.0 ft					9.5 x 13.6 ft			
5	Room area						150.0 ft²					128.8 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	12F-0bw	0.065	n	4.27	0.80	90	80	342	64	86	76	322	60
.	└G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	└G	4A5-2oc	0.350	n	22.99	11.05	10	0	230	110	10	0	230	110
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	└G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	└D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	150	150	256	162	128	128	219	139
	F	19A-30bstp	0.034	-	1.87	0.42	150	150	281	62	128	128	240	53
6	c) AED excursion									-20				-19
	Envelope loss/gain								1109	379			1012	344
12	a) Infiltration								520	49			494	46
	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)								1629	428			1506	391
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								173	69			0	0
14	Subtotal								1802	497			1506	391
15	Duct loads						39%	30%	706	147	39%	30%	590	116
	Total room load								2507	644			2095	506
	Air required (cfm)								50	32			42	25

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name					Kitchen				Living Room			
2	Exposed wall					26.5 ft				40.0 ft			
3	Room height					9.0 ft		heat/cool		9.0 ft		heat/cool	
4	Room dimensions					13.0 x 13.6 ft				22.5 x 17.5 ft			
5	Room area					176.3 ft²				393.8 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	12F-0bw	0.065	n	4.27	0.80	117	107	457	85	0	0	0	0
.	└G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	└G	4A5-2oc	0.350	n	22.99	11.05	10	0	230	110	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	122	107	455	85	158	128	544	102
11	└G	4A5-2oc	0.350	e	22.99	34.24	15	0	345	514	30	0	690	1027
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	203	139	595	111
	└G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	42	0	968	777
	└D	11E0	0.260	s	17.08	7.32	0	0	0	0	21	21	359	154
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	176	176	300	190	394	394	673	426
	F	19A-30bstp	0.034	-	1.87	0.42	176	176	329	73	394	394	738	164
6	c) AED excursion									-97				-166
	Envelope loss/gain								2115	961			4567	2595
12	a) Infiltration								1377	129			2079	195
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					1			230	3			690
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								3493	2520			6646	3480
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			34	14
14	Subtotal								3493	2520			6680	3494
15	Duct loads						39%	30%	1368	745	39%	30%	2617	1033
	Total room load								4861	3265			9296	4527
	Air required (cfm)								97	164			186	227

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name						CL 2				Bedroom 2			
2	Exposed wall						4.0 ft				28.0 ft			
3	Room height						9.0 ft		heat/cool		9.0 ft		heat/cool	
4	Room dimensions						8.5 x 4.0 ft				16.0 x 12.0 ft			
5	Room area						34.0 ft²				192.0 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	12F-0bw	0.065	n	4.27	0.80	0	0	0	0	0	0	0	0
.	└G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	└G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	└G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	144	132	563	105
	└G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	12	0	278	223
	└D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	36	36	154	29	108	88	377	70
	└G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	20	0	452	673
	C	16C-38aw	0.026	-	1.71	1.08	34	34	58	37	192	192	328	208
	F	19A-30bstp	0.034	-	1.87	0.42	34	34	64	14	192	192	360	80
6	c) AED excursion									-5				161
	Envelope loss/gain								276	75			2359	1521
12	a) Infiltration								208	20			1455	137
	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)								483	95			3814	1657
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								-483	-95			306	73
14	Subtotal								0	0			4119	1730
15	Duct loads						39%	30%	0	0	39%	30%	1614	512
	Total room load								0	0			5733	2242
	Air required (cfm)								0	0			114	113

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name					Hall				Bath 2				
2	Exposed wall					0 ft				7.5 ft				
3	Room height					9.0 ft		heat/cool		9.0 ft		heat/cool		
4	Room dimensions					31.5 x 4.0 ft				7.5 x 12.0 ft				
5	Room area					126.0 ft²				90.0 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	12F-0bw	0.065	n	4.27	0.80	0	0	0	0	0	0	0	0
.	└G	10D-c	0.350	n	22.99	7.73	0	0	0	0	0	0	0	0
.	└G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0	0	0	0	0
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0	0	0	0	0
11	└G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	s	4.27	0.80	0	0	0	0	68	68	288	54
	└G	4A5-2oc	0.350	s	22.99	18.46	0	0	0	0	0	0	0	0
	└D	11E0	0.260	s	17.08	7.32	0	0	0	0	0	0	0	0
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0	0	0	0	0
	└G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0	0	0	0	0
	C	16C-38aw	0.026	-	1.71	1.08	126	126	215	136	90	90	154	97
	F	19A-30bstp	0.034	-	1.87	0.42	126	126	236	52	90	90	169	37
6	c) AED excursion									-9				-10
	Envelope loss/gain								451	180			611	178
12	a) Infiltration								0	0			390	37
	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)								451	180			1001	215
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								-451	-180			64	26
14	Subtotal								0	0			1064	241
15	Duct loads						39%	30%	0	0	39%	30%	417	71
	Total room load								0	0			1481	312
	Air required (cfm)								0	0			30	16

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Right-J® Worksheet
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

1	Room name				Bedroom 3										
2	Exposed wall				16.5 ft										
3	Room height				9.0 ft				heat/cool						
4	Room dimensions				16.5 x 12.0 ft										
5	Room area				198.0 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	12F-0bw	0.065	n	4.27	0.80	0	0	0	0				
.	├─G	10D-c	0.350	n	22.99	7.73	0	0	0	0				
.	└─G	4A5-2oc	0.350	n	22.99	11.05	0	0	0	0				
.	W	12F-0bw	0.065	e	4.27	0.80	0	0	0	0				
11	└─G	4A5-2oc	0.350	e	22.99	34.24	0	0	0	0				
	W	12F-0bw	0.065	s	4.27	0.80	149	129	549	102				
	├─G	4A5-2oc	0.350	s	22.99	18.46	20	0	460	369				
	└─D	11E0	0.260	s	17.08	7.32	0	0	0	0				
	W	12F-0bw	0.065	w	4.27	0.80	0	0	0	0				
	└─G	4A5-2oc	0.350	w	22.99	34.24	0	0	0	0				
	C	16C-38aw	0.026	-	1.71	1.08	198	198	338	214				
	F	19A-30bstp	0.034	-	1.87	0.42	198	198	371	82				
6	c) AED excursion									45				
	Envelope loss/gain								1718	814				
12	a) Infiltration								858	81				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @ 230					0			0				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								2576	895				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								141	56				
14	Subtotal								2716	951				
15	Duct loads						39%	30%	1064	281				
	Total room load								3780	1232				
	Air required (cfm)								75	62				

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Project Summary
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Notes: Joe Contractor
Superior HVAC

Design Information

Weather: Chicago Midway AP, IL, US

Winter Design Conditions

Outside db	4	°F
Inside db	70	°F
Design TD	66	°F

Summer Design Conditions

Outside db	90	°F
Inside db	75	°F
Design TD	15	°F
Daily range	L	
Relative humidity	50	%
Moisture difference	34	gr/lb

Heating Summary

Structure	28787	Btuh
Ducts	11276	Btuh
Central vent (33 cfm)	2335	Btuh
Humidification	0	Btuh
Piping	0	Btuh
Equipment load	42397	Btuh

Sensible Cooling Equipment Load Sizing

Structure	12298	Btuh
Ducts	3638	Btuh
Central vent (33 cfm)	519	Btuh
Blower	0	Btuh
Use manufacturer's data	y	
Rate/swing multiplier	1.00	
Equipment sensible load	16454	Btuh

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	2 (Average)

	Heating	Cooling
Area (ft²)	1939	1939
Volume (ft³)	17450	17450
Air changes/hour	0.47	0.20
Equiv. AVF (cfm)	138	58

Latent Cooling Equipment Load Sizing

Structure	2120	Btuh
Ducts	1740	Btuh
Central vent (33 cfm)	750	Btuh
Equipment latent load	4609	Btuh
Equipment total load	21064	Btuh
Req. total capacity at 0.78 SHR	1.8	ton

Heating Equipment Summary

Make	Goodman Mfg.
Trade	GOODMAN
Model	GCH950453BX**
AHRI ref	3653909

Efficiency	95 AFUE	
Heating input	46000	Btuh
Heating output	44000	Btuh
Temperature rise	51	°F
Actual air flow	800	cfm
Air flow factor	0.020	cfm/Btuh
Static pressure	0.60	in H2O
Space thermostat		

Cooling Equipment Summary

Make	Goodman Mfg.
Trade	GOODMAN
Cond	SSX160241B*
Coil	CA*F3636*6D*
AHRI ref	4652177

Efficiency	13.2 EER, 16 SEER	
Sensible cooling	18720	Btuh
Latent cooling	5280	Btuh
Total cooling	24000	Btuh
Actual air flow	800	cfm
Air flow factor	0.050	cfm/Btuh
Static pressure	0.60	in H2O
Load sensible heat ratio	0.78	

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Manual S Compliance Report
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

Cooling Equipment

Design Conditions

Outdoor design DB:	89.6°F	Sensible gain:	16454	Btuh	Entering coil DB: 77.0°F
Outdoor design WB:	73.3°F	Latent gain:	4609	Btuh	Entering coil WB: 64.1°F
Indoor design DB:	75.0°F	Total gain:	21064	Btuh	
Indoor RH:	50%	Estimated airflow:	800	cfm	

Manufacturer's Performance Data at Actual Design Conditions

Equipment type: Split AC
Manufacturer: Goodman Mfg. Model: SSX160241B*+CA*F3636*6D*

Actual airflow:	800	cfm		
Sensible capacity:	18121	Btuh	110% of load	
Latent capacity:	4900	Btuh	106% of load	
Total capacity:	23021	Btuh	109% of load	SHR: 79%

Heating Equipment

Design Conditions

Outdoor design DB:	4.3°F	Heat loss:	42397	Btuh	Entering coil DB: 60.8°F
Indoor design DB:	70.0°F				

Manufacturer's Performance Data at Actual Design Conditions

Equipment type: Gas furnace
Manufacturer: Goodman Mfg. Model: GCH950453BX**

Actual airflow:	800	cfm		
Output capacity:	44000	Btuh	104% of load	Temp. rise: 50 °F

The above equipment was selected in accordance with ACCA Manual S.

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

Form RPER 1 15 Mar 09

Air Conditioning Contractors of America

Header Information

Contractor: Savoy Engineering Group

Mechanical license:

Building plan #:

Home address (Street or Lot#, Block, Subdivision): ACCA Manual J Street, Entire House

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

HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

Winter Design Conditions

Outdoor temperature:	4	°F
Indoor temperature:	70	°F
Total heat loss:	42397	Btuh

Summer Design Conditions

Outdoor temperature:	90	°F
Indoor temperature:	75	°F
Grains difference:	34 gr/lb @ 50% RH	
Sensible heat gain:	16454	Btuh
Latent heat gain:	4609	Btuh
Total heat gain:	21064	Btuh

Building Construction Information

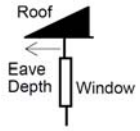
Building

Orientation: Front Door faces South
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms:	3	
Conditioned floor area:	1939	ft²
Number of occupants:	4	

Windows

Eave overhang depth:	0	ft
Internal shade: Blinds, drapes, etc.	none	
Number of skylights:	0	



HVAC EQUIPMENT SELECTION (IRC M1401.3)

Heating Equipment Data

Equipment type: Furnace, Heat pump, Boiler, etc.	Gas furnace
Model:	Goodman Mfg. GCH950453BX**+
Heating output capacity: Heat pumps - capacity at winter design outdoor conditions	44000 Btuh
Aux. heating output capacity:	0 Btuh

Cooling Equipment Data

Equipment type: Air Conditioner, Heat pump, etc.	Split AC
Model:	Goodman Mfg. SSX160241B*+CA*F3636*6D*
Total cooling capacity:	23021 Btuh
Sensible cooling capacity:	18121 Btuh
Latent cooling capacity:	4900 Btuh

Blower Data

Heating cfm:	800
Cooling cfm:	800
Static pressure: Fan's rated external static pressure for design airflow	0.60 in H2O

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow:	800	cfm	Longest supply duct:	232	ft	Duct Materials Used	
Equipment design ESP:	0.60	in H2O	Longest return duct:	197	ft	Trunk duct:	Sheet metal
Total device pressure losses:	-0.3	in H2O	**Total effective length (TEL):**	429	ft		
Available static pressure (ASP):	0.33	in H2O	**Friction rate:** Friction Rate = ASP ÷ (TEL x 100)	0.077	in/100ft	Branch duct:	Round flex vinyl, Sheet metal

I declare the load calculation, equipment, equipment selection and duct 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: _____

Contractor's signature: _____ Date: _____

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

*Home qualifies for MJ1AE Form based on Abridged Edition Checklist

Duct System Summary
Entire House
Savoy Engineering Group

Job: SEG 0314-077W
Date: Mar 17, 2014
By: Tracy Savoy

Phone: (801) 949-5337 Web: www.load-calculations.com

Project Information

For: Right-Sized Residence
ACCA Manual J Street, Oak Park, IL 60301

	Heating	Cooling
External static pressure	0.60 in H2O	0.60 in H2O
Pressure losses	0.27 in H2O	0.27 in H2O
Available static pressure	0.33 in H2O	0.33 in H2O
Supply / return available pressure	0.178 / 0.152 in H2O	0.178 / 0.152 in H2O
Lowest friction rate	0.077 in/100ft	0.077 in/100ft
Actual air flow	800 cfm	800 cfm
Total effective length (TEL)	429 ft	

Supply Branch Detail Table

Name	Design (Btuh)	Htg (cfm)	Clg (cfm)	Design FR	Diam (in)	H x W (in)	Duct Matl	Actual Ln (ft)	Ftg.Eqv Ln (ft)	Trunk
Bath 2	h 1481	30	16	0.084	4.0	0x0	VlFx	21.3	190.0	st5
Bedroom 2	h 5733	114	113	0.115	7.0	0x0	VlFx	29.5	125.0	st4
Bedroom 3	h 3780	75	62	0.081	5.0	0x0	VlFx	29.5	190.0	st5
Den	h 2507	50	32	0.082	4.0	0x0	VlFx	33.5	185.0	st6
Dining	h 2095	42	25	0.080	6.0	0x0	VlFx	44.0	180.0	st7
Kitchen	c 1633	49	82	0.078	6.0	0x0	VlFx	54.5	175.0	st10
Kitchen-A	c 1633	49	82	0.077	6.0	0x0	VlFx	56.5	175.0	st10
Living Room	c 2264	93	114	0.087	7.0	0x0	VlFx	54.3	150.0	st11
Living Room-A	c 2264	93	114	0.088	7.0	0x0	VlFx	53.2	150.0	st11
Master Bath	h 2734	55	30	0.084	5.0	0x0	VlFx	22.0	190.0	st5
Master Bedroom	h 3787	76	66	0.107	5.0	0x0	VlFx	31.7	135.0	st2
Master Bedroom-A	h 3787	76	66	0.107	5.0	0x0	VlFx	32.3	135.0	st2

Supply Trunk Detail Table

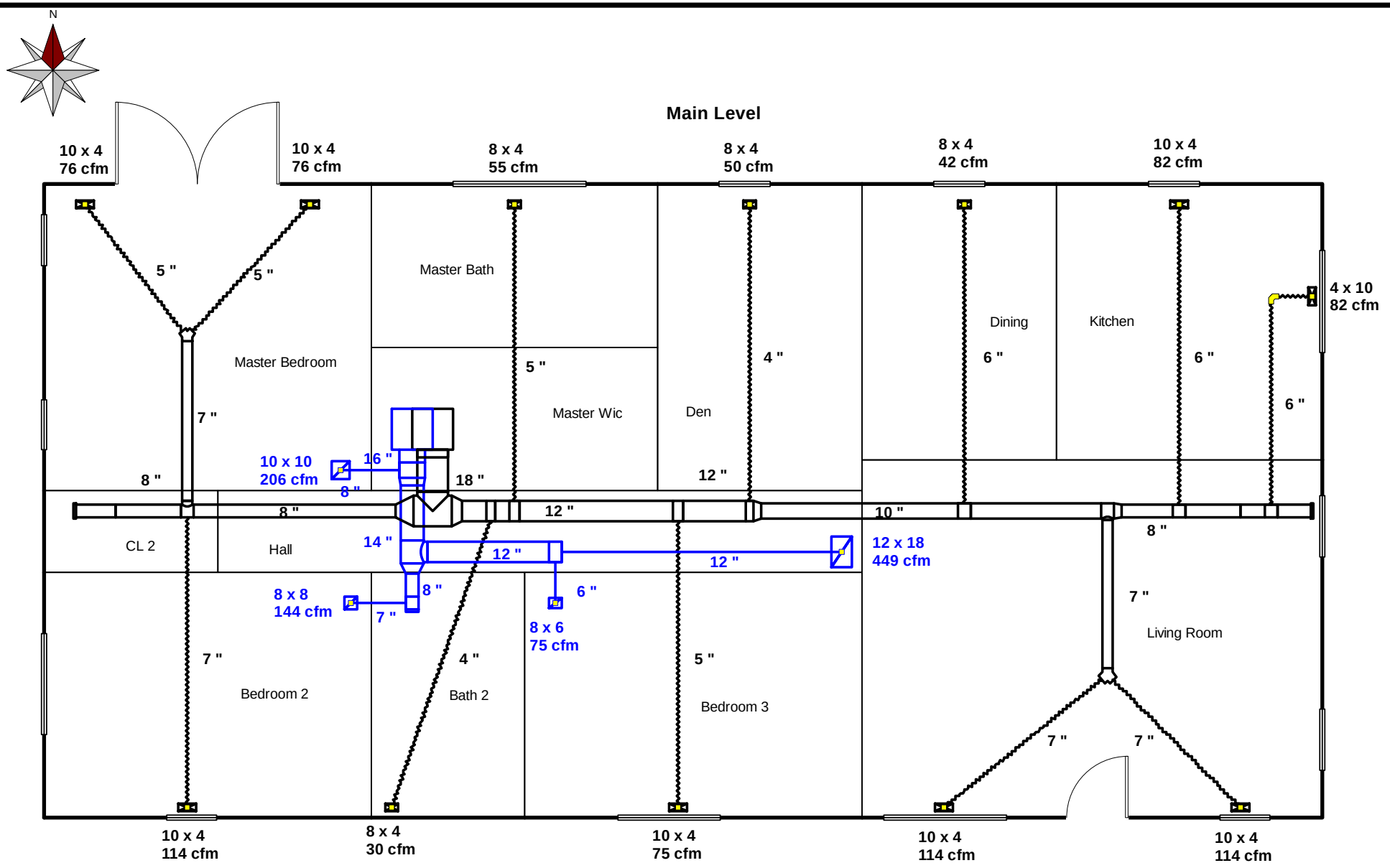
Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st10	Peak AVF	97	164	0.077	470	8.0	0 x 0	ShtMetl	st7
st7	Peak AVF	325	417	0.077	764	10.0	0 x 0	ShtMetl	st6
st6	Peak AVF	375	449	0.077	572	12.0	0 x 0	ShtMetl	st5
st5	Peak AVF	534	556	0.077	708	12.0	0 x 0	ShtMetl	st1
st2	Peak AVF	151	131	0.107	566	7.0	0 x 0	ShtMetl	st4
st4	Peak AVF	266	244	0.107	761	8.0	0 x 0	ShtMetl	st1
st11	Peak AVF	186	227	0.087	850	7.0	0 x 0	ShtMetl	st7
st1	Peak AVF	800	800	0.077	453	18.0	0 x 0	ShtMetl	

Return Branch Detail Table

Name	Grill Size (in)	Htg (cfm)	Clg (cfm)	TEL (ft)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Stud/Joist Opening (in)	Duct Matl	Trunk
rb2	20x 11	375	449	197.0	0.077	572	12.0	0x 0		ShMt	rt3
rb5	10x 10	206	161	130.5	0.116	590	8.0	0x 0		ShMt	rt1
rb3	10x 10	144	128	126.5	0.120	539	7.0	0x 0		ShMt	rt4
rb4	6x 10	75	62	185.5	0.082	384	6.0	0x 0		ShMt	rt3

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt3	Peak AVF	450	511	0.077	650	12.0	0 x 0	ShtMetl	rt2
rt1	Peak AVF	800	800	0.077	573	16.0	0 x 0	ShtMetl	
rt2	Peak AVF	594	639	0.077	598	14.0	0 x 0	ShtMetl	rt1
rt4	Peak AVF	144	128	0.120	413	8.0	0 x 0	ShtMetl	rt2



Job #: SEG 0314-077W
Performed by Tracy Savoy for:
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