Authority Air Designs, LLC.
6608 W. 95th Place
Westminster, CO. 80021-6422
(303) 859-2967
Joe@AuthorityAir.com
www.AuthorityAir.com

March 25, 2012

Royal Comfort Heating & Cooling
Doug Fleming
7170 W. Radcliff Ave.
Littleton, CO 80123

Re: 1110 E. Layton Ave - HVAC Design

Dear Doug,

This letter concerns the zoning system design for the Main Floor at 1110 E. Layton Ave. It is very important for successful system operation that the following instructions are followed.

1) **Zoning Layout** - The zoning layout had to be changed slightly to ensure the system could be balanced properly. The two Studies "A Study" and "B Study" must be moved to the Master Zone. Without these two rooms, the zoning system is too far out of capacity balance to function well.
2) **Bryant ZONEBB3ZHP01** - The Bryant ZONEBB3ZHP01 Zone Control panel is the control recommended for this design. The thermostats installed for both zones should be two-stage heating and cooling and contain the proper number of wires to control all the equipment to be installed, including the humidifiers and HRV's. The Master Bedroom Zone should be initially wired for single-stage, 1st stage operation in heating and cooling modes only. This would be the initial setup and should have the ability to be changed to two-stage operation in both heating and cooling modes after the system is put into operation and tested.
3) **Two-Stage Furnace & Air Conditioner** - Authority Air Designs insists with any zoning system, the installation of two-stage furnace and air conditioner is required. Without the installation of two-stage equipment the capacity has no ability to step down when a single zone is open. This would create excessive noise and probable equipment damage. The attached design has a two-speed furnace and air conditioner for the main zone.
4) **Bypass Damper** - The Main Zone System requires the installation of a 12" Honeywell MARD modulating damper and a Honeywell SPC static pressure control. The combination of these two items will allow the precise adjustment of the equipment static pressure and noise levels. This control must be adjusted according to the Bryant ZONEBB3ZHP01 Installation and Operating Instructions.
5) **LAT** - The leaving air temperature sensor (LAT) should not be installed in the supply plenum until the system is operational and the cross-sectional temperature readings are performed. Once the cross-sectional temperature reading are taken, with the various zone damper positions, the lowest supply temperature spot, in cooling mode, is the recommended LAT Sensor location. The LAT Sensor location and setup is extremely

important to a successful zoning system design and operation. The ZONEBB3ZHP01 Installation and Operation Manual should be thoroughly read and the LAT setup performed. If you have any questions on the setup please call or email me. I am available to make a site visit to assist with the final commissioning of this system if required.

There are numerous options and operational setup changes that can be made to this system. Too many to list in this letter but the systems has the ability to be fine-tuned to meet very high homeowner expectation.

Thank you for choosing Authority Air Designs, LLC. for your HVAC Design needs. I hope we can assist you in the future.

Sincerely,

Joe Colburn
Authority Air Designs, LLC.

Phone: (303) 859-2967
Email: Joe@AuthorityAir.com
Website: www.AuthorityAir.com

Project Summary
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	79861	Btuh
Ducts	6876	Btuh
Central vent (419 cfm)	26208	Btuh
Humidification	6657	Btuh
Piping	0	Btuh
Equipment load	119602	Btuh

Sensible Cooling Equipment Load Sizing

Structure	39960	Btuh
Ducts	5177	Btuh
Central vent (419 cfm)	6001	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	48991	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	9481	9481
Volume (ft³)	89881	89881
Air changes/hour	0.13	0.07
Equiv. AVF (cfm)	195	105

Latent Cooling Equipment Load Sizing

Structure	-798	Btuh
Ducts	-52	Btuh
Central vent (419 cfm)	-7991	Btuh
Equipment latent load	0	Btuh
Equipment total load	48991	Btuh
Req. total capacity at 0.70 SHR	5.8	ton

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref no.	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref no.	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

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

Project Summary
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	22381	Btuh
Ducts	0	Btuh
Central vent (153 cfm)	9534	Btuh
Humidification	10552	Btuh
Piping	0	Btuh
Equipment load	42467	Btuh

Sensible Cooling Equipment Load Sizing

Structure	8738	Btuh
Ducts	0	Btuh
Central vent (153 cfm)	2183	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	10462	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	3715	3715
Volume (ft³)	31868	31868
Air changes/hour	0.12	0.06
Equiv. AVF (cfm)	62	33

Latent Cooling Equipment Load Sizing

Structure	-435	Btuh
Ducts	0	Btuh
Central vent (153 cfm)	-2907	Btuh
Equipment latent load	0	Btuh
Equipment total load	10462	Btuh
Req. total capacity at 0.85 SHR	1.0	ton

Heating Equipment Summary

Make Bryant
Trade BRYANT
Model 925TA42060V17A
AHRI ref no.4740263

Efficiency	96.3 AFUE	
Heating input	53664	Btuh
Heating output	51875	Btuh
Temperature rise	57	°F
Actual air flow	1000	cfm
Air flow factor	0.045	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

Cooling Equipment Summary

Make Bryant
Trade Legacy 13
Cond 113ANA018-B
Coil CNPVP2417A
AHRI ref no.3040613

Efficiency	11.2 EER, 13.2 SEER	
Sensible cooling	15300	Btuh
Latent cooling	2700	Btuh
Total cooling	18000	Btuh
Actual air flow	1000	cfm
Air flow factor	0.114	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

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

Project Summary
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	36140	Btuh
Ducts	0	Btuh
Central vent (184 cfm)	11476	Btuh
Humidification	12922	Btuh
Piping	0	Btuh
Equipment load	60537	Btuh

Sensible Cooling Equipment Load Sizing

Structure	21478	Btuh
Ducts	0	Btuh
Central vent (184 cfm)	2628	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	23093	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	3715	3715
Volume (ft³)	38953	38953
Air changes/hour	0.12	0.07
Equiv. AVF (cfm)	81	44

Latent Cooling Equipment Load Sizing

Structure	-430	Btuh
Ducts	0	Btuh
Central vent (184 cfm)	-3499	Btuh
Equipment latent load	0	Btuh
Equipment total load	23093	Btuh
Req. total capacity at 0.85 SHR	2.3	ton

Heating Equipment Summary

Make	Bryant
Trade	Bryant
Model	355CAV060080
AHRI ref no.	2010326

Efficiency	95 AFUE	
Heating input	63360	Btuh
Heating output	58608	Btuh
Temperature rise	40	°F
Actual air flow	1600	cfm
Air flow factor	0.044	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

Cooling Equipment Summary

Make	Bryant
Trade	Preferred Two-Stage 17
Cond	127ANA036
Coil	CNPVP4821A
AHRI ref no.	5104547

Efficiency	12.7 EER, 16.5 SEER	
Sensible cooling	30940	Btuh
Latent cooling	5460	Btuh
Total cooling	36400	Btuh
Actual air flow	1600	cfm
Air flow factor	0.073	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

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

Project Summary
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	21340	Btuh
Ducts	6876	Btuh
Central vent (83 cfm)	5198	Btuh
Humidification	6377	Btuh
Piping	0	Btuh
Equipment load	39791	Btuh

Sensible Cooling Equipment Load Sizing

Structure	10306	Btuh
Ducts	5293	Btuh
Central vent (83 cfm)	1190	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	16084	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	2050	2050
Volume (ft³)	19060	19060
Air changes/hour	0.16	0.09
Equiv. AVF (cfm)	52	28

Latent Cooling Equipment Load Sizing

Structure	67	Btuh
Ducts	-52	Btuh
Central vent (83 cfm)	-1585	Btuh
Equipment latent load	0	Btuh
Equipment total load	16084	Btuh
Req. total capacity at 0.85 SHR	1.6	ton

Heating Equipment Summary

Make Bryant
Trade Bryant
Model 925TA42060V17A
AHRI ref no.4740263

Efficiency	96.3 AFUE	
Heating input	53664	Btuh
Heating output	51875	Btuh
Temperature rise	57	°F
Actual air flow	1000	cfm
Air flow factor	0.035	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

Cooling Equipment Summary

Make Bryant
Trade 13 Seer
Cond 113ANA024
Coil CNPHP3017A
AHRI ref no.4765618

Efficiency	12.0 EER, 14.5 SEER	
Sensible cooling	19720	Btuh
Latent cooling	3480	Btuh
Total cooling	23200	Btuh
Actual air flow	1000	cfm
Air flow factor	0.064	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

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

Project Summary
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	15732	Btuh
Ducts	0	Btuh
Central vent (82 cfm)	0	Btuh
Humidification	1358	Btuh
Piping	0	Btuh
Equipment load	17090	Btuh

Sensible Cooling Equipment Load Sizing

Structure	10011	Btuh
Ducts	0	Btuh
Central vent (82 cfm)	0	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	9590	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	1662	1662
Volume (ft³)	18385	18385
Air changes/hour	0.13	0.07
Equiv. AVF (cfm)	40	21

Latent Cooling Equipment Load Sizing

Structure	-8	Btuh
Ducts	0	Btuh
Central vent (82 cfm)	0	Btuh
Equipment latent load	0	Btuh
Equipment total load	9590	Btuh
Req. total capacity at 0.70 SHR	1.1	ton

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref no.	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref no.	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

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

Project Summary
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: IMPORTANT - See Zoning Notes

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	20408	Btuh
Ducts	0	Btuh
Central vent (102 cfm)	0	Btuh
Humidification	1407	Btuh
Piping	0	Btuh
Equipment load	21816	Btuh

Sensible Cooling Equipment Load Sizing

Structure	17291	Btuh
Ducts	0	Btuh
Central vent (102 cfm)	0	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	16565	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	2053	2053
Volume (ft³)	20568	20568
Air changes/hour	0.12	0.06
Equiv. AVF (cfm)	41	22

Latent Cooling Equipment Load Sizing

Structure	-422	Btuh
Ducts	0	Btuh
Central vent (102 cfm)	0	Btuh
Equipment latent load	0	Btuh
Equipment total load	16565	Btuh
Req. total capacity at 0.70 SHR	2.0	ton

Heating Equipment Summary

Make	n/a		
Trade	n/a		
Model	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Heating input			
Heating output		0	Btuh
Temperature rise		0	°F
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Space thermostat	n/a		

Cooling Equipment Summary

Make	n/a		
Trade	n/a		
Cond	n/a		
Coil	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Sensible cooling		0	Btuh
Latent cooling		0	Btuh
Total cooling		0	Btuh
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Load sensible heat ratio		0	

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

AED Assessment
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

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Project Information

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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

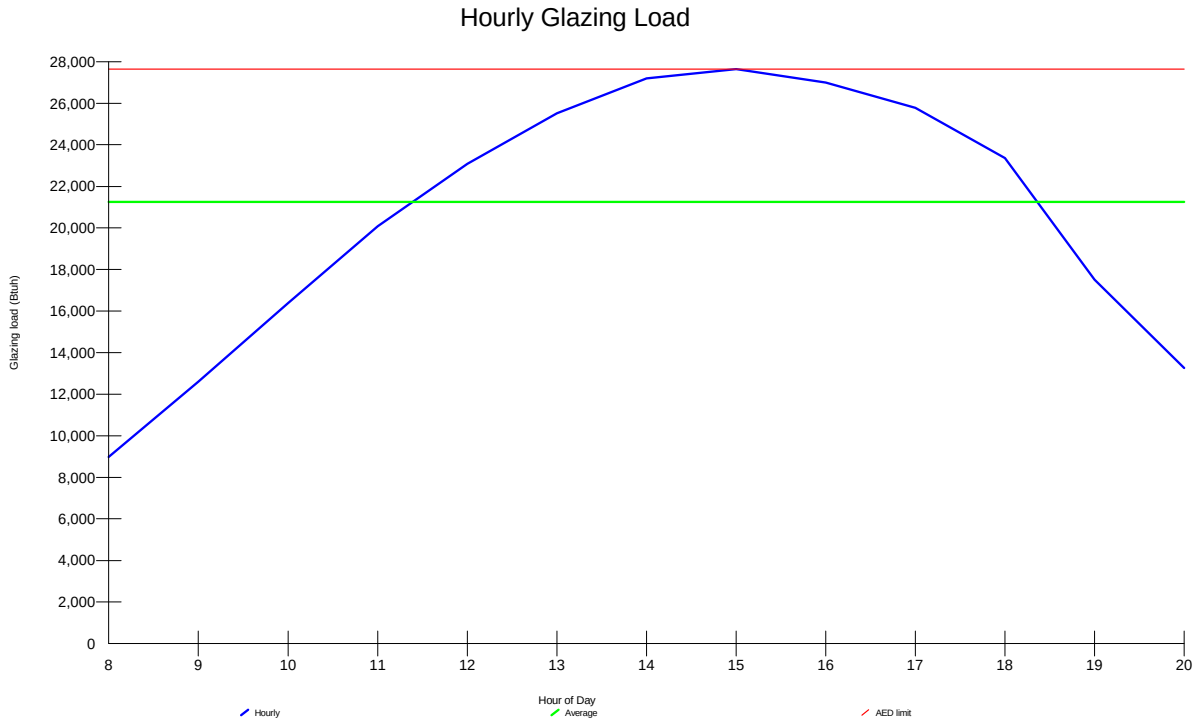
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 30.0%.

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

AED excursion: 6 Btuh (PFG - 1.3*AFG)

AED Assessment
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

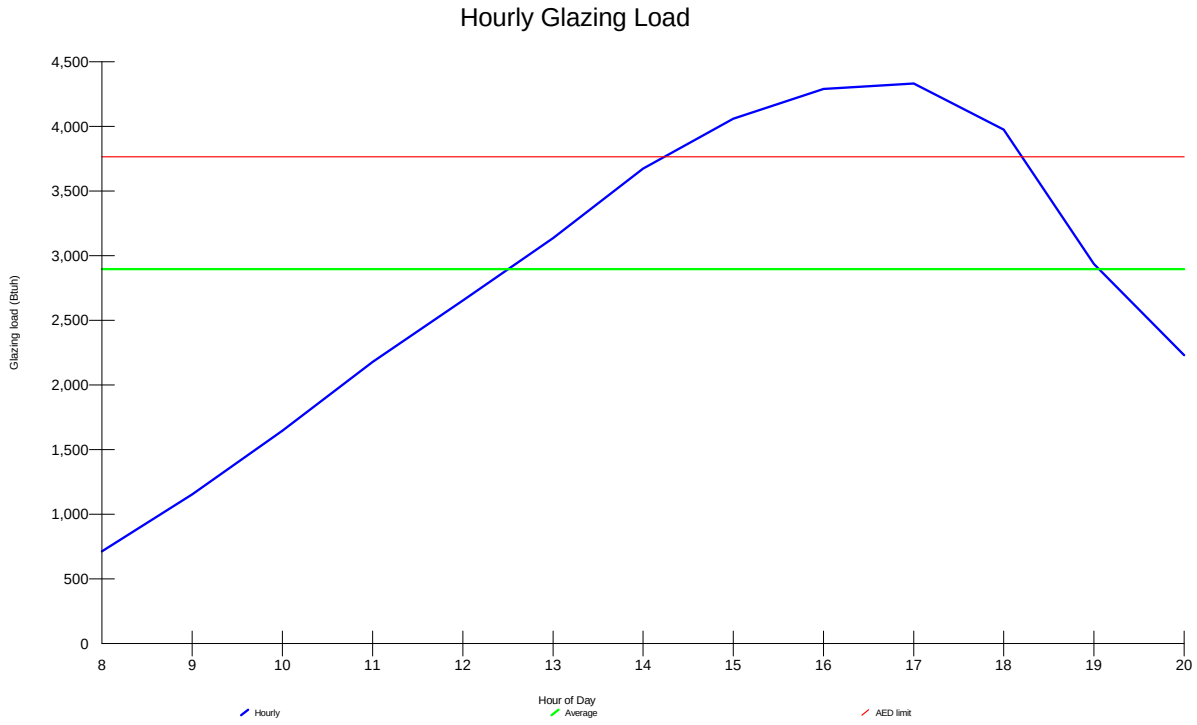
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 49.6%.

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

AED excursion: 568 Btuh (PFG - 1.3*AFG)

AED Assessment
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

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Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

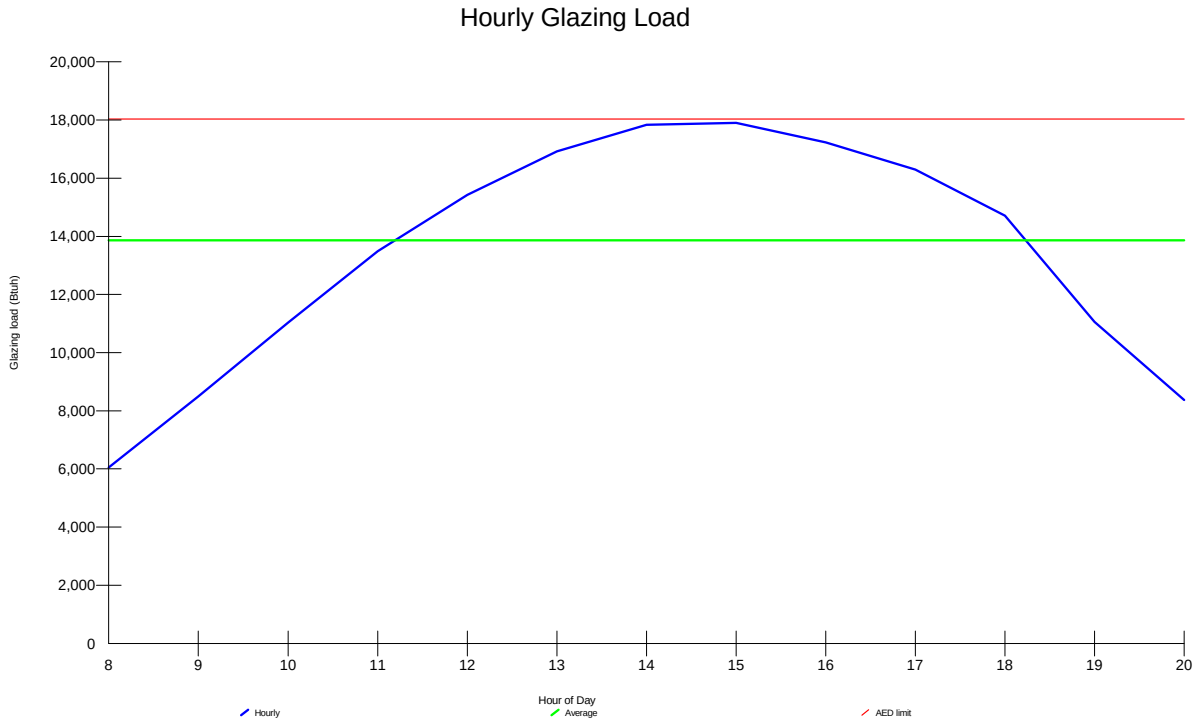
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 29.1%.

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

AED excursion: 0 Btuh

AED Assessment
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

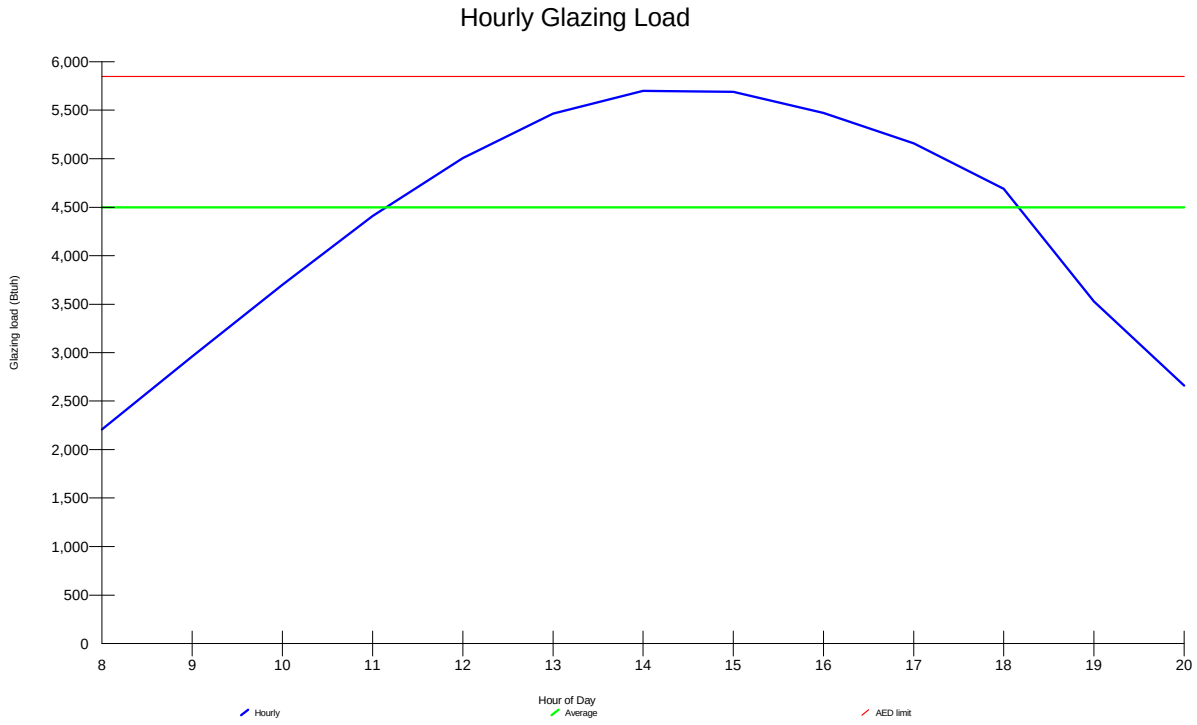
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 26.6%.

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

AED excursion: 0 Btuh

AED Assessment
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

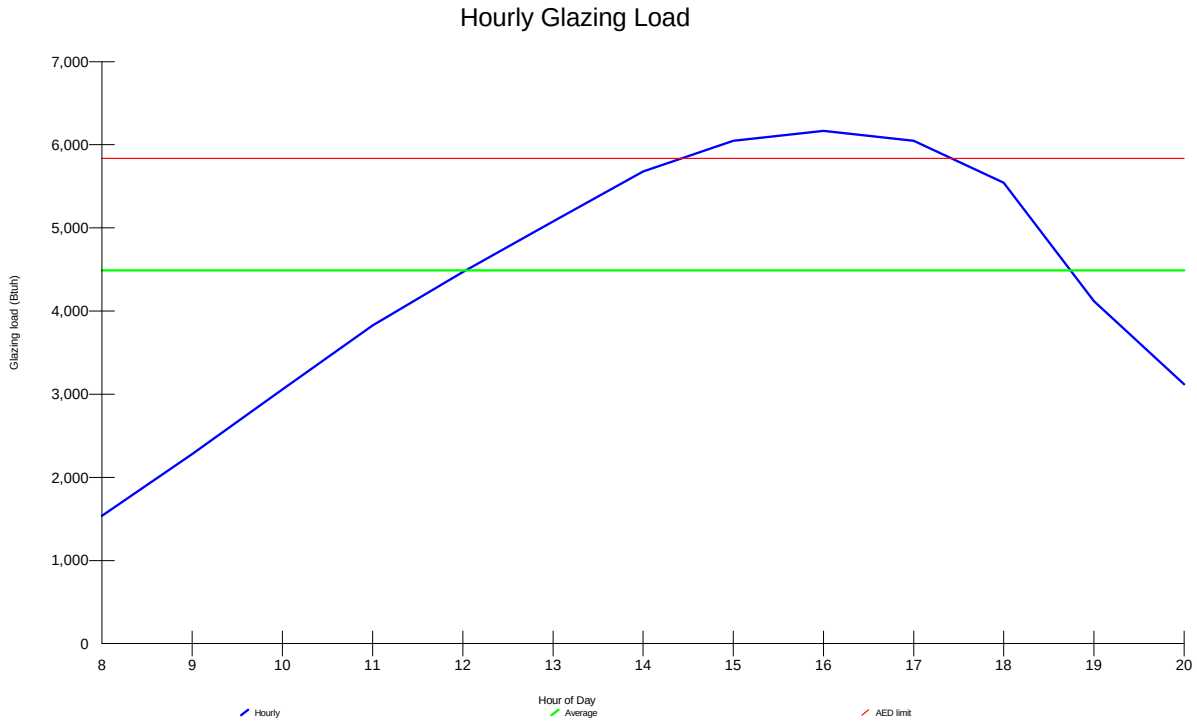
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 37.4%.

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

AED excursion: 1919 Btuh (PFG - ALP)

AED Assessment
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

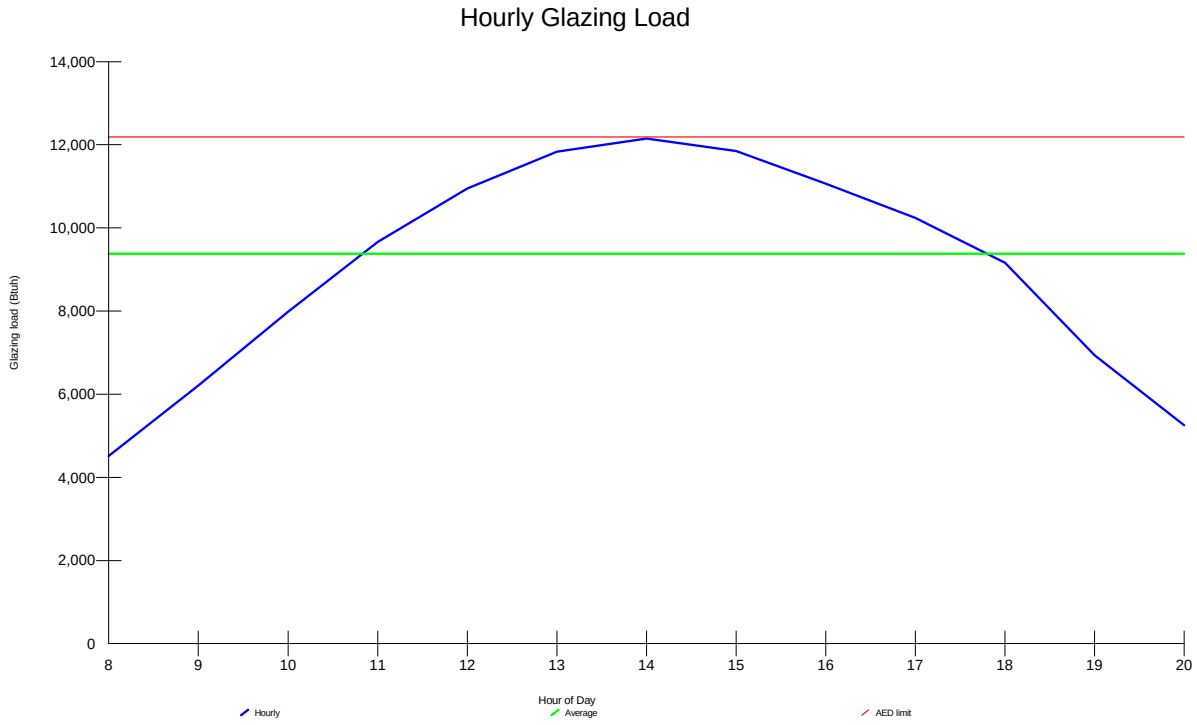
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 29.5%.

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

AED excursion: 3905 Btuh (PFG - ALP)

Building Analysis
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

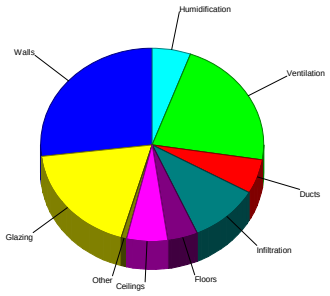
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

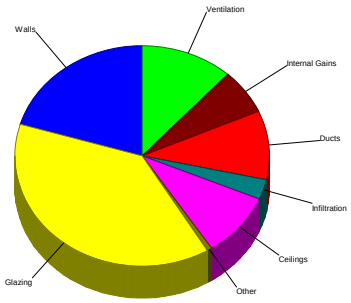
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.1	32205	26.9
Glazing	20.7	22239	18.6
Doors	26.9	962	0.8
Ceilings	1.8	7043	5.9
Floors	1.4	5244	4.4
Infiltration	1.4	12168	10.2
Ducts		6876	5.7
Piping		0	0
Humidification		6657	5.6
Ventilation		26208	21.9
Adjustments		0	
Total		**119602**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.3	10407	20.4
Glazing	18.2	19536	38.2
Doors	9.2	329	0.6
Ceilings	1.3	4808	9.4
Floors	0	0	0
Infiltration	0.2	1500	2.9
Ducts		5177	10.1
Ventilation		6001	11.7
Internal gains		3380	6.6
Blower		0	0
Adjustments		0	
Total		**51138**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.059 Btuh/ft²-°F

Data entries checked.

Building Analysis
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

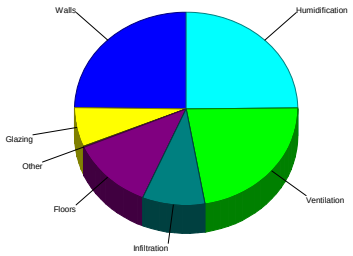
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

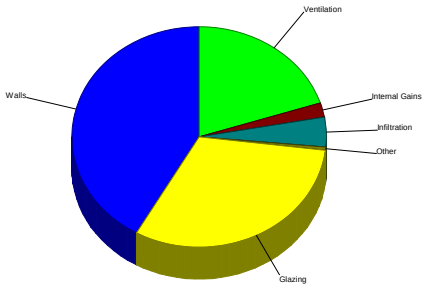
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	3.9	10533	24.8
Glazing	20.7	2777	6.5
Doors	0	0	0
Ceilings	1.8	78	0.2
Floors	1.4	5127	12.1
Infiltration	1.4	3865	9.1
Ducts		0	0
Piping		0	0
Humidification		10552	24.8
Ventilation		9534	22.4
Adjustments		0	
Total		**42467**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.7	4565	41.8
Glazing	25.4	3413	31.2
Doors	0	0	0
Ceilings	1.3	53	0.5
Floors	0	0	0
Infiltration	0.2	477	4.4
Ducts		0	0
Ventilation		2183	20.0
Internal gains		230	2.1
Blower		0	0
Adjustments		0	
Total		**10921**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.041 Btuh/ft²-°F

WARNING: window to floor area ratio = 3.6% - less than 5%.

Building Analysis
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

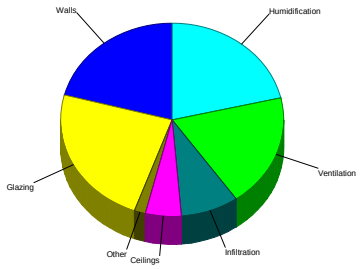
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

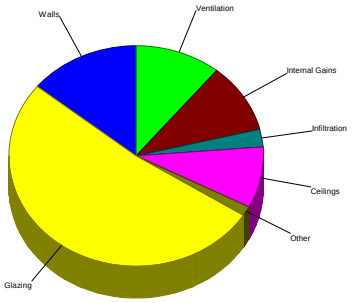
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.2	12634	20.9
Glazing	20.7	14314	23.6
Doors	26.9	962	1.6
Ceilings	1.8	3176	5.2
Floors	0	0	0
Infiltration	1.4	5055	8.4
Ducts		0	0
Piping		0	0
Humidification		12922	21.3
Ventilation		11476	19.0
Adjustments		0	
Total		**60537**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.1	3406	14.1
Glazing	18.1	12492	51.8
Doors	9.2	329	1.4
Ceilings	1.3	2168	9.0
Floors	0	0	0
Infiltration	0.2	623	2.6
Ducts		0	0
Ventilation		2628	10.9
Internal gains		2460	10.2
Blower		0	0
Adjustments		0	
Total		**24106**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.083 Btuh/ft²-°F

Data entries checked.

Building Analysis
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

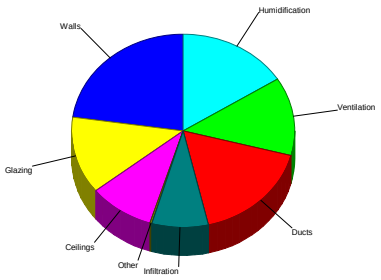
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

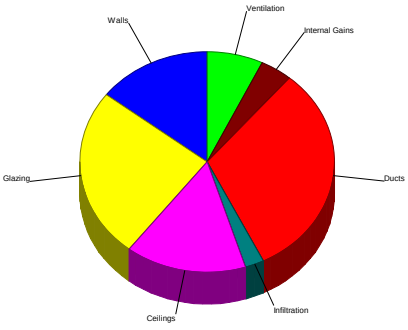
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.2	9039	22.7
Glazing	20.7	5148	12.9
Doors	0	0	0
Ceilings	1.8	3789	9.5
Floors	2.0	117	0.3
Infiltration	1.4	3248	8.2
Ducts		6876	17.3
Piping		0	0
Humidification		6377	16.0
Ventilation		5198	13.1
Adjustments		0	
Total		**39791**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.1	2436	14.5
Glazing	16.9	4193	25.0
Doors	0	0	0
Ceilings	1.3	2586	15.4
Floors	0	0	0
Infiltration	0.2	400	2.4
Ducts		5293	31.5
Ventilation		1190	7.1
Internal gains		690	4.1
Blower		0	0
Adjustments		0	
Total		**16790**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.058 Btuh/ft²-°F

Data entries checked.

Building Analysis
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

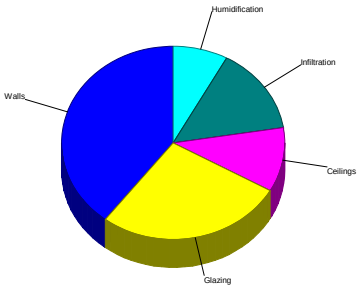
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

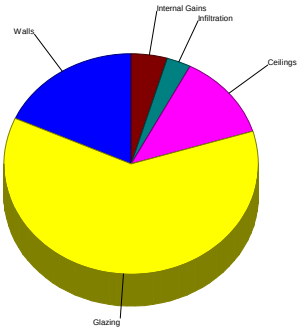
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.2	6765	39.6
Glazing	20.7	4647	27.2
Doors	0	0	0
Ceilings	1.8	1837	10.8
Floors	0	0	0
Infiltration	1.4	2483	14.5
Ducts		0	0
Piping		0	0
Humidification		1358	7.9
Ventilation		0	0
Adjustments		0	
Total		**17090**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.1	1824	18.2
Glazing	27.5	6167	61.6
Doors	0	0	0
Ceilings	1.3	1254	12.5
Floors	0	0	0
Infiltration	0.2	306	3.1
Ducts		0	0
Ventilation		0	0
Internal gains		460	4.6
Blower		0	0
Adjustments		0	
Total		**10011**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.068 Btuh/ft²-°F

Data entries checked.

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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

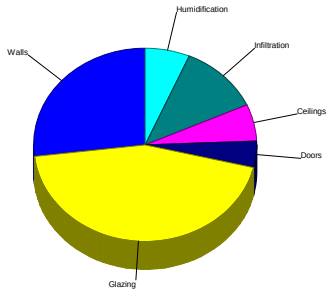
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

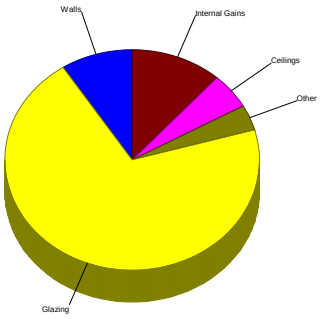
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.2	5869	26.9
Glazing	20.7	9667	44.3
Doors	26.9	962	4.4
Ceilings	1.8	1338	6.1
Floors	0	0	0
Infiltration	1.4	2572	11.8
Ducts		0	0
Piping		0	0
Humidification		1407	6.5
Ventilation		0	0
Adjustments		0	
Total		**21816**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.1	1582	9.1
Glazing	26.0	12149	70.3
Doors	9.2	329	1.9
Ceilings	1.3	914	5.3
Floors	0	0	0
Infiltration	0.2	317	1.8
Ducts		0	0
Ventilation		0	0
Internal gains		2000	11.6
Blower		0	0
Adjustments		0	
Total		**17291**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.099 Btuh/ft²-°F

Data entries checked.

Component Constructions
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Basement Wall - R-11 - Draped: Heavy Damp Soil, 8" Basement Concrete Wall, R-11 Draped Insulation	n	127	0.051	11.0	3.51	445	1.45	183
	e	154	0.051	11.0	3.51	542	1.45	224
	s	127	0.051	11.0	3.51	445	1.45	183
	w	43	0.051	11.0	3.51	151	1.45	62
	all	451	0.051	11.0	3.51	1582	1.45	653
STD - Basement Wall - R-13 - Frame: Basement Wall, Heavy Damp Soil, 8" Concrete, 2" x 4" Framing, R-13 Cavity Insulation, 1/2" Gypsum Board	n	628	0.057	13.0	3.96	2485	1.73	1086
	ne	59	0.057	13.0	3.96	233	1.73	102
	e	299	0.057	13.0	3.96	1185	1.73	518
	se	32	0.057	13.0	3.96	126	1.73	55
	s	633	0.057	13.0	3.96	2508	1.73	1096
	sw	32	0.057	13.0	3.96	128	1.73	56
	w	518	0.057	13.0	3.96	2053	1.73	897
	nw	59	0.057	13.0	3.96	233	1.73	102
	all	2260	0.057	13.0	3.96	8951	1.73	3912
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	1239	0.061	21.0	4.22	5230	1.14	1410
	ne	76	0.061	21.0	4.22	320	1.14	86
	e	1104	0.061	21.0	4.22	4659	1.14	1256
	se	136	0.061	21.0	4.22	575	1.14	155
	s	1190	0.061	21.0	4.22	5020	1.14	1353
	sw	52	0.061	21.0	4.22	221	1.14	60
	w	1262	0.061	21.0	4.22	5326	1.14	1436
	nw	76	0.061	21.0	4.22	320	1.14	86
	all	5136	0.061	21.0	4.22	21672	1.14	5842

Partitions
(none)

Windows

U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	22	0.300	0	20.7	449	9.97	216
	n	145	0.300	0	20.7	2996	9.97	1442
	ne	42	0.300	0	20.7	869	21.5	904
	e	58	0.300	0	20.7	1206	30.2	1761
	se	10	0.300	0	20.7	207	26.0	260
	s	53	0.300	0	20.7	1104	15.8	840
	s	145	0.300	0	20.7	3002	15.8	2285
	sw	23	0.300	0	20.7	466	26.0	585
	w	59	0.300	0	20.7	1225	30.2	1788
	w	99	0.300	0	20.7	2039	30.2	2977
	nw	42	0.300	0	20.7	869	21.5	904
	all	697	0.300	0	20.7	14431	20.0	13963
U-30 SHGC-27 GD: U-30 SHGC-27 - Glass Door; NFRC rated (SHGC=0.27)	n	145	0.300	0	20.7	3006	9.97	1447
	e	24	0.300	0	20.7	497	30.2	725
	s	112	0.300	0	20.7	2318	15.8	1765
	all	281	0.300	0	20.7	5821	14.0	3937
U-30 SHGC-27 SLG: U-30 SHGC-30 - SLG Door; NFRC rated (SHGC=0.30)	s	96	0.300	0	20.7	1987	17.0	1630

Doors

11D0: Door, wd sc type	n	18	0.390	0	26.9	481	9.20	164
	e	18	0.390	0	26.9	481	9.20	164
	all	36	0.390	0	26.9	962	9.20	329

Ceilings

STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		3812	0.027	38.0	1.85	7043	1.26	4808

Floors

21A-32t: Bg floor, heavy damp soil, 8' depth		3715	0.020	0	1.38	5127	0	0
STD Floor - R-38: Framed Floor Over Outside Air, R-38 Cavity Insulation, Wood Floor		59	0.029	38.0	1.97	117	0	0

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Basement Wall - R-11 - Draped: Heavy Damp Soil, 8" Basement Concrete Wall, R-11 Draped Insulation	n	127	0.051	11.0	3.51	445	1.45	183
	e	154	0.051	11.0	3.51	542	1.45	224
	s	127	0.051	11.0	3.51	445	1.45	183
	w	43	0.051	11.0	3.51	151	1.45	62
	all	451	0.051	11.0	3.51	1582	1.45	653
STD - Basement Wall - R-13 - Frame: Basement Wall, Heavy Damp Soil, 8" Concrete, 2" x 4" Framing, R-13 Cavity Insulation, 1/2" Gypsum Board	n	628	0.057	13.0	3.96	2485	1.73	1086
	ne	59	0.057	13.0	3.96	233	1.73	102
	e	299	0.057	13.0	3.96	1185	1.73	518
	se	32	0.057	13.0	3.96	126	1.73	55
	s	633	0.057	13.0	3.96	2508	1.73	1096
	sw	32	0.057	13.0	3.96	128	1.73	56
	w	518	0.057	13.0	3.96	2053	1.73	897
	nw	59	0.057	13.0	3.96	233	1.73	102
	all	2260	0.057	13.0	3.96	8951	1.73	3912
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	22	0.300	0	20.7	449	9.97	216
	s	53	0.300	0	20.7	1104	15.8	840
	w	59	0.300	0	20.7	1225	30.2	1788
	all	134	0.300	0	20.7	2777	21.2	2845
Doors								
(none)								
Ceilings								
STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		42	0.027	38.0	1.85	78	1.26	53
Floors								
21A-32t: Bg floor, heavy damp soil, 8' depth		3715	0.020	0	1.38	5127	0	0

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Project Information

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7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	794	0.061	21.0	4.22	3350	1.14	903
	ne	39	0.061	21.0	4.22	164	1.14	44
	e	592	0.061	21.0	4.22	2499	1.14	674
	se	28	0.061	21.0	4.22	119	1.14	32
	s	772	0.061	21.0	4.22	3259	1.14	878
	sw	29	0.061	21.0	4.22	122	1.14	33
	w	701	0.061	21.0	4.22	2956	1.14	797
	nw	39	0.061	21.0	4.22	164	1.14	44
	all	2994	0.061	21.0	4.22	12634	1.14	3406
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	98	0.300	0	20.7	2023	9.97	974
	ne	20	0.300	0	20.7	414	21.5	430
	e	38	0.300	0	20.7	792	30.2	1156
	se	10	0.300	0	20.7	207	26.0	260
	s	68	0.300	0	20.7	1397	15.8	1064
	sw	10	0.300	0	20.7	207	26.0	260
	w	91	0.300	0	20.7	1884	30.2	2751
	nw	20	0.300	0	20.7	414	21.5	430
	all	355	0.300	0	20.7	7338	20.7	7325
U-30 SHGC-27 GD: U-30 SHGC-27 - Glass Door; NFRC rated (SHGC=0.27)	n	105	0.300	0	20.7	2174	9.97	1046
	e	24	0.300	0	20.7	497	30.2	725
	s	112	0.300	0	20.7	2318	15.8	1765
	all	241	0.300	0	20.7	4989	14.7	3537
U-30 SHGC-27 SLG: U-30 SHGC-30 - SLG Door; NFRC rated (SHGC=0.30)	s	96	0.300	0	20.7	1987	17.0	1630
Doors								
11D0: Door, wd sc type	n	18	0.390	0	26.9	481	9.20	164
	e	18	0.390	0	26.9	481	9.20	164
	all	36	0.390	0	26.9	962	9.20	329

Ceilings

STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board	1719	0.027	38.0	1.85	3176	1.26	2168

Floors

(none)

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Project Information

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7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	446	0.061	21.0	4.22	1880	1.14	507
	ne	37	0.061	21.0	4.22	156	1.14	42
	e	512	0.061	21.0	4.22	2160	1.14	582
	se	108	0.061	21.0	4.22	457	1.14	123
	s	417	0.061	21.0	4.22	1761	1.14	475
	sw	24	0.061	21.0	4.22	99	1.14	27
	w	562	0.061	21.0	4.22	2370	1.14	639
	nw	37	0.061	21.0	4.22	156	1.14	42
	all	2142	0.061	21.0	4.22	9039	1.14	2436
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	47	0.300	0	20.7	973	9.97	468
	ne	22	0.300	0	20.7	455	21.5	473
	e	20	0.300	0	20.7	414	30.2	605
	s	78	0.300	0	20.7	1604	15.8	1221
	sw	13	0.300	0	20.7	259	26.0	325
	w	8	0.300	0	20.7	155	30.2	227
	nw	22	0.300	0	20.7	455	21.5	473
	all	209	0.300	0	20.7	4316	18.2	3793
U-30 SHGC-27 GD: U-30 SHGC-27 - Glass Door; NFRC rated (SHGC=0.27)	n	40	0.300	0	20.7	832	9.97	401
Doors								
(none)								
Ceilings								
STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		2050	0.027	38.0	1.85	3789	1.26	2586

Floors

STD Floor - R-38: Framed Floor Over Outside Air, R-38 Cavity Insulation, Wood Floor	59	0.029	38.0	1.97	117	0	0

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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	483	0.061	21.0	4.22	2037	1.14	549
	e	137	0.061	21.0	4.22	577	1.14	155
	se	28	0.061	21.0	4.22	119	1.14	32
	s	357	0.061	21.0	4.22	1505	1.14	406
	sw	29	0.061	21.0	4.22	122	1.14	33
	w	570	0.061	21.0	4.22	2405	1.14	648
	all	1603	0.061	21.0	4.22	6765	1.14	1824
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	71	0.300	0	20.7	1465	9.97	705
	e	5	0.300	0	20.7	109	30.2	159
	se	10	0.300	0	20.7	207	26.0	260
	s	31	0.300	0	20.7	631	15.8	481
	sw	10	0.300	0	20.7	207	26.0	260
	w	58	0.300	0	20.7	1201	30.2	1753
	all	185	0.300	0	20.7	3819	19.6	3617
U-30 SHGC-27 GD: U-30 SHGC-27 - Glass Door; NFRC rated (SHGC=0.27)	s	40	0.300	0	20.7	828	15.8	630
Doors								
(none)								
Ceilings								
STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		994	0.027	38.0	1.85	1837	1.26	1254
Floors								
(none)								

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Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	311	0.061	21.0	4.22	1313	1.14	354
	ne	39	0.061	21.0	4.22	164	1.14	44
	e	456	0.061	21.0	4.22	1922	1.14	518
	s	416	0.061	21.0	4.22	1753	1.14	473
	w	131	0.061	21.0	4.22	551	1.14	149
	nw	39	0.061	21.0	4.22	164	1.14	44
	all	1391	0.061	21.0	4.22	5869	1.14	1582
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	27	0.300	0	20.7	559	9.97	269
	ne	20	0.300	0	20.7	414	21.5	430
	e	33	0.300	0	20.7	683	30.2	997
	s	37	0.300	0	20.7	766	15.8	583
	w	33	0.300	0	20.7	683	30.2	997
	nw	20	0.300	0	20.7	414	21.5	430
	all	170	0.300	0	20.7	3519	21.8	3708
U-30 SHGC-27 GD: U-30 SHGC-27 - Glass Door; NFRC rated (SHGC=0.27)	n	105	0.300	0	20.7	2174	9.97	1046
	e	24	0.300	0	20.7	497	30.2	725
	s	72	0.300	0	20.7	1490	15.8	1135
	all	201	0.300	0	20.7	4161	14.5	2906
U-30 SHGC-27 SLG: U-30 SHGC-30 - SLG Door; NFRC rated (SHGC=0.30)	s	96	0.300	0	20.7	1987	17.0	1630
Doors								
11D0: Door, wd sc type	n	18	0.390	0	26.9	481	9.20	164
	e	18	0.390	0	26.9	481	9.20	164
	all	36	0.390	0	26.9	962	9.20	329
Ceilings								
STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		724	0.027	38.0	1.85	1338	1.26	914

Right-J® Worksheet
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Entire House				Basement Zone			
1	Room name													
2	Exposed wall						959.5 ft				352.1 ft			
3	Room height						9.5 ft		d		8.6 ft		d	
4	Room dimensions													
5	Room area						9480.5 ft²				3715.1 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	STD - Basement Wall	0.078	n	3.51	1.45	127	127	445	183	127	127	445	183
.	W	STD - Basement Wall	0.093	n	3.96	1.73	649	628	2485	1086	649	628	2485	1086
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	22	0	449	216	22	0	449	216
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	1547	1239	5230	1410	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	145	0	2996	1442	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	145	0	3006	1447	0	0	0	0
	└D	11D0	0.390	n	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	59	59	233	102	59	59	233	102
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	118	76	320	86	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	42	0	869	904	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	154	154	542	224	154	154	542	224
	W	STD - Basement Wall	0.093	e	3.96	1.73	299	299	1185	518	299	299	1185	518
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	1204	1104	4659	1256	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	58	0	1206	1761	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	24	0	497	725	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	32	32	126	55	32	32	126	55
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	146	136	575	155	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	127	127	445	183	127	127	445	183
	W	STD - Basement Wall	0.093	s	3.96	1.73	687	633	2508	1096	687	633	2508	1096
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	53	0	1104	840	53	0	1104	840
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	1543	1190	5020	1353	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	145	0	3002	2285	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	112	0	2318	1765	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	96	0	1987	1630	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	32	32	128	56	32	32	128	56
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	75	52	221	60	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	23	0	466	585	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	43	43	151	62	43	43	151	62
	W	STD - Basement Wall	0.093	w	3.96	1.73	578	518	2053	897	578	518	2053	897
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	59	0	1225	1788	59	0	1225	1788
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	1361	1262	5326	1436	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	99	0	2039	2977	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	59	59	233	102	59	59	233	102
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	118	76	320	86	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	42	0	869	904	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	3812	3812	7043	4808	42	42	78	53
	F	21A-32t	0.020	-	1.38	0.00	3715	3715	5127	0	3715	3715	5127	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	59	59	117	0	0	0	0	0
6	c) AED excursion									6				568
	Envelope loss/gain								67693	35080			18516	8031
12	a) Infiltration								12168	1500			3865	477
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					6			1380	1			230
		Appliances/other								2000				0
	Subtotal (lines 6 to 13)								79861	39960			22381	8738
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								79861	39960			22381	8738
15	Duct loads						9%	13%	6876	5177	0%	0%	0	0
	Total room load								86737	45137			22381	8738
	Air required (cfm)								3600	4003			1000	1000

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

Right-J® Worksheet
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Main Zone				Upper Zone			
1	Room name													
2	Exposed wall						352.1 ft				255.3 ft			
3	Room height						10.5 ft		d		9.3 ft		d	
4	Room dimensions													
5	Room area						3715.1 ft²				2050.4 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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	3.96	1.73	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	1014	794	3350	903	533	446	1880	507
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	98	0	2023	974	47	0	973	468
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	105	0	2174	1046	40	0	832	401
	└D	11D0	0.390	n	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	59	39	164	44	59	37	156	42
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	20	0	414	430	22	0	455	473
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	672	592	2499	674	532	512	2160	582
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	38	0	792	1156	20	0	414	605
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	24	0	497	725	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	38	28	119	32	108	108	457	123
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	3.96	1.73	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	1048	772	3259	878	495	417	1761	475
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	68	0	1397	1064	78	0	1604	1221
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	112	0	2318	1765	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	96	0	1987	1630	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	39	29	122	33	36	24	99	27
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	10	0	207	260	13	0	259	325
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	3.96	1.73	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	792	701	2956	797	569	562	2370	639
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	91	0	1884	2751	8	0	155	227
	W	STD - Basement Wall	0.093	nw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	59	39	164	44	59	37	156	42
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	20	0	414	430	22	0	455	473
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	1719	1719	3176	2168	2050	2050	3789	2586
	F	21A-32t	0.020	-	1.38	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	0	0	0	0	59	59	117	0
6	c) AED excursion									0				0
	Envelope loss/gain								31085	18395			18092	9216
12	a) Infiltration								5055	623			3248	400
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					2			460	3			690
		Appliances/other								2000				0
	Subtotal (lines 6 to 13)								36140	21478			21340	10306
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								36140	21478			21340	10306
15	Duct loads						0%	0%	0	0	32%	51%	6876	5293
	Total room load								36140	21478			28216	15599
	Air required (cfm)								1600	1600			1000	1000

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

Right-J® Worksheet
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Basement Zone				Dn Crawl			
1	Room name													
2	Exposed wall						352.1 ft				112.7 ft			
3	Room height						8.6 ft		d		4.0 ft		heat/cool	
4	Room dimensions										1.0	x 880.5 ft		
5	Room area						3715.1 ft²				880.5 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	STD - Basement Wall	0.078	n	3.51	1.45	127	127	445	183	127	127	445	183
.	W	STD - Basement Wall	0.093	n	3.96	1.73	649	628	2485	1086	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	22	0	449	216	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	59	59	233	102	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	154	154	542	224	154	154	542	224
	W	STD - Basement Wall	0.093	e	3.96	1.73	299	299	1185	518	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	32	32	126	55	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	127	127	445	183	127	127	445	183
	W	STD - Basement Wall	0.093	s	3.96	1.73	687	633	2508	1096	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	53	0	1104	840	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	32	32	128	56	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	43	43	151	62	43	43	151	62
	W	STD - Basement Wall	0.093	w	3.96	1.73	578	518	2053	897	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	59	0	1225	1788	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	59	59	233	102	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	42	42	78	53	0	0	0	0
	F	21A-32t	0.020	-	1.38	0.00	3715	3715	5127	0	881	881	1215	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									568				-47
	Envelope loss/gain								18516	8031			2797	606
12	a) Infiltration								3865	477			612	75
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					1			230	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								22381	8738			3410	682
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								22381	8738			3410	682
15	Duct loads						0%	0%	0	0	-0%	0%	0	0
	Total room load								22381	8738			3410	682
	Air required (cfm)								1000	1000			152	78

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

Right-J® Worksheet
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Dn Theater 33.8 ft 10.0 ft heat/cool 1.0 x 644.2 ft 644.2 ft²				Dn AV 14.6 ft 10.0 ft heat/cool 1.0 x 84.5 ft 84.5 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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	3.96	1.73	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	3.96	1.73	20	20	79	35	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	3.96	1.73	298	254	1006	440	86	86	340	149
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	43	0	897	683	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	3.96	1.73	20	20	79	35	60	60	238	104
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0	0	0	0	0
	F	21A-32t	0.020	-	1.38	0.00	644	644	889	0	85	85	117	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									101				-18
	Envelope loss/gain								2951	1293			694	235
12	a) Infiltration								458	57			198	24
	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)								3409	1350			892	259
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								131	36			123	34
14	Subtotal								3540	1386			1015	293
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								3540	1386			1015	293
	Air required (cfm)								158	159			45	34

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

Right-J® Worksheet
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Dn Billiards 43.5 ft 10.0 ft heat/cool 1.0 x 586.7 ft 586.7 ft²				Dn Mech 25.8 ft 10.0 ft heat/cool 1.0 x 191.1 ft 191.1 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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	3.96	1.73	158	137	541	237	178	178	703	307
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	22	0	449	216	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	59	59	233	102	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	3.96	1.73	139	139	551	241	45	45	178	78
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	3.96	1.73	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	3.96	1.73	20	20	79	35	35	35	139	61
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	59	59	233	102	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0	0	0	0	0
	F	21A-32t	0.020	-	1.38	0.00	587	587	810	0	191	191	264	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-64				-31
	Envelope loss/gain								2896	868			1283	414
12	a) Infiltration								591	73			350	43
	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)								3488	940			1633	457
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								52	14			288	79
14	Subtotal								3540	955			1921	537
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								3540	955			1921	537
	Air required (cfm)								158	109			86	61

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

Right-J® Worksheet
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Dn Storage 40.3 ft				Dn Exercise 26.4 ft			
1	Room name													
2	Exposed wall						10.0 ft		heat/cool		10.0 ft		heat/cool	
3	Room height							1.0 x	248.4 ft			1.0 x	308.8 ft	
4	Room dimensions						248.4 ft²				308.8 ft²			
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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	3.96	1.73	223	223	884	387	40	40	158	69
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	3.96	1.73	75	75	297	130	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	3.96	1.73	0	0	0	0	70	70	277	121
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	3.96	1.73	104	104	412	180	154	117	462	202
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	38	0	776	1134
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0	42	42	78	53
	F	21A-32t	0.020	-	1.38	0.00	248	248	343	0	309	309	426	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-49				446
	Envelope loss/gain								1937	648			2178	2026
12	a) Infiltration								547	67			359	44
	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)								2483	715			2537	2070
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								111	31			94	26
14	Subtotal								2595	746			2632	2096
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								2595	746			2632	2096
	Air required (cfm)								116	85			118	240

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

Right-J® Worksheet
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Dn Bath 5				Dn Bedroom 5			
1	Room name						0 ft				48.7 ft			
2	Exposed wall						10.0 ft		heat/cool		10.0 ft		heat/cool	
3	Room height							1.0 x	73.8 ft			1.0 x	310.2 ft	
4	Room dimensions						73.8 ft²				310.2 ft²			
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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	3.96	1.73	0	0	0	0	50	50	198	87
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	3.96	1.73	0	0	0	0	20	20	79	35
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0	32	32	126	55
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	3.96	1.73	0	0	0	0	168	168	667	291
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0	32	32	128	56
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	3.96	1.73	0	0	0	0	184	163	643	281
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	22	0	449	655
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	3.96	1.73	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0	0	0	0	0
	F	21A-32t	0.020	-	1.38	0.00	74	74	102	0	310	310	428	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									0				205
	Envelope loss/gain								102	0			2718	1664
12	a) Infiltration								0	0			661	82
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @	230				0			0	1			230
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								102	0			3379	1976
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								26	7			220	61
14	Subtotal								128	7			3600	2037
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								128	7			3600	2037
	Air required (cfm)								6	1			161	233

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

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Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

1	Room name						Dn Stairs								
2	Exposed wall						6.5 ft								
3	Room height						10.0 ft				heat/cool				
4	Room dimensions							1.0	x	386.8	ft				
5	Room area						386.8 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	STD - Basement Wall	0.078	n	3.51	1.45	0	0	0	0				
.	W	STD - Basement Wall	0.093	n	3.96	1.73	0	0	0	0				
.	└G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0				
.	W	STD - Frame - R-21 -	0.061	n	0.00	0.00	0	0	0	0				
11	├G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0				
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	ne	3.96	1.73	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	e	3.51	1.45	0	0	0	0				
	W	STD - Basement Wall	0.093	e	3.96	1.73	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	e	0.00	0.00	0	0	0	0				
	├G	U-30 SHGC-27	0.300	e	0.00	0.00	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0				
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	se	3.96	1.73	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	s	3.51	1.45	0	0	0	0				
	W	STD - Basement Wall	0.093	s	3.96	1.73	65	55	218	95				
	└G	U-30 SHGC-27	0.300	s	20.70	15.76	10	0	207	158				
	W	STD - Frame - R-21 -	0.061	s	0.00	0.00	0	0	0	0				
	├G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	sw	3.96	1.73	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	w	3.51	1.45	0	0	0	0				
	W	STD - Basement Wall	0.093	w	3.96	1.73	0	0	0	0				
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	w	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	nw	3.96	1.73	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0				
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0				
	F	21A-32t	0.020	-	1.38	0.00	387	387	534	0				
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0				
6	c) AED excursion									25				
	Envelope loss/gain								959	278				
12	a) Infiltration								88	11				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @	230				0			0				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								1047	289				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								-1047	-289				
14	Subtotal								0	0				
15	Duct loads						-0%	0%	0	0				
	Total room load								0	0				
	Air required (cfm)								0	0				

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

Right-J® Worksheet
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Main Zone				West Zone			
1	Room name													
2	Exposed wall						352.1 ft				189.9 ft			
3	Room height						10.5 ft		d		10.0 ft		p	
4	Room dimensions													
5	Room area						3715.1 ft²				2053.5 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	1014	794	3350	903	461	311	1313	354
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	98	0	2023	974	27	0	559	269
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	105	0	2174	1046	105	0	2174	1046
	D	11D0	0.390	n	26.91	9.20	18	18	481	164	18	18	481	164
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	59	39	164	44	59	39	164	44
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	20	0	414	430	20	0	414	430
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	672	592	2499	674	530	456	1922	518
	G	U-30 SHGC-27	0.300	e	20.70	30.23	38	0	792	1156	33	0	683	997
	G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	24	0	497	725	24	0	497	725
	D	11D0	0.390	e	26.91	9.20	18	18	481	164	18	18	481	164
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	38	28	119	32	0	0	0	0
	G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	1048	772	3259	878	621	415	1753	473
	G	U-30 SHGC-27	0.300	s	20.70	15.76	68	0	1397	1064	37	0	766	583
	G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	112	0	2318	1765	72	0	1490	1135
	G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	96	0	1987	1630	96	0	1987	1630
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	39	29	122	33	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	792	701	2956	797	164	131	551	149
	G	U-30 SHGC-27	0.300	w	20.70	30.23	91	0	1884	2751	33	0	683	997
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	59	39	164	44	59	39	164	44
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	20	0	414	430	20	0	414	430
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	1719	1719	3176	2168	724	724	1338	914
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									0				3905
	Envelope loss/gain								31085	18395			17836	14974
12	a) Infiltration								5055	623			2572	317
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					2			460	0			0
		Appliances/other								2000				2000
	Subtotal (lines 6 to 13)								36140	21478			20408	17291
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								36140	21478			20408	17291
15	Duct loads						0%	0%	0	0	0%	0%	0	0
	Total room load								36140	21478			20408	17291
	Air required (cfm)								1600	1600			904	1268

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

Right-J® Worksheet
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

1	Room name					East Zone									
2	Exposed wall					162.2 ft									
3	Room height					11.1 ft		p							
4	Room dimensions														
5	Room area					1661.6 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0				
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0				
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0				
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	553	483	2037	549				
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	71	0	1465	705				
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0				
	└D	11D0	0.390	n	26.91	9.20	0	0	0	0				
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0				
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	142	137	577	155				
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	5	0	109	159				
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	0	0	0	0				
	└D	11D0	0.390	e	26.91	9.20	0	0	0	0				
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	38	28	119	32				
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260				
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	427	357	1505	406				
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	31	0	631	481				
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	40	0	828	630				
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	0	0	0	0				
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	39	29	122	33				
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	10	0	207	260				
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	628	570	2405	648				
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	58	0	1201	1753				
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0				
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	994	994	1837	1254				
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0				
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0				
6	c) AED excursion									1919				
	Envelope loss/gain								13249	9245				
12	a) Infiltration								2483	306				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @ 230					2			460				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								15732	10011				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								0	0				
14	Subtotal								15732	10011				
15	Duct loads						0%	0%	0	0				
	Total room load								15732	10011				
	Air required (cfm)								696	734				

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

		Upper Zone	A Bedroom
1	Room name		
2	Exposed wall	255.3 ft	32.8 ft
3	Room height	9.3 ft d	10.0 ft heat/cool
4	Room dimensions		1.0 x 185.7 ft
5	Room area	2050.4 ft²	185.7 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	533	446	1880	507	51	51	215	58
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	47	0	973	468	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	40	0	832	401	0	0	0	0
	D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	59	37	156	42	0	0	0	0
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	22	0	455	473	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	532	512	2160	582	129	109	461	124
	G	U-30 SHGC-27	0.300	e	20.70	30.23	20	0	414	605	20	0	414	605
	G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	108	108	457	123	0	0	0	0
	G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	495	417	1761	475	148	148	622	168
	G	U-30 SHGC-27	0.300	s	20.70	15.76	78	0	1604	1221	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	36	24	99	27	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	13	0	259	325	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	569	562	2370	639	0	0	0	0
	G	U-30 SHGC-27	0.300	w	20.70	30.23	8	0	155	227	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	59	37	156	42	0	0	0	0
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	22	0	455	473	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	2050	2050	3789	2586	186	186	343	234
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	59	59	117	0	0	0	0	0
6	c) AED excursion									0				9
	Envelope loss/gain								18092	9216			2055	1198
12	a) Infiltration								3248	400			445	55
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					3			690	1			230
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								21340	10306			2500	1482
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								21340	10306			2500	1482
15	Duct loads						32%	51%	6876	5293	32%	51%	805	761
	Total room load								28216	15599			3305	2244
	Air required (cfm)								1000	1000			117	144

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							A Bath 25.2 ft 9.0 ft heat/cool 1.0 x 85.4 ft 85.4 ft²				A WIC 12.2 ft 9.0 ft heat/cool 8.9 x 6.9 ft 61.7 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	87	82	346	93	0	0	0	0
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	5	0	104	50	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	98	98	411	111	29	29	123	33
	G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	80	80	339	91
	G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	42	42	177	48	0	0	0	0
	G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	85	85	158	108	62	62	114	78
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	44	44	87	0	0	0	0	0
6	c) AED excursion									-22				-11
	Envelope loss/gain								1283	388			576	192
12	a) Infiltration								308	38			149	18
	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)								1591	426			725	210
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								1591	426			725	210
15	Duct loads						32%	51%	513	219	32%	51%	234	108
	Total room load								2104	644			958	318
	Air required (cfm)								75	41			34	20

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							K Bath				K Bedroom			
1	Room name						0 ft				30.4 ft			
2	Exposed wall						9.0 ft			heat/cool	10.0 ft			heat/cool
3	Room height							1.0	x	100.9 ft		1.0	x	225.4 ft
4	Room dimensions													
5	Room area						100.9 ft²				225.4 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0	62	40	167	45
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	22	0	455	219
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	59	37	156	42
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	22	0	455	473
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0	115	115	485	131
	G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	10	10	42	11
	G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	59	37	156	42
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	22	0	455	473
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	101	101	186	127	225	225	417	284
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-6				-98
	Envelope loss/gain								186	121			2789	1624
12	a) Infiltration								0	0			414	51
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	1			230
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								186	121			3203	1905
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								186	121			3203	1905
15	Duct loads						32%	51%	60	62	32%	51%	1032	978
	Total room load								247	183			4235	2883
	Air required (cfm)								9	12			150	185

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

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Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Mezzanine				Open to Great			
1	Room name						Mezzanine				Open to Great			
2	Exposed wall						9.6 ft				47.3 ft			
3	Room height						9.0 ft			heat/cool	9.0 ft			heat/cool
4	Room dimensions							1.0 x 327.4 ft				1.0 x 425.5 ft		
5	Room area						327.4 ft²				425.5 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	87	72	304	82	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	15	0	311	149	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0	89	89	377	102
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	188	128	538	145
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	60	0	1242	945
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	149	149	627	169
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	327	327	605	413	425	425	786	537
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	10	10	19	0	0	0	0	0
6	c) AED excursion									-32				158
	Envelope loss/gain								1238	612			3570	2056
12	a) Infiltration								118	15			578	71
	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)								1357	627			4147	2127
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								1357	627			4147	2127
15	Duct loads						32%	51%	437	322	32%	51%	1336	1092
	Total room load								1794	948			5484	3219
	Air required (cfm)								64	61			194	206

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Up Stairs				Laundry			
1	Room name						Up Stairs				Laundry			
2	Exposed wall						31.2 ft				35.3 ft			
3	Room height						9.0 ft			heat/cool	9.0 ft			heat/cool
4	Room dimensions						1.0	x	224.9 ft		1.0	x	123.7 ft	
5	Room area						224.9 ft²				123.7 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0	69	64	270	73
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	5	0	104	50
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0	52	52	218	59
	G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	108	108	457	123	0	0	0	0
	G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	35	17	72	19	45	45	190	51
	G	U-30 SHGC-27	0.300	s	20.70	15.76	18	0	362	276	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	36	24	99	27	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	13	0	259	325	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	102	95	399	108	152	152	639	172
	G	U-30 SHGC-27	0.300	w	20.70	30.23	8	0	155	227	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	225	225	416	284	124	124	229	156
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	0	0	1	0	5	5	10	0
6	c) AED excursion									99				-30
	Envelope loss/gain								2219	1487			1659	531
12	a) Infiltration								381	47			431	53
	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)								2600	1534			2090	584
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								2600	1534			2090	584
15	Duct loads						32%	51%	838	788	32%	51%	674	300
	Total room load								3438	2322			2764	884
	Air required (cfm)								122	149			98	57

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

Right-J® Worksheet
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							D Bedroom 28.0 ft 10.0 ft heat/cool 1.0 x 195.6 ft 195.6 ft²				D Bath 3.6 ft 9.0 ft heat/cool 1.0 x 94.2 ft 94.2 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	145	105	442	119	32	32	136	37
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	40	0	832	401	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	20	20	84	23	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	115	115	485	131	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	196	196	361	247	94	94	174	119
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	1.97	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-59				-8
	Envelope loss/gain								2206	861			310	148
12	a) Infiltration								380	47			44	5
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					1			230	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								2586	1138			354	153
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								2586	1138			354	153
15	Duct loads						32%	51%	833	585	32%	51%	114	79
	Total room load								3419	1723			468	232
	Air required (cfm)								121	110			17	15

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

Right-J® Worksheet
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							East Zone				M Spa			
1	Room name													
2	Exposed wall						162.2 ft				28.8 ft			
3	Room height						11.1 ft		p		14.0 ft		heat/cool	
4	Room dimensions										1.0 x 335.7 ft			
5	Room area						1661.6 ft²				335.7 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	553	483	2037	549	230	203	855	230
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	71	0	1465	705	27	0	564	272
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	142	137	577	155	15	15	64	17
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	5	0	109	159	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	38	28	119	32	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	427	357	1505	406	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	31	0	631	481	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	40	0	828	630	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	39	29	122	33	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	628	570	2405	648	159	153	647	175
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	58	0	1201	1753	5	0	109	159
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	994	994	1837	1254	295	295	545	372
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									1919				121
	Envelope loss/gain								13249	9245			2784	1345
12	a) Infiltration								2483	306			548	68
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					2			460	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								15732	10011			3332	1413
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								15732	10011			3332	1413
15	Duct loads						0%	0%	0	0	-0%	0%	0	0
	Total room load								15732	10011			3332	1413
	Air required (cfm)								696	734			148	104

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

Right-J® Worksheet
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							M WC 10.2 ft 9.0 ft heat/cool 3.8 x 6.4 ft 24.1 ft²				M WIC 2 21.9 ft 9.0 ft heat/cool 1.0 x 125.3 ft 125.3 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	34	34	142	38	36	36	152	41
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	58	53	222	60	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	5	0	109	159	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	63	63	266	72
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	98	92	388	105
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	6	0	129	189
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	24	24	44	30	125	125	231	158
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									43				89
	Envelope loss/gain								517	330			1167	654
12	a) Infiltration								124	15			268	33
	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)								641	345			1435	687
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								641	345			1435	687
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								641	345			1435	687
	Air required (cfm)								28	25			64	50

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

Right-J® Worksheet
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							M Suite				Powder 2			
1	Room name						M Suite				Powder 2			
2	Exposed wall						52.5 ft				5.4 ft			
3	Room height						12.0 ft		heat/cool		9.0 ft		heat/cool	
4	Room dimensions						1.0	x 408.3 ft			5.9	x 14.8 ft		
5	Room area						408.3 ft²				87.3 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	60	60	253	68	49	43	180	49
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	6	0	124	60
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	24	24	101	27	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	38	28	119	32	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	205	165	696	188	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	40	0	828	630	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	39	29	122	33	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	10	0	207	260	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	264	227	956	258	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	38	0	776	1134	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	400	400	738	504	43	43	79	54
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									1001				18
	Envelope loss/gain								5004	4395			384	180
12	a) Infiltration								856	106			66	8
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					2			460	0			0
		Appliances/other								0				0
	Subtotal (lines 6 to 13)								5860	4960			450	188
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								5860	4960			450	188
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								5860	4960			450	188
	Air required (cfm)								259	364			20	14

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

Right-J® Worksheet
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Stairs				B Study			
1	Room name						Stairs				B Study			
2	Exposed wall						6.3 ft				22.5 ft			
3	Room height						9.0 ft			heat/cool	10.0 ft			heat/cool
4	Room dimensions							1.0 x	331.8 ft			1.0 x	260.1 ft	
5	Room area						331.8 ft²				260.1 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0	145	108	454	122
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	38	0	776	374
	G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	n	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0	45	45	190	51
	G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	se	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	56	44	185	50	0	0	0	0
	G	U-30 SHGC-27	0.300	s	20.70	15.76	13	0	259	197	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	35	35	148	40
	G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	3	3	6	4	17	17	32	22
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									222				121
	Envelope loss/gain								449	473			1599	729
12	a) Infiltration								76	9			306	38
	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)								526	482			1905	767
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								526	482			1905	767
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								526	482			1905	767
	Air required (cfm)								23	35			84	56

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

Right-J® Worksheet
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

1	Room name					A Study									
2	Exposed wall					14.6 ft									
3	Room height					12.0 ft				heat/cool					
4	Room dimensions					1.0	x	89.1 ft							
5	Room area					89.1 ft²									
	Ty	Construction number	U-value (Btuh/ft²-°F)	Or	HTM (Btuh/ft²)		Area or perimeter (ft²) (ft)		Load (Btuh)		Area or perimeter		Load	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0				
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0				
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0				
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0				
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	n	0.00	0.00	0	0	0	0				
	└D	11D0	0.390	n	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	ne	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	ne	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0				
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	e	0.00	0.00	0	0	0	0				
	└D	11D0	0.390	e	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	se	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	se	20.70	25.98	0	0	0	0				
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	103	85	359	97				
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	18	0	373	284				
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0				
	└G	U-30 SHGC-27 SLG	0.300	s	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	sw	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	sw	20.70	25.98	0	0	0	0				
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	72	63	266	72				
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	9	0	186	272				
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	nw	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	nw	0.00	0.00	0	0	0	0				
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	88	88	162	111				
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0				
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0				
6	c) AED excursion									304				
	Envelope loss/gain								1345	1139				
12	a) Infiltration								238	29				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @	230				0			0				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								1583	1168				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								0	0				
14	Subtotal								1583	1168				
15	Duct loads						-0%	0%	0	0				
	Total room load								1583	1168				
	Air required (cfm)								70	86				

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							West Zone				Powder 1			
1	Room name													
2	Exposed wall						189.9 ft				14.3 ft			
3	Room height						10.0 ft		p		9.0 ft		heat/cool	
4	Room dimensions										6.8 x 8.1 ft			
5	Room area						2053.5 ft²				54.6 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	461	311	1313	354	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	27	0	559	269	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	105	0	2174	1046	0	0	0	0
	└D	11D0	0.390	n	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	59	39	164	44	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	20	0	414	430	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	530	456	1922	518	68	68	288	78
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	33	0	683	997	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	24	0	497	725	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	621	415	1753	473	61	54	227	61
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	37	0	766	583	7	0	145	110
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	72	0	1490	1135	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	96	0	1987	1630	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	164	131	551	149	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	33	0	683	997	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	59	39	164	44	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	20	0	414	430	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	724	724	1338	914	55	55	101	69
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									3905				109
	Envelope loss/gain								17836	14974			761	427
12	a) Infiltration								2572	317			175	22
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								2000				0
	Subtotal (lines 6 to 13)								20408	17291			936	449
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								20408	17291			936	449
15	Duct loads						0%	0%	0	0	-0%	0%	0	0
	Total room load								20408	17291			936	449
	Air required (cfm)								904	1268			41	33

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Pantry				Entry			
1	Room name						Pantry				Entry			
2	Exposed wall						4.2 ft				8.5 ft			
3	Room height						9.0 ft			heat/cool	9.0 ft			heat/cool
4	Room dimensions						4.7 x 8.1 ft				1.0 x 63.7 ft			
5	Room area						37.7 ft²				63.7 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0	0	0	0	0
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	└D	11D0	0.390	n	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	0	0	0	0	41	23	96	26
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	0	0	0	0	18	18	481	164
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	38	38	158	43	36	36	152	41
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	38	38	70	48	64	64	118	80
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-4				-15
	Envelope loss/gain								228	86			846	297
12	a) Infiltration								51	6			104	13
	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)								279	92			950	310
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								279	92			950	310
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								279	92			950	310
	Air required (cfm)								12	7			42	23

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Hearth				Kitchen			
1	Room name													
2	Exposed wall						28.6 ft				32.6 ft			
3	Room height						11.5 ft		heat/cool		10.0 ft		heat/cool	
4	Room dimensions						1.0 x 203.5 ft				1.0 x 365.1 ft			
5	Room area						203.5 ft²				365.1 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0	178	130	546	147
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	48	0	994	478
	└D	11D0	0.390	n	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	42	42	178	48	148	122	516	139
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	26	0	538	786
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	163	133	561	151	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	30	0	621	473	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	124	91	382	103	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	33	0	683	997	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	203	203	376	257	149	149	276	188
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									672				4
	Envelope loss/gain								2801	2701			2871	1743
12	a) Infiltration								447	55			443	55
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								0				2000
	Subtotal (lines 6 to 13)								3248	2756			3313	3798
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								3248	2756			3313	3798
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								3248	2756			3313	3798
	Air required (cfm)								144	202			147	279

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
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By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Mud				C Dining			
1	Room name													
2	Exposed wall						21.9 ft				11.5 ft			
3	Room height						9.0 ft			heat/cool	10.0 ft			heat/cool
4	Room dimensions						1.0	x	116.0 ft		1.0	x	303.3 ft	
5	Room area						116.0 ft²				303.3 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	125	100	424	114	0	0	0	0
11	G	U-30 SHGC-27	0.300	n	20.70	9.97	7	0	145	70	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	0	0	0	0
	D	11D0	0.390	n	26.91	9.20	18	18	481	164	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	72	65	274	74	0	0	0	0
	G	U-30 SHGC-27	0.300	e	20.70	30.23	7	0	145	212	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	D	11D0	0.390	e	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	115	43	181	49
	G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	72	0	1490	1135
	G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0	0	0	0	0
	G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	116	116	214	146	99	99	184	125
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									18				1224
	Envelope loss/gain								1683	799			1856	2533
12	a) Infiltration								268	33			156	19
	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)								1951	832			2012	2552
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								1951	832			2012	2552
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								1951	832			2012	2552
	Air required (cfm)								86	61			89	187

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
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By: Joe Colburn
Plan: Custom

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							F Dining 33.8 ft 10.0 ft heat/cool 1.0 x 268.5 ft 268.5 ft²				Foyer 9.7 ft 10.0 ft heat/cool 1.0 x 220.6 ft 220.6 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0	0	0	0	0
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	62	42	176	47	97	40	167	45
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	20	0	414	199	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0	57	0	1180	568
	└D	11D0	0.390	n	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	59	39	164	44	0	0	0	0
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	20	0	414	430	0	0	0	0
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	139	115	486	131	0	0	0	0
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	24	0	497	725	0	0	0	0
	└D	11D0	0.390	e	26.91	9.20	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	20	20	84	23	0	0	0	0
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0	0	0	0	0
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0	0	0	0	0
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	59	39	164	44	0	0	0	0
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	20	0	414	430	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0	0	0	0	0
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0	0	0	0	0
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0	0	0	0	0
6	c) AED excursion									-97				173
	Envelope loss/gain								2814	1979			1347	786
12	a) Infiltration								460	57			131	16
	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)								3274	2035			1479	802
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								3274	2035			1479	802
15	Duct loads						-0%	0%	0	0	-0%	0%	0	0
	Total room load								3274	2035			1479	802
	Air required (cfm)								145	149			65	59

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

Right-J® Worksheet
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

1	Room name						Great								
2	Exposed wall						24.8 ft								
3	Room height						10.0 ft				heat/cool				
4	Room dimensions							1.0	x	420.4 ft					
5	Room area						420.4 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	STD - Basement Wall	0.078	n	0.00	0.00	0	0	0	0				
.	W	STD - Basement Wall	0.093	n	0.00	0.00	0	0	0	0				
.	└G	U-30 SHGC-27	0.300	n	0.00	0.00	0	0	0	0				
.	W	STD - Frame - R-21 -	0.061	n	4.22	1.14	0	0	0	0				
11	├G	U-30 SHGC-27	0.300	n	20.70	9.97	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	n	20.70	9.97	0	0	0	0				
	└D	11D0	0.390	n	26.91	9.20	0	0	0	0				
	W	STD - Basement Wall	0.093	ne	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	ne	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	ne	20.70	21.52	0	0	0	0				
	W	STD - Basement Wall	0.078	e	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	e	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	20	20	84	23				
	├G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	e	20.70	30.23	0	0	0	0				
	└D	11D0	0.390	e	26.91	9.20	0	0	0	0				
	W	STD - Basement Wall	0.093	se	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	se	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	se	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	s	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	s	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	s	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	208	112	474	128				
	├G	U-30 SHGC-27	0.300	s	20.70	15.76	0	0	0	0				
	├G	U-30 SHGC-27 GD	0.300	s	20.70	15.76	0	0	0	0				
	└G	U-30 SHGC-27 SLG	0.300	s	20.70	16.98	96	0	1987	1630				
	W	STD - Basement Wall	0.093	sw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	sw	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	sw	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.078	w	0.00	0.00	0	0	0	0				
	W	STD - Basement Wall	0.093	w	0.00	0.00	0	0	0	0				
	└G	U-30 SHGC-27	0.300	w	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	20	20	84	23				
	└G	U-30 SHGC-27	0.300	w	20.70	30.23	0	0	0	0				
	W	STD - Basement Wall	0.093	nw	0.00	0.00	0	0	0	0				
	W	STD - Frame - R-21 -	0.061	nw	4.22	1.14	0	0	0	0				
	└G	U-30 SHGC-27	0.300	nw	20.70	21.52	0	0	0	0				
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	0	0	0	0				
	F	21A-32t	0.020	-	0.00	0.00	0	0	0	0				
	F	STD Floor - R-38	0.029	-	0.00	0.00	0	0	0	0				
6	c) AED excursion									1820				
	Envelope loss/gain								2630	3624				
12	a) Infiltration								337	42				
	b) Room ventilation								0	0				
13	Internal gains:	Occupants @ 230					0			0				
		Appliances/other								0				
	Subtotal (lines 6 to 13)								2967	3666				
	Less external load								0	0				
	Less transfer								0	0				
	Redistribution								0	0				
14	Subtotal								2967	3666				
15	Duct loads						-0%	0%	0	0				
	Total room load								2967	3666				
	Air required (cfm)								131	269				

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

Load Short Form
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make	n/a		
Trade	n/a		
Model	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Heating input			
Heating output		0	Btuh
Temperature rise		0	°F
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Space thermostat	n/a		

COOLING EQUIPMENT

Make	n/a		
Trade	n/a		
Cond	n/a		
Coil	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Sensible cooling		0	Btuh
Latent cooling		0	Btuh
Total cooling		0	Btuh
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Load sensible heat ratio		0	

ROOM NAME		Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Basement Zone	d	3715	22381	8738	1000	1000
Main Zone	d	3715	36140	21478	1600	1600
Upper Zone	d	2050	28216	15599	1000	1000
Entire House	d	9481	86737	45137	3600	4003
Other equip loads			32865	6001		
Equip. @ 0.96 RSM				48991		
Latent cooling				0		
TOTALS		9481	119602	48991	3600	4003

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

Load Short Form
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make Bryant
Trade BRYANT
Model 925TA42060V17A
AHRI ref no.4740263

Efficiency	96.3 AFUE	
Heating input	53664	Btuh
Heating output	51875	Btuh
Temperature rise	57	°F
Actual air flow	1000	cfm
Air flow factor	0.045	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

COOLING EQUIPMENT

Make Bryant
Trade Legacy 13
Cond 113ANA018-B
Coil CNPVP2417A
AHRI ref no.3040613

Efficiency	11.2 EER, 13.2 SEER	
Sensible cooling	15300	Btuh
Latent cooling	2700	Btuh
Total cooling	18000	Btuh
Actual air flow	1000	cfm
Air flow factor	0.114	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Dn Crawl	881	3410	682	152	78
Dn Theater	644	3540	1386	158	159
Dn AV	85	1015	293	45	34
Dn Billiards	587	3540	955	158	109
Dn Mech	191	1921	537	86	61
Dn Storage	248	2595	746	116	85
Dn Exercise	309	2632	2096	118	240
Dn Bath 5	74	128	7	6	1
Dn Bedroom 5	310	3600	2037	161	233
Dn Stairs	387	0	0	0	0

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

Basement Zone d Other equip loads Equip. @ 0.96 RSM Latent cooling	3715	22381 20086	8738 2183 10462 0	1000	1000
TOTALS	3715	42467	10462	1000	1000

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

Load Short Form
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make Bryant
Trade Bryant
Model 355CAV060080
AHRI ref no. 2010326

Efficiency	95 AFUE	
Heating input	63360	Btuh
Heating output	58608	Btuh
Temperature rise	40	°F
Actual air flow	1600	cfm
Air flow factor	0.044	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

COOLING EQUIPMENT

Make Bryant
Trade Preferred Two-Stage 17
Cond 127ANA036
Coil CNPVP4821A
AHRI ref no. 5104547

Efficiency	12.7 EER, 16.5 SEER	
Sensible cooling	30940	Btuh
Latent cooling	5460	Btuh
Total cooling	36400	Btuh
Actual air flow	1600	cfm
Air flow factor	0.073	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

ROOM NAME		Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
West Zone	p	2053	20408	17291	904	1268
East Zone	p	1662	15732	10011	696	734
Main Zone	d	3715	36140	21478	1600	1600
Other equip loads			24397	2628		
Equip. @ 0.96 RSM				23093		
Latent cooling				0		
TOTALS		3715	60537	23093	1600	1600

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

Load Short Form
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make Bryant
Trade Bryant
Model 925TA42060V17A
AHRI ref no.4740263

Efficiency	96.3 AFUE	
Heating input	53664	Btuh
Heating output	51875	Btuh
Temperature rise	57	°F
Actual air flow	1000	cfm
Air flow factor	0.035	cfm/Btuh
Static pressure	1.00	in H2O
Space thermostat		

COOLING EQUIPMENT

Make Bryant
Trade 13 Seer
Cond 113ANA024
Coil CNPHP3017A
AHRI ref no.4765618

Efficiency	12.0 EER, 14.5 SEER	
Sensible cooling	19720	Btuh
Latent cooling	3480	Btuh
Total cooling	23200	Btuh
Actual air flow	1000	cfm
Air flow factor	0.064	cfm/Btuh
Static pressure	1.00	in H2O
Load sensible heat ratio	1.00	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
A Bedroom	186	3305	2244	117	144
A Bath	85	2104	644	75	41
A WIC	62	958	318	34	20
K Bath	101	247	183	9	12
K Bedroom	225	4235	2883	150	185
Mezzanine	327	1794	948	64	61
Open to Great	425	5484	3219	194	206
Up Stairs	225	3438	2322	122	149
Laundry	124	2764	884	98	57
D Bedroom	196	3419	1723	121	110
D Bath	94	468	232	17	15

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

Upper Zone Other equip loads Equip. @ 0.96 RSM Latent cooling	d	2050	28216 11576	15599 1190 16084 0	1000	1000
TOTALS		2050	39791	16084	1000	1000

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

Load Short Form
East Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make	n/a		
Trade	n/a		
Model	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Heating input			
Heating output		0	Btuh
Temperature rise		0	°F
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Space thermostat	n/a		

COOLING EQUIPMENT

Make	n/a		
Trade	n/a		
Cond	n/a		
Coil	n/a		
AHRI ref no.	n/a		
Efficiency		n/a	
Sensible cooling		0	Btuh
Latent cooling		0	Btuh
Total cooling		0	Btuh
Actual air flow		0	cfm
Air flow factor		0	cfm/Btuh
Static pressure		0	in H2O
Load sensible heat ratio		0	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
M Spa	336	3332	1413	148	104
M WC	24	641	345	28	25
M WIC 2	125	1435	687	64	50
M Suite	408	5860	4960	259	364
Powder 2	87	450	188	20	14
Stairs	332	526	482	23	35
B Study	260	1905	767	84	56
A Study	89	1583	1168	70	86

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

East Zone	p	1662	15732	10011	696	734
Other equip loads			1358	0		
Equip. @ 0.96	RSM			9590		
Latent cooling				0		
TOTALS		1662	17090	9590	696	734

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

Load Short Form
West Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make	n/a
Trade	n/a
Model	n/a
AHRI ref no.	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

COOLING EQUIPMENT

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref no.	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Powder 1	55	936	449	41	33
Pantry	38	279	92	12	7
Entry	64	950	310	42	23
Hearth	203	3248	2756	144	202
Kitchen	365	3313	3798	147	279
Mud	116	1951	832	86	61
C Dining	303	2012	2552	89	187
F Dining	269	3274	2035	145	149
Foyer	221	1479	802	65	59
Great	420	2967	3666	131	269

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

West Zone	p	2053	20408	17291	904	1268
Other equip loads			1407	0		
Equip. @ 0.96	RSM			16565		
Latent cooling				0		
TOTALS		2053	21816	16565	904	1268

Load Multizone Summary Report

Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Infiltration Summary

ZONE NAME	Heating Volume ft³	Heating ACH	Heating AVF cfm	Heating HTM Btuh/ft²	Cooling Volume ft³	Cooling ACH	Cooling AVF cfm	Cooling HTM Btuh/ft²
Basement Zone	31868	0.12	62	1.4	31868	0.06	33	0.2
Upper Zone	19060	0.16	52	1.4	19060	0.09	28	0.2
West Zone	20568	0.12	41	1.4	20568	0.06	22	0.2
East Zone	18385	0.13	40	1.4	18385	0.07	21	0.2
Entire House	89881	0.13	195	1.4	89881	0.07	105	0.2

Load and AVF Summary

ROOM NAME	Area ft²	Htg load Btuh	Clg load Btuh	Htg AVF cfm	Clg AVF cfm
Dn Crawl	881	3410	682	152	78
Dn Theater	644	3540	1386	158	159
Dn AV	85	1015	293	45	34
Dn Billiards	587	3540	955	158	109
Dn Mech	191	1921	537	86	61
Dn Storage	248	2595	746	116	85
Dn Exercise	309	2632	2096	118	240
Dn Bath 5	74	128	7	6	1
Dn Bedroom 5	310	3600	2037	161	233
Dn Stairs	387	0	0	0	0
Basement Zone	3715	22381	8738	1000	1000
A Bedroom	186	3305	2244	117	144
A Bath	85	2104	644	75	41
A WIC	62	958	318	34	20
K Bath	101	247	183	9	12
K Bedroom	225	4235	2883	150	185
Mezzanine	327	1794	948	64	61
Open to Great	425	5484	3219	194	206
Up Stairs	225	3438	2322	122	149
Laundry	124	2764	884	98	57
D Bedroom	196	3419	1723	121	110
D Bath	94	468	232	17	15
Upper Zone	2050	28216	15599	1000	1000
Powder 1	55	936	449	41	33
Pantry	38	279	92	12	7
Entry	64	950	310	42	23
Hearth	203	3248	2756	144	202
Kitchen	365	3313	3798	147	279
Mud	116	1951	832	86	61
C Dining	303	2012	2552	89	187
F Dining	269	3274	2035	145	149
Foyer	221	1479	802	65	59
Great	420	2967	3666	131	269
West Zone	2053	20408	17291	904	1268
M Spa	336	3332	1413	148	104
M WC	24	641	345	28	25
M WIC 2	125	1435	687	64	50
M Suite	408	5860	4960	259	364
Powder 2	87	450	188	20	14
Stairs	332	526	482	23	35
B Study	260	1905	767	84	56
A Study	89	1583	1168	70	86
East Zone	1662	15732	10011	696	734
Entire House	9481	86737	45137	3600	4003

Duct System Summary
Basement Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

	Heating	Cooling
External static pressure	1.00 in H2O	1.00 in H2O
Pressure losses	0.38 in H2O	0.38 in H2O
Available static pressure	0.62 in H2O	0.62 in H2O
Supply / return available pressure	0.34 / 0.28 in H2O	0.34 / 0.28 in H2O
Lowest friction rate	0.089 in/100ft	0.089 in/100ft
Actual air flow	1000 cfm	1000 cfm
Total effective length (TEL)	700 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
Dn AV	h 1015	45	34	0.107	5.0	0x 0	ShMt	39.6	280.0	st2
Dn Bath 5	h 128	6	1	0.121	4.0	0x 0	ShMt	43.7	240.0	st3
Dn Bedroom 5	c 1018	80	117	0.089	7.0	0x 0	ShMt	57.3	330.0	st3
Dn Bedroom 5-A	c 1018	80	117	0.117	6.0	0x 0	ShMt	57.2	235.0	st3
Dn Billiards	h 1770	79	55	0.135	5.0	0x 0	ShMt	29.2	225.0	st2
Dn Billiards-A	h 1770	79	55	0.139	5.0	0x 0	ShMt	11.3	235.0	st2
Dn Crawl	h 3410	152	78	0.111	7.0	0x 0	ShMt	57.9	250.0	st2
Dn Exercise	c 1048	59	120	0.101	7.0	0x 0	ShMt	40.9	300.0	st3
Dn Exercise-A	c 1048	59	120	0.106	7.0	0x 0	ShMt	38.8	285.0	st3
Dn Mech	h 1921	86	61	0.136	6.0	0x 0	ShMt	7.6	245.0	st3
Dn Storage	h 2595	116	85	0.128	6.0	0x 0	ShMt	33.4	235.0	st3
Dn Theater	c 693	79	79	0.121	6.0	0x 0	ShMt	53.3	230.0	st2
Dn Theater-A	c 693	79	79	0.122	6.0	0x 0	ShMt	40.7	240.0	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
st3	Peak AVF	486	621	0.089	657	11.8	8 x 17	ShtMetl	
st2	Peak AVF	514	379	0.107	771	10.6	8 x 12	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 17	716	526	271.0	0.102	670	14.0	0x 0		ShMt	rt4
rb16	12x 9	167	234	217.0	0.128	670	8.0	0x 0		ShMt	rt5
rb17	12x 9	118	240	312.3	0.089	440	10.0	0x 0		ShMt	rt5

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt4	Peak AVF	716	526	0.102	586	12.1	8 x 22	ShtMetl	rt2
rt5	Peak AVF	284	474	0.089	609	10.7	8 x 14	ShtMetl	rt2
rt2	Peak AVF	1000	1000	0.089	480	14.1	12 x 25	ShtMetl	

Duct System Summary
Main Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

	Heating	Cooling
External static pressure	1.00 in H2O	1.00 in H2O
Pressure losses	0.35 in H2O	0.35 in H2O
Available static pressure	0.65 in H2O	0.65 in H2O
Supply / return available pressure	0.36 / 0.29 in H2O	0.36 / 0.29 in H2O
Lowest friction rate	0.075 in/100ft	0.075 in/100ft
Actual air flow	1600 cfm	1600 cfm
Total effective length (TEL)	862 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
A Study	c	1168	70	86	0.087	6.0	0x 0	ShMt	49.8	365.0	st5
B Study	h	1905	84	56	0.148	5.0	0x 0	ShMt	19.3	225.0	st5
C Dining	c	1276	45	94	0.105	6.0	0x 0	ShMt	48.3	295.0	st4
C Dining-A	c	1276	45	94	0.092	6.0	0x 0	ShMt	58.6	335.0	st4A
Entry	h	950	42	23	0.078	5.0	0x 0	ShMt	82.2	385.0	st4A
F Dining	c	1018	72	75	0.129	5.0	0x 0	ShMt	35.5	245.0	st4
F Dining-A	c	1018	72	75	0.095	6.0	0x 0	ShMt	46.4	335.0	st4A
Foyer-A	h	1479	65	59	0.130	5.0	0x 0	ShMt	28.9	250.0	st4
Great	c	1833	66	134	0.125	7.0	0x 0	ShMt	45.5	245.0	st4
Great-A	c	1833	66	134	0	0	0x 0	ShMt	0	0	
Hearth	c	1378	72	101	0.089	6.0	0x 0	ShMt	70.1	335.0	st4A
Hearth-A	c	1378	72	101	0.075	7.0	0x 0	ShMt	80.4	400.0	st4A
Kitchen	c	1899	73	139	0.095	7.0	0x 0	ShMt	45.6	335.0	st4A
Kitchen-A	c	1899	73	139	0.098	7.0	0x 0	ShMt	36.0	335.0	st4A
M Spa	h	1666	74	52	0.123	5.0	0x 0	ShMt	43.4	250.0	st5
M Spa-A	h	1666	74	52	0.101	6.0	0x 0	ShMt	52.9	305.0	st5
M Suite	c	1653	86	121	0.124	6.0	0x 0	ShMt	42.6	250.0	st5
M Suite-A	c	1653	86	121	0.101	7.0	0x 0	ShMt	52.3	305.0	st5
M Suite-B	c	1653	86	121	0.082	7.0	0x 0	ShMt	52.7	390.0	st5
M WC	h	641	28	25	0.124	4.0	0x 0	ShMt	36.2	255.0	st5
M WIC 2	h	1435	64	50	0.077	6.0	0x 0	ShMt	45.3	425.0	st5
Mud	h	1951	86	61	0.088	6.0	0x 0	ShMt	73.3	340.0	st4A
Pantry	h	279	12	7	0.082	4.0	0x 0	ShMt	82.1	360.0	st4A
Powder 1	h	936	41	33	0.076	5.0	0x 0	ShMt	86.1	390.0	st4A
Powder 2	h	450	20	14	0.124	4.0	0x 0	ShMt	28.1	265.0	st5
Stairs	c	482	23	35	0.123	4.0	0x 0	ShMt	29.4	265.0	st5

Supply Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st5	Peak AVF	696	734	0.077	601	12.9	8 x 22	ShtMetl	
st4	Peak AVF	838	1134	0.075	544	16.1	12 x 25	ShtMetl	
st4A	Peak AVF	590	772	0.075	632	13.2	8 x 22	ShtMetl	st4

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
rb14	14x 5	102	165	161.0	0.179	472	8.0	0x 0		ShMt	rt6
rb13	14x 6	116	195	172.2	0.167	558	8.0	0x 0		ShMt	rt6
rb9	14x 13	205	408	185.4	0.155	520	12.0	0x 0		ShMt	rt6
rb4	14x 13	338	399	247.5	0.116	509	12.0	0x 0		ShMt	rt7
rb11	14x 7	199	189	240.9	0.119	569	8.0	0x 0		ShMt	rt7
rb12	14x 6	170	129	149.6	0.192	486	8.0	0x 0		ShMt	rt7
rb10	0x 0	160	173	381.9	0.075	496	8.0	0x 0		ShMt	rt6A
rb7	0x 0	150	172	222.9	0.129	492	8.0	0x 0		ShMt	rt6A
rb8	0x 0	160	173	269.0	0.107	496	8.0	0x 0		ShMt	rt6A

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt6	Peak AVF	893	1285	0.075	617	16.0	12 x 25	ShtMetl	rt3
rt6A	Peak AVF	470	518	0.075	666	11.4	8 x 14	ShtMetl	rt6
rt3	Peak AVF	1600	2003	0.075	721	19.7	16 x 25	ShtMetl	
rt7	Peak AVF	707	717	0.116	517	12.4	10 x 20	ShtMetl	rt3

Duct System Summary
Upper Zone
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave.
Date: Mar 24, 2012
By: Joe Colburn
Plan: Custom

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

	Heating	Cooling
External static pressure	1.00 in H2O	1.00 in H2O
Pressure losses	0.35 in H2O	0.35 in H2O
Available static pressure	0.65 in H2O	0.65 in H2O
Supply / return available pressure	0.50 / 0.15 in H2O	0.50 / 0.15 in H2O
Lowest friction rate	0.075 in/100ft	0.075 in/100ft
Actual air flow	1000 cfm	1000 cfm
Total effective length (TEL)	867 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
A Bath	h	2104	75	41	0.208	6.0	0x 0	VlFx	28.9	210.0	st1
A Bedroom	c	2244	117	144	0.114	8.0	0x 0	VlFx	40.6	395.0	st1
A WIC	h	958	34	20	0.108	5.0	0x 0	VlFx	24.8	435.0	st1
D Bath	h	468	17	15	0.080	4.0	0x 0	VlFx	23.2	595.0	st1
D Bedroom	h	3419	121	110	0.088	8.0	0x 0	VlFx	29.3	535.0	st1
K Bath	c	183	9	12	0.188	4.0	0x 0	VlFx	18.8	245.0	st1
K Bedroom	c	1441	75	92	0.155	6.0	0x 0	VlFx	29.1	290.0	st1
K Bedroom-A	c	1441	75	92	0.116	7.0	0x 0	VlFx	26.2	400.0	st1
Laundry	h	2764	98	57	0.075	7.0	0x 0	VlFx	31.6	630.0	st1
Mezzanine	h	1794	64	61	0.121	6.0	0x 0	VlFx	8.6	400.0	st1
Open to Great	c	1610	97	103	0.110	7.0	0x 0	VlFx	16.8	435.0	st1
Open to Great-A	c	1610	97	103	0.096	7.0	0x 0	VlFx	15.4	500.0	st1
Up Stairs	c	2322	122	149	0.079	8.0	0x 0	VlFx	36.5	595.0	st1

Supply Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st1	Peak AVF	1000	1000	0.075	533	16.4	16 x 19	DctLinr	

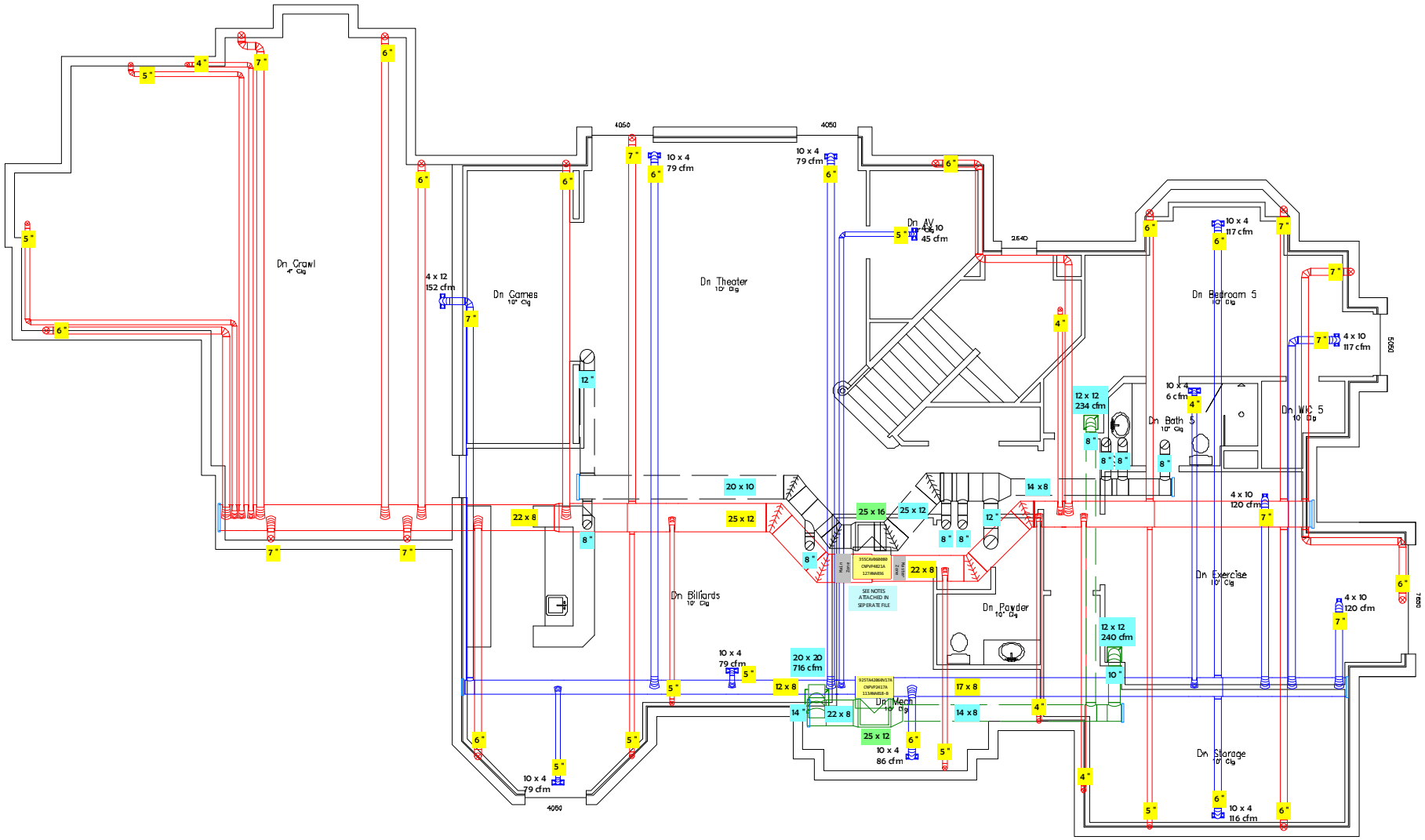
Return Branch Detail Table

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
rb5	12x 10	159	197	96.8	0.159	563	8.0	0x 0		VlFx	rt1
rb6	12x 7	138	125	90.3	0.171	515	7.0	0x 0		VlFx	rt1
rb3	20x 15	478	473	75.6	0.204	608	12.0	0x 0		VlFx	rt1
rb1	0x 0	226	205	205.7	0.075	414	10.0	0x 0		VlFx	rt1

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt1	Peak AVF	1000	1000	0.075	533	16.4	16 x 19	DctLinr	

Basement



Job #: 1110 E. Layton Ave.
Performed by Joe Colburn for:
Doug Fleming
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Scale: 3/32" = 1'0"

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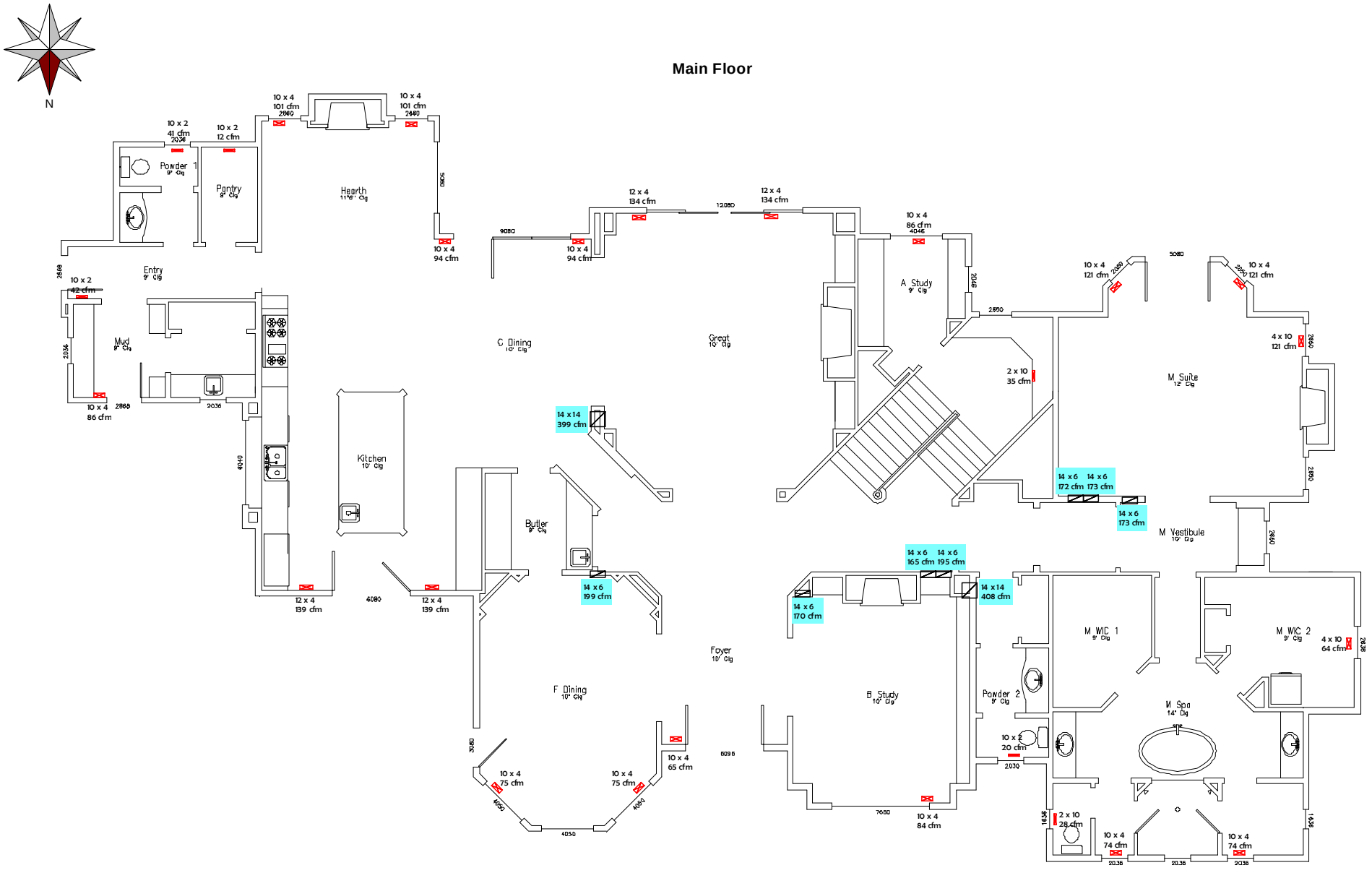
Main Floor



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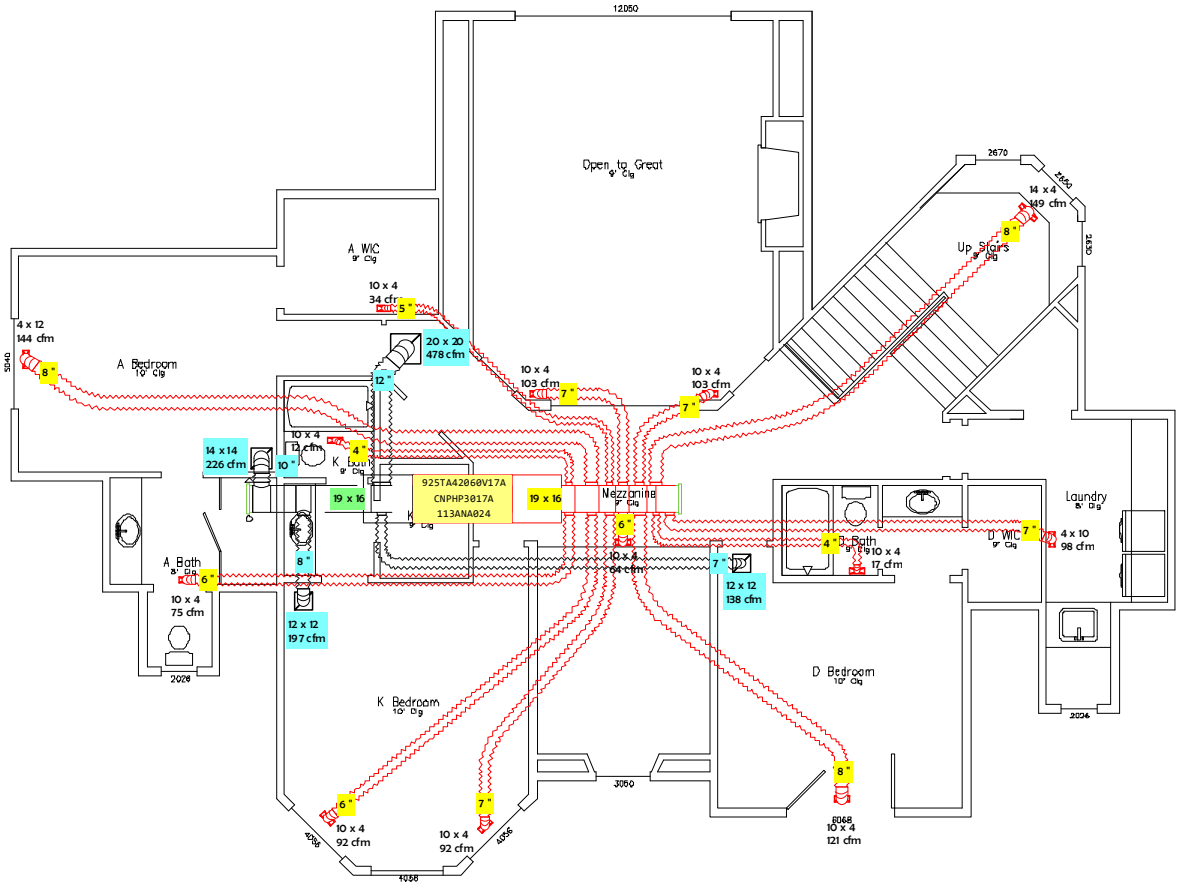
Upper Floor



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... Comfort - 1110 E Layton Ave.rup

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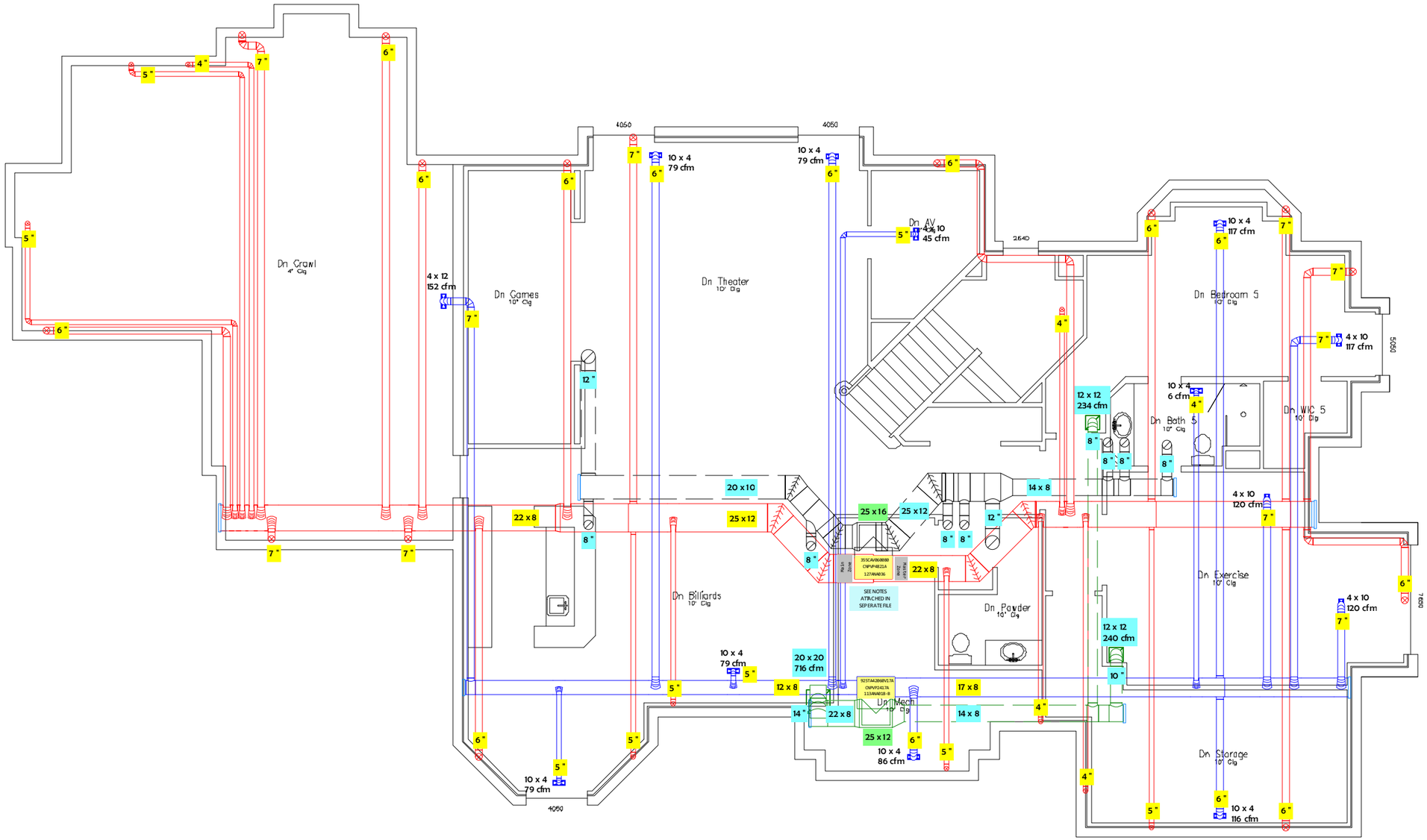
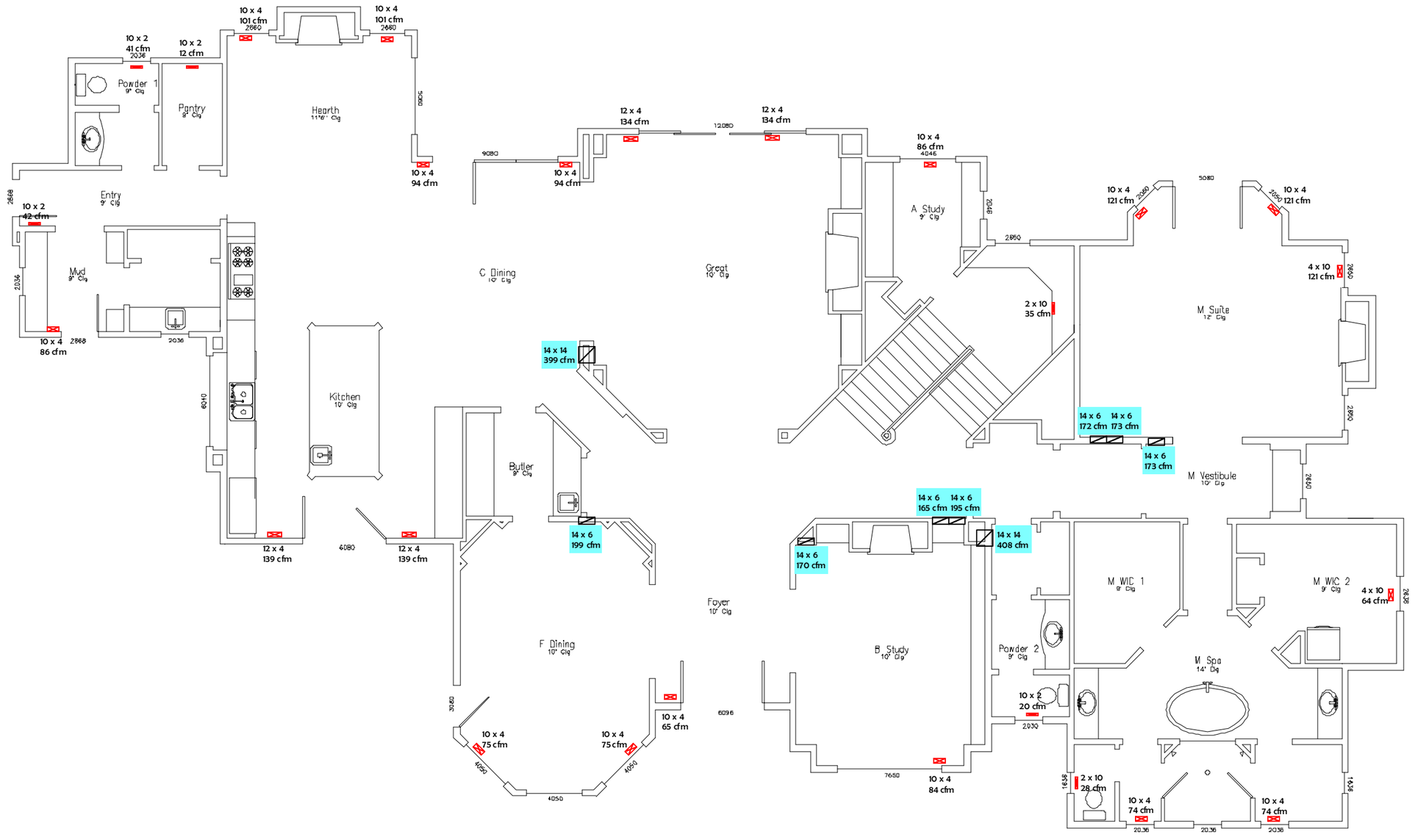
Basement



Job #: 1110 E. Layton Ave. **Performed by Joe Colburn for:** Doug Fleming 7170 W. Radcliff Ave. Littleton, CO 80123 Phone: (720) 394-2363 Fax: (303) 904-0668 www.RoyalComfortHVAC.net RDougFleming@msn.com	**Authority Air Designs, LLC.** 6680 W. 95th Place Westminster, CO 80021-6422 Phone: (303) 859-2967 www.AuthorityAir.com Joe@AuthorityAir.com	Scale: 1/8" = 1'0" Page 1 Uponor System Design Software 12.0.04 RSU09203 2012-Apr-08 18:47:45 ... Comfort - 1110 E Layton Ave.rup

N

Main Floor



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7170 W. Radcliff Ave.
Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
www.RoyalComfortHVAC.net RDougFleming@msn.com

Authority Air Designs, LLC.
6680 W. 95th Place
Westminster, CO 80021-6422
Phone: (303) 859-2967
www.AuthorityAir.com Joe@AuthorityAir.com

Scale: 1/8" = 1'0"

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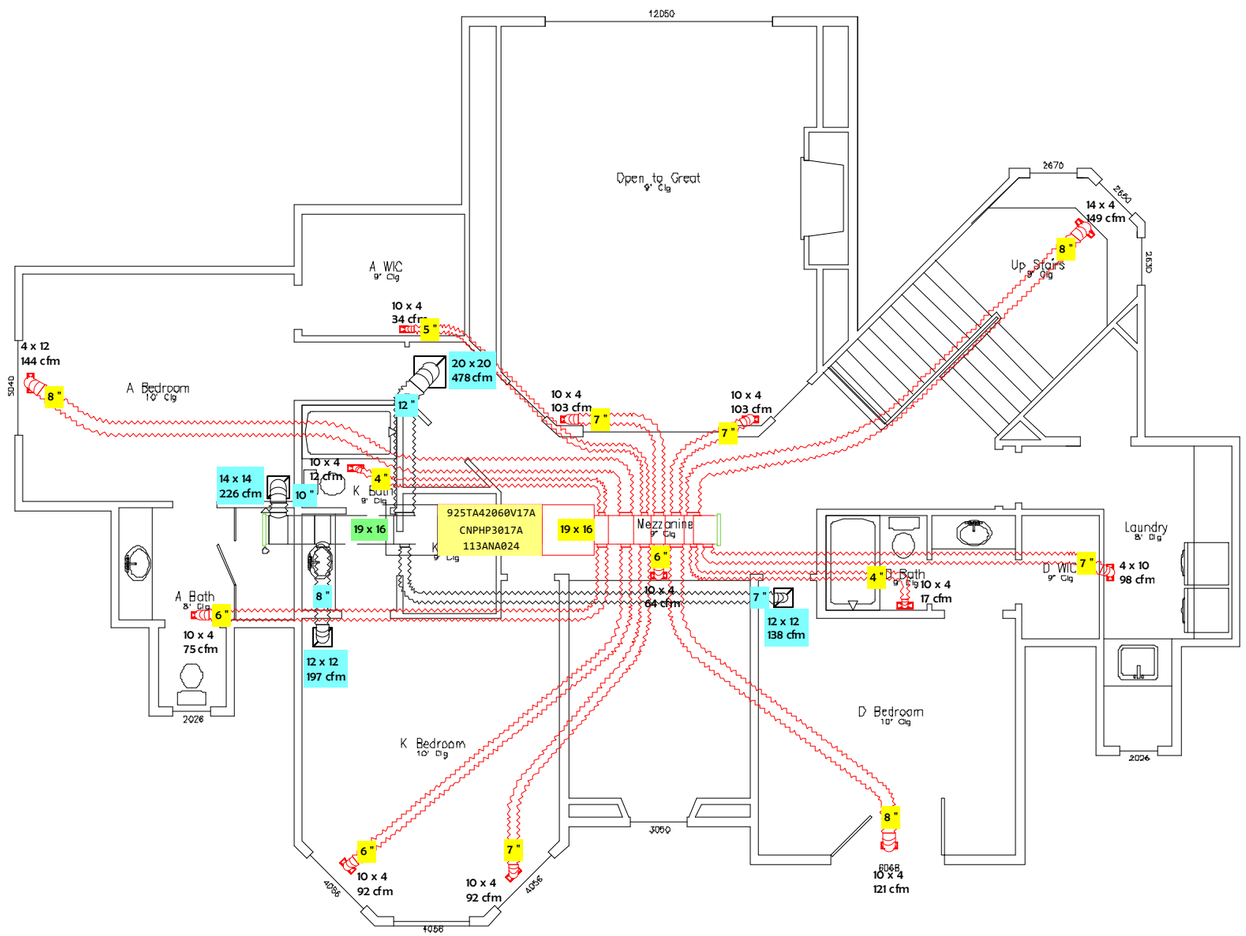
... Comfort - 1110 E Layton Ave.rup

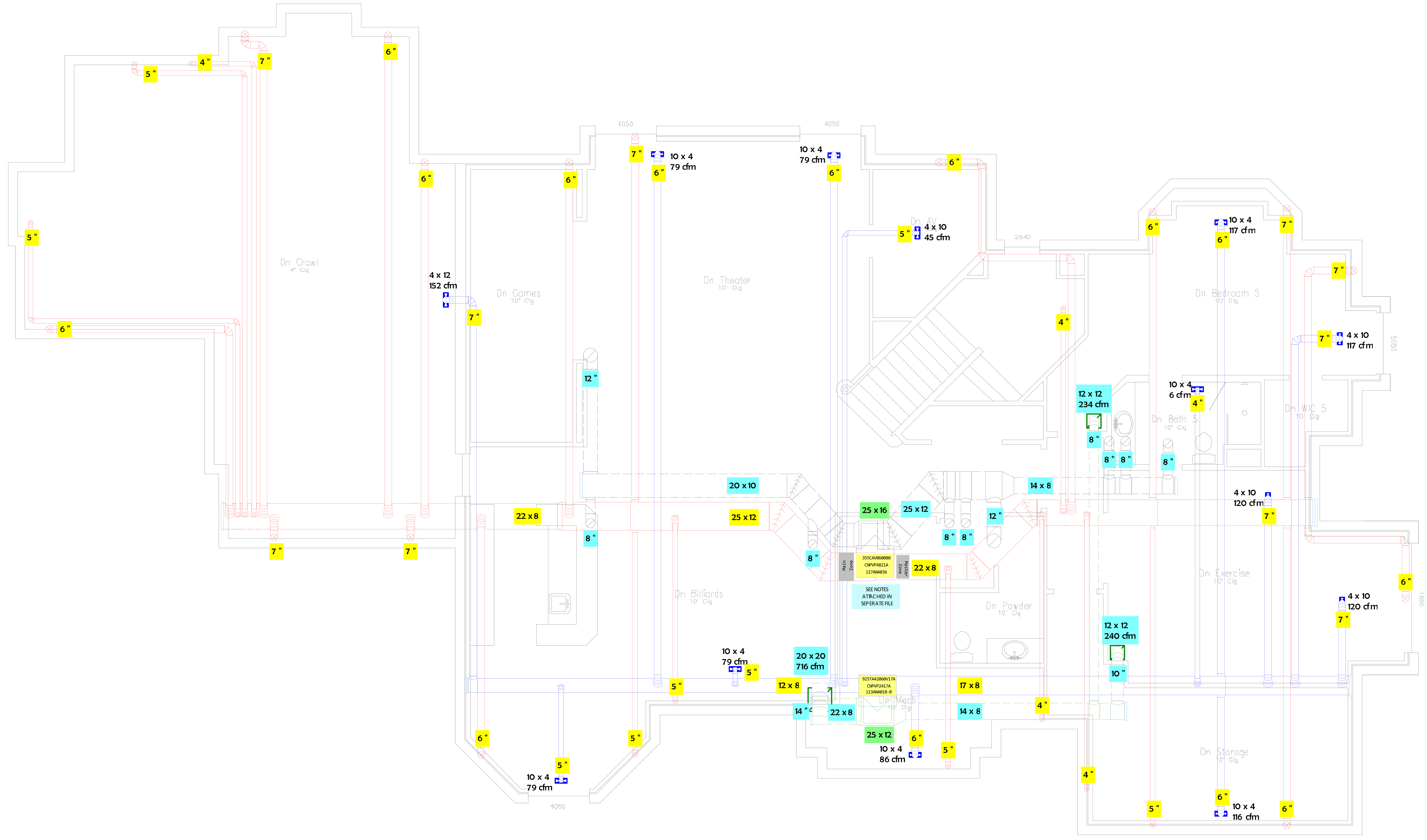
N

Upper Floor



Job #: 1110 E. Layton Ave. **Performed by Joe Colburn for:** Doug Fleming 7170 W. Radcliff Ave. Littleton, CO 80123 Phone: (720) 394-2363 Fax: (303) 904-0668 www.RoyalComfortHVAC.net RDougFleming@msn.com	**Authority Air Designs, LLC.** 6680 W. 95th Place Westminster, CO 80021-6422 Phone: (303) 859-2967 www.AuthorityAir.com Joe@AuthorityAir.com	Scale: 1/8" = 1'0" Page 3 Uponor System Design Software 12.0.04 RSU09203 2012-Apr-08 18:47:45 ... Comfort - 1110 E Layton Ave.rup

Basement



Job #: 1110 E. LaytonAve.
Performed by Joe Colburn for:
Doug Fleming
7170 W. Raddiff Ave.
Littleton, CO 80123
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Scale: 3/8" = 1'0"
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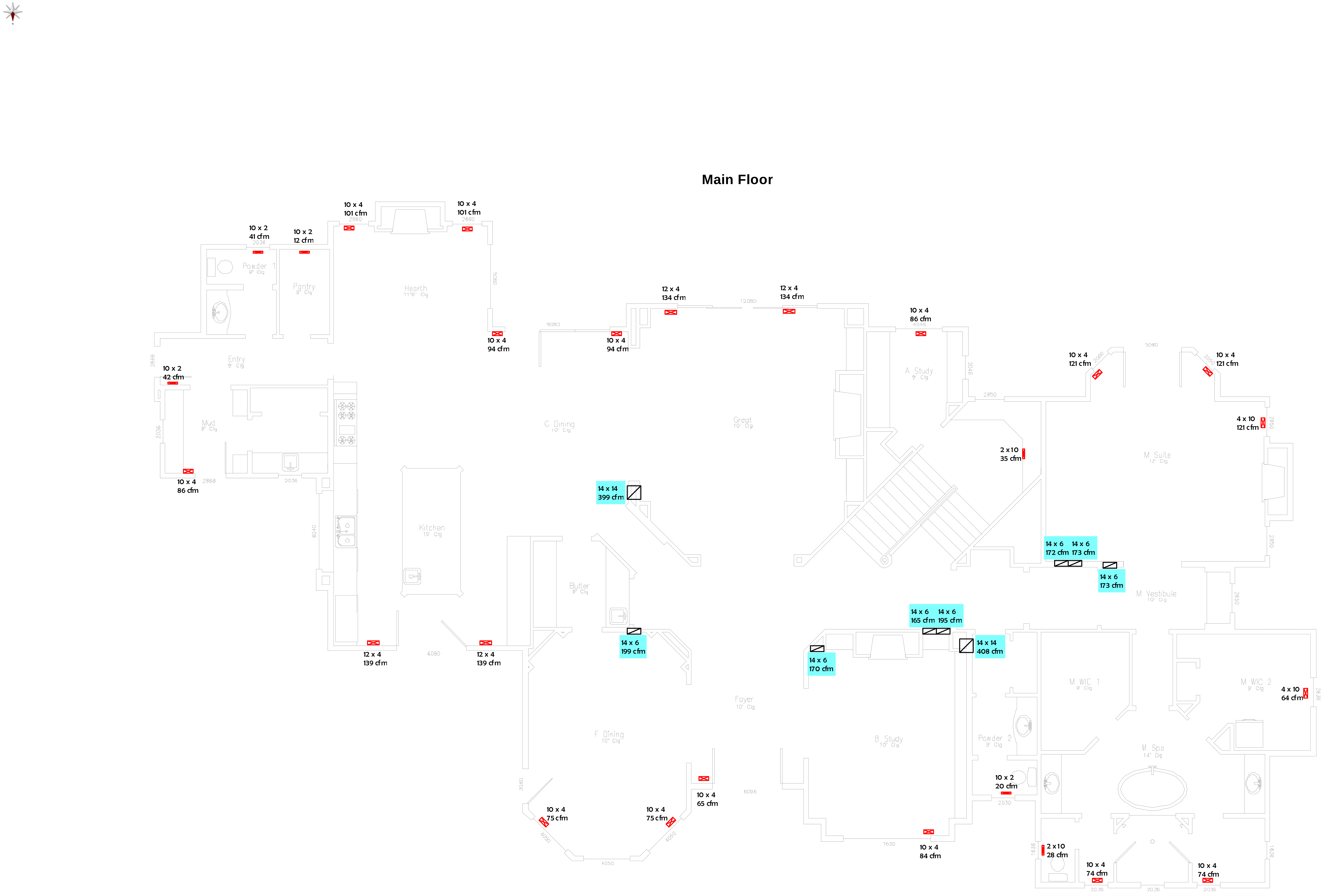
... Comfort - 1110 E LaytonAve.rup

Main Floor



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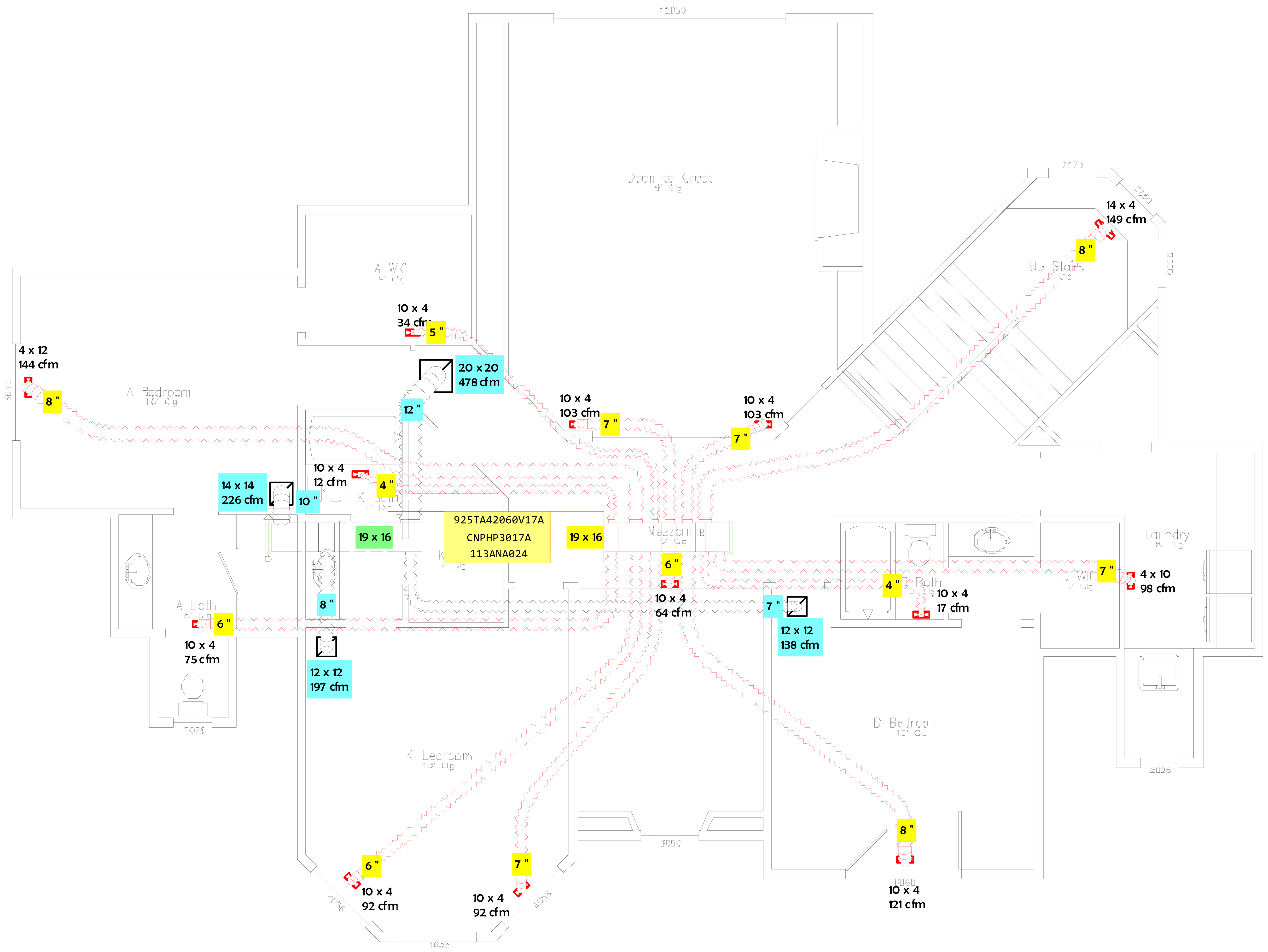
Upper Floor



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Project Summary
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com
Notes: Guest Suite

Design Information

Weather: Denver Stapleton Intl AP, CO, US

Winter Design Conditions

Outside db	1	°F
Inside db	70	°F
Design TD	69	°F

Summer Design Conditions

Outside db	91	°F
Inside db	75	°F
Design TD	16	°F
Daily range	H	
Relative humidity	50	%
Moisture difference	-34	gr/lb

Heating Summary

Structure	10186	Btuh
Ducts	3454	Btuh
Central vent (25 cfm)	1576	Btuh
Humidification	2369	Btuh
Piping	0	Btuh
Equipment load	17585	Btuh

Sensible Cooling Equipment Load Sizing

Structure	4991	Btuh
Ducts	2662	Btuh
Central vent (25 cfm)	361	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.96	
Equipment sensible load	7677	Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

	Heating	Cooling
Area (ft²)	680	680
Volume (ft³)	6335	6335
Air changes/hour	0.27	0.14
Equiv. AVF (cfm)	29	15

Latent Cooling Equipment Load Sizing

Structure	118	Btuh
Ducts	-22	Btuh
Central vent (25 cfm)	-480	Btuh
Equipment latent load	0	Btuh
Equipment total load	7677	Btuh
Req. total capacity at 0.85 SHR	0.8	ton

Heating Equipment Summary

Make Bryant
Trade BRYANT
Model 986TA30040V14A
AHRI ref no. 4706932

Efficiency	96.5	AFUE
Heating input	35776	Btuh
Heating output	34882	Btuh
Temperature rise	48	°F
Actual air flow	800	cfm
Air flow factor	0.059	cfm/Btuh
Static pressure	0.70	in H2O
Space thermostat		

Cooling Equipment Summary

Make Bryant
Trade Legacy 13 SEER
Cond 113ANC018-B
Coil CNPHP2417A
AHRI ref no. 3040616

Efficiency	11.2 EER, 13.2 SEER	
Sensible cooling	15300	Btuh
Latent cooling	2700	Btuh
Total cooling	18000	Btuh
Actual air flow	800	cfm
Air flow factor	0.105	cfm/Btuh
Static pressure	0.70	in H2O
Load sensible heat ratio	1.00	

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

AED Assessment
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

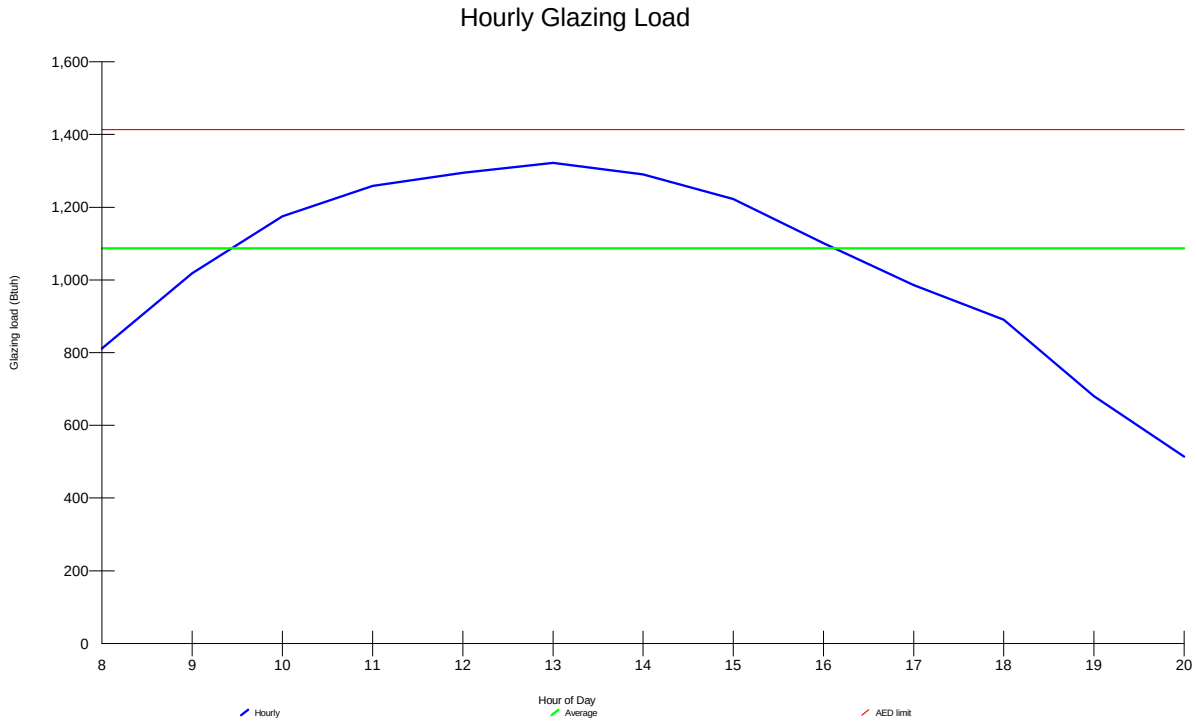
Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Test for Adequate Exposure Diversity



Maximum hourly glazing load exceeds average by 21.5%.

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

AED excursion: 0 Btuh

Building Analysis
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
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6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

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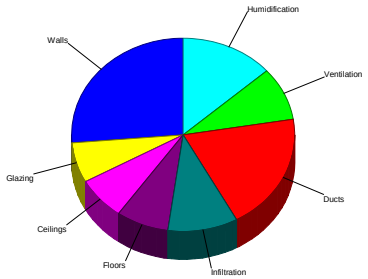
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0
Infiltration:		
Method	Simplified	
Construction quality	Tight	
Fireplaces	1 (Tight)	

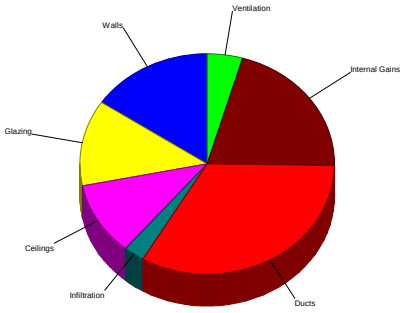
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.2	4628	26.3
Glazing	20.7	1180	6.7
Doors	0	0	0
Ceilings	1.8	1257	7.2
Floors	2.0	1340	7.6
Infiltration	1.5	1781	10.1
Ducts		3454	19.6
Piping		0	0
Humidification		2369	13.5
Ventilation		1576	9.0
Adjustments		0	
Total		**17585**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.1	1247	15.6
Glazing	17.8	1014	12.7
Doors	0	0	0
Ceilings	1.3	858	10.7
Floors	0	0	0
Infiltration	0.2	211	2.6
Ducts		2662	33.2
Ventilation		361	4.5
Internal gains		1660	20.7
Blower		0	0
Adjustments		0	
Total		**8014**	**100.0**



Latent Cooling Load = 0 Btuh
Overall U-value = 0.048 Btuh/ft²-°F

Data entries checked.

Component Constructions
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
7170 W. Radcliff Ave., Littleton, CO 80123
Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Conditions

Location:
Denver Stapleton Intl AP, CO, US
Elevation: 5285 ft
Latitude: 40°N

Outdoor:	Heating	Cooling
Dry bulb (°F)	1	91
Daily range (°F)	-	27 (H)
Wet bulb (°F)	-	60
Wind speed (mph)	15.0	7.5

Indoor:	Heating	Cooling
Indoor temperature (°F)	70	75
Design TD (°F)	69	16
Relative humidity (%)	50	50
Moisture difference (gr/lb)	61.1	-34.0

Infiltration:

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

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								
STD - Frame - R-21 - Stucco: Wood Framed Wall, Stucco Exterior, 1/2" Sheathing, R-21 Cavity Insulation, 1/2" Gypsum Board	n	328	0.061	21.0	4.22	1382	1.14	373
	e	202	0.061	21.0	4.22	851	1.14	229
	s	341	0.061	21.0	4.22	1439	1.14	388
	w	226	0.061	21.0	4.22	956	1.14	258
	all	1097	0.061	21.0	4.22	4628	1.14	1247
Partitions								
(none)								
Windows								
U-30 SHGC-27: U-30 SHGC-27 - Windows; NFRC rated (SHGC=0.27)	n	25	0.300	0	20.7	518	9.97	249
	e	18	0.300	0	20.7	373	30.2	544
	s	14	0.300	0	20.7	290	15.8	221
	all	57	0.300	0	20.7	1180	17.8	1014
Doors								
(none)								
Ceilings								
STD - Attic CLG - R-38: Attic Ceiling, Asphalt Shingles, R-38 Ceiling Insulation, 1/2" Gypsum Board		680	0.027	38.0	1.85	1257	1.26	858
Floors								
STD Floor - R-38: Framed Floor Over Outside Air, R-38 Cavity Insulation, Wood Floor		680	0.029	38.0	1.97	1340	0	0

Right-J® Worksheet
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Guest
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							Entire House				G Bedroom			
1	Room name													
2	Exposed wall						124.0 ft				42.1 ft			
3	Room height						9.3 ft		d		9.0 ft		heat/cool	
4	Room dimensions										13.8 x 15.1 ft			
5	Room area						680.5 ft²				207.4 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	STD - Frame - R-21 -	0.061	n	4.22	1.14	353	328	1382	373	119	119	503	136
.	G	U-30 SHGC-27	0.300	n	20.70	9.97	25	0	518	249	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	220	202	851	229	136	118	497	134
.	G	U-30 SHGC-27	0.300	e	20.70	30.23	18	0	373	544	18	0	373	544
11	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	355	341	1439	388	124	124	522	141
	G	U-30 SHGC-27	0.300	s	20.70	15.76	14	0	290	221	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	226	226	956	258	0	0	0	0
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	680	680	1257	858	207	207	383	262
	F	STD Floor - R-38	0.029	-	1.97	0.00	680	680	1340	0	207	207	408	0
6	c) AED excursion									0				32
	Envelope loss/gain								8405	3120			2687	1248
12	a) Infiltration								1781	211			585	69
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @	230				2			460	2			460
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								10186	4991			3271	1778
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								10186	4991			3271	1778
15	Duct loads						34%	53%	3454	2662	34%	53%	1109	948
	Total room load								13640	7653			4381	2726
	Air required (cfm)								800	800			257	285

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

Right-J® Worksheet
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Guest
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

							G Living 75.2 ft 9.5 ft heat/cool 1.0 x 421.4 ft 421.4 ft²				G Bath 6.8 ft 9.0 ft heat/cool 5.3 x 9.8 ft 51.6 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	STD - Frame - R-21 -	0.061	n	4.22	1.14	186	161	680	183	47	47	199	54
.	G	U-30 SHGC-27	0.300	n	20.70	9.97	25	0	518	249	0	0	0	0
.	W	STD - Frame - R-21 -	0.061	e	4.22	1.14	84	84	354	95	0	0	0	0
.	G	U-30 SHGC-27	0.300	e	20.70	30.23	0	0	0	0	0	0	0	0
11	W	STD - Frame - R-21 -	0.061	s	4.22	1.14	231	217	916	247	0	0	0	0
	G	U-30 SHGC-27	0.300	s	20.70	15.76	14	0	290	221	0	0	0	0
	W	STD - Frame - R-21 -	0.061	w	4.22	1.14	213	213	899	242	14	14	57	15
	C	STD - Attic CLG - R-	0.027	-	1.85	1.26	421	421	779	532	52	52	95	65
	F	STD Floor - R-38	0.029	-	1.97	0.00	421	421	830	0	52	52	102	0
6	c) AED excursion									-29				-4
	Envelope loss/gain								5265	1741			453	131
12	a) Infiltration								1103	131			94	11
	b) Room ventilation								0	0			0	0
13	Internal gains:	Occupants @ 230					0			0	0			0
		Appliances/other								1200				0
	Subtotal (lines 6 to 13)								6367	3072			547	142
	Less external load								0	0			0	0
	Less transfer								0	0			0	0
	Redistribution								0	0			0	0
14	Subtotal								6367	3072			547	142
15	Duct loads						34%	53%	2159	1638	34%	53%	186	76
	Total room load								8526	4710			733	217
	Air required (cfm)								500	492			43	23

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

Load Short Form
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

Project Information

For: Doug Fleming, Royal Comfort Heating & Cooling, Inc.
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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

Design Information

	Htg	Clg
Outside db (°F)	1	91
Inside db (°F)	70	75
Design TD (°F)	69	16
Daily range	-	H
Inside humidity (%)	50	50
Moisture difference (gr/lb)	61	-34

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Tight)

HEATING EQUIPMENT

Make Bryant
Trade BRYANT
Model 986TA30040V14A
AHRI ref no.4706932

Efficiency	96.5 AFUE	
Heating input	35776	Btuh
Heating output	34882	Btuh
Temperature rise	48	°F
Actual air flow	800	cfm
Air flow factor	0.059	cfm/Btuh
Static pressure	0.70	in H2O
Space thermostat		

COOLING EQUIPMENT

Make Bryant
Trade Legacy 13 SEER
Cond 113ANC018-B
Coil CNPHP2417A
AHRI ref no.3040616

Efficiency	11.2 EER, 13.2 SEER	
Sensible cooling	15300	Btuh
Latent cooling	2700	Btuh
Total cooling	18000	Btuh
Actual air flow	800	cfm
Air flow factor	0.105	cfm/Btuh
Static pressure	0.70	in H2O
Load sensible heat ratio	1.00	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
G Bedroom	207	4381	2726	257	285
G Living	421	8526	4710	500	492
G Bath	52	733	217	43	23
Entire House d	680	13640	7653	800	800
Other equip loads		3945	361		
Equip. @ 0.96 RSM			7677		
Latent cooling			0		
TOTALS	680	17585	7677	800	800

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

Duct System Summary
Entire House
Authority Air Designs, LLC.

Job: 1110 E. Layton Ave. - Gu...
Date: Mar 25, 2012
By: Joe Colburn
Plan: Guest Suite

6680 W. 95th Place, Westminster, CO 80021-6422 Phone: (303) 859-2967 Email: Joe@AuthorityAir.com Web: www.AuthorityAir.com

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Phone: (720) 394-2363 Fax: (303) 904-0668
Web: www.RoyalComfortHVAC.net Email: RDougFleming@msn.com

	Heating	Cooling
External static pressure	0.70 in H2O	0.70 in H2O
Pressure losses	0.31 in H2O	0.31 in H2O
Available static pressure	0.39 in H2O	0.39 in H2O
Supply / return available pressure	0.24 / 0.15 in H2O	0.24 / 0.15 in H2O
Lowest friction rate	0.071 in/100ft	0.071 in/100ft
Actual air flow	800 cfm	800 cfm
Total effective length (TEL)	548 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
G Bath	h 733	43	23	0.113	5.0	0x 0	VlFx	14.4	195.0	st1
G Bedroom	c 1363	128	142	0.071	10.0	0x 0	VlFx	25.6	305.0	st1
G Bedroom-A	c 1363	128	142	0.071	10.0	0x 0	VlFx	26.4	305.0	st1
G Living	h 2132	125	123	0.100	8.0	0x 0	VlFx	15.0	220.0	st1
G Living-A	h 2132	125	123	0.095	8.0	0x 0	VlFx	18.6	230.0	st1
G Living-B	h 2132	125	123	0.103	8.0	0x 0	VlFx	8.6	220.0	st1
G Living-C	h 2132	125	123	0.096	8.0	0x 0	VlFx	14.7	230.0	st1

Supply Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st1	Peak AVF	800	800	0.071	427	15.2	16 x 19	DctLinr	

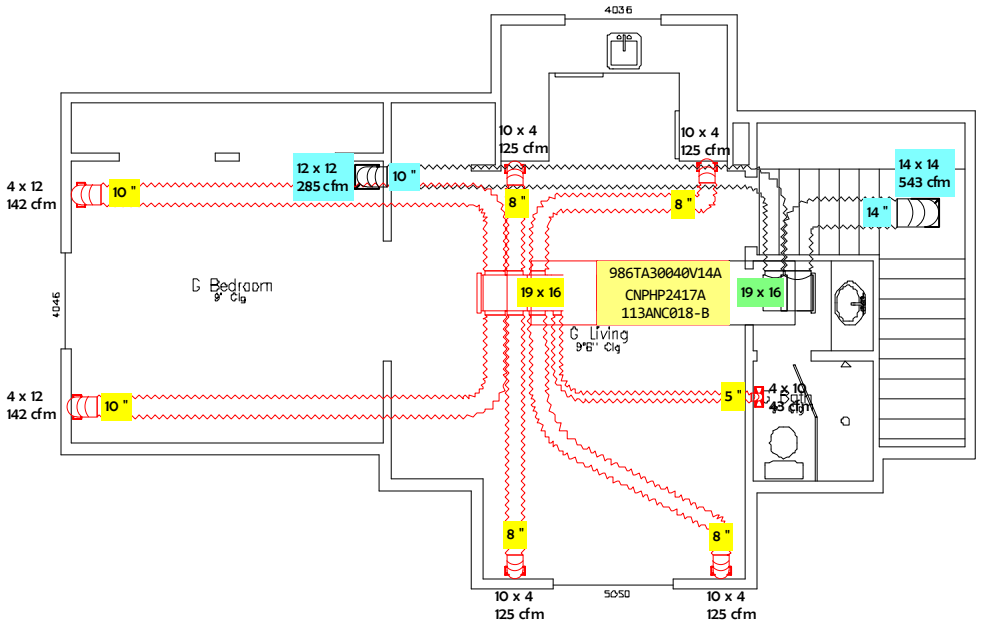
Return Branch Detail Table

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
rb1	0x 0	543	515	216.5	0.071	508	14.0	0x 0		VlFx	rt1
rb3	12x 11	257	285	98.8	0.156	522	10.0	0x 0		VlFx	rt1

Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt1	Peak AVF	800	800	0.071	427	15.3	16 x 19	DctLinr	

Guest



Job #: 1110 E. Layton Ave. - Guest
Performed by Joe Colburn for:
Doug Fleming
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Phone: (720) 394-2363 Fax: (303) 904-0668
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6680 W. 95th Place
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Scale: 1/8" = 1'0"

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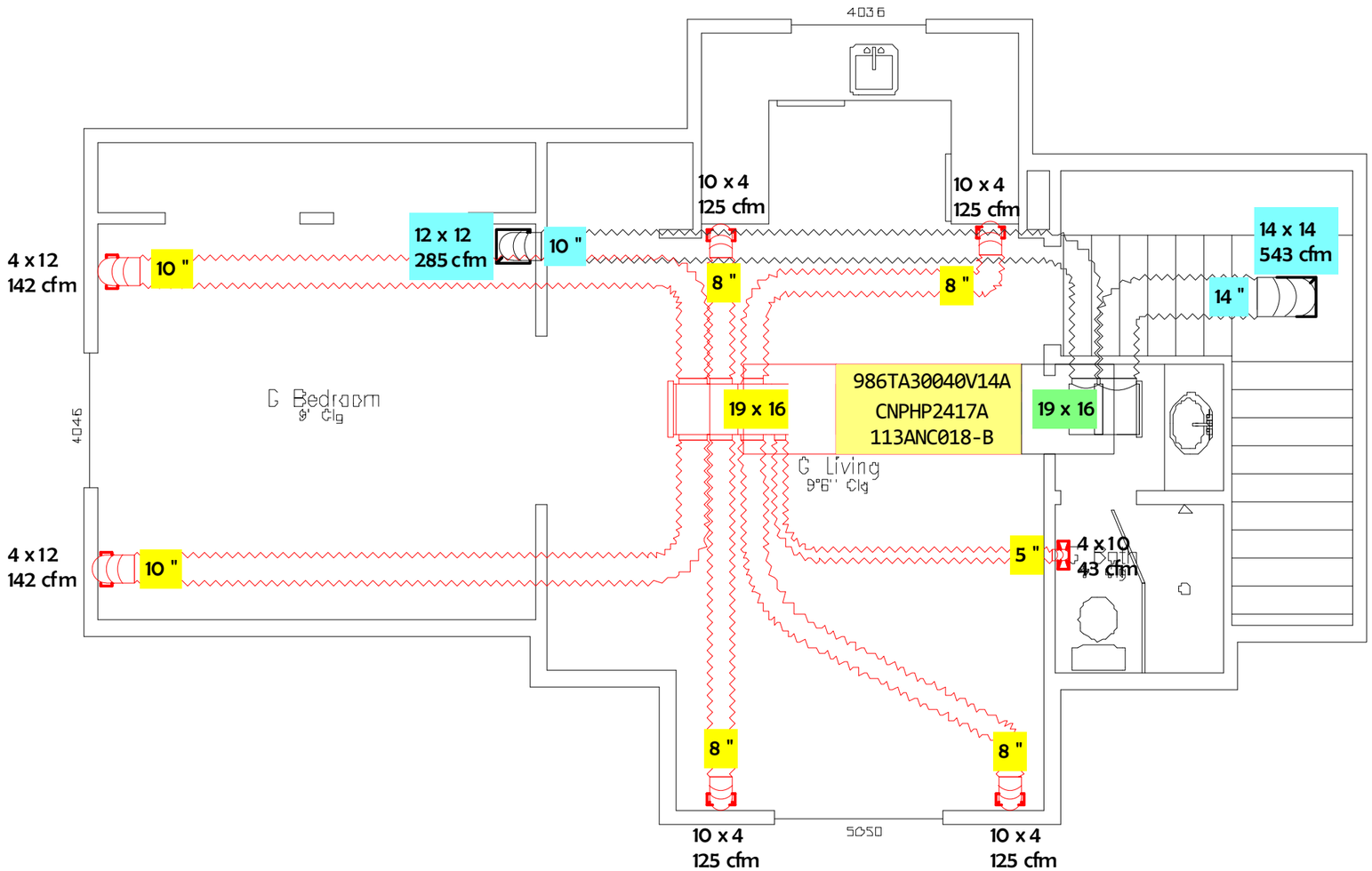
Guest



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Installation and Operating Instructions

3-ZONE CONTROL
ZONEBB3Z(AC/HP)01

Cancels: NEW

II ZONEKIT.0.13
11-04

TABLE OF CONTENTS

NOTE: Read the entire instruction manual before starting the installation.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes and wear safety glasses. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local and state building codes and Sheet Metal and Air Conditioning National Association (SMACNA) for special installation requirements.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit or in instructions and manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which may result in ehanced installation, reliability, or operation.

INSTALLATION CONSIDERATIONS

Before the actual installation of a zoning system can begin, decisions need to be made to determine the number and location of zones. This affects duct and damper selections.

This instruction covers the physical installation and start up of the Bryant 3-Zone system. Use this instruction to guide the actual installation process after all the air side decisions have been made.

1. Install in non-condensing areas with ambients between 32°F and 158°F.
2. A TXV is required on the indoor coil when used with all residential split system equipment.
3. A separate transformer is not needed to power the 3-Zone system. Up to five dampers may be used in each zone by electrically connecting them in parallel.
4. Load calculations must be performed for each zone's peak demand. Size each zone duct for at least its peak demand plus 25%. Size equipment for the building block load, not the sum of zone peak demands. It is important that the equipment not be oversized.
5. When only two zone operation is needed, any two of the three zone connections may be used. There is no inherent priority dependent on zone number.

⚠	**CAUTION: UNIT DAMAGE HAZARD** Failure to follow this caution may result in unit damage. TXV on indoor coil is required with all residential split system equipment.

INTRODUCTION

The Bryant 3-Zone system allows the air conditioning and heating equipment to control temperatures in 3 distinct spaces or zones within a building. Each zone has independent temperature settings controlled by a conventional thermostat.

There are two distinct controllers:

- ZONEBB3ZAC01 - Single Stage Heat / Single Stage Cool using conventional single stage thermostats.
- ZONEBB3ZHP01 - Three Stage Heat / Two Stage Cool compatible for HP and multi-stage application thermostats and equipment.

Each system controller is comprised of a three-zone controller and a duct temperature sensor.

NOTE: Thermostats are purchased separately.

The comfort temperature settings can change automatically through the use of schedules if programmable thermostats are selected. This allows the Bryant 3-Zone to change the temperature settings in zones to reflect occupancy or usage. The Bryant 3-Zone system uses motorized air volume control dampers (also called zone dampers) to regulate the flow of conditioned air into the zones.

INSTALLATION

I. CHECK EQUIPMENT AND JOB SITE

A. Inspect Equipment

File claim with shipping company, prior to installation, if shipment is damaged or incomplete.

II. COMPONENT LOCATION AND WIRING CONSIDERATIONS

> **WARNING: ELECTRICAL SHOCK HAZARD**
> Failure to follow this warning could result in personal injury or death.
> Turn off power to unit before routing control wiring or any service operation. Remember, there may be more than one power supply to unit.

All wiring must comply with national, local, and state codes.

A. Locating Bryant 3-Zone System

All wiring is run back to the Bryant 3-Zone System. Select a location near the furnace or fan coil where wiring from each thermostat, each damper actuator, and the equipment itself can come together easily.

The Bryant 3-Zone System is approved for indoor use only and should never be installed with any of its components exposed to the elements. It may be installed in any area where the temperature remains between 32° and 158°F, and there is no condensation. The cover must be installed to prevent damage from other sources. Do not locate where it will be accessible to children. It may be mounted in either vertical or horizontal position. Remember that wiring access is likely the most important consideration.

> **CAUTION: EQUIPMENT DAMAGE HAZARD**
> Failure to follow this caution may result in equipment damage.
> To prevent possible damage to Bryant 3-Zone System, do not mount control on plenum, duct work, or flush against furnace.

B. Locating Thermostats

For proper operation, each thermostat must accurately measure the temperature within its zone.

For accurate temperature measurement, the following guidelines should be followed:

Thermostat should be mounted:

- Approximately 5 ft. (1.5m) from floor.
- Close to the center of its zone, preferably on an inside wall.
- On a section of wall without pipes or duct work.

Thermostat should NOT be mounted:

- Close to a window, on an outside wall, or next to a door leading to the outside.
- Where it will be exposed to direct light and heat from a lamp, sun, fireplace, or other temperature radiating object which may cause a false reading.
- Close to or in direct airflow from supply registers and return-air grilles.
- In areas with poor air circulation, such as behind a door or in an alcove.

C. Wiring Considerations

All wiring in the Bryant Three-Zone system may be unshielded. Ordinary thermostat wire is ideal. Use 22 gage or larger for normal wiring. Lengths over 100 ft. should use 20 gage or larger wire.

Each damper actuator requires 3 conductors. The connection to thermostats and equipment (furnace or fan coil) could require as many as 8 conductors for a multi-stage installation. The leaving air temperature (LAT) and heat pump temperature (HPT)—*(used with heat pumps only)* sensors require 2 conductors each.

Cables with excess conductors are acceptable. Cut off or fold back and tape any unneeded conductors.

Plan the routing of wiring early to avoid possible problems later on.

Remember all wires converge at the Bryant 3-Zone system, so its location is important.

III. INSTALL COMPONENTS

A. Install Bryant 3-Zone System

The Bryant 3-Zone System is designed so that wires can enter it from behind, above, or below. Plan wire routing before mounting.

1. Open door to access eight mounting screw slots
2. Mount to wall using four screws and wall anchors provided.
3. Level and tighten screws.

B. Install Thermostats

1. Follow manufacturer's supplied instructions for installing thermostats.

> **CAUTION: EQUIPMENT DAMAGE HAZARD**
> Failure to follow this caution may result in equipment damage.
> Improper wiring or installation may damage the thermostats. Check to make sure wiring is correct before proceeding with installation or turning on unit.

IV. INSTALL ZONE DAMPERS

Proper selection and sizing of dampers is important for proper system operation. Selection and sizing information is not provided in this installation instruction.

If duct work requires multiple dampers for a single zone, up to 5 dampers may be wired in parallel.

Zone dampers may be installed in any position.

Install dampers so that actuator is visible for inspection and accessible in the event it would ever need to be serviced. The black mark on the end of damper shaft represents position of damper blade.

The 45 degree actuators on round ducts have their mechanical stops set at 45 degrees. DO NOT CHANGE THIS SETTING. Doing so will allow the actuator to close when it is trying to open. If an actuator is removed, it must be properly aligned when it is reinstalled. Do this by rotating the actuator and the blade to their closed positions and then tightening the actuator to the shaft. This assures alignment at the closed position. (Pressing the blade release button releases the motor and allows the actuator to be manually turned.)

> **CAUTION: EQUIPMENT DAMAGE HAZARD**
> Failure to follow this caution may result in equipment damage.
> When dampers are located in an unconditioned space, condensation is likely to occur in cooling. Regular and severe condensation will damage the actuator. To prevent condensation and losses, all dampers and ductwork in unconditioned space must be insulated or otherwise protected.

Whenever condensation might occur, it is recommended that plastic actuator covers (Part# DAMPACTXXCOV) be used over the actuator. These covers can help prevent condensation on actuators by locking out ambient humidity. Insulation may be applied over the cover to minimize heat transfer.

To install, place the cover over actuator and seal in place over the surrounding insulation with duct tape on all four sides. Sealing need not be perfect because there will be positive pressure inside the cover. Do not mount the dampers with their actuators hanging directly beneath the ductwork. It is best to mount the actuator facing in either the three or nine o'clock position.

For specific duct types, follow instructions below:

A. Round Metal Duct Work

1. Crimp end of branch duct.
2. Slip end of zone damper over end of duct work. Use self-tapping sheet metal screw to secure. (See Fig. 2.)
3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.
4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.)

NOTE: All zone dampers and duct work must be properly supported according to local codes or SMACNA standards.

B. Rectangular Metal Duct Work

1. Make connections using S-lock and drives. (See Fig. 2.)
2. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.

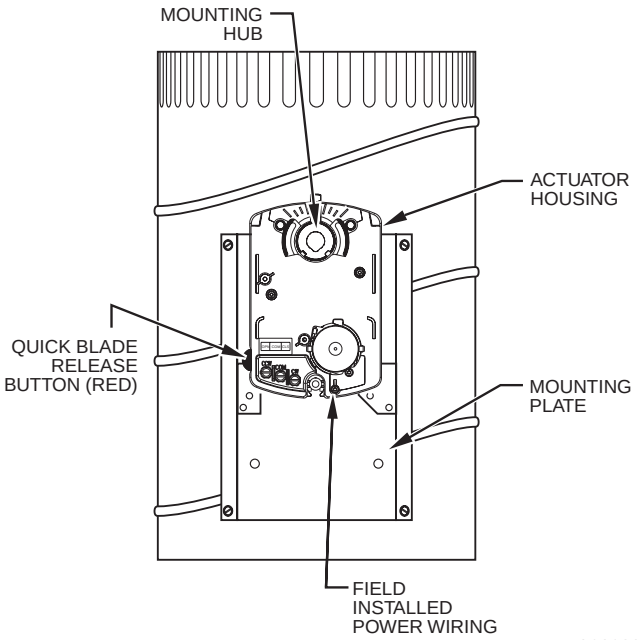

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Fig. 1—Damper 24-vac Connections

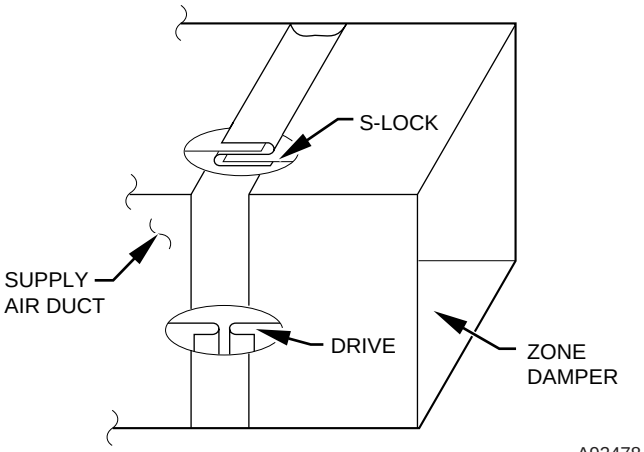

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Fig. 2—Rectangular Metal Duct Work

3. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 3.)

C. Round Flexible Duct Work

1. Slip 1 end of flexible duct work over 1 end of zone damper. (See Fig. 4.)

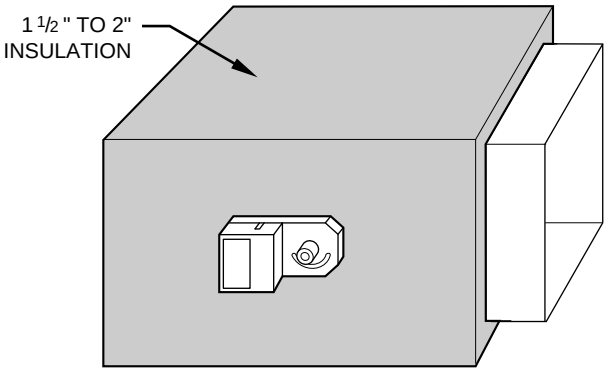

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Fig. 3—Insulated Rectangular Metal Duct Work

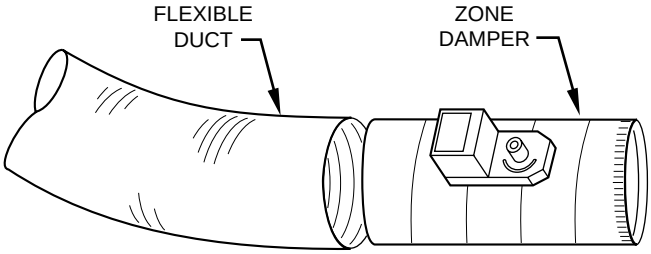

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Fig 4—Round Flexible Duct Work

2. Secure flexible duct to zone damper using SMACNA or other approved method.
3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.
4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 5.)

NOTE: All zone dampers and duct work must be properly supported according to local codes or SMACNA standards.

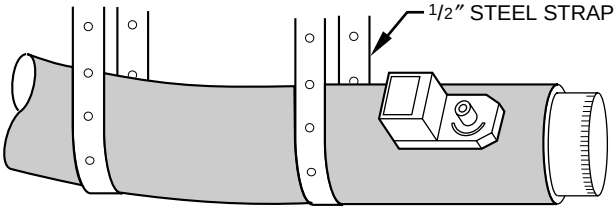

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Fig. 5—Insulated Round Duct Work

D. Rectangular Fibrous Glass Duct Work

1. Insert 1 end of zone damper into 1 end of fibrous glass duct work approximately 2 to 3 in. (See Fig. 6.)
2. Screw field-supplied screws and tabs into zone damper.
3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.
4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 7.)

V. INSTALL BAROMETRIC BYPASS DAMPER

NOTE: The barometric bypass damper is a critical part of Bryant 3-Zone System for controlling noise at minimum airflow. A barometric bypass should be installed unless the duct work and indoor unit have been sized for use without a bypass.

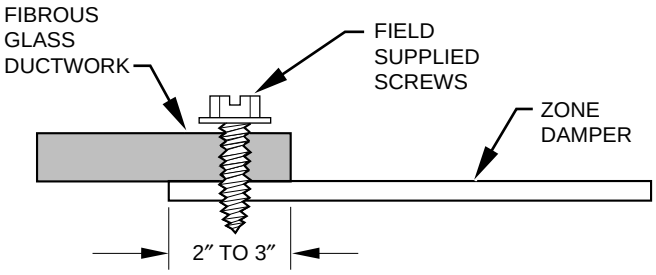

Fig. 6—Rectangular Fibrous Glass Duct Work

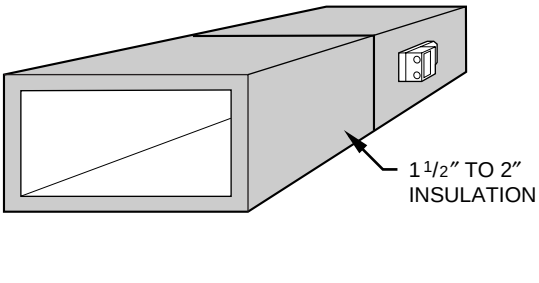

Fig. 7—Insulated Rectangular Fibrous Glass Duct Work

The bypass should be installed according to local codes and SMACNA standards. Be sure bypass is properly supported.

For proper installation, refer to Installation Instructions packaged with barometric bypass.

VI. INSTALL LEAVING AIR TEMPERATURE (LAT) SENSOR

NOTE: The supplied LAT sensor must be installed for normal operation. Heat pump systems may use an optional HPT (heat pump temperature) sensor for added protection. These sensors protect the equipment when leaving air temperatures approach excessive levels.

Locate LAT sensor in main supply trunk after heating and cooling coil and before bypass damper and first branch. The LAT sensor is radiant shielded to prevent heat from affecting correct air temperature.

1. Drill a 1/4-in. hole at location in supply trunk where sensor will be installed.
2. Insert sensor in hole and use as a template to mark the 2 mounting holes.
3. Drill two 1/16-in. holes to accept No. 6 screws through pre-drilled holes in duct temperature sensor back plate.
4. Use 2 No. 6 sheet metal screws to mount duct temperature sensor to unit.
5. Connect sensor to 2-conductor wire using provided wire nuts. (See Fig. 9, 10, or 11 for connection to Bryant 3-Zone System.)

VII. INSTALL HEAT PUMP TEMPERATURE (HPT) SENSOR

The optional HPT sensor is recommended in all heat pump/fan coil installations. If an optional HPT sensor is not used, the 10K ohm resistor attached to the two HPT terminals on the board must be left in place. The HPT sensor measures the temperature of the air leaving the indoor coil. The sensor is to be installed downstream of the indoor coil but before the electric heaters. It can be installed through the wall of the fan coil or may be located entirely inside the fan coil near the blower inlet. Anchor firmly in place with cable ties so that it cannot interfere with the blower wheel.

SYSTEM WIRING

Wiring the system is best done in four steps. Thermostats, Equipment, Dampers, and Remainder. The descriptions below and Table 1 will help you choose the correct wiring diagram for your system. Table 1 also shows the proper setting of dipswitches 9 and 10 for each diagram. Based on the equipment, 3-zone control, and thermostat type, select the appropriate wiring diagram. Terminal designations on all the thermostats are those of Bryant thermostats. Other brands may vary somewhat. Wiring diagrams and 3-Zone Control board layouts are located at the end of this Installation Instruction.

TABLE 1—WIRING DIAGRAM SELECTION CHART

WIRING DIAGRAM	EQUIPMENT	3-ZONE TYPE	STAT TYPE	SWITCH 9	SWITCH 10
Fig. 10	1-spd. AC, 1-Stg. heat	AC	AC	not present	not present
Fig. 11	1-spd. AC, 1 or 2-stg. heat	HP/2S	AC	ON	ON
Fig. 12	1-spd. HP, 1-stg. aux heat	HP/2S	HP	OFF	OFF
Fig. 13	1-spd. HP, 1-stg. aux heat	HP/2S	AC (2 ht)	OFF	ON
Fig. 14	2-spd. AC, 1 or 2-stg. heat	HP/2S	2S (AC)	ON	ON
Fig. 15	2-spd. HP, 1-stg. aux heat	HP/2S	2S (HP)	OFF	OFF

Fig. 8 - Shows the board layout for the AC Control.
Fig. 9 - Shows the board layout for the HP/2S Control.
Fig. 10 - Shows the 3-Zone AC Control wiring. It supports only 1 stage cooling and 1 stage heating.
Fig. 11 - Shows that the 3-Zone HP/2S Control may be used in 1 stage cooling and 1 or 2 stage heating applications. For 2 stage heating, the stat may be a 2 stage heat AC stat or a HP stat converted to AC. (Bryant HP stats can be field converted to 2 stage heat AC stats.)
Fig. 12 - Shows the conventional HP system, using a HP stat. Only single stage auxiliary heat is supported for heat pump systems. Using the HP stat allows control of emergency heat directly from the stat.
Fig. 13 - Is also a HP system, but uses an AC stat with 2 stage heating instead of a HP stat. (Bryant HP stats can be field converted to 2 stage heat AC stats.) Here, emergency heat can only be selected by a switch on the 3-Zone Control.
Fig. 14 - Is a 2 speed AC system and may have 1 or 2 stages of heat. An HP/2S Control and a 2S stat set for AC operation must be used.
Fig. 15 - Is for a 2 speed HP. It requires an HP/2S Control and a 2S stat set for HP operation. Only single stage auxiliary heat is supported for heat pump systems.

I. WIRE THERMOSTATS

All zone thermostats are wired identically, so only the Zone 1 thermostat is shown on the wiring diagrams. For physical location of connections on 3-Zone Control refer to Fig. 8 (AC Control) or 9 (HP Control).

Battery or power stealing thermostats may not require the C connection. Refer to thermostat Installation Instructions. Be careful not to cross zone numbers.

II. WIRE EQUIPMENT

Again, from the selected Fig. 10 through 15, make each connection as shown at the indoor and outdoor units and the 3-zone Control. Connect the equipment R to both Rz and either Rh or Rc. A jumper will be needed. Rc and Rh are internally connected but may be separated by breaking a twist-off (see step 4 below).

III. WIRE DAMPERS

Each damper has three connections: Close, Open, and Common. Find the connection points along the lower left side of the 3-Zone Control. Suggested colors are Close = red; Open = green; Common = white. Field label and make the connections at the dampers and at the 3-Zone Control. Be careful not to cross zone numbers.

IV. WIRE REMAINDER

Connect the LAT sensor to the LAT and LATC terminals. Polarity does not matter. If used, connect the HPT sensor to the HPT and HPTC terminals. If the HPT sensor is not used, you **must** leave the 10K ohm resistor connected in its place.

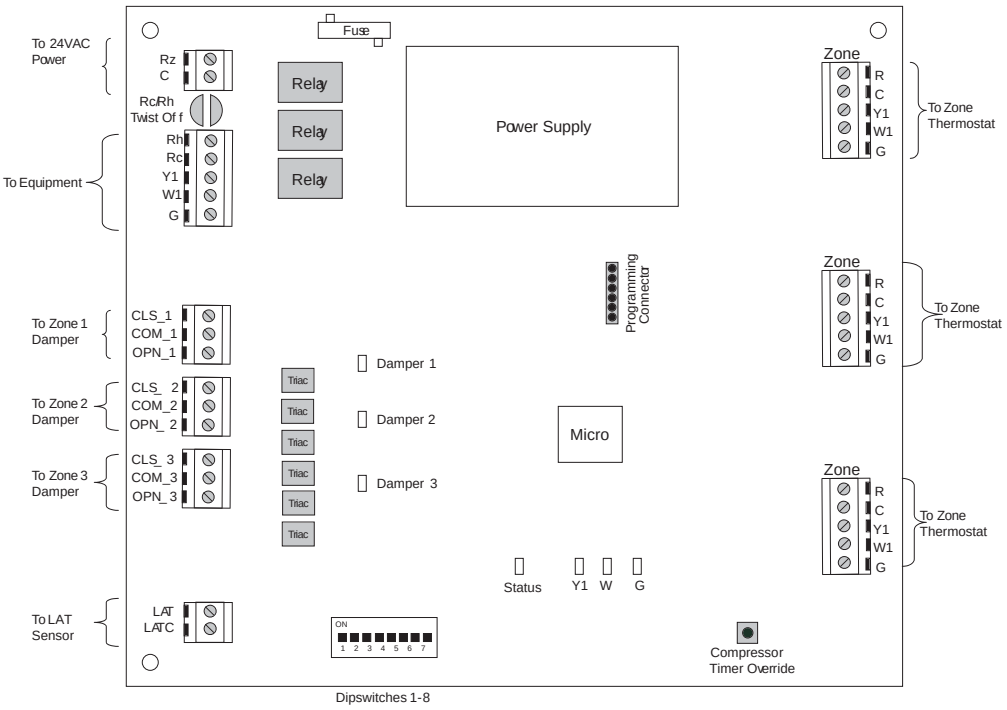

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Fig. 8—AC or 1-Stage System Wiring Diagram

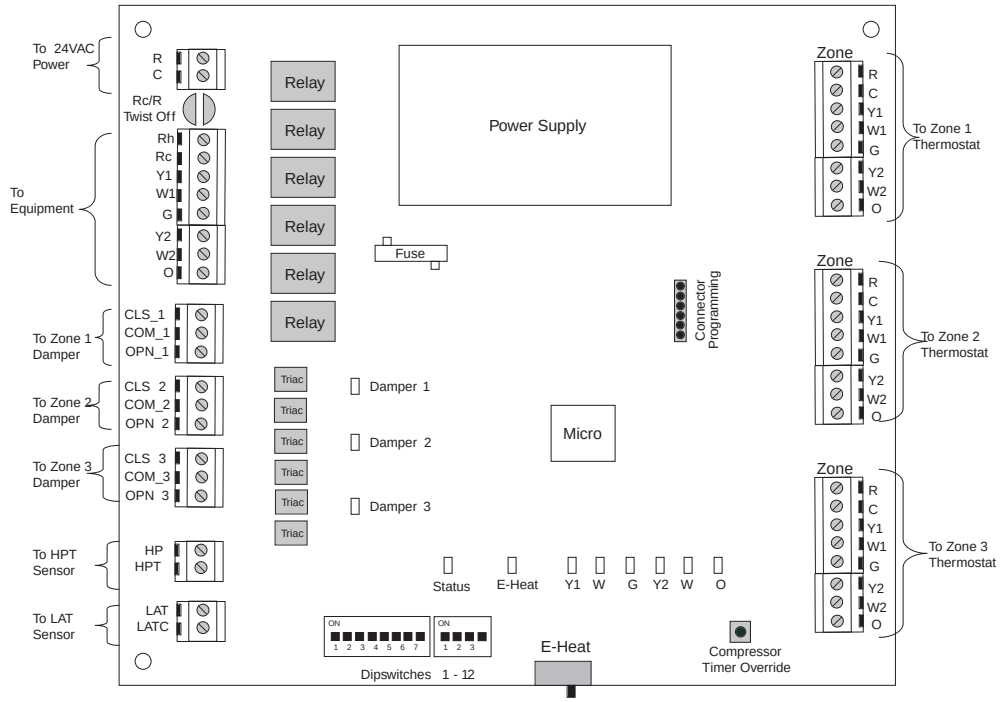

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Fig. 9—HP or 2-Stage System Wiring Diagram

If the cooling and heating systems have separate transformers, twist off the Rc/Rh jumper using a pair of long nosed pliers. Then connect the R of the cooling transformer to Rc, the R of the heating transformer to Rh and the common of both transformers to C. Connect a jumper wire between Rz and Rc. Rc powers G, Y, and O outputs. Rh powers W outputs.

UNDERSTANDING SYSTEM OPERATION (READ BEFORE STARTING SYSTEM)

Mode and Damper Positions

The thermostats determine the system heating or cooling mode. The first call in any zone sets the mode to satisfy that call. It will remain in that mode until all calls in that mode are satisfied and the equipment has been off for the time set by the auto changeover time dipswitches. (See Timers section.)

In normal heating or cooling, the damper of any zone with a call in the current mode will be open and all other zones will be closed. When there is no call, any zone with its fan set to ON will be open, and any zone with its fan set to AUTO will be closed. If any zone fan is set to ON, the blower will be energized.

If all fan settings are AUTO, the dampers will remain in their last position before the equipment turned off and the blower will be off. (This normally means one damper open and all others closed.)

When dampers are to move, all opening is done first, followed by all closing.

Stages

In multi-stage systems, the equipment stage is set by the greatest thermostat call, but may be delayed by the control's cycle and

TABLE 2—LIMIT TEMPERATURE LEVELS AND ACTIONS

LIMIT LEVEL	0	1	2	3	4	5	6	7
Cooling Limit (40 deg) above	47	46	45	44	43	42	41	40
HP limit (115 deg) below	107	108	109	110	111	112	113	115
Heat Limit (130 deg) below	119	121	122	124	125	127	128	130
Heat Limit (145 deg) below	131	133	135	137	139	141	143	145
Heat Limit (160 deg) below	143	145	148	150	153	155	158	160
Heat Limit (175 deg) below	155	158	161	164	166	169	172	175
LIMIT ACTIONS								
″Closed″ Damper Positions	0	2	4	6	8	10	12	14
Allowed stages (1 stg)	1	1	1	1	1	1	1	0
Allowed Stages (2 stg)	2	2	2	1	1	1	1	0
Allowed stages (3 stg)	3	3	3	2	2	1	1	0

staging timers. (See timers explanation below.) The AC Control supports only single stage heat and cool. The HP control supports two stage cooling, two stage furnace heating, and three stage HP heating (lo HP, hi HP, hi HP + aux heat.)

Emergency Heat

Emergency heat (aux heat without compressor heat) can be selected for a HP system by either of two ways: First, by selecting Eheat using the Eheat override switch on the HP Control, or second, selection of Eheat on each of the thermostats, provided they have the Eheat function. When either of these Eheat selections is made, a heating demand provides a W signal without a Y signal to the equipment.

NOTE: The second Eheat method requires HP thermostats and that they all must be set to Eheat.

Indicator LEDs

There are 7 indicator LEDs on the AC Control and an additional 3 on the HP/2S Control. Their locations are shown on Fig. 8 and 9.

Each damper has its own green LED which is ON when the damper opens due to a calling condition or partially open due to an LAT or HPT limit condition.

Each equipment output has its own LED which is on when that output is energized. Y and O outputs are yellow, W outputs are red and the G output is green.

In addition, there is a status LED whose operation is described under the section **Error Codes**.

Timers

To control excessive equipment cycling or rapid staging up, the control has two timers. The cycle timer prevents the same stage from turning on within 10 minutes of the last time it turned on. This allows a stage to turn on for as short or as long as the thermostats request, but will not allow more than six cycles per hour.

The staging timer prevents a higher stage from turning on until the next stage below it has been on for 15 minutes. This minimizes use of electric heat with heat HP systems.

There is also a timegaurd timer which will not allow the compressor to be turned on until it has been off for five minutes.

A changeover timer, which can be set from 0 to 30 minutes, limits the control's ability to switch between heating and cooling. The opposite mode is prevented from coming on until the first mode has been satisfied for the selected time.

Timer Override

A momentary switch is located near the bottom of the control circuit board. Pressing it momentarily overrides all of the system timers, allowing the control to immediately jump to the highest calling stage.

Temperature Limits and Sensors

Both the AC and HP controls have a LAT (leaving air temperature) sensor which is to be placed in the downstream air path of the heating /cooling equipment. It is used in both heating and cooling to limit LAT to a safe value. It must be connected. The system will not operate without it. Its setting is fixed for cooling and is adjustable in four settings for heating. Selection of best setting is discussed under **LAT Limit Selection**.

The HP control also has an optional HPT Sensor (heat pump temperature) which is to be placed downstream of the coil but ahead of the electric heater. This sensor measures the temperature of the air leaving the coil during HP heating. It is not included with the control, but may be ordered separately as part number TSATXXSEN01-B. A 10K ohm resistor is factory installed in its place when the actual sensor is not used. In the HP control only, dipswitch 11 allows the installer to temporarily disable both the LAT and the HPT sensors. Disabling of these sensors is only to be done on a temporary basis.

> ⚠ **CAUTION: UNIT DAMAGE HAZARD**
> Failure to follow this caution could result in unit damage. Operating equipment with sensors disabled can cause permanent damage to HVAC equipment.

Bypass

The purpose of a bypass is to limit noise in the duct system when the dampers are excessively restricting it. When a direct bypass (outlet air fed back directly into the return) is used, bypassing decreases entering air temperature in cooling and increases it in heating. Excessive bypassing will lead to limit trips, either through the LAT /HPT sensors or the equipment internal limits.

Setting the Bypass

Setting the bypass is a balance between too much noise (bypass trip pressure set too high) and excessive bypassing which will cause limit trips, diminishing performance. As a general rule, the bypass should remain closed as much as possible. It should never open when all the dampers are open and only open as much as needed to bring noise to an acceptable level when only one damper is open. (See **System Setup** for details.)

LAT Limit Selection

Cycling on internal equipment limits is to be avoided because it overstresses and can shorten the life of the equipment. Therefore, the LAT limit setting should be selected to trip below the equipment limit. See **System Setup** for details on how to choose one of four available LAT limits.

Limit Levels and Actions

The response of the system to the LAT/HPT sensors are shown in Table 2. Cooling and HP limits are not adjustable. Looking at Table 2, there are eight limit level index numbers, 0 through 7. These represent the closeness of the actual LAT/HPT temperatures to the final shutdown limit. 0 represents no limit challenge while 7 indicates a final shutdown of the equipment. Note that progressive actions are taken by the control as the LAT/HPT limit is approached. Each action progressively reduces the limit challenge by increasing airflow. Normally, the system will stabilize at limit level 1 or 2 because opening all closed dampers 2 or 4 positions (out of 15) will reduce LAT to a level below its limit.

Using Limit Level Indicator

The final setting of the bypass for best performance has always been something of a black art. The 3-Zone System has a new feature to simplify this adjustment. While the system is operating, these limit level numbers, if greater than zero, are flashed on the status LED.

Once the proper LAT limit choice is made based on equipment maximum rise, the limit level indicator assists in setting the bypass pressure adjustment. See **System Setup** for details.

Installer Test Mode

Dipswitch 4 selects a special Installer Test Mode, designed to assist the installer (or service person) to commission the system. It verifies damper movement in proper zone and that the heating and cooling equipment operates properly at each stage. When this mode is selected, by moving dipswitch 4 to ON, the following sequence will be executed once:

Step 1 — Two minutes, one flash of status LED. The blower is energized with G, damper 1 opens, and other dampers are closed.

Step 2 — Two minutes, two flashes of LED: With the blower on, damper 1 closes and damper 2 opens.

Step 3 — Two minutes, three flashes of LED: With the blower ON, damper 3 opens and damper 2 closes.

Step 4 — Two minutes, four flashes of LED: All dampers open, first stage of heat turns on. For HP control only, this is followed by the second stage of heat (HP plus aux heat, hi HP, or hi furnace) for two more minutes. For HP control with two stage compressor, the third stage of heat (hi HP plus aux heat) comes on for a third 2 minute period.

Step 5 — Two minutes, five flashes of LED: All dampers are open and first stage of cooling turns on for 2 minutes. For HP board only, second stage of cooling comes on for an additional 2 minutes.

At the end of Step 5, the control returns to normal operation. To restart the test sequence, the switch must be moved to OFF and then back to ON.

If zoning is disabled (Switch 5 = ON), the procedure above will be followed, except all the dampers will remain open throughout the sequence.

SYSTEM SETUP

Thermostats

Read the thermostat Installation Instructions and be sure to complete the required setup of these devices before using them to bring on the equipment. If the thermostats have a ″zoning″ selection, be sure to turn it on. This will eliminate the timers within the thermostat and allow the 3-Zone control's timers to do their job.

There are 8 dipswitch settings on the AC zone control and an additional 4 on the HP board. Below is a table summarizing their function. Below the table is a more detailed description of what each does and how to set it properly for your application.

TABLE 4—DIPSWITCH SETTINGS FOR HP CONTROL ONLY

DIPSWITCH 2 POSITION	ACTION (OFF)	ACTION (ON)
9	HP Operation	AC Operation
10	HP Thermostat	AC Thermostat
11	LAT and HPT Safeties Enabled	LAT and HPT Safeties Disabled
12	Reversing Valve Energized in Cooling (O)	Reversing Valve Energized in Heating (B)

Dipswitches

Dipswitch 1- This determines whether or not a minimum time must pass before the control is allowed to transition between heating and cooling or vice versa. If it is set to ON, there is no time requirement. Default is OFF.

Dipswitch 2 - This switch, together with dipswitch 3, determines the changeover time, effective if switch 1 is OFF. ON sets 30 minutes. OFF sets 20 minutes. Default is OFF.

Dipswitch 3 - This is a multiplier, modifying the time set on switch 2. ON multiplies the set time by 0.5. OFF multiplies the set time by 1.0. Default is OFF.

Dipswitch 4 - This selects the Installer Test Mode, used to check system operation. Details are provided in section **Installer Test**. ON selects Installer Test. OFF selects normal operation. Default is OFF.

Dipswitch 5 - Enables and disables zoning. ON disables zoning, with all dampers open and zone 1 thermostat controlling. OFF selects normal zoning operation. Default is OFF.

Dipswitch 6 - Selects G ON or OFF with W. Selecting ON causes G to be energized whenever W is energized. Selecting OFF does not bring on G with W. Default is OFF.

Dipswitch 7 and 8 - Sets LAT limit temperature. See **LAT Limit Selection** for proper setting. Default is OFF = 145° limit.

The following dipswitches are on the HP/2S control only:

Dipswitch 9 - Informs the control whether it is connected to a heat pump or an air conditioner. OFF selects HP. ON selects AC. Default is OFF.

Dipswitch 10 - Informs the control of the type of thermostat being used. OFF selects HP thermostat. ON selects AC thermostat. A HP thermostat may **not** be selected if the system selection is AC. A 2-stage heat AC thermostat or a HP thermostat may be used with a single stage HP. Default is OFF (HP).

Dipswitch 11 - Disables LAT and HPT safeties when ON. ON is intended only for emergencies. When ON is selected, there is no over/under temperature protection for the equipment. Default is OFF.

Dipswitch 12 - Informs the control whether the reversing valve is energized in cooling (O function) or heating (B function). ON selects B function. OFF selects O function. Default is OFF.

TABLE 3—DIPSWITCH SETTINGS

DIPSWITCH 1 POSITION	ACTION (OFF)	ACTION (ON)
1	Auto changeover Timer Active	Defeat Auto Changeover Timer
2	Auto Changeover 20 Minutes	Auto Changeover 30 Minutes
3	Auto Changeover Timer X 1	Auto Changeover Timer X .5
4	Normal Operation	Installer Test
5	Zoning Enabled	Zoning Disabled
6	Fan With W Disabled	Fan With W Enabled
7	LAT Setting	LAT Setting
8	LAT Setting	LAT Setting

LAT Limit Selection

To accommodate varying heat rises in furnaces and fan coils, the LAT limit adjustment has four selections: 130, 145, 160 and 175 degrees. In addition to these, the HPT limit is fixed at 115 degrees and the cooling limit (also sensed by LAT sensor) is 40 degrees. To select the proper limit, check or calculate the rated maximum rise of the equipment. Add 75 degrees to this value. Pick the closest LAT limit choice below this value and use dipswitches 7 and 8 to enter this value using:

TABLE 5—LAT LIMIT

TEMPERATURE	SWITCH 7	SWITCH 8
130	OFF	ON
145 (default)	OFF	OFF
160	ON	OFF
175	ON	ON

Take a minute to study the LAT Limit table. Note that the limits are the final shutdown temperatures, but actions begin earlier. First, at levels 1 and 2, closed dampers begin to open gradually, followed at level 3 by staging down of multi stage equipment, if it exists. Under most limit challenges, the system will stabilize between 1 and 3 due to opening of closed dampers.

> ⚠ **CAUTION: UNIT DAMAGE HAZARD**
> Failure to follow this caution could result in unit damage. Setting LAT limit too high can shorten the life of the HVAC equipment.

Automatic Checkout

An automatic checkout procedure is provided which will exercise dampers, heating, and cooling in that order. It is described under the **Understanding System Operation** section in **Installer Test Mode**. This may be used or the system may be checked out manually by creating thermostat calls. When using thermostats, remember that only the calling zoning dampers will be open. This provides the means to select which dampers are open for any heating or cooling call. It is advisable that the initial checkout be made with all dampers open before the bypass is set. This can be done by temporarily setting Switch 5 to ON (disable zoning) and controlling the equipment from the Zone 1 thermostat. When the equipment is operating satisfactorily, return Switch 5 to OFF and proceed to the next section.

Bypass Adjustment

The bypass should be set to the highest possible pressure setting consistent with an acceptable air noise level. To set, operate the system with a call from the smallest zone at its highest airflow (highest may be either heating or cooling). This condition forces the largest amount of air through the smallest duct, creating the highest static pressure at the bypass. Adjust the bypass pressure setting so that the bypass stays closed. Then check to determine if the level of noise and ″blow″ in that zone is acceptable. If it is unacceptable, reduce the bypass pressure setting (see bypass instructions for how to adjust) until it just begins to crack open. Check again, continuing the process until an acceptable noise and ″blow″ level is reached.

If, under this condition, the LAT approaches its limit, the system will open the other closed dampers until the LAT reaches an acceptable level. This operation is acceptable. The system will automatically open dampers enough to keep the LAT at a safe value, and will do it only when the zone demands require it. You may observe the limit level on the status LED (if it is above zero). If it stabilizes at a value of higher than 2, an overly small duct system is indicated and it would be desirable to raise the bypass pressure setting, if possible.

Error Codes

The status LED indicates normal operation, problems, and LAT/HPT limit status according to a two digit code. The first digit flashes its number, followed by a 2 second pause, followed by the second digit, followed by a 4 second pause. The cycle the repeats. The codes are:

TABLE 6—ERROR CODES

ON CONTINUOUSLY	NO PROBLEMS
11 - 17	LAT limit level 1 - 7
21 - 27	HPT limit level 1 - 7
31	LAT shorted
32	LAT open
33	HPT open
34	HPT shorted
41	Invalid: Sw 9=ON; Sw 10=OFF

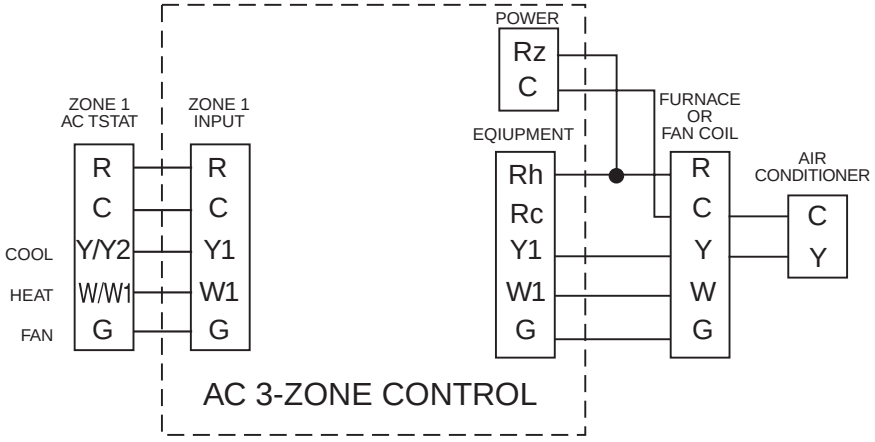

Fig. 10 — AC 3-Zone Control, AC STAT, 1-Stg. AC with 1-Stg. Heat

A04196

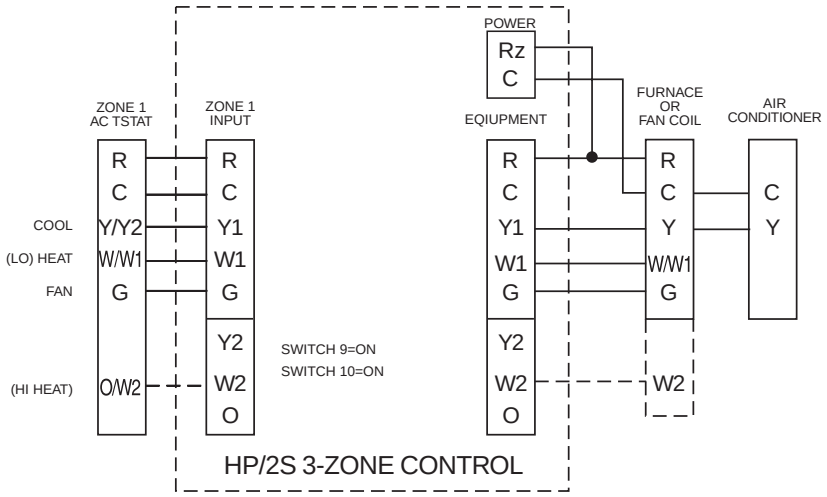

Fig. 11 — HP/2S 3-Zone Control, AC Stat, 1-Stg. AC with 1 or 2-Stg. Heat

A04197

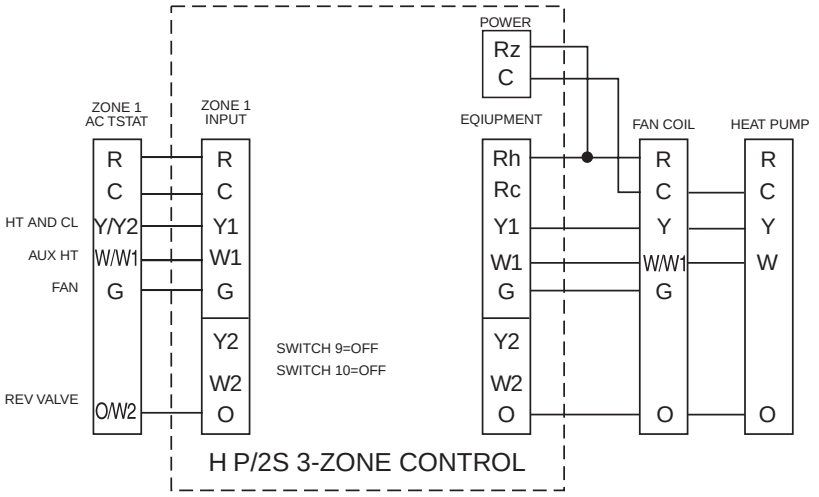

Fig. 12 — HP/2S 3-Zone Control, HP Stat, 1-Stg. HP with 1-Stg. Aux. Heat

A04198

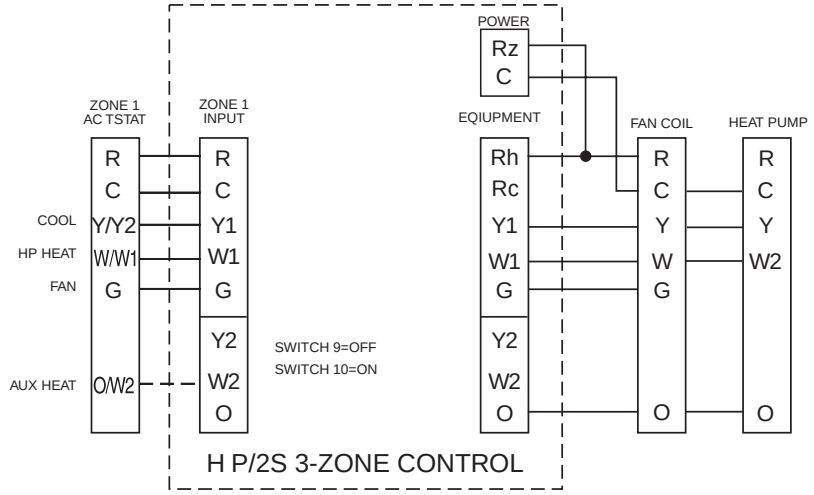

Fig. 13 — HP/2S 3-Zone Control, AC Stat, 1-Stg. HP with 1-Stg. Aux. Heat

A04199

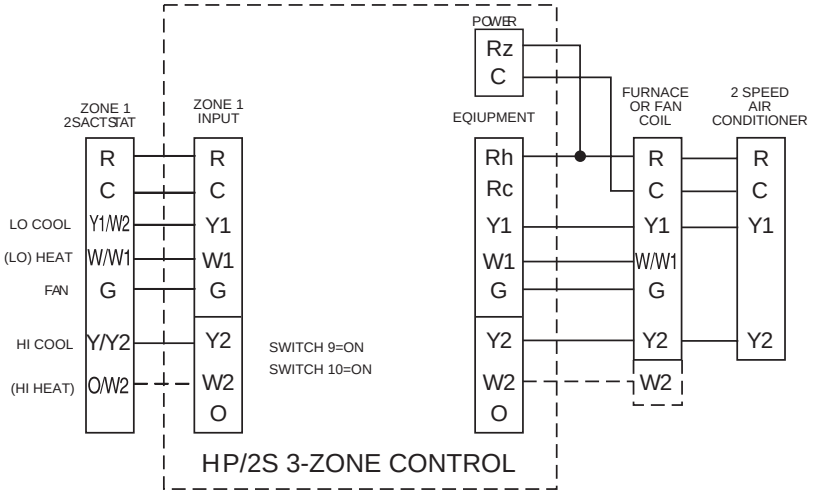

Fig. 14 — HP/2S 3-Zone Control, AC Stat, 2-Spd AC with 1 or 2-Stg. Heat

A04200

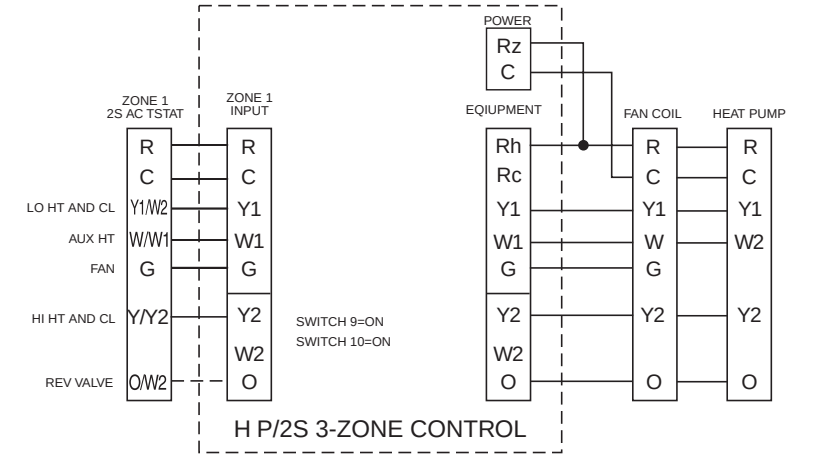

Fig. 15 — HP/2S 3-Zone Control, HP Stat, 2-Spd HP with 1-Stg. Aux. Heat

A04201

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