

DEPARTMENT OF INSPECTIONS, LICENSES & PERMITS 3430 COURT HOUSE DRIVE ELLICOTT CITY, MD 21043 PERMITS (410) 313-2455 INSPECTIONS (410) 313-1850	HOWARD COUNTY RESIDENTIAL HEATING-VENTILATION-AIR CONDITIONING AND REFRIGERATION PERMIT APPLICATION	HVACR PERMIT # <u>mic001360</u> BUILDING PERMIT #
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BUILDING ADDRESS: <u>13615 Triadelphia Mill Road</u> <u>Clarksville, MD 21029</u> SUBDIVISION: <u>0000</u> CENSUS TRACT: <u>28</u> SECTION: <u>0034</u> AREA: <u>0001</u> LOT: <u>28</u> TAX MAP: <u>0034</u> PARCEL: <u>0001</u> BLOCK: <u>9999</u> ZONE:	OWNERS NAME: <u>Serif MoMoney</u> ADDRESS: <u>13615 Triadelphia Mill Road</u> CITY: <u>Clarksville</u> STATE: <u>MD</u> ZIP CODE: <u>21029</u> HOME PHONE: WORK PHONE:
PROPERTY ID: MAP COORDINATES: TYPE OF IMPROVEMENTS: USE:	

CHECK ONE	HOW MANY	COMPANY NAME:
SINGLE FAMILY DWELLING ☒	<u>3</u> ZONES	Ground Loop Heating & Air Cond., Inc.
SINGLE FAMILY TOWNHOUSE ☐	___ ZONES	LICENSEE NAME: <u>Michael E. Cullum</u>
MULTI-FAMILY / HOTEL/MOTEL ☐	___ ROOMS	ADDRESS: <u>1701 Whiteford Road</u>
ASSISTED LIVING HOMES (16 OR FEWER RESIDENTS) ☐	___ ROOMS	CITY: <u>Darlington</u>
		STATE: <u>MD</u> ZIP CODE: <u>21034</u>
		PHONE: <u>410-836-1706</u> HVACR LICENSE NO: <u>6539</u>

New

☐ Heating and Air Conditioning
☒ Geo Thermal System

☐ Heating System Only
☐ Ductless Mini Splits

☐ Other Work (Describe):
☐ Thru The Wall Systems

Replacement

☐ Heating
☐ Air Conditioning
☐ Heating and Air Conditioning

Water Furnace
NVW 048 NDZ072
4ton 6ton

Additions and Alterations

☐ Heating
☐ Air Conditioning
☐ Heating and Air Conditioning

****Replacement Geo Thermal Systems are not required; However, if a tax credit is being sought a permit is required****

Zones Permit Fee = # of Zones x \$40 = <u>120.00</u> Technology Fee (10% of Permit Fee) = <u>12.00</u> Plus Application Fee <u>\$50.00</u> Total Fees Due = <u>182.00</u>	Rooms Permit Fee = # of Rooms x \$80 = _____ Technology Fee (10% of Permit Fee) = _____ Plus Application Fee \$50 <u>\$50.00</u> Total Fees Due = _____
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I HAVE CAREFULLY EXAMINED AND READ THIS APPLICATION AND KNOW IT IS TRUE AND CORRECT. THE WORK DESCRIBED HEREIN WILL BE PERFORMED BY A STATE HVAC LICENSED PERSON(S), AND ALL WORK WILL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS OF HOWARD COUNTY THE STATE OF MARYLAND.

Michael C
 SIGNATURE OF LICENSEE
Michael Cullum
 PRINT NAME OF LICENSEE
linda @ ground loop.com
 Email Address

Approved by State HVAC
 Howard County Health Department
 10/28/16 12/6/16
 DATE

Validation
 Check Number: 24007
 Cash: _____
 Receipt Number: 471194

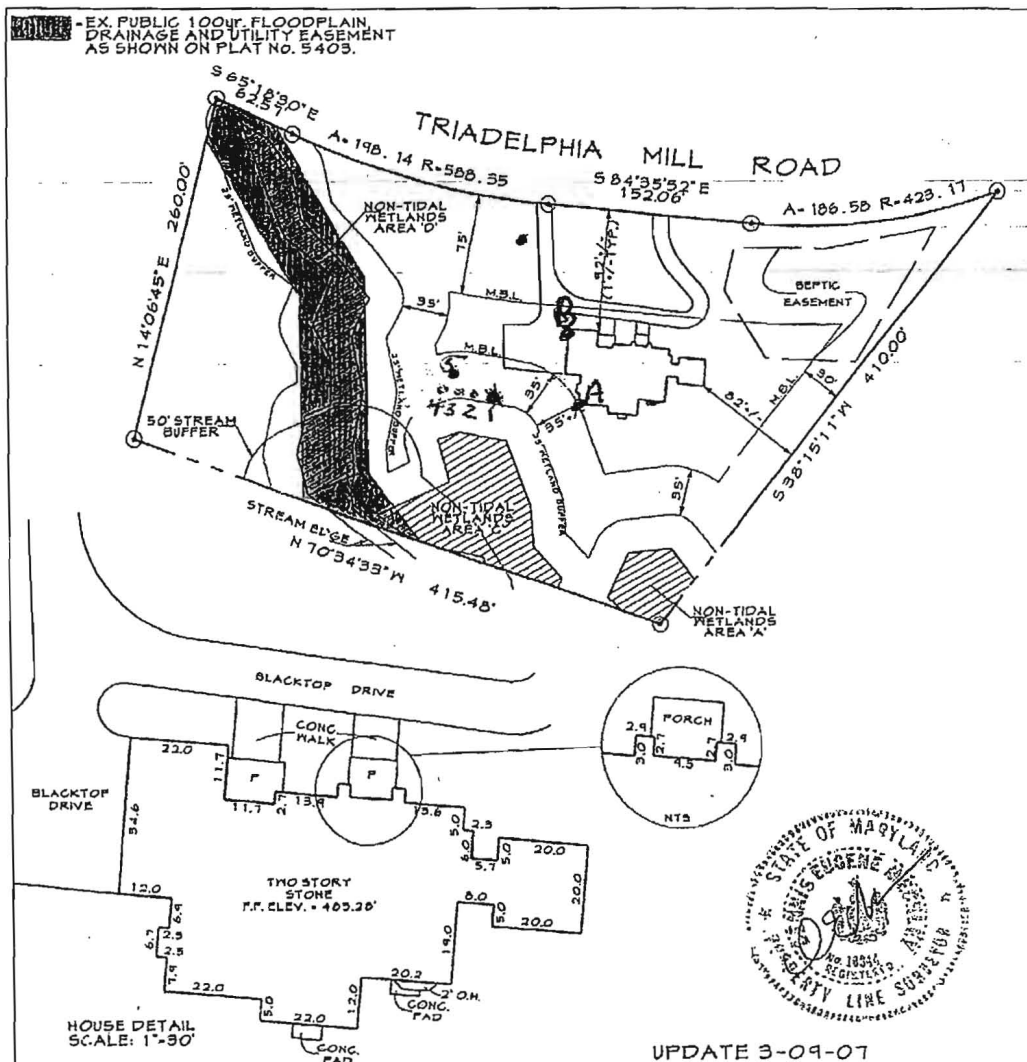
RECEIVED Vertical Loops
 NOV 21 2016
 LICENSES & PERMITS
 DIVISION

Make check payable to: DIRECTOR OF FINANCE OF HOWARD COUNTY
 Word doc: T:\Updated Forms\hvac application
 Rev:10.2009

* Geo boxes not drilled yet.

James M. Vail (12/6/16)

MIL 001360



geo holes

hole #	A	B
1	64	78
5	102	96
4	110	110
3	94	98
2	80	87

A licensed Maryland Surveyor either personally prepared this Location Drawing, or was in responsible charge over its preparation and the surveying work reflected in it, in compliance with the Maryland Minimum Standards of Practice for Land Surveyors.

UPDATE 3-09-07
LOCATION DRAWING
LOT 28

DUNFRETEN ESTATES

5th ELECTION DISTRICT HOWARD COUNTY, MD.
PLATBOOK 16980.

I hereby certify that I have surveyed the property shown hereon for the sole purpose of locating the improvements. This plan is a benefit to the consumer only in so far as it is required by a lender or a title insurance company or its agent in connection with contemplated transfer, financing or refinancing. It is not to be relied upon for the establishment of boundary, easement or right-of-way lines for any reason, such as the location of fences, garages, buildings, or other existing or future improvements.

By Dennis E. Meckley Date 3/20/07
Dennis E. Meckley Property Line Surveyor No. 10844



FREDERICK OFFICE:
3445 Progress Drive, Suite 88
Frederick, MD 21701-4079
(301) 442-5790
FAX (301) 442-4054

WESTMINSTER OFFICE:
439 East Main Street
Westminster, MD 21157-3538
(410) 442-5790
FAX (410) 442-4054

DRAWN BY: CDD
DESIGN BY:
REVIEW BY: DEM
DATE: 7-13-06
SCALE: 1"=100'
JOB NO: 2005030
SHEET: 1 OF 1

owner's

Senif Mumuney
13615 Triadelphia Rd
Clarksville md 21029

HVAC contractor

Ground Loop Htg & Air Cond Co. Inc.
410-836-1706
Contact Scott Cullum

Project Information

For: Serif Mumuney

Design Conditions

Location:

Baltimore, MD, US
Elevation: 154 ft
Latitude: 39°N

Outdoor:

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

Heating

12
-
-
15.0

Cooling

94
19 (M)
75
7.5

Indoor:

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

Heating

71
59
40
38.0

Cooling

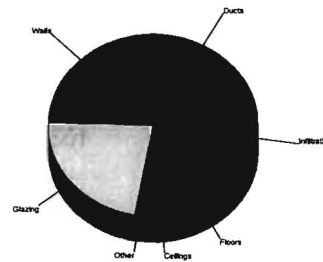
73
21
50
41.3

Infiltration:

Method
Construction quality
FireplacesSimplified
Average
0

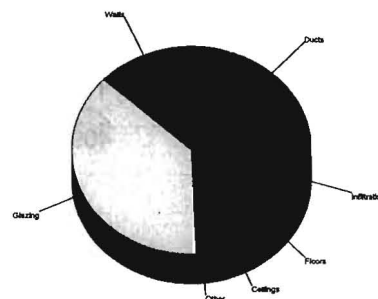
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.3	23419	24.5
Glazing	27.9	21639	22.6
Doors	23.3	1467	1.5
Ceilings	1.6	4900	5.1
Floors	2.3	7172	7.5
Infiltration	3.5	21785	22.8
Ducts		15213	15.9
Piping		0	0
Humidification		0	0
Ventilation		0	0
Adjustments		0	0
Total		95596	100.0



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.5	8063	13.2
Glazing	29.7	22989	37.5
Doors	13.9	878	1.4
Ceilings	1.5	4667	7.6
Floors	0.8	2568	4.2
Infiltration	1.2	7776	12.7
Ducts		14339	23.4
Ventilation		0	0
Internal gains		0	0
Blower		0	0
Adjustments		0	0
Total		61280	100.0

Latent Cooling Load = 12061 Btuh
Overall U-value = 0.082 Btuh/ft²-°F

Data entries checked.

Project Information

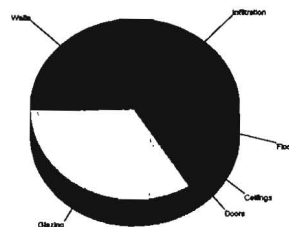
For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		72	70
Elevation: 154 ft		Design TD (°F)		60	24
Latitude: 39°N		Relative humidity (%)		30	50
		Moisture difference (gr/lb)		26.8	47.0
Outdoor:		Heating	Cooling		
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			
		Infiltration:			
		Method	Simplified		
		Construction quality	Average		
		Fireplaces	0		

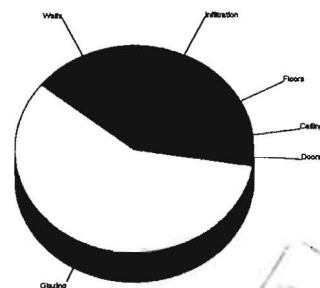
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	4.8	11238	25.2
Glazing	28.1	14984	33.6
Doors	23.3	1467	3.3
Ceilings	1.7	1130	2.5
Floors	2.1	5369	12.1
Infiltration	3.5	10356	23.2
Ducts		0	0
Piping		0	0
Humidification		0	0
Ventilation		0	0
Adjustments		0	0
Total		44544	100.0



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.8	4258	14.3
Glazing	32.5	17325	58.1
Doors	13.9	878	2.9
Ceilings	1.7	1122	3.8
Floors	0.8	2122	7.1
Infiltration	1.4	4094	13.7
Ducts		0	0
Ventilation		0	0
Internal gains		0	0
Blower		0	0
Adjustments		0	0
Total		29800	100.0



Latent Cooling Load = 5043 Btuh
Overall U-value = 0.099 Btuh/ft²-°F

Data entries checked.



Project Information

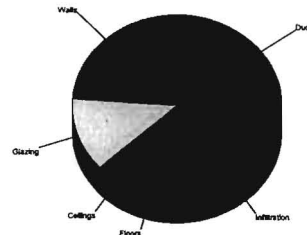
For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		70	75
Elevation: 154 ft		Design TD (°F)		58	19
Latitude: 39°N		Relative humidity (%)		50	50
		Moisture difference (gr/lb)		46.8	36.8
Outdoor:		Infiltration:			
Dry bulb (°F)	12	94	Method	Simplified	
Daily range (°F)	-	19 (M)	Construction quality	Average	
Wet bulb (°F)	-	75	Fireplaces	0	
Wind speed (mph)	15.0	7.5			

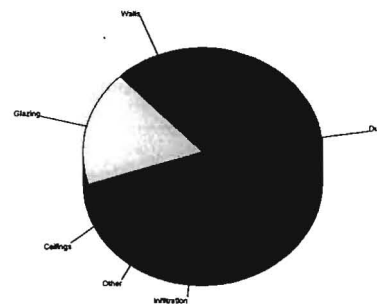
Heating

Component	Btuh/ft²	Btuh	% of load
Walls	3.9	12181	23.9
Glazing	27.5	6655	13.0
Doors	0	0	0
Ceilings	1.5	3770	7.4
Floors	2.9	1803	3.5
Infiltration	3.4	11429	22.4
Ducts		15213	29.8
Piping		0	0
Humidification		0	0
Ventilation		0	0
Adjustments		0	0
Total		51052	100.0



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	1.2	3805	12.1
Glazing	23.4	5664	18.0
Doors	0	0	0
Ceilings	1.4	3545	11.3
Floors	0.7	445	1.4
Infiltration	1.1	3684	11.7
Ducts		14339	45.5
Ventilation		0	0
Internal gains		0	0
Blower		0	0
Adjustments		0	0
Total		31482	100.0



Latent Cooling Load = 7079 Btuh
Overall U-value = 0.065 Btuh/ft²-°F

Data entries checked.

Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		71	73
Elevation: 154 ft		Design TD (°F)		59	21
Latitude: 39°N		Relative humidity (%)		40	50
		Moisture difference (gr/lb)		38.0	41.3
Outdoor:	Heating	Cooling			
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			
		Infiltration:			
		Method	Simplified		
		Construction quality	Average		
		Fireplaces	0		

Construction descriptions

	Or	Area ft²	U-value Btu/h/ft²·°F	Insul R ft²·°F/Btu/h	Htg HTM Btu/h/ft²	Loss Btu/h	Clg HTM Btu/h/ft²	Gain Btu/h
Walls								
12D-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-17 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	518	0.086	15.0	5.13	2660	1.83	947
	e	293	0.086	15.0	5.13	1502	1.83	535
	s	458	0.086	15.0	5.13	2351	1.83	837
	w	365	0.086	15.0	5.13	1874	1.83	667
	all	1634	0.086	15.0	5.13	8387	1.83	2985
12E-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	623	0.068	19.0	3.92	2444	1.06	663
	e	272	0.068	19.0	3.92	1067	1.06	289
	s	705	0.068	19.0	3.92	2765	1.06	750
	w	277	0.068	19.0	3.92	1087	1.06	295
	all	1877	0.068	19.0	3.92	7363	1.06	1997
12E-0sw: Frm wall, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	435	0.068	19.0	3.92	1707	1.47	640
	e	169	0.068	19.0	3.92	663	1.47	249
	s	435	0.068	19.0	3.92	1707	1.47	640
	w	189	0.068	19.0	3.92	742	1.47	278
	all	1228	0.068	19.0	3.92	4818	1.47	1808
12E-0sw: Frm wall, vnl ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	174	0.068	19.0	4.06	706	1.81	315
	ne	77	0.068	19.0	4.06	312	1.81	139
	e	47	0.068	19.0	4.06	191	1.81	85
	se	77	0.068	19.0	4.06	312	1.81	139
	s	174	0.068	19.0	4.06	706	1.81	315
	sw	77	0.068	19.0	4.06	312	1.81	139
	nw	77	0.068	19.0	4.06	312	1.81	139
	all	702	0.068	19.0	4.06	2851	1.81	1273

Partitions
(none)

Windows

10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e
innr, 1/4" gap, 1/4" thk; 6.67 ft head ht

n	36	0.490	0	29.3	1053	12.5	448
n	75	0.470	0	28.1	2104	19.9	1489
n	72	0.490	0	28.3	2036	10.7	773
n	50	0.470	0	27.1	1356	17.5	875
n	20	0.470	0	27.1	542	17.5	350
n	42	0.470	0	28.1	1178	19.9	834
ne	25	0.470	0	28.1	701	39.2	979
e	38	0.470	0	28.1	1052	53.6	2011
e	20	0.470	0	27.1	542	51.3	1026
e	25	0.470	0	28.1	701	53.6	1341
se	25	0.470	0	28.1	701	46.3	1157
s	150	0.470	0	28.1	4209	29.1	4366
s	40	0.470	0	27.1	1094	26.8	1079
s	20	0.470	0	27.1	542	26.8	535
s	42	0.470	0	28.1	1178	29.1	1223
sw	25	0.470	0	28.1	701	46.3	1157
w	25	0.470	0	28.1	701	53.6	1341
w	20	0.470	0	27.1	542	51.3	1026
nw	25	0.470	0	28.1	701	39.2	979
all	775	0.470	0	27.9	21639	29.7	22989

Doors

11D0: Door, wd sc type

n	21	0.390	0	23.3	489	13.9	293
s	42	0.390	0	23.3	978	13.9	586
all	63	0.390	0	23.3	1467	13.9	878

Ceilings

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

348	0.032	30.0	1.91	665	1.90	660
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16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 cell ins, 1/2"
gypsum board int fnsh

2813	0.026	38.0	1.51	4236	1.42	4007
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Floors

19A-19bstp: Part floor, r-19 ins, frm flr, 10" thkns, 1/2" gypsum
board int fnsh

2188	0.049	19.0	2.29	5016	0.91	1983
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19C-19cswp: Flr floor, frm flr, 10" thkns, hrd wd flr fnsh, r-19 cav
ins, tight crwl ovr, r-11 wall insul

348	0.049	30.0	1.01	353	0.40	140
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20P-19c: Flr floor, frm flr, 10" thkns, carpet flr fnsh, r-19 cav ins,
gar ovr

625	0.050	19.0	2.88	1803	0.71	445
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Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		70	75
Elevation: 154 ft		Design TD (°F)		58	19
Latitude: 39°N		Relative humidity (%)		50	50
		Moisture difference (gr/lb)		46.8	36.8
Outdoor:	Heating	Cooling	Infiltration:		
Dry bulb (°F)	12	94	Method	Simplified	
Daily range (°F)	-	19 (M)	Construction quality	Average	
Wet bulb (°F)	-	75	Fireplaces	0	
Wind speed (mph)	15.0	7.5			

Construction descriptions

	Or	Area ft²	U-value Btu/h/ft²·°F	Insul R ft²·°F/Btu/h	Htg HTM Btu/h/ft²	Loss Btu/h	Clg HTM Btu/h/ft²	Gain Btu/h
Walls								
12E-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	623	0.068	19.0	3.92	2444	1.06	663
	e	272	0.068	19.0	3.92	1067	1.06	289
	s	705	0.068	19.0	3.92	2765	1.06	750
	w	277	0.068	19.0	3.92	1087	1.06	295
	all	1877	0.068	19.0	3.92	7363	1.06	1997
12E-0sw: Frm wall, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	435	0.068	19.0	3.92	1707	1.47	640
	e	169	0.068	19.0	3.92	663	1.47	249
	s	435	0.068	19.0	3.92	1707	1.47	640
	w	189	0.068	19.0	3.92	742	1.47	278
	all	1228	0.068	19.0	3.92	4818	1.47	1808
Partitions								
(none)								
Windows								
10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht	n	72	0.490	0	28.3	2036	10.7	773
	n	50	0.470	0	27.1	1356	17.5	875
	n	20	0.470	0	27.1	542	17.5	350
	e	20	0.470	0	27.1	542	51.3	1026
	s	40	0.470	0	27.1	1094	26.8	1079
	s	20	0.470	0	27.1	542	26.8	535
	w	20	0.470	0	27.1	542	51.3	1026
	all	242	0.470	0	27.5	6655	23.4	5664
Doors								
(none)								
Ceilings								
16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		2513	0.026	38.0	1.50	3770	1.41	3545
Floors								
20P-19c: Flr floor, frm flr, 10" thkns, carpet flr fnsh, r-19 cav ins, gar ovr		625	0.050	19.0	2.88	1803	0.71	445

Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		72	70
Elevation: 154 ft		Design TD (°F)		60	24
Latitude: 39°N		Relative humidity (%)		30	50
		Moisture difference (gr/lb)		26.8	47.0
Outdoor:	Heating	Cooling			
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			
		Infiltration:			
		Method	Simplified		
		Construction quality	Average		
		Fireplaces	0		

Construction descriptions

Walls

12D-Obw: Frm wall, brk 8" ext, 3/8" wood shth, r-17 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud

	Or	Area ft²	U-value Btuh/ft²-°F	Insul R ft²-°F/Btuh	Htg HTM Btuh/ft²	Loss Btuh	Clg HTM Btuh/ft²	Gain Btuh
n		518	0.086	15.0	5.13	2660	1.83	947
e		293	0.086	15.0	5.13	1502	1.83	535
s		458	0.086	15.0	5.13	2351	1.83	837
w		365	0.086	15.0	5.13	1874	1.83	667
all		1634	0.086	15.0	5.13	8387	1.83	2985
n		174	0.068	19.0	4.06	706	1.81	315
ne		77	0.068	19.0	4.06	312	1.81	139
e		47	0.068	19.0	4.06	191	1.81	85
se		77	0.068	19.0	4.06	312	1.81	139
s		174	0.068	19.0	4.06	706	1.81	315
sw		77	0.068	19.0	4.06	312	1.81	139
nw		77	0.068	19.0	4.06	312	1.81	139
all		702	0.068	19.0	4.06	2851	1.81	1273

Partitions

(none)

Windows

10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht

n	36	0.490	0	29.3	1053	12.5	448
n	75	0.470	0	28.1	2104	19.9	1489
n	42	0.470	0	28.1	1178	19.9	834
ne	25	0.470	0	28.1	701	39.2	979
e	38	0.470	0	28.1	1052	53.6	2011
e	25	0.470	0	28.1	701	53.6	1341
se	25	0.470	0	28.1	701	46.3	1157
s	150	0.470	0	28.1	4209	29.1	4366
s	42	0.470	0	28.1	1178	29.1	1223
sw	25	0.470	0	28.1	701	46.3	1157
w	25	0.470	0	28.1	701	53.6	1341
nw	25	0.470	0	28.1	701	39.2	979
all	533	0.470	0	28.1	14984	32.5	17325

Doors

11D0: Door, wd sc type

n	21	0.390	0	23.3	489	13.9	293
s	42	0.390	0	23.3	978	13.9	586
all	63	0.390	0	23.3	1467	13.9	878

Ceilings

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

348 0.032 30.0 1.91 665 1.90 660

16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh

300 0.026 38.0 1.55 466 1.54 462

Floors

19A-19bstp: Part floor, r-19 ins, frm flr, 10" thkns, 1/2" gypsum board int fnsh

2188 0.049 19.0 2.29 5016 0.91 1983

19C-19cswp: Flr floor, frm flr, 10" thkns, hrd wd flr fnsh, r-19 cav ins, tight crwl ovr, r-11 wall insul

348 0.049 30.0 1.01 353 0.40 140



Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		72	70
Elevation: 154 ft		Design TD (°F)		60	24
Latitude: 39°N		Relative humidity (%)		30	50
		Moisture difference (gr/lb)		26.8	47.0
Outdoor:	Heating	Cooling			
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			
		Infiltration:			
		Method	Simplified		
		Construction quality	Average		
		Fireplaces	0		

Construction descriptions

	Or	Area ft²	U-value Btu/h/ft²·°F	Insul R ft²·°F/Btu/h	Htg HTM Btu/h/ft²	Loss Btu/h	Clg HTM Btu/h/ft²	Gain Btu/h
Walls								
12D-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-17 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	518	0.086	15.0	5.13	2660	1.83	947
	e	293	0.086	15.0	5.13	1502	1.83	535
	s	458	0.086	15.0	5.13	2351	1.83	837
	w	365	0.086	15.0	5.13	1874	1.83	667
	all	1634	0.086	15.0	5.13	8387	1.83	2985
Partitions (none)								
Windows								
10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht	n	36	0.490	0	29.3	1053	12.5	448
	n	75	0.470	0	28.1	2104	19.9	1489
	e	38	0.470	0	28.1	1052	53.6	2011
	s	150	0.470	0	28.1	4209	29.1	4366
	w	25	0.470	0	28.1	701	53.6	1341
	all	324	0.470	0	28.2	9120	29.8	9655
Doors								
11D0: Door, wd sc type	n	21	0.390	0	23.3	489	13.9	293
	s	42	0.390	0	23.3	978	13.9	586
	all	63	0.390	0	23.3	1467	13.9	878
Ceilings								
16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		300	0.026	38.0	1.55	466	1.54	462
Floors								
19A-19bstp: Part floor, r-19 ins, frm flr, 10" thkns, 1/2" gypsum board int fnsh		2188	0.049	19.0	2.29	5016	0.91	1983

Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		70	75
Elevation: 154 ft		Design TD (°F)		58	19
Latitude: 39°N		Relative humidity (%)		50	50
		Moisture difference (gr/lb)		46.8	36.8
Outdoor:	Heating	Cooling	Infiltration:		
Dry bulb (°F)	12	94	Method	Simplified	
Daily range (°F)	-	19 (M)	Construction quality	Average	
Wet bulb (°F)	-	75	Fireplaces	0	
Wind speed (mph)	15.0	7.5			

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								
12E-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	434	0.068	19.0	3.92	1703	1.06	462
	e	272	0.068	19.0	3.92	1067	1.06	289
	s	490	0.068	19.0	3.92	1921	1.06	521
	w	72	0.068	19.0	3.92	282	1.06	77
	all	1268	0.068	19.0	3.92	4974	1.06	1349
Partitions (none)								
Windows								
10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht	n	36	0.490	0	28.3	1018	10.7	387
	n	50	0.470	0	27.1	1356	17.5	875
	s	30	0.470	0	27.1	823	26.8	812
	all	116	0.470	0	27.5	3196	17.8	2073
Doors (none)								
Ceilings								
16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 cell ins, 1/2" gypsum board int fnsh		133	0.026	38.0	1.50	200	1.41	188
Floors (none)								

Project Information

For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		70	75
Elevation: 154 ft		Design TD (°F)		58	19
Latitude: 39°N		Relative humidity (%)		50	50
		Moisture difference (gr/lb)		46.8	36.8
Outdoor:	Heating	Cooling	Infiltration:		
Dry bulb (°F)	12	94	Method	Simplified	
Daily range (°F)	-	19 (M)	Construction quality	Average	
Wet bulb (°F)	-	75	Fireplaces	0	
Wind speed (mph)	15.0	7.5			

Construction descriptions

Walls

12E-0sw: Frm wall, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud

Or	Area ft²	U-value Btu/h/ft²·°F	Insul R ft²·°F/Btu/h	Htg HTM Btu/h/ft²	Loss Btu/h	Clg HTM Btu/h/ft²	Gain Btu/h
n	435	0.068	19.0	3.92	1707	1.47	640
e	169	0.068	19.0	3.92	663	1.47	249
s	435	0.068	19.0	3.92	1707	1.47	640
w	189	0.068	19.0	3.92	742	1.47	278
all	1228	0.068	19.0	3.92	4818	1.47	1808

Partitions (none)

Windows

4A4-2ov: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht

n	20	0.470	0	27.1	542	17.5	350
e	20	0.470	0	27.1	542	51.3	1026
s	20	0.470	0	27.1	542	26.8	535
all	60	0.470	0	27.1	1627	31.8	1911

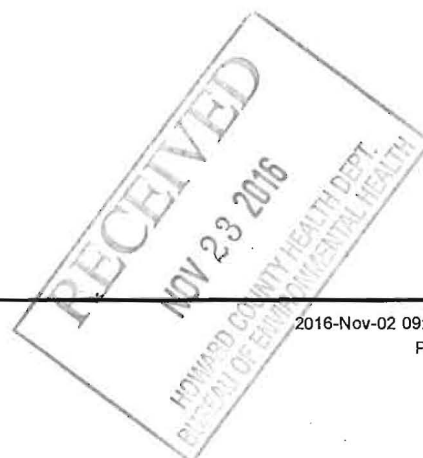
Doors (none)

Ceilings

16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh

1755	0.026	38.0	1.50	-2633	1.41	2475
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Floors (none)



Project Information

For: Serif Mumuney

Design Conditions

Location:			Indoor:		Heating	Cooling
Baltimore, MD, US			Indoor temperature (°F)		72	70
Elevation: 154 ft			Design TD (°F)		60	24
Latitude: 39°N			Relative humidity (%)		30	50
			Moisture difference (gr/lb)		26.8	47.0
Outdoor:	Heating	Cooling	Infiltration:			
Dry bulb (°F)	12	94	Method		Simplified	
Daily range (°F)	-	19 (M)	Construction quality		Average	
Wet bulb (°F)	-	75	Fireplaces		0	
Wind speed (mph)	15.0	7.5				

Construction descriptions

Walls

12E-0sw: Frm wall, vnl ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud

	Or	Area ft²	U-value Btuh/ft²-°F	Insul R ft²-°F/Btuh	Htg HTM Btuh/ft²	Loss Btuh	Clg HTM Btuh/ft²	Gain Btuh
n		174	0.068	19.0	4.06	706	1.81	315
ne		77	0.068	19.0	4.06	312	1.81	139
e		47	0.068	19.0	4.06	191	1.81	85
se		77	0.068	19.0	4.06	312	1.81	139
s		174	0.068	19.0	4.06	706	1.81	315
sw		77	0.068	19.0	4.06	312	1.81	139
nw		77	0.068	19.0	4.06	312	1.81	139
all		702	0.068	19.0	4.06	2851	1.81	1273

Partitions

(none)

Windows

4A4-2ov: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht

n	42	0.470	0	28.1	1178	19.9	834
ne	25	0.470	0	28.1	701	39.2	979
e	25	0.470	0	28.1	701	53.6	1341
se	25	0.470	0	28.1	701	46.3	1157
s	42	0.470	0	28.1	1178	29.1	1223
sw	25	0.470	0	28.1	701	46.3	1157
nw	25	0.470	0	28.1	701	39.2	979
all	209	0.470	0	28.1	5864	36.7	7670

Doors

(none)

Ceilings

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

348	0.032	30.0	1.91	665	1.90	660
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Floors

19C-19cswp: Flr floor, frm flr, 10" thkns, hrd wd flr fnsh, r-19 cav ins, tight cowl ovr, r-11 wall insul

348	0.049	30.0	1.01	353	0.40	140
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Project Information

For: Serif Mumuney

Design Conditions

Location:				Indoor:		Heating	Cooling
Baltimore, MD, US				Indoor temperature (°F)		70	75
Elevation: 154 ft				Design TD (°F)		58	19
Latitude: 39°N				Relative humidity (%)		50	50
				Moisture difference (gr/lb)		46.8	36.8
Outdoor:	Heating	Cooling		Infiltration:			
Dry bulb (°F)	12	94		Method	Simplified		
Daily range (°F)	-	19 (M)		Construction quality	Average		
Wet bulb (°F)	-	75		Fireplaces	0		
Wind speed (mph)	15.0	7.5					

Construction descriptions

	Or	Area ft²	U-value Btu/h/ft²-°F	Insul R ft²-°F/Btu/h	Htg HTM Btu/h/ft²	Loss Btu/h	Clg HTM Btu/h/ft²	Gain Btu/h
Walls								
12E-0bw: Frm wall, brk 8" ext, 3/8" wood shth, r-19 cav ins, 1/2" gypsum board int fnsh, 2"x6" wood frm, 16" o.c. stud	n	189	0.068	19.0	3.92	742	1.06	201
	s	215	0.068	19.0	3.92	844	1.06	229
	w	205	0.068	19.0	3.92	804	1.06	218
	all	609	0.068	19.0	3.92	2389	1.06	648
Partitions (none)								
Windows								
10D-v: 2 glazing, clr outr, air gas, insulated vinyl frm mat, clr low-e innr, 1/4" gap, 1/4" thk; 6.67 ft head ht	n	36	0.490	0	28.3	1018	10.7	387
	s	10	0.470	0	27.1	271	26.8	268
	w	20	0.470	0	27.1	542	51.3	1026
	all	66	0.470	0	27.7	1831	25.5	1680
Doors (none)								
Ceilings								
16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		625	0.026	38.0	1.50	938	1.41	882
Floors								
20P-19c: Flr floor, frm flr, 10" thkns, carpet flr fnsh, r-19 cav ins, gar ovr		625	0.050	19.0	2.88	1803	0.71	445

Project Information

For: Serif Mumuney

Notes:

Design Information

Weather: Baltimore, MD, US

Winter Design Conditions

Outside db	12 °F
Inside db	71 °F
Design TD	59 °F

Summer Design Conditions

Outside db	94 °F
Inside db	73 °F
Design TD	21 °F
Daily range	M
Relative humidity	50 %
Moisture difference	41 gr/lb

Heating Summary

Structure	80383 Btuh
Ducts	15213 Btuh
Central vent (0 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	95596 Btuh

Sensible Cooling Equipment Load Sizing

Structure	46941 Btuh
Ducts	14339 Btuh
Central vent (0 cfm)	0 Btuh
Blower	0 Btuh
Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	61280 Btuh

Infiltration

Method	Simplified	
Construction quality	Average	
Fireplaces	0	
	Heating	Cooling
Area (ft ²)	6804	6804
Volume (ft ³)	59070	59070
Air changes/hour	0.34	0.34
Equiv. AVF (cfm)	340	340

Latent Cooling Equipment Load Sizing

Structure	9486 Btuh
Ducts	2575 Btuh
Central vent (0 cfm)	0 Btuh
Equipment latent load	12061 Btuh
Equipment total load	73341 Btuh
Req. total capacity at 0.70 SHR	7.3 ton

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref.	n/a
Efficiency	n/a
Heating input	0 Btuh
Heating output	0 °F
Temperature rise	0 cfm
Actual air flow	0 cfm/Btuh
Air flow factor	0 in H2O
Static pressure	n/a
Space thermostat	

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref.	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

Bold/italic values have been manually overridden

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

Project Information

For: Serif Mumuney

Notes:

Design Information

Weather: Baltimore, MD, US

Winter Design Conditions

Outside db	12 °F
Inside db	72 °F
Design TD	60 °F

Summer Design Conditions

Outside db	94 °F
Inside db	70 °F
Design TD	24 °F
Daily range	M
Relative humidity	50 %
Moisture difference	47 gr/lb

Heating Summary

Structure	44544 Btuh
Ducts	0 Btuh
Central vent (0 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	44544 Btuh

Sensible Cooling Equipment Load Sizing

Structure	29800 Btuh
Ducts	0 Btuh
Central vent (0 cfm)	0 Btuh
Blower	0 Btuh
Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	29800 Btuh

Infiltration

Method	Simplified	
Construction quality	Average	
Fireplaces	0	
	Heating	Cooling
Area (ft ²)	2536	2536
Volume (ft ³)	26056	26056
Air changes/hour	0.37	0.37
Equiv. AVF (cfm)	159	159

Latent Cooling Equipment Load Sizing

Structure	5043 Btuh
Ducts	0 Btuh
Central vent (0 cfm)	0 Btuh
Equipment latent load	5043 Btuh
Equipment total load	34843 Btuh
Req. total capacity at 0.70 SHR	3.5 ton

Heating Equipment Summary

Make	
Trade	
Model	
AHRI ref	
Efficiency	80 AFUE
Heating input	0 Btuh
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	1816 cfm
Air flow factor	0.041 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	

Cooling Equipment Summary

Make	
Trade	
Cond	
Coil	
AHRI ref	
Efficiency	0 SEER
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	1816 cfm
Air flow factor	0.061 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0.86

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

Project Information

For: Serif Mumuney

Notes:

Design Information

Weather: Baltimore, MD, US

Winter Design Conditions

Outside db	12 °F
Inside db	70 °F
Design TD	58 °F

Summer Design Conditions

Outside db	94 °F
Inside db	75 °F
Design TD	19 °F
Daily range	M
Relative humidity	50 %
Moisture difference	37 gr/lb

Heating Summary

Structure	35838 Btuh
Ducts	15213 Btuh
Central vent (0 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	51052 Btuh

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	0

	Heating	Cooling
Area (ft ²)	4268	4268
Volume (ft ³)	33014	33014
Air changes/hour	0.33	0.33
Equiv. AVF (cfm)	181	181

Heating Equipment Summary

Make	
Trade	
Model	
AHRI ref	
Efficiency	80 AFUE
Heating input	0 Btuh
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	1196 cfm
Air flow factor	0.023 cfm/Btuh
Static pressure	0 in H ₂ O
Space thermostat	

Sensible Cooling Equipment Load Sizing

Structure	17143 Btuh
Ducts	14339 Btuh
Central vent (0 cfm)	0 Btuh
Blower	0 Btuh

Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	31482 Btuh

Latent Cooling Equipment Load Sizing

Structure	4504 Btuh
Ducts	2575 Btuh
Central vent (0 cfm)	0 Btuh
Equipment latent load	7079 Btuh

Equipment total load	38561 Btuh
Req. total capacity at 0.70 SHR	3.7 ton

Cooling Equipment Summary

Make	
Trade	
Cond	
Coil	
AHRI ref	
Efficiency	0 SEER
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	1196 cfm
Air flow factor	0.038 cfm/Btuh
Static pressure	0 in H ₂ O
Load sensible heat ratio	0.82

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



Project Information

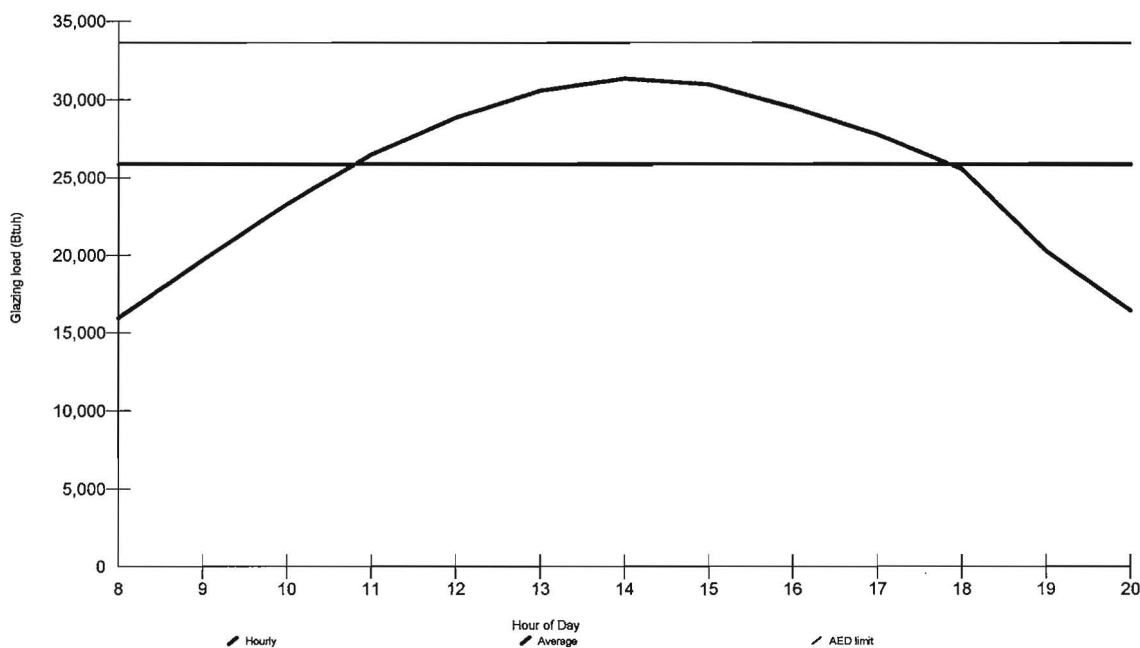
For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		71	73
Elevation: 154 ft		Design TD (°F)		59	21
Latitude: 39°N		Relative humidity (%)		40	50
		Moisture difference (gr/lb)		38.0	41.3
Outdoor:		Heating	Cooling	Infiltration:	
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			

Test for Adequate Exposure Diversity

Hourly Glazing Load



Maximum hourly glazing load exceeds average by 21.2%.

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

AED excursion: 0 Btuh

Project Information

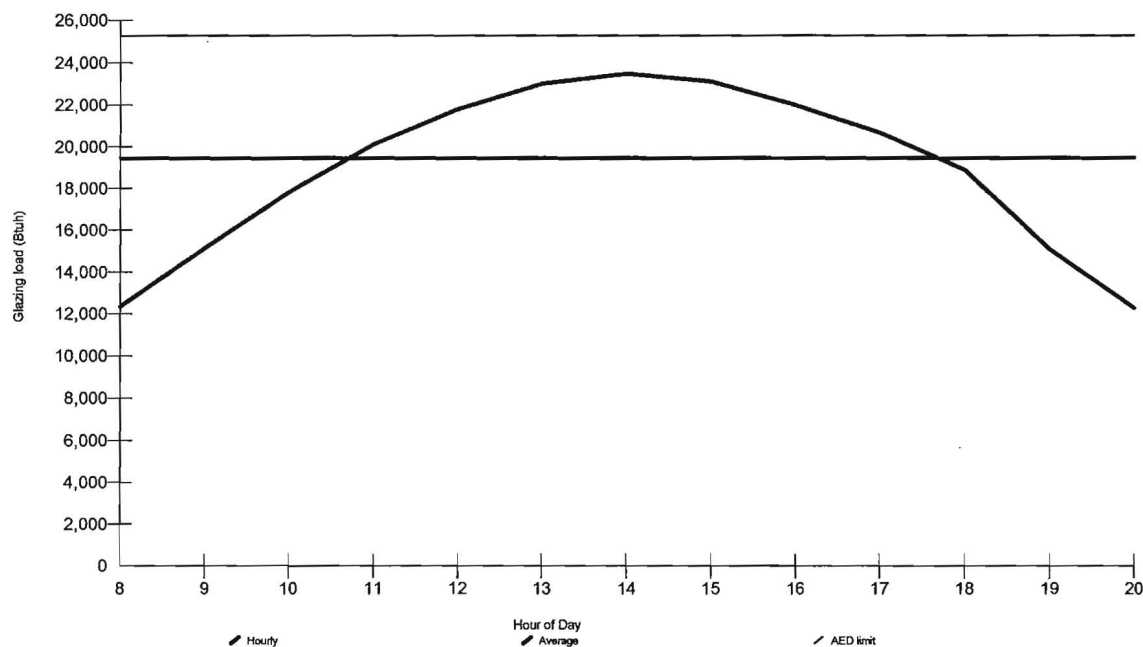
For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		72	70
Elevation: 154 ft		Design TD (°F)		60	24
Latitude: 39°N		Relative humidity (%)		30	50
Outdoor:		Moisture difference (gr/lb)		26.8	47.0
		Heating	Cooling	Infiltration:	
Dry bulb (°F)		12	94		
Daily range (°F)		-	19 (M)		
Wet bulb (°F)		-	75		
Wind speed (mph)		15.0	7.5		

Test for Adequate Exposure Diversity

Hourly Glazing Load



Maximum hourly glazing load exceeds average by 20.7%.

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

AED excursion: 0 Btuh

Project Information

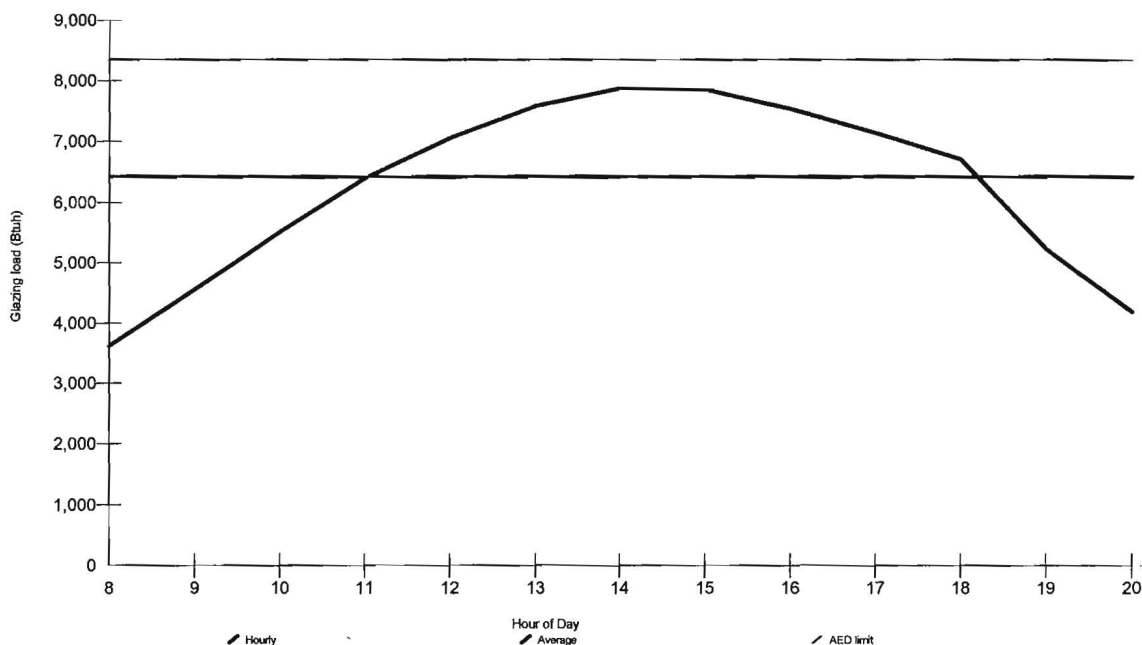
For: Serif Mumuney

Design Conditions

Location:		Indoor:		Heating	Cooling
Baltimore, MD, US		Indoor temperature (°F)		70	75
Elevation: 154 ft		Design TD (°F)		58	19
Latitude: 39°N		Relative humidity (%)		50	50
		Moisture difference (gr/lb)		46.8	36.8
Outdoor:		Heating	Cooling	Infiltration:	
Dry bulb (°F)	12	94			
Daily range (°F)	-	19 (M)			
Wet bulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			

Test for Adequate Exposure Diversity

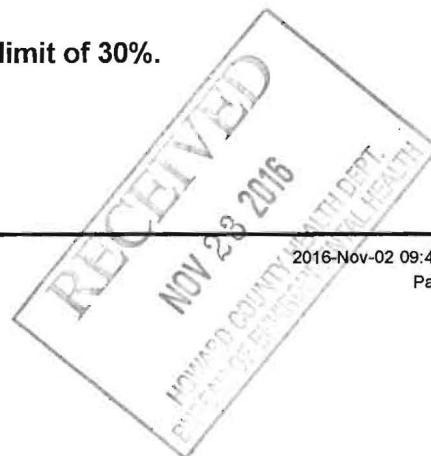
Hourly Glazing Load



Maximum hourly glazing load exceeds average by 22.6%.

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

AED excursion: 0 Btuh



1	Room name					Entire House				SECOND					
2	Exposed wall					709.9 ft				432.0 ft					
3	Room height					8.7 ft				7.7 ft					
4	Room dimensions					6804.0 ft²				4268.0 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	12D-0bw	0.086	n	5.13	1.83	650	518	2660	947	0	0	0	0	
	G	10D-v	0.490	n	29.25	12.45	36	0	1053	448	0	0	0	0	
	G	4A4-2ov	0.470	n	28.06	19.85	75	0	2104	1489	0	0	0	0	
11	D	11D0	0.390	n	23.28	13.94	21	21	489	293	0	0	0	0	
	W	12E-0bw	0.068	n	3.92	1.06	745	623	2444	663	745	623	2444	663	
	G	10D-v	0.490	n	28.27	10.74	72	0	2036	773	72	0	2036	773	
	G	4A4-2ov	0.470	n	27.12	17.50	50	0	1356	875	50	0	1356	875	
	W	12E-0sw	0.068	n	3.92	1.47	455	435	1707	640	455	435	1707	640	
	G	4A4-2ov	0.470	n	27.12	17.50	20	0	542	350	20	0	542	350	
	W	12E-0sw	0.068	n	4.06	1.81	216	174	706	315	0	0	0	0	
	G	4A4-2ov	0.470	n	28.06	19.85	42	0	1178	834	0	0	0	0	
	W	12E-0sw	0.068	ne	4.06	1.81	102	77	312	139	0	0	0	0	
	G	4A4-2ov	0.470	ne	28.06	39.17	25	0	701	979	0	0	0	0	
	W	12D-0bw	0.086	e	5.13	1.83	330	293	1502	535	0	0	0	0	
	G	4A4-2ov	0.470	e	28.06	53.63	38	0	1052	2011	0	0	0	0	
	W	12E-0bw	0.068	e	3.92	1.06	272	272	1067	289	272	272	1067	289	
	W	12E-0sw	0.068	e	3.92	1.47	189	169	663	249	189	169	663	249	
	G	4A4-2ov	0.470	e	27.12	51.28	20	0	542	1026	20	0	542	1026	
	W	12E-0sw	0.068	e	4.06	1.81	72	47	191	85	0	0	0	0	
	G	4A4-2ov	0.470	e	28.06	53.63	25	0	701	1341	0	0	0	0	
	W	12E-0sw	0.068	se	4.06	1.81	102	77	312	139	0	0	0	0	
	G	4A4-2ov	0.470	se	28.06	46.30	25	0	701	1157	0	0	0	0	
	W	12D-0bw	0.086	s	5.13	1.83	650	458	2351	837	0	0	0	0	
	G	4A4-2ov	0.470	s	28.06	29.11	150	0	4209	4366	0	0	0	0	
	D	11D0	0.390	s	23.28	13.94	42	42	978	586	0	0	0	0	
	W	12E-0bw	0.068	s	3.92	1.06	745	705	2765	750	745	705	2765	750	
	G	4A4-2ov	0.470	s	27.12	26.76	40	0	1094	1079	40	0	1094	1079	
	W	12E-0sw	0.068	s	3.92	1.47	455	435	1707	640	455	435	1707	640	
	G	4A4-2ov	0.470	s	27.12	26.76	20	0	542	535	20	0	542	535	
	W	12E-0sw	0.068	s	4.06	1.81	216	174	706	315	0	0	0	0	
	G	4A4-2ov	0.470	s	28.06	29.11	42	0	1178	1223	0	0	0	0	
	W	12E-0sw	0.068	sw	4.06	1.81	102	77	312	139	0	0	0	0	
	G	4A4-2ov	0.470	sw	28.06	46.30	25	0	701	1157	0	0	0	0	
	W	12D-0bw	0.086	w	5.13	1.83	390	365	1874	667	0	0	0	0	
	G	4A4-2ov	0.470	w	28.06	53.63	25	0	701	1341	0	0	0	0	
	W	12E-0bw	0.068	w	3.92	1.06	297	277	1087	295	297	277	1087	295	
	G	4A4-2ov	0.470	w	27.12	51.28	20	0	542	1026	20	0	542	1026	
	W	12E-0sw	0.068	w	3.92	1.47	189	189	742	278	189	189	742	278	
	W	12E-0sw	0.068	nw	4.06	1.81	102	77	312	139	0	0	0	0	
	G	4A4-2ov	0.470	nw	28.06	39.17	25	0	701	979	0	0	0	0	
	C	16B-30ad	0.032	-	1.91	1.90	348	348	665	660	0	0	0	0	
	C	16B-38ad	0.026	-	1.51	1.42	2813	2813	4236	4007	2513	2513	3770	3545	
	F	19A-19bstp	0.049	-	2.29	0.91	2188	2188	5016	1983	0	0	0	0	
	F	19C-19cswp	0.049	-	1.01	0.40	348	348	353	140	0	0	0	0	
	F	20P-19c	0.050	-	2.88	0.71	625	625	1803	445	625	625	1803	445	
6	c) AED excursion									0				0	
	Envelope loss/gain									58598	39165			24410	13459
12	a) Infiltration									21785	7776			11429	3684
	b) Room ventilation									0	0			0	0
13	Internal gains: Occupants @ 230 Appliances/other							0		0	0			0	0
	Subtotal (lines 6 to 13)									80383	46941			35838	17143
	Less external load									0	0			0	0
	Less transfer									0	0			0	0
	Redistribution									0	0			0	0
14	Subtotal									80383	46941			35838	17143
15	Duct loads							19%	31%	15213	14339	42%	84%	15213	14339
	Total room load									95596	61280			51052	31482
	Air required (cfm)									3013	3013			1196	1196

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

