BUILDING INFORMATION

Category:	**Non-residential**
Status:	**In planning**
Building type:	**New construction**
Year of construction:	
Units:	**1**
Number of occupants:	**262 (Design)**

Boundary conditions

Climate:	**Portland, ME**	
Internal heat gains:	**0.6**	Btu/hr ft²
Interior temperature:	**68**	°F
Overheat temperature:	**77**	°F

Building geometry

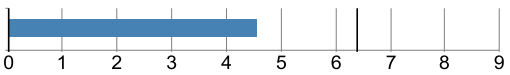
Enclosed volume:	**308264**	ft³
Total area envelope:	**33739.9**	ft²
AV ratio:	**0.1**	1/ft
Floor area:	**21475**	ft²

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

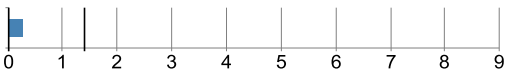
Heating demand

specific:	**4.56**	kBtu/ft²yr
target:	**6.4**	kBtu/ft²yr
total:	97817.96	kBtu/yr



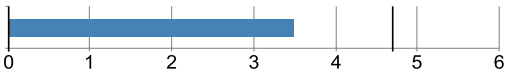
Cooling demand

specific:	**0.27**	kBtu/ft²yr
target:	**1.4**	kBtu/ft²yr
total:	5880.5	kBtu/yr
latent:	0.03	kBtu/ft²yr



Heating load

specific:	**3.5**	Btu/hr ft²
target:	**4.7**	Btu/hr ft²
total:	75188.52	Btu/hr

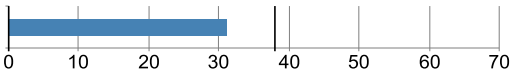


Cooling load

specific:	**2.28**	Btu/hr ft²
target:	**3.8**	Btu/hr ft²
total:	48935.7	Btu/hr

Primary energy

specific:	**31.18**	kBtu/ft²yr
target:	**38.04**	kBtu/ft²yr
total:	669577.59	kBtu/yr



Site energy

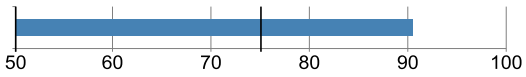
total:	9.87	kBtu/ft²yr
building systems:	47.74	kBtu/yr
photovoltaic savings:	0	kBtu/ft²yr

Air tightness

ACH50:	**0.39**	1/hr
target:	**0.39**	1/hr
CFM50 per envelope area:	**0.05**	cfm/ft²
target:	**0.05**	cfm/ft²

PASSIVEHOUSE RECOMMENDATIONS

HRV efficiency: **90.4** %



Frequency of overheating: **3.1** %
Cooling system is not required

BUILDING ELEMENTS

Windows

Average SHGC: **0.37**

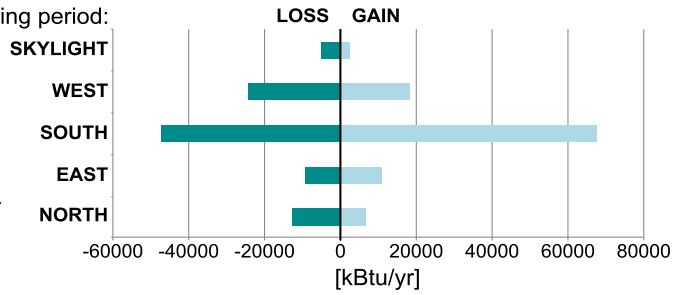
Average solar reduction factor heating: **0.53**

Average solar reduction factor cooling: **0.52**

Average U-value: **0.187** Btu/hr ft² °F

Total glazing area: **2264.2** ft²

Heat gain/loss heating period:



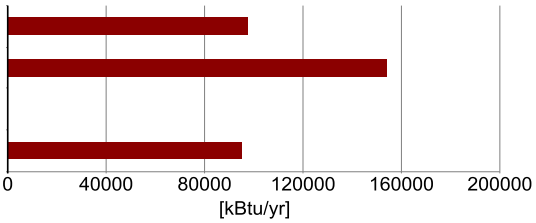
HVAC

Total heating demand: **97818** kBtu/yr

Total DHW energy demand: **153848** kBtu/yr

Solar DHW contribution: **0** kBtu/yr

Auxiliary electricity: **95243** kBtu/yr



Electricity

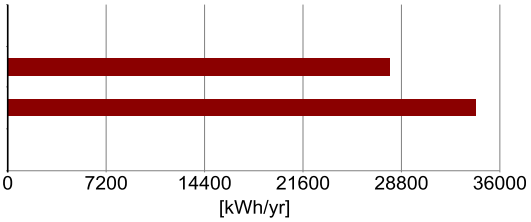
Direct heating / DHW: **0** kWh/yr

HVAC auxiliary energy: **27916** kWh/yr

Appliances: **34190** kWh/yr

Output PV system: **0** kWh/yr

Total electricity demand: **62105** kWh/yr



HEAT FLOW

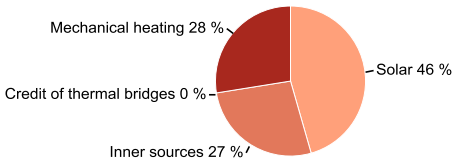
Heat gains

Solar: **135744** kBtu/yr

Inner sources: **80187** kBtu/yr

Credit of thermal bridges: **0** kBtu/yr

Mechanical heating: **97818** kBtu/yr



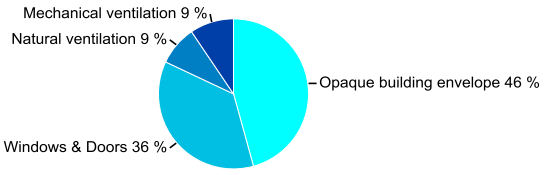
Heat losses

Opaque building envelope: **143415** kBtu/yr

Windows & Doors: **113868** kBtu/yr

Natural ventilation: **26806** kBtu/yr

Mechanical ventilation: **29660** kBtu/yr

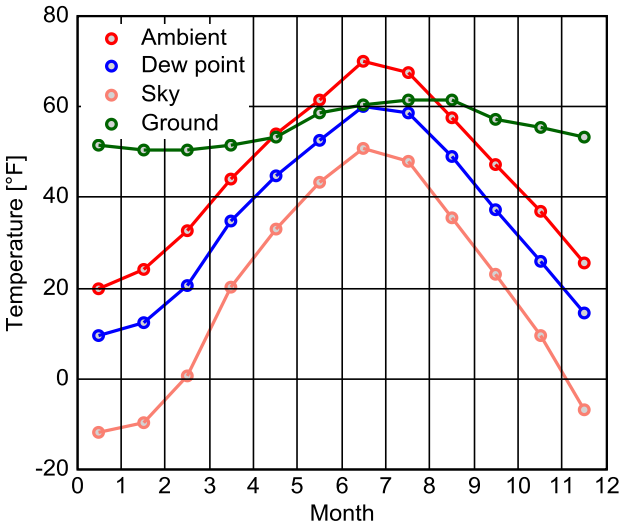


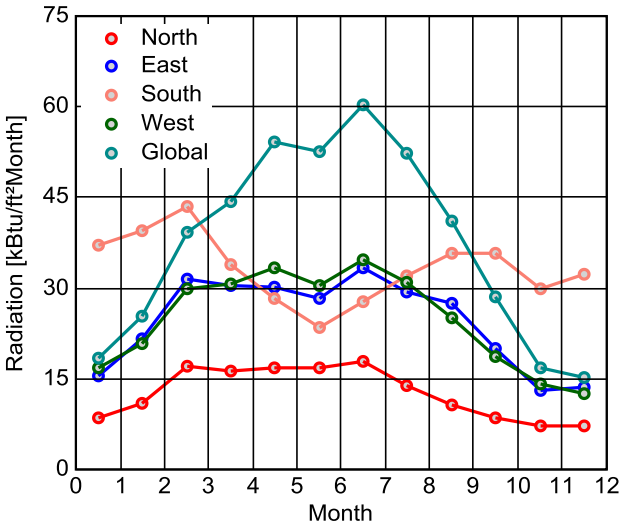
CLIMATE

Latitude:	**43.7**	°
Longitude:	**-70.3**	°
Elevation of weather station:	**45.7**	ft
Elevation of building site:	**125**	ft
Heat capacity air:	**0.018**	Btu/ft³F
Daily temperature swing summer:	**18.2**	°F
Average wind speed:	**13.1**	ft/s

Ground

Average ground surface temperature:	**46.6**	°F
Amplitude ground surface temperature:	**57.1**	°F
Ground thermal conductivity:	**1.2**	Btu/hr ft °F
Ground heat capacity:	**29.8**	Btu/ft³F
Depth below grade of groundwater:	**9.8**	ft
Flow rate groundwater:	**0.2**	ft/d





Calculation parameters

Length of heating period:	**303**	days/yr
Heating degree hours:	**185.8**	kFh/a
Phase shift months:	**1.3**	mths

Climate for	Heating load 1	Heating load 2	Cooling
Temperature [°F]	5.4	31.1	78.3
Solar radiation North [Btu/hr ft²]	12.7	7.9	26.9
Solar radiation East [Btu/hr ft²]	24.7	12.7	54.5
Solar radiation South [Btu/hr ft²]	58.6	20.9	42.8
Solar radiation West [Btu/hr ft²]	26.3	12	61.8
Solar radiation Global [Btu/hr ft²]	28.5	13.9	103.7

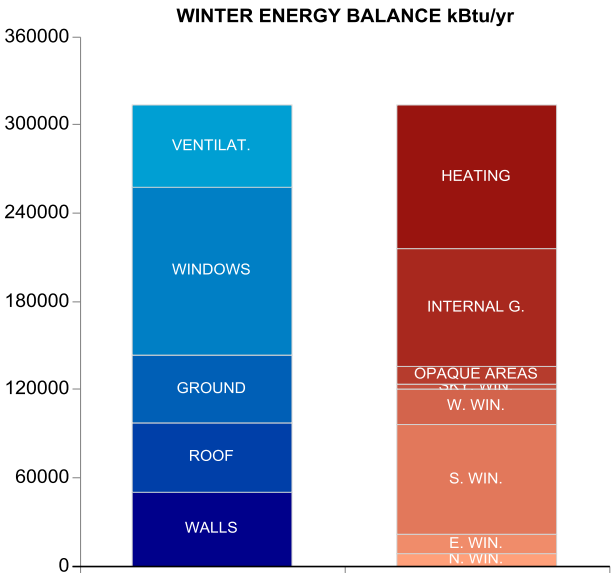
Relevant boundary conditions for heating load calculation: Heating load 1

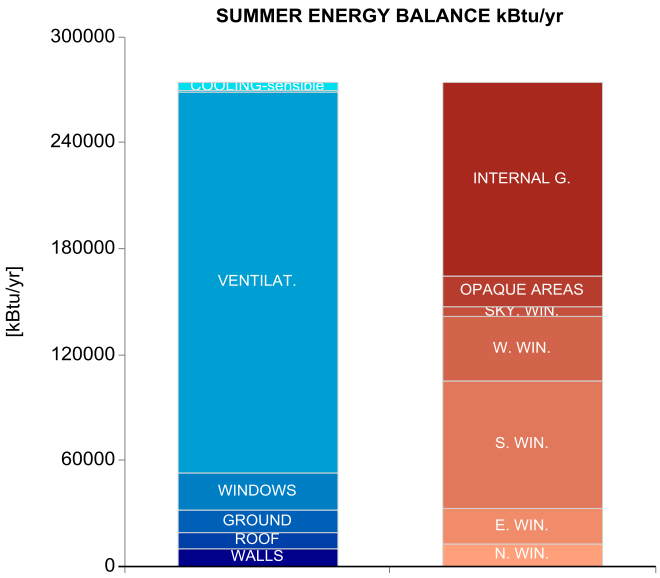
ANNUAL HEAT DEMAND

Transmission losses :	**257283**	kBtu/yr
Ventilation losses:	**56466**	kBtu/yr
Total heat losses:	**313749**	kBtu/yr
Solar heat gains:	**161883**	kBtu/yr
Internal heat gains:	**95628**	kBtu/yr
Total heat gains:	**257511**	kBtu/yr
Utilization factor:	**83.9**	%
Useful heat gains:	**215931**	kBtu/yr
Annual heat demand:	**97818**	kBtu/yr
Specific annual heat demand:	**4555.4**	Btu/ft²yr

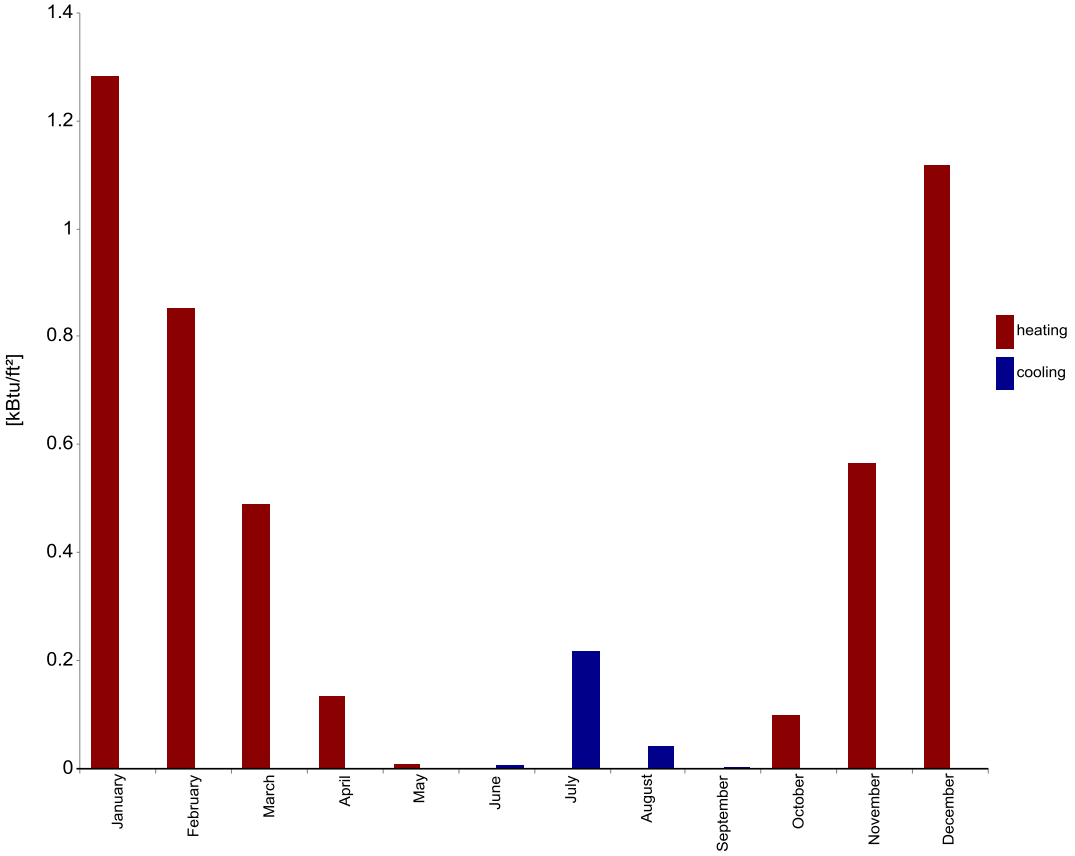
ANNUAL COOLING DEMAND

Solar heat gains:	**164066**	kBtu/yr
Internal heat gains:	**109938**	kBtu/yr
Total heat gains:	**274003**	kBtu/yr
Transmission losses :	**278311**	kBtu/yr
Ventilation losses:	**1132528**	kBtu/yr
Total heat losses:	**1410839**	kBtu/yr
Utilization factor:	**19**	%
Useful heat losses:	**268680**	kBtu/yr
Cooling demand - sensible:	**5323**	kBtu/yr
Cooling demand - latent:	**558**	kBtu/yr
Annual cooling demand:	**5880**	kBtu/yr
Specific annual cooling demand:	**0.3**	kBtu/ft²yr





SPECIFIC HEAT/COOLING DEMAND MONTHLY



Month	Heating [kBtu/ft²]	Cooling [kBtu/ft²]
January	1.3	0
February	0.9	0
March	0.5	0
April	0.1	0
May	0	0
June	0	0
July	0	0.2
August	0	0
September	0	0
October	0.1	0
November	0.6	0
December	1.1	0

HEATING LOAD

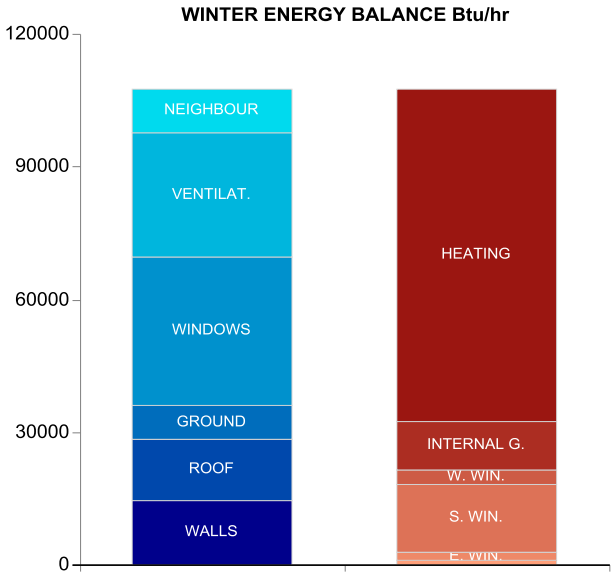
	First climate		Second climate	
Transmission heat losses:	**79255.5**	Btu/hr	**54129.1**	Btu/hr
Ventilation heat losses:	**28433.3**	Btu/hr	**16808.7**	Btu/hr
Total heat loss:	**107688.8**	Btu/hr	**70937.8**	Btu/hr
Solar heat gain:	**21608.2**	Btu/hr	**8631.7**	Btu/hr
Internal heat gain:	**10892.1**	Btu/hr	**10892.1**	Btu/hr
Total heat gains heating:	**32500.3**	Btu/hr	**19523.7**	Btu/hr
Heating load:	**75188.5**	Btu/hr	**51414**	Btu/hr

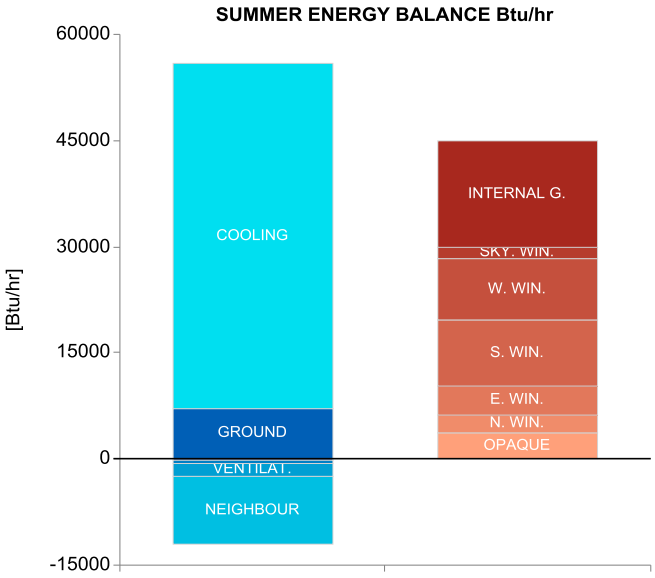
Relevant heating load:	**75188.5**	Btu/hr
Specific heating load:	**3.5**	Btu/hr ft²

COOLING LOAD

Solar heat gain:	**29863.8**	Btu/hr
Internal heat gain:	**15119.4**	Btu/hr
Total heat gains cooling:	**44983.2**	Btu/hr
Transmission heat losses:	**-2267.9**	Btu/hr
Ventilation heat losses:	**-1684.6**	Btu/hr
Total heat loss:	**-3952.5**	Btu/hr
Cooling load - sensible:	**48935.7**	Btu/hr
Cooling load - latent:	**0**	Btu/hr

Relevant cooling load:	**48935.7**	Btu/hr
Specific maximum cooling load:	**2.3**	Btu/hr





AREAS

Name	Area [ft²]	Average U-value [Btu/hr ft² °F]	Absorption coefficient	Emission coefficient	Reduction factor shading [%]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.1: West (A282°, 368.56 ft², width 52.33 ft)	368.6	0.014	0	0	0	523.9	768.2
VC.1: North (A0°, 588.52 ft², width 9.796 ft)	588.5	0.014	0	0	0	836.5	1226.6
VC.1: West (A270°, 320.03 ft², width 16.992 ft)	320	0.014	0	0	0	454.9	667
VC.1: North (A12°, 264.97 ft², width 21.521 ft)	265	0.014	0	0	0	376.6	552.3
VC.2: East (A102°, 1154.68 ft², width 72.667 ft)	1154.7	0.021	0.4	0.9	100	5279.2	5241
VC.3: East (A93.3°, 710.11 ft², width 42.909 ft)	710.1	0.021	0.4	0.9	100	3246.6	3223.2
VC.3: West (A282°, 869.33 ft², width 72.667 ft)	869.3	0.021	0.4	0.9	100	3974.5	3945.8
VC.4: West (A273.3°, 566.41 ft², width 42.909 ft)	566.4	0.021	0.4	0.9	100	2589.6	2570.9
VC.4: West (A282°, 982.53 ft², width 72.667 ft)	982.5	0.021	0.4	0.9	100	4492.1	4459.7
VC.5: West (A273.3°, 498.17 ft², width 42.909 ft)	498.2	0.021	0.4	0.9	100	2277.6	2261.2
VC.6: North (A0.8°, 490.03 ft², width 37.695 ft)	490	0.424	0	0	0	0	0
VC.6: NE (A63°, 42.48 ft², width 4.111 ft)	42.5	0.424	0	0	0	0	0
VC.6: North (A0°, 578.03 ft², width 7 ft)	578	0.424	0	0	0	0	0
VC.6: East (A90.2°, 2121.18 ft², width 37.658 ft)	2121.2	0.424	0	0	0	0	0
VC.6: South (A180°, 42.27 ft², width 3.433 ft)	42.3	0.424	0	0	0	0	0
VC.6: East (A90°, 92.96 ft², width 7.55 ft)	93	0.424	0	0	0	0	0
VC.7: Horizontal (648.07 ft², width 37.691 ft)	648.1	0.457	0	0	0	0	0
VC.8: Horizontal (4082.78 ft², width 85.415 ft)	4082.8	0.021	0.4	0.9	100	18666.4	18531.6
VC.8: Horizontal (394.19 ft², width 22.233 ft)	394.2	0.021	0.4	0.9	100	1802.3	1789.2
VC.9: East (A102°, 603.82 ft², width 72.667 ft)	603.8	0.021	0.4	0.9	100	2760.7	2740.7
VC.10: Horizontal (981.36 ft², width 48.861 ft)	981.4	0.023	0.4	0.9	100	4735.2	4701
VC.11: Horizontal (9201.66 ft², width 120.656 ft)	9201.7	0.048	0	0	0	46129.7	67644.2
VC.12: Horizontal (174.61 ft², width 37.691 ft)	174.6	0.386	0	0	0	0	0
VC.13: East (A93.3°, 385.84 ft², width 42.909 ft)	385.8	0.021	0.4	0.9	100	1764.1	1751.3
VC.15: S.G.1.1: South (A192°, 3.25 ft², width 3.25 ft)	3.3	0.023	0.4	0.9	100	15.8	15.7
VC.16: S.1.G.1: South (A183.3°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.17: S.1.G.1: South (A183.3°, 4.76 ft², width 4.76 ft)	4.8	0.023	0.4	0.9	100	23.1	23
VC.18: D.G.1: East (A102°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.19: W1.1: West (A282°, 9.05 ft², width 6.404 ft)	9.1	0.023	0.4	0.9	100	43.9	43.6
VC.71: W.G.1: West (A282°, 3.86 ft², width 3.833 ft)	3.9	0.023	0.4	0.9	100	18.7	18.6
VC.72: W.G.1: West (A282°, 4.74 ft², width 4.668 ft)	4.7	0.023	0.4	0.9	100	23	22.8
VC.73: S.G.1.2: South (A192°, 3.25 ft², width 3.25 ft)	3.3	0.023	0.4	0.9	100	15.8	15.7
VC.74: S.G.1.3: South (A192°, 3.34 ft², width 3.313 ft)	3.3	0.023	0.4	0.9	100	16.2	16.1
VC.76: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)	4.1	0.023	0.4	0.9	100	19.7	19.5
VC.77: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)	4.1	0.023	0.4	0.9	100	19.7	19.5
VC.78: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)	4.1	0.023	0.4	0.9	100	19.7	19.5
VC.79: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)	4.1	0.023	0.4	0.9	100	19.7	19.5
VC.106: B.G.1: West (A273.3°, 45 ft², width 4.5 ft)	45	0.023	0.4	0.9	100	218.4	216.8
VC.107: B.G.1: West (A273.3°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.108: D.G.1: East (A102°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.109: S.G.1.4: South (A192°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.110: S.G.1.5: South (A192°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.111: S.1.G.1: South (A183.3°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.112: S.1.G.1: South (A183.3°, 3.1 ft², width 3.064 ft)	3.1	0.023	0.4	0.9	100	15.1	15
VC.114: S.1.G.1: South (A183.3°, 4.76 ft², width 4.76 ft)	4.8	0.023	0.4	0.9	100	23.1	22.9
VC.119: East (A93.3°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.120: L.G.1: East (A93.3°, 4.5 ft², width 4.5 ft)	4.5	0.023	0.4	0.9	100	21.8	21.7
VC.121: Opaque Door: East (A93.3°, 20.5 ft², width 3 ft)	20.5	0.077	0.4	0.9	100	337.4	335
VC.130: SM.G.2: South (A185.1°, 4.38 ft², width 3.5 ft)	4.4	0.023	0.4	0.9	100	21.2	21.1
VC.132: SM.G.2: South (A185.1°, 4.37 ft², width 3.5 ft)	4.4	0.023	0.4	0.9	100	21.2	21.1

Transmission heat losses - areas (continue)

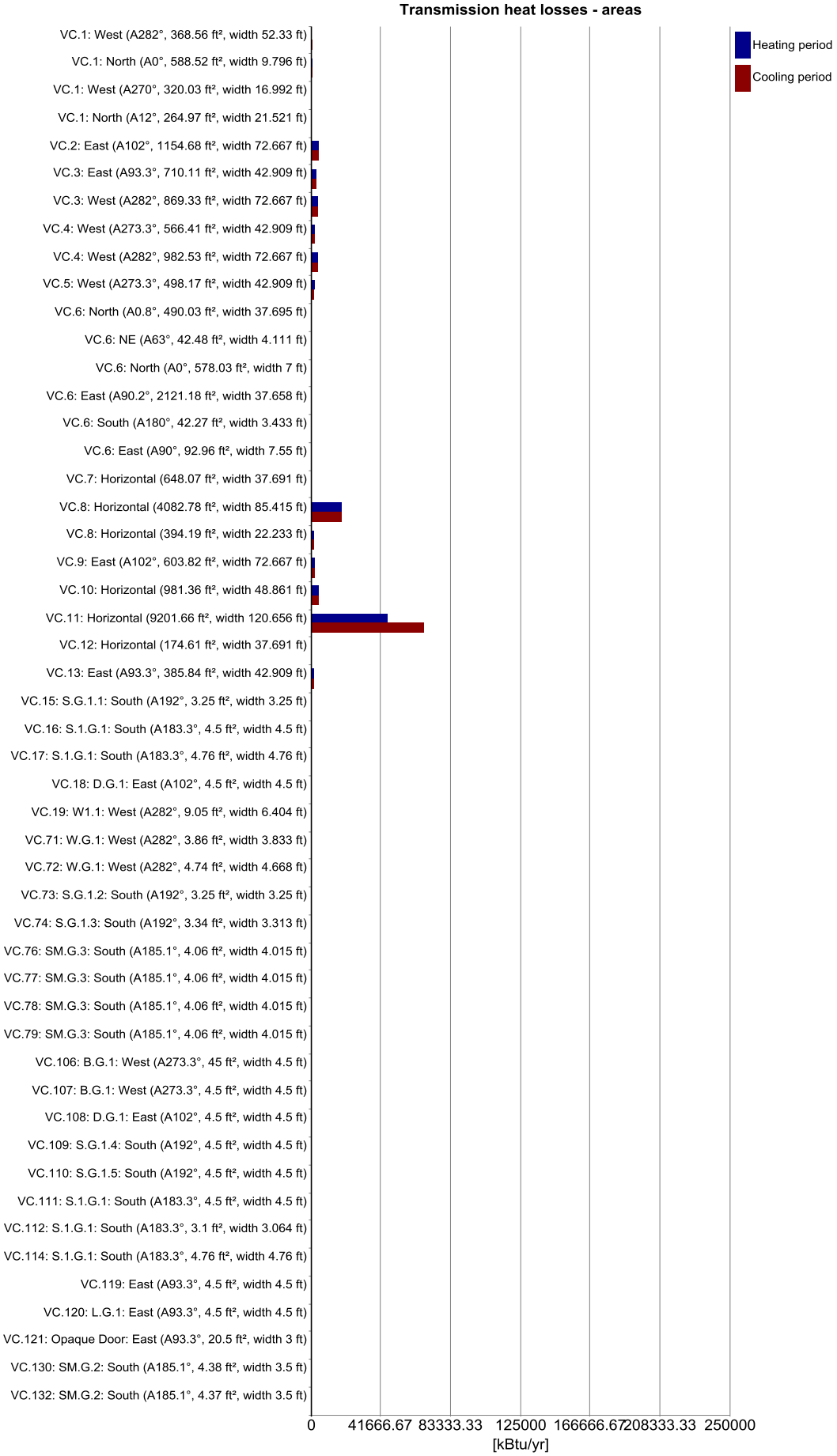
Name	Area [ft²]	Average U-value [Btu/hr ft² °F]	Absorption coefficient	Emission coefficient	Reduction factor shading [%]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.134: South (A185.1°, 16.5 ft², width 22 ft)	16.5	0.023	0.4	0.9	100	80.1	79.5
VC.135: South (A192°, 7.08 ft², width 0.708 ft)	7.1	0.023	0.4	0.9	100	34.4	34.1
VC.136: East (A93.2°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.137: West (A282°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.138: West (A273.3°, 45.8 ft², width 4.58 ft)	45.8	0.023	0.4	0.9	100	222.2	220.6
VC.139: South (A192°, 148.13 ft², width 14.813 ft)	148.1	0.023	0.4	0.9	100	718.8	713.6
VC.140: South (A192°, 53.33 ft², width 5.333 ft)	53.3	0.023	0.4	0.9	100	258.8	256.9
VC.141: East (A102°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.142: South (A192°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.143: West (A273.3°, 7.08 ft², width 0.708 ft)	7.1	0.023	0.4	0.9	100	34.4	34.1
VC.144: West (A273.3°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.145: East (A102°, 6.65 ft², width 0.665 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.146: West (A282°, 38.33 ft², width 3.833 ft)	38.3	0.023	0.4	0.9	100	186	184.7
VC.147: South (A183.3°, 38.96 ft², width 3.896 ft)	39	0.023	0.4	0.9	100	189	187.7
VC.148: East (A102°, 43.61 ft², width 4.361 ft)	43.6	0.023	0.4	0.9	100	211.6	210.1
VC.149: South (A185.1°, 51.62 ft², width 22.321 ft)	51.6	0.023	0.4	0.9	100	250.5	248.7
VC.150: South (A185.1°, 43.36 ft², width 4.336 ft)	43.4	0.023	0.4	0.9	100	210.4	208.9
VC.151: West (A273.3°, 6.81 ft², width 0.681 ft)	6.8	0.023	0.4	0.9	100	33	32.8
VC.152: South (A183.3°, 53.33 ft², width 5.333 ft)	53.3	0.023	0.4	0.9	100	258.8	256.9
VC.153: South (A183.3°, 6.67 ft², width 0.667 ft)	6.7	0.023	0.4	0.9	100	32.3	32.1
VC.154: South (A185.1°, 42.97 ft², width 4.297 ft)	43	0.023	0.4	0.9	100	208.5	207
VC.155: West (A282°, 181.77 ft², width 36.355 ft)	181.8	0.023	0.4	0.9	100	882	875.7
VC.156: South (A185.1°, 13.16 ft², width 22.244 ft)	13.2	0.023	0.4	0.9	100	63.8	63.4
VC.157: South (A185.1°, 61.2 ft², width 22.244 ft)	61.2	0.023	0.4	0.9	100	297	294.8
VC.158: West (A270°, 22.22 ft², width 3.333 ft)	22.2	0.023	0.4	0.9	100	107.8	107.1
VC.159: West (A270°, 56.28 ft², width 4.906 ft)	56.3	0.023	0.4	0.9	100	273.1	271.1
VC.160: East (A93.3°, 377.96 ft², width 42.909 ft)	378	0.023	0.4	0.9	100	1834	1820.8
VC.161: East (A93.3°, 52.97 ft², width 23.542 ft)	53	0.023	0.4	0.9	100	257	255.2
VC.162: North (A0°, 230.04 ft², width 38.003 ft)	230	0.023	0.4	0.9	100	1116.2	1108.2
VC.163: East (A93.3°, 205.22 ft², width 22.572 ft)	205.2	0.023	0.4	0.9	100	995.8	988.6
VC.164: West (A270°, 9 ft², width 9 ft)	9	0.023	0.4	0.9	100	43.7	43.4
VC.165: West (A270°, 356.26 ft², width 16.992 ft)	356.3	0.023	0.4	0.9	100	1728.7	1716.2
VC.168: West (A273.3°, 442.18 ft², width 42.909 ft)	442.2	0.023	0.4	0.9	100	2145.6	2130.1
VC.169: East (A102°, 7.08 ft², width 0.708 ft)	7.1	0.023	0.4	0.9	100	34.4	34.1
VC.170: South (A183.3°, 7.08 ft², width 0.708 ft)	7.1	0.023	0.4	0.9	100	34.4	34.1
VC.171: South (A183.3°, 81.05 ft², width 8.105 ft)	81.1	0.023	0.4	0.9	100	393.3	390.5
VC.172: West (A270°, 6.69 ft², width 0.669 ft)	6.7	0.023	0.4	0.9	100	32.5	32.2
VC.173: South (A183.3°, 659.89 ft², width 45 ft)	659.9	0.023	0.4	0.9	100	3202	3178.9
VC.174: East (A93.3°, 40.04 ft², width 4.004 ft)	40	0.023	0.4	0.9	100	194.3	192.9
VC.175: North (A12°, 546.03 ft², width 43.35 ft)	546	0.023	0.4	0.9	100	2649.5	2630.4
VC.176: West (A282°, 1631.22 ft², width 72.667 ft)	1631.2	0.023	0.4	0.9	100	7915.3	7858.1
VC.177: South (A192°, 1059 ft², width 45 ft)	1059	0.023	0.4	0.9	100	5138.7	5101.6
VC.178: East (A102°, 650.99 ft², width 42.6 ft)	651	0.023	0.4	0.9	100	3158.8	3136
VC.179: North (A360°, 591.01 ft², width 47.798 ft)	591	0.023	0.4	0.9	100	2867.8	2847.1
VC.180: South (A183.3°, 37.31 ft², width 21.049 ft)	37.3	0.023	0.4	0.9	100	181.1	179.8
VC.181: South (A183.3°, 9.69 ft², width 19.38 ft)	9.7	0.023	0.4	0.9	100	47	46.7
VC.182: South (A183.3°, 27.57 ft², width 11.026 ft)	27.6	0.023	0.4	0.9	100	133.8	132.8
VC.183: South (A183.3°, 48.2 ft², width 18.575 ft)	48.2	0.023	0.4	0.9	100	233.9	232.2
VC.184: North (A0°, 148.55 ft², width 14.376 ft)	148.6	0.023	0.4	0.9	100	720.8	715.6
VC.185: North (A0°, 148.55 ft², width 14.376 ft)	148.6	0.023	0.4	0.9	100	720.8	715.6

Transmission heat losses - areas (continue)

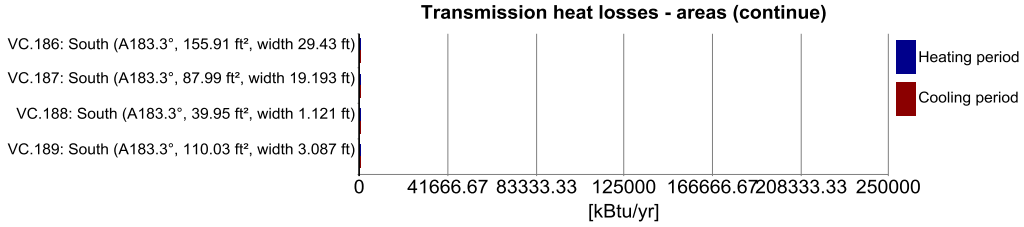
Name	Area [ft²]	Average U-value [Btu/hr ft² °F]	Absorption coefficient	Emission coefficient	Reduction factor shading [%]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.186: South (A183.3°, 155.91 ft², width 29.43 ft)	155.9	0.023	0.4	0.9	100	756.5	751.1
VC.187: South (A183.3°, 87.99 ft², width 19.193 ft)	88	0.023	0.4	0.9	100	427	423.9
VC.188: South (A183.3°, 39.95 ft², width 1.121 ft)	40	0.023	0.4	0.9	100	193.9	192.5
VC.189: South (A183.3°, 110.03 ft², width 3.087 ft)	110	0.023	0.4	0.9	100	533.9	530

Degree hours [kFh/a]

	Heating	Cooling
Ambient heating	118.8	117.9
Ground heating	57.5	84.3


Transmission heat losses - areas
Heating period
Cooling period
VC.1: West (A282°, 368.56 ft², width 52.33 ft)
VC.1: North (A0°, 588.52 ft², width 9.796 ft)
VC.1: West (A270°, 320.03 ft², width 16.992 ft)
VC.1: North (A12°, 264.97 ft², width 21.521 ft)
VC.2: East (A102°, 1154.68 ft², width 72.667 ft)
VC.3: East (A93.3°, 710.11 ft², width 42.909 ft)
VC.3: West (A282°, 869.33 ft², width 72.667 ft)
VC.4: West (A273.3°, 566.41 ft², width 42.909 ft)
VC.4: West (A282°, 982.53 ft², width 72.667 ft)
VC.5: West (A273.3°, 498.17 ft², width 42.909 ft)
VC.6: North (A0.8°, 490.03 ft², width 37.695 ft)
VC.6: NE (A63°, 42.48 ft², width 4.111 ft)
VC.6: North (A0°, 578.03 ft², width 7 ft)
VC.6: East (A90.2°, 2121.18 ft², width 37.658 ft)
VC.6: South (A180°, 42.27 ft², width 3.433 ft)
VC.6: East (A90°, 92.96 ft², width 7.55 ft)
VC.7: Horizontal (648.07 ft², width 37.691 ft)
VC.8: Horizontal (4082.78 ft², width 85.415 ft)
VC.8: Horizontal (394.19 ft², width 22.233 ft)
VC.9: East (A102°, 603.82 ft², width 72.667 ft)
VC.10: Horizontal (981.36 ft², width 48.861 ft)
VC.11: Horizontal (9201.66 ft², width 120.656 ft)
VC.12: Horizontal (174.61 ft², width 37.691 ft)
VC.13: East (A93.3°, 385.84 ft², width 42.909 ft)
VC.15: S.G.1.1: South (A192°, 3.25 ft², width 3.25 ft)
VC.16: S.1.G.1: South (A183.3°, 4.5 ft², width 4.5 ft)
VC.17: S.1.G.1: South (A183.3°, 4.76 ft², width 4.76 ft)
VC.18: D.G.1: East (A102°, 4.5 ft², width 4.5 ft)
VC.19: W1.1: West (A282°, 9.05 ft², width 6.404 ft)
VC.71: W.G.1: West (A282°, 3.86 ft², width 3.833 ft)
VC.72: W.G.1: West (A282°, 4.74 ft², width 4.668 ft)
VC.73: S.G.1.2: South (A192°, 3.25 ft², width 3.25 ft)
VC.74: S.G.1.3: South (A192°, 3.34 ft², width 3.313 ft)
VC.76: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)
VC.77: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)
VC.78: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)
VC.79: SM.G.3: South (A185.1°, 4.06 ft², width 4.015 ft)
VC.106: B.G.1: West (A273.3°, 45 ft², width 4.5 ft)
VC.107: B.G.1: West (A273.3°, 4.5 ft², width 4.5 ft)
VC.108: D.G.1: East (A102°, 4.5 ft², width 4.5 ft)
VC.109: S.G.1.4: South (A192°, 4.5 ft², width 4.5 ft)
VC.110: S.G.1.5: South (A192°, 4.5 ft², width 4.5 ft)
VC.111: S.1.G.1: South (A183.3°, 4.5 ft², width 4.5 ft)
VC.112: S.1.G.1: South (A183.3°, 3.1 ft², width 3.064 ft)
VC.114: S.1.G.1: South (A183.3°, 4.76 ft², width 4.76 ft)
VC.119: East (A93.3°, 4.5 ft², width 4.5 ft)
VC.120: L.G.1: East (A93.3°, 4.5 ft², width 4.5 ft)
VC.121: Opaque Door: East (A93.3°, 20.5 ft², width 3 ft)
VC.130: SM.G.2: South (A185.1°, 4.38 ft², width 3.5 ft)
VC.132: SM.G.2: South (A185.1°, 4.37 ft², width 3.5 ft)
0
41666.67
83333.33
125000
166666.67
208333.33
250000
[kBtu/yr]

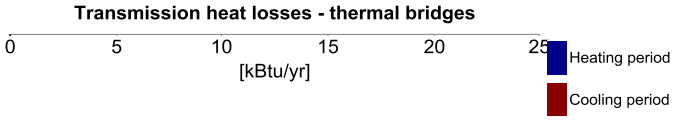

Transmission heat losses - areas (continue)
Heating period
Cooling period
VC.134: South (A185.1°, 16.5 ft², width 22 ft)
VC.135: South (A192°, 7.08 ft², width 0.708 ft)
VC.136: East (A93.2°, 6.67 ft², width 0.667 ft)
VC.137: West (A282°, 6.67 ft², width 0.667 ft)
VC.138: West (A273.3°, 45.8 ft², width 4.58 ft)
VC.139: South (A192°, 148.13 ft², width 14.813 ft)
VC.140: South (A192°, 53.33 ft², width 5.333 ft)
VC.141: East (A102°, 6.67 ft², width 0.667 ft)
VC.142: South (A192°, 6.67 ft², width 0.667 ft)
VC.143: West (A273.3°, 7.08 ft², width 0.708 ft)
VC.144: West (A273.3°, 6.67 ft², width 0.667 ft)
VC.145: East (A102°, 6.65 ft², width 0.665 ft)
VC.146: West (A282°, 38.33 ft², width 3.833 ft)
VC.147: South (A183.3°, 38.96 ft², width 3.896 ft)
VC.148: East (A102°, 43.61 ft², width 4.361 ft)
VC.149: South (A185.1°, 51.62 ft², width 22.321 ft)
VC.150: South (A185.1°, 43.36 ft², width 4.336 ft)
VC.151: West (A273.3°, 6.81 ft², width 0.681 ft)
VC.152: South (A183.3°, 53.33 ft², width 5.333 ft)
VC.153: South (A183.3°, 6.67 ft², width 0.667 ft)
VC.154: South (A185.1°, 42.97 ft², width 4.297 ft)
VC.155: West (A282°, 181.77 ft², width 36.355 ft)
VC.156: South (A185.1°, 13.16 ft², width 22.244 ft)
VC.157: South (A185.1°, 61.2 ft², width 22.244 ft)
VC.158: West (A270°, 22.22 ft², width 3.333 ft)
VC.159: West (A270°, 56.28 ft², width 4.906 ft)
VC.160: East (A93.3°, 377.96 ft², width 42.909 ft)
VC.161: East (A93.3°, 52.97 ft², width 23.542 ft)
VC.162: North (A0°, 230.04 ft², width 38.003 ft)
VC.163: East (A93.3°, 205.22 ft², width 22.572 ft)
VC.164: West (A270°, 9 ft², width 9 ft)
VC.165: West (A270°, 356.26 ft², width 16.992 ft)
VC.168: West (A273.3°, 442.18 ft², width 42.909 ft)
VC.169: East (A102°, 7.08 ft², width 0.708 ft)
VC.170: South (A183.3°, 7.08 ft², width 0.708 ft)
VC.171: South (A183.3°, 81.05 ft², width 8.105 ft)
VC.172: West (A270°, 6.69 ft², width 0.669 ft)
VC.173: South (A183.3°, 659.89 ft², width 45 ft)
VC.174: East (A93.3°, 40.04 ft², width 4.004 ft)
VC.175: North (A12°, 546.03 ft², width 43.35 ft)
VC.176: West (A282°, 1631.22 ft², width 72.667 ft)
VC.177: South (A192°, 1059 ft², width 45 ft)
VC.178: East (A102°, 650.99 ft², width 42.6 ft)
VC.179: North (A360°, 591.01 ft², width 47.798 ft)
VC.180: South (A183.3°, 37.31 ft², width 21.049 ft)
VC.181: South (A183.3°, 9.69 ft², width 19.38 ft)
VC.182: South (A183.3°, 27.57 ft², width 11.026 ft)
VC.183: South (A183.3°, 48.2 ft², width 18.575 ft)
VC.184: North (A0°, 148.55 ft², width 14.376 ft)
VC.185: North (A0°, 148.55 ft², width 14.376 ft)
0
41666.67
83333.33
125000
166666.67
208333.33
250000
[kBtu/yr]



THERMAL BRIDGES

Transmission heat losses - thermal bridges

Name	Length [ft]	Psi-value [Btu/hr ft °F]	Transmission losses [kBtu/yr]	Transmission losses cooling [kBtu/yr]



WINDOWS

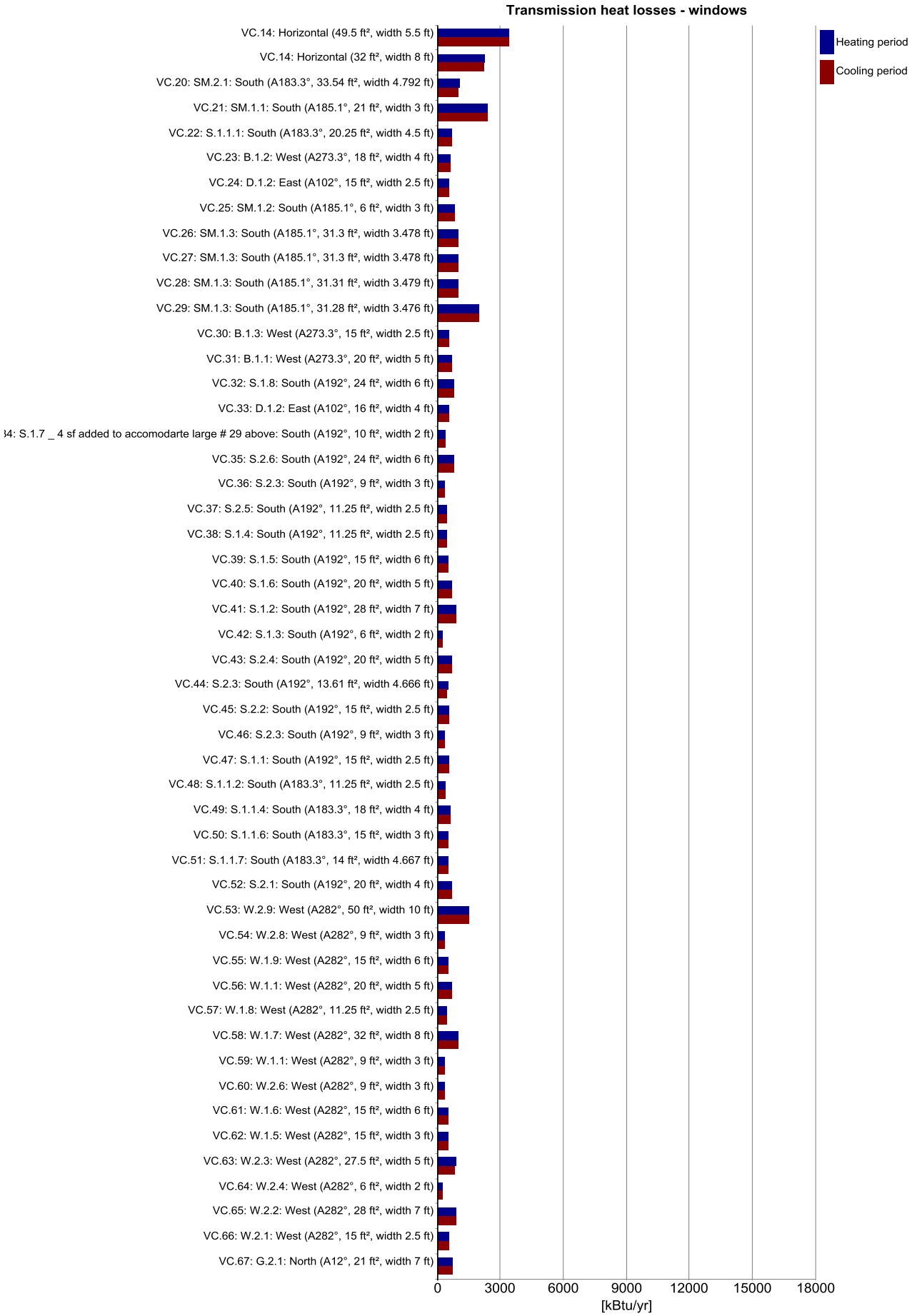
Name	Quan-tity	Incli-nation [°]	U-value total [Btu/hr ft² °F]	SHGC (perpen-dicular)	Reduction factor shading [%]	Reduction factor shading summer [%]	Solar gain heating [kBtu/yr]	Solar gain cooling [kBtu/yr]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.14: Horizontal (49.5 ft², width 5.5 ft)	1	0	0.324	0.2	87.9	93.3	1945.9	3082.4	3428.8	3404
VC.14: Horizontal (32 ft², width 8 ft)	1	0	0.328	0.2	85	92.7	1198.4	1951.7	2243.3	2227.1
VC.20: SM.2.1: South (A183.3°, 33.54 ft², width 4.792 ft)	1	90	0.145	0.4	91.5	86.5	2484.5	1646.6	1041	1033.5
VC.21: SM.1.1: South (A185.1°, 21 ft², width 3 ft)	1	90	0.529	0.2	90.6	88.7	658.1	452.2	2376.1	2358.9
VC.22: S.1.1.1: South (A183.3°, 20.25 ft², width 4.5 ft)	1	90	0.155	0.4	94.3	93.6	1475.8	1025.9	670.6	665.8
VC.23: B.1.2: West (A273.3°, 18 ft², width 4 ft)	1	90	0.158	0.4	90.3	97.1	710	937.1	607.2	602.9
VC.24: D.1.2: East (A102°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	84.3	94.4	809.1	974.7	564	559.9
VC.25: SM.1.2: South (A185.1°, 6 ft², width 3 ft)	1	90	0.677	0.2	90.8	89.1	124.8	85.9	867.9	861.6
VC.26: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)	1	90	0.151	0.4	92.8	91.8	2290.6	1590	1007.2	999.9
VC.27: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)	1	90	0.151	0.4	92.8	91.8	2290.6	1590	1007.2	999.9
VC.28: SM.1.3: South (A185.1°, 31.31 ft², width 3.479 ft)	1	90	0.151	0.4	92.8	91.8	2291.9	1590.9	1007.5	1000.3
VC.29: SM.1.3: South (A185.1°, 31.28 ft², width 3.476 ft)	2	90	0.151	0.4	92.8	91.8	4578.6	3178.1	2013.6	1999.1
VC.30: B.1.3: West (A273.3°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	85.9	95.4	706.6	963.3	564	559.9
VC.31: B.1.1: West (A273.3°, 20 ft², width 5 ft)	1	90	0.156	0.4	91.1	97.4	804.8	1056	665	660.2
VC.32: S.1.8: South (A192°, 24 ft², width 6 ft)	1	90	0.152	0.4	94.7	94.3	1764.3	1250.9	780.4	774.7
VC.33: D.1.2: East (A102°, 16 ft², width 4 ft)	1	90	0.161	0.4	89.1	96.3	715.8	832.3	549.5	545.6
VC.34: S.1.7 _ 4 sf added to accomodarte large # 29 above: South (A192°, 10 ft², width 2 ft)	1	90	0.162	0.4	89.8	88.6	596.6	419.1	388.8	386
VC.35: S.2.6: South (A192°, 24 ft², width 6 ft)	1	90	0.152	0.4	94.1	93.2	1752.4	1237.2	780.4	774.7
VC.36: S.2.3: South (A192°, 9 ft², width 3 ft)	1	90	0.177	0.4	91.2	89.2	559	389.5	341.3	338.9
VC.37: S.2.5: South (A192°, 11.25 ft², width 2.5 ft)	1	90	0.181	0.6	90.3	89	914.2	642.3	435.5	432.3
VC.38: S.1.4: South (A192°, 11.25 ft², width 2.5 ft)	1	90	0.181	0.6	90.3	89	914.2	642.3	435.5	432.3
VC.39: S.1.5: South (A192°, 15 ft², width 6 ft)	1	90	0.168	0.4	93.1	90.5	999.6	692.2	539.3	535.4
VC.40: S.1.6: South (A192°, 20 ft², width 5 ft)	1	90	0.156	0.4	94.2	93.6	1438	1018.3	665	660.2
VC.41: S.1.2: South (A192°, 28 ft², width 7 ft)	1	90	0.15	0.4	95.1	94.7	2090.7	1483.7	895.8	889.3
VC.42: S.1.3: South (A192°, 6 ft², width 2 ft)	1	90	0.194	0.4	88.5	86	328.7	227.5	248.6	246.8
VC.43: S.2.4: South (A192°, 20 ft², width 5 ft)	1	90	0.156	0.4	94.2	93.6	1438	1018.3	665	660.2
VC.44: S.2.3: South (A192°, 13.61 ft², width 4.666 ft)	1	90	0.167	0.4	93	91.2	912.7	637.8	485	481.5
VC.45: S.2.2: South (A192°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	90.9	89.9	1291.6	910.3	564	559.9
VC.46: S.2.3: South (A192°, 9 ft², width 3 ft)	1	90	0.177	0.4	91.2	89.2	559	389.5	341.3	338.9
VC.47: S.1.1: South (A192°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	90.9	89.9	1291.6	910.3	564	559.9
VC.48: S.1.1.2: South (A183.3°, 11.25 ft², width 2.5 ft)	1	90	0.173	0.4	91.5	90	723.1	498.3	417.1	414.1
VC.49: S.1.1.4: South (A183.3°, 18 ft², width 4 ft)	1	90	0.158	0.4	93.9	93	1287.4	893.7	607.2	602.9
VC.50: S.1.1.6: South (A183.3°, 15 ft², width 3 ft)	1	90	0.164	0.4	92.8	91.8	1026.2	710.7	526.9	523.1
VC.51: S.1.1.7: South (A183.3°, 14 ft², width 4.667 ft)	1	90	0.166	0.4	93.3	91.3	955.5	654.9	495.9	492.4
VC.52: S.2.1: South (A192°, 20 ft², width 4 ft)	1	90	0.156	0.4	94	93.6	1434.2	1017.7	665	660.2
VC.53: W.2.9: West (A282°, 50 ft², width 10 ft)	1	90	0.14	0.4	94.3	98.5	2051.9	2744.5	1493.5	1482.7
VC.54: W.2.8: West (A282°, 9 ft², width 3 ft)	1	90	0.177	0.4	86.7	95.4	281	395.6	341.3	338.9
VC.55: W.1.9: West (A282°, 15 ft², width 6 ft)	1	90	0.168	0.4	89.7	96.3	509	699.8	539.3	535.4
VC.56: W.1.1: West (A282°, 20 ft², width 5 ft)	1	90	0.156	0.4	91.2	97.3	735.9	1005.6	665	660.2
VC.57: W.1.8: West (A282°, 11.25 ft², width 2.5 ft)	1	90	0.181	0.6	85.2	94.9	456.3	650.7	435.5	432.3
VC.58: W.1.7: West (A282°, 32 ft², width 8 ft)	1	90	0.148	0.4	93	98	1246	1682	1011.2	1003.9
VC.59: W.1.1: West (A282°, 9 ft², width 3 ft)	1	90	0.177	0.4	86.7	95.4	281	395.6	341.3	338.9
VC.60: W.2.6: West (A282°, 9 ft², width 3 ft)	1	90	0.177	0.4	86.7	95.4	281	395.6	341.3	338.9
VC.61: W.1.6: West (A282°, 15 ft², width 6 ft)	1	90	0.168	0.4	89.7	96.3	509	699.8	539.3	535.4
VC.62: W.1.5: West (A282°, 15 ft², width 3 ft)	1	90	0.164	0.4	88.7	96.3	513.7	714.3	526.9	523.1
VC.63: W.2.3: West (A282°, 27.5 ft², width 5 ft)	1	90	0.148	0.4	92.2	97.7	1059.9	1437.7	872.1	865.8
VC.64: W.2.4: West (A282°, 6 ft², width 2 ft)	1	90	0.194	0.4	82.7	93.7	162.4	235.6	248.6	246.8
VC.65: W.2.2: West (A282°, 28 ft², width 7 ft)	1	90	0.15	0.4	92.5	97.8	1075.9	1456.5	895.8	889.3
VC.66: W.2.1: West (A282°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	86	95.2	646.6	916.4	564	559.9
VC.67: G.2.1: North (A12°, 21 ft², width 7 ft)	1	90	0.159	0.4	92.2	96.1	466.6	558.6	712.4	707.3

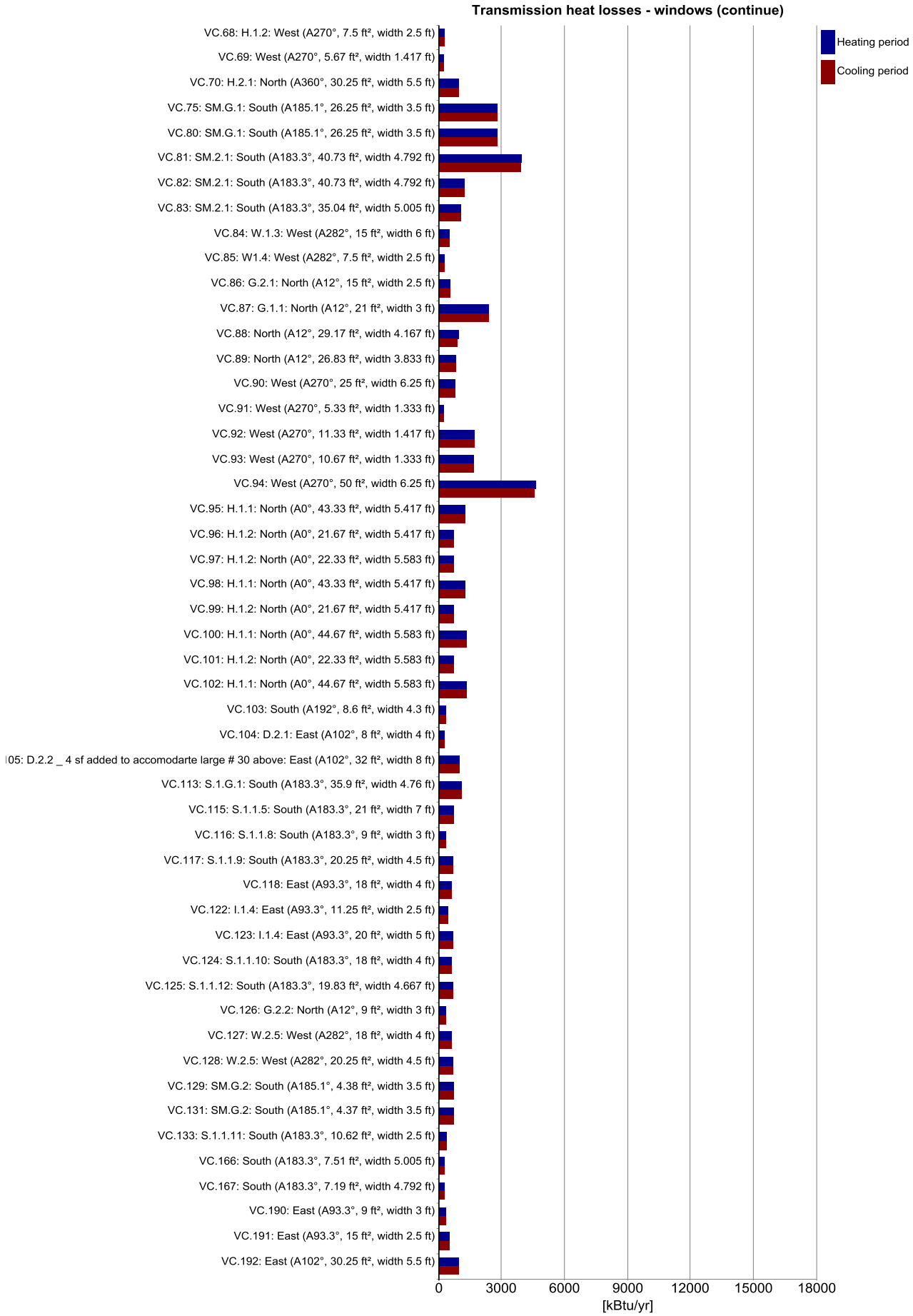
Transmission heat losses - windows (continue)

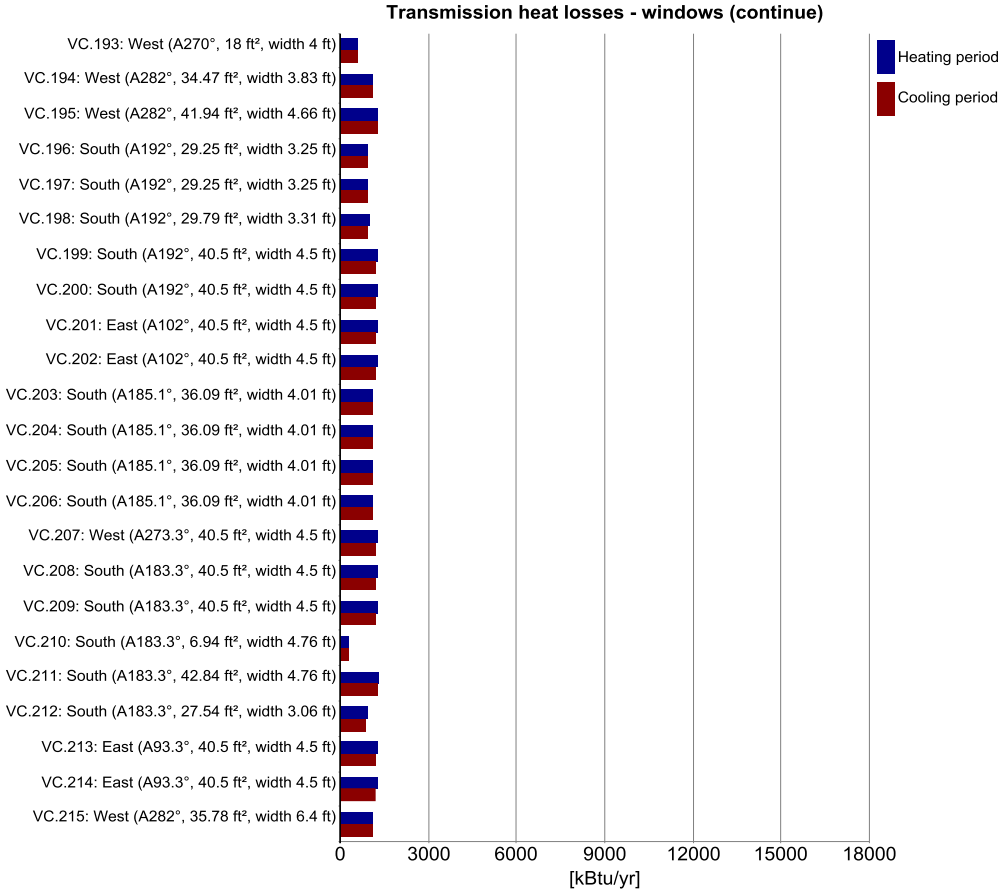
Name	Quan-tity	Incli-nation [°]	U-value total [Btu/hr ft² °F]	SHGC (perpen-dicular)	Reduction factor shading [%]	Reduction factor shading summer [%]	Solar gain heating [kBtu/yr]	Solar gain cooling [kBtu/yr]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.68: H.1.2: West (A270°, 7.5 ft², width 2.5 ft)	1	90	0.191	0.6	83.5	94.3	301.5	410.2	306.9	304.7
VC.69: West (A270°, 5.67 ft², width 1.417 ft)	1	90	0.208	0.4	42.5	42.5	81.8	98.5	251.3	249.5
VC.70: H.2.1: North (A360°, 30.25 ft², width 5.5 ft)	1	90	0.146	0.4	97.8	98.8	744.9	857.2	946.8	939.9
VC.75: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)	1	90	0.501	0.2	90.6	89.1	875.9	604.2	2812.4	2792.1
VC.80: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)	1	90	0.501	0.2	74.4	37	718.9	251.2	2812.4	2792.1
VC.81: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)	1	90	0.455	0.2	91.8	88.2	1516.5	1020.8	3958.7	3930.2
VC.82: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)	1	90	0.143	0.4	92.4	89.3	3086.3	2088.5	1241	1232.1
VC.83: SM.2.1: South (A183.3°, 35.04 ft², width 5.005 ft)	1	90	0.144	0.4	91.6	86.7	2611.4	1731.5	1080.2	1072.4
VC.84: W.1.3: West (A282°, 15 ft², width 6 ft)	1	90	0.168	0.4	89.7	96.3	509	699.8	539.3	535.4
VC.85: W1.4: West (A282°, 7.5 ft², width 2.5 ft)	1	90	0.191	0.6	82.8	93.5	264.2	382.1	306.9	304.7
VC.86: G.2.1: North (A12°, 15 ft², width 2.5 ft)	1	90	0.176	0.6	88.8	91.3	404.7	478.4	564	559.9
VC.87: G.1.1: North (A12°, 21 ft², width 3 ft)	1	90	0.529	0.2	89.4	91.9	206.4	243.9	2376.1	2358.9
VC.88: North (A12°, 29.17 ft², width 4.167 ft)	1	90	0.149	0.4	92.7	95	684.4	806.3	926.4	919.7
VC.89: North (A12°, 26.83 ft², width 3.833 ft)	1	90	0.151	0.4	92.3	94.6	620.1	730.7	865.2	859
VC.90: West (A270°, 25 ft², width 6.25 ft)	1	90	0.151	0.4	50	44.9	582.1	630.8	809.2	803.4
VC.91: West (A270°, 5.33 ft², width 1.333 ft)	1	90	0.212	0.4	41.9	42.2	73.6	89.4	241.7	240
VC.92: West (A270°, 11.33 ft², width 1.417 ft)	1	90	0.713	0.2	64.8	82.3	87.4	133.7	1726.4	1713.9
VC.93: West (A270°, 10.67 ft², width 1.333 ft)	1	90	0.735	0.2	62.7	81.3	72.5	113.2	1676.3	1664.2
VC.94: West (A270°, 50 ft², width 6.25 ft)	1	90	0.433	0.2	83.2	89.9	1042	1356.4	4630.6	4597.1
VC.95: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)	1	90	0.141	0.4	84.7	89.2	948.6	1138.6	1303.1	1293.7
VC.96: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)	1	90	0.154	0.4	54.5	53.3	286.5	319.1	713	707.9
VC.97: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)	1	90	0.153	0.4	54.5	53.3	296.4	330.2	732.3	727
VC.98: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)	1	90	0.141	0.4	83.2	87.7	932	1118.9	1303.1	1293.7
VC.99: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)	1	90	0.154	0.4	54.5	53.3	286.5	319.1	713	707.9
VC.100: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)	1	90	0.14	0.4	84.8	89.3	981.5	1178.1	1337.5	1327.8
VC.101: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)	1	90	0.153	0.4	54.5	53.3	296.4	330.2	732.3	727
VC.102: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)	1	90	0.14	0.4	84.8	89.3	981.5	1178.1	1337.5	1327.8
VC.103: South (A192°, 8.6 ft², width 4.3 ft)	1	90	0.185	0.4	91.1	86.1	511.6	344.7	339.7	337.3
VC.104: D.2.1: East (A102°, 8 ft², width 4 ft)	1	90	0.186	0.4	84.6	92.7	295.8	348.6	318.7	316.4
VC.105: D.2.2 _ 4 sf added to accomodarte large # 30 above: East (A102°, 32 ft², width 8 ft)	1	90	0.148	0.4	92.1	97.5	1575.4	1794.4	1011.2	1003.9
VC.113: S.1.G.1: South (A183.3°, 35.9 ft², width 4.76 ft)	1	90	0.144	0.4	74.9	33	2188.4	674.5	1107.2	1099.2
VC.115: S.1.1.5: South (A183.3°, 21 ft², width 7 ft)	1	90	0.159	0.4	94.3	92.6	1502.4	1033.2	712.4	707.3
VC.116: S.1.1.8: South (A183.3°, 9 ft², width 3 ft)	1	90	0.177	0.4	91.4	89	565.7	385.5	341.3	338.9
VC.117: S.1.1.9: South (A183.3°, 20.25 ft², width 4.5 ft)	1	90	0.155	0.4	94.3	93.6	1475.8	1025.9	670.6	665.8
VC.118: East (A93.3°, 18 ft², width 4 ft)	1	90	0.158	0.4	90.3	97.1	760.8	932.4	607.2	602.9
VC.122: I.1.4: East (A93.3°, 11.25 ft², width 2.5 ft)	1	90	0.181	0.6	85.1	95.1	534.3	680.5	435.5	432.3
VC.123: I.1.4: East (A93.3°, 20 ft², width 5 ft)	1	90	0.156	0.4	91.1	97.4	862.4	1050.7	665	660.2
VC.124: S.1.1.10: South (A183.3°, 18 ft², width 4 ft)	1	90	0.158	0.4	93.9	93	1287.4	893.7	607.2	602.9
VC.125: S.1.1.12: South (A183.3°, 19.83 ft², width 4.667 ft)	1	90	0.162	0.6	94	93.2	2030.4	1409.2	685.6	680.7
VC.126: G.2.2: North (A12°, 9 ft², width 3 ft)	1	90	0.177	0.4	88.8	92.7	174.5	209.2	341.3	338.9
VC.127: W.2.5: West (A282°, 18 ft², width 4 ft)	1	90	0.158	0.4	90.4	97	649.3	892.2	607.2	602.9
VC.128: W.2.5: West (A282°, 20.25 ft², width 4.5 ft)	1	90	0.161	0.6	90.7	97.1	1052	1442.8	697.5	692.5
VC.129: SM.G.2: South (A185.1°, 4.38 ft², width 3.5 ft)	1	90	0.791	0.2	10.3	17.4	6.2	7.4	740.1	734.8
VC.131: SM.G.2: South (A185.1°, 4.37 ft², width 3.5 ft)	1	90	0.791	0.2	10.3	17.4	6.2	7.4	740.1	734.7
VC.133: S.1.1.11: South (A183.3°, 10.62 ft², width 2.5 ft)	1	90	0.182	0.6	90.4	88.6	861.8	591.4	414	411
VC.166: South (A183.3°, 7.51 ft², width 5.005 ft)	1	90	0.199	0.4	89	76.5	403.4	242.8	320.1	317.7
VC.167: South (A183.3°, 7.19 ft², width 4.792 ft)	1	90	0.2	0.4	88.9	76.3	383.9	230.9	307.5	305.3
VC.190: East (A93.3°, 9 ft², width 3 ft)	1	90	0.177	0.4	85.5	94.8	324.7	410.9	341.3	338.9
VC.191: East (A93.3°, 15 ft², width 2.5 ft)	1	90	0.168	0.4	86.5	95.6	575.8	725.6	539.3	535.4
VC.192: East (A102°, 30.25 ft², width 5.5 ft)	1	90	0.146	0.4	92	97.5	1497.7	1708.9	946.8	939.9

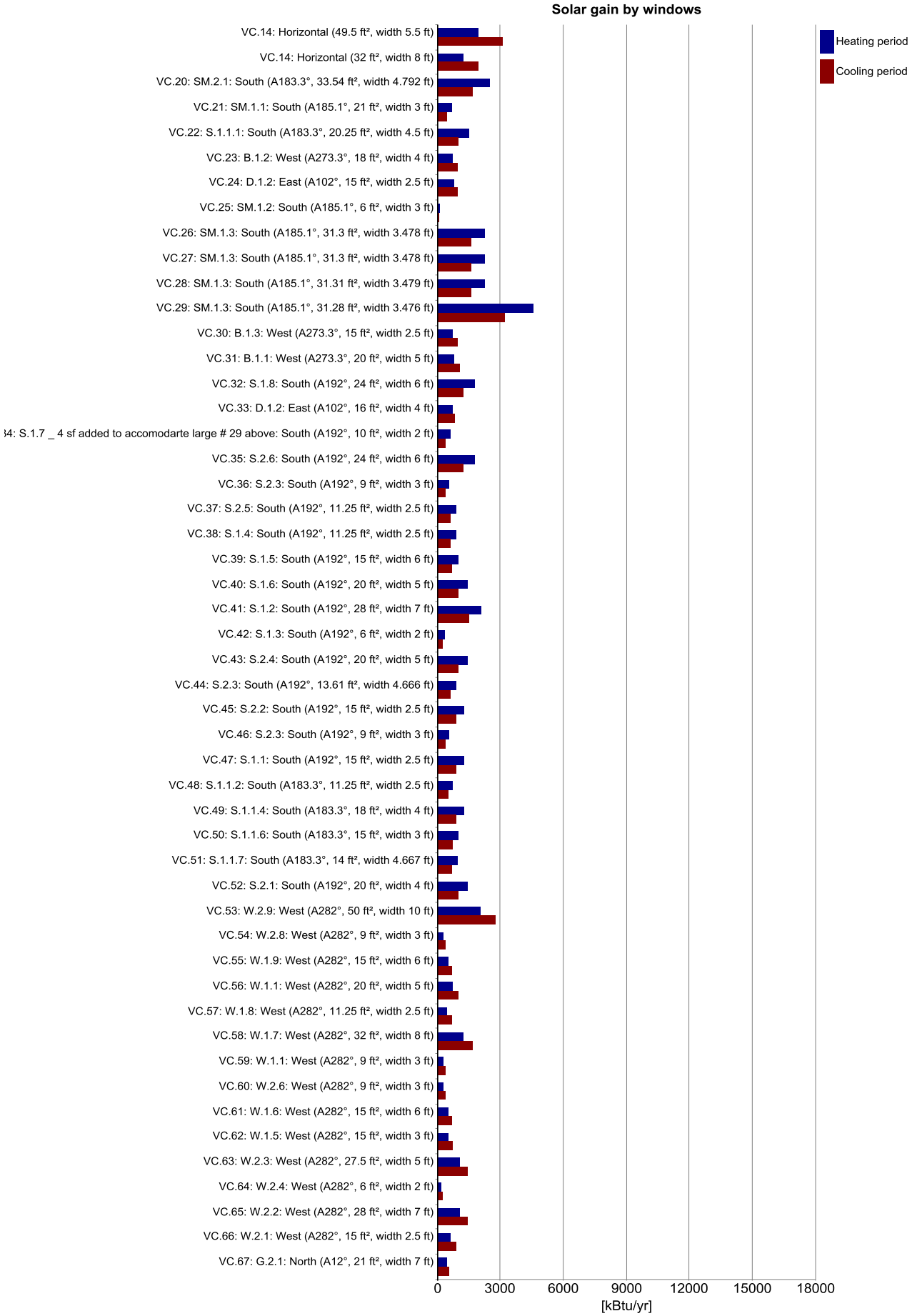
Transmission heat losses - windows (continue)

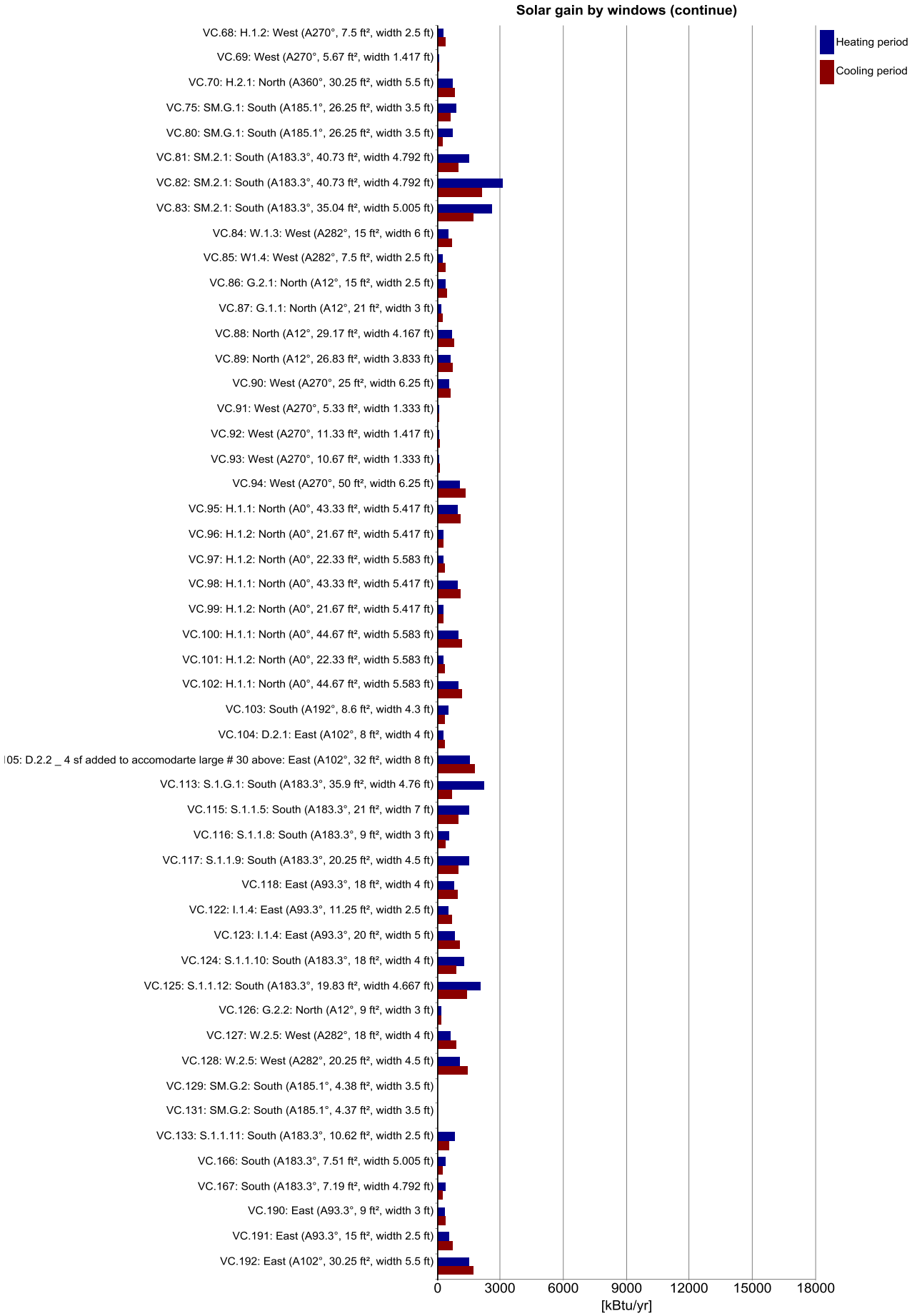
Name	Quantity	Inclination [°]	U-value total [Btu/hr ft² °F]	SHGC (perpendicular)	Reduction factor shading [%]	Reduction factor shading summer [%]	Solar gain heating [kBtu/yr]	Solar gain cooling [kBtu/yr]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.193: West (A270°, 18 ft², width 4 ft)	1	90	0.158	0.4	89.4	96.7	726.4	947.3	607.2	602.9
VC.194: West (A282°, 34.47 ft², width 3.83 ft)	1	90	0.148	0.4	68.3	70.1	986.6	1298.3	1087.8	1079.9
VC.195: West (A282°, 41.94 ft², width 4.66 ft)	1	90	0.143	0.4	69.2	70.5	1247.1	1626.5	1277.6	1268.4
VC.196: South (A192°, 29.25 ft², width 3.25 ft)	1	90	0.153	0.4	67.2	26.5	1520.2	426.7	955.1	948.2
VC.197: South (A192°, 29.25 ft², width 3.25 ft)	1	90	0.153	0.4	67.2	26.5	1520.2	426.7	955.1	948.2
VC.198: South (A192°, 29.79 ft², width 3.31 ft)	1	90	0.152	0.4	67.3	26.5	1554.6	436.5	968.9	961.9
VC.199: South (A192°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68.3	27	2237.9	630.5	1241	1232.1
VC.200: South (A192°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68.3	27	2237.9	630.5	1241	1232.1
VC.201: East (A102°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68	67	1504.6	1593.6	1241	1232.1
VC.202: East (A102°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68	67	1504.6	1593.6	1241	1232.1
VC.203: South (A185.1°, 36.09 ft², width 4.01 ft)	1	90	0.146	0.4	69.9	28.1	2030.4	572.3	1129	1120.8
VC.204: South (A185.1°, 36.09 ft², width 4.01 ft)	1	90	0.146	0.4	69.9	28.1	2030.4	572.3	1129	1120.8
VC.205: South (A185.1°, 36.09 ft², width 4.01 ft)	1	90	0.146	0.4	69.9	28.1	2030.4	572.3	1129	1120.8
VC.206: South (A185.1°, 36.09 ft², width 4.01 ft)	1	90	0.146	0.4	69.9	28.1	2030.4	572.3	1129	1120.8
VC.207: West (A273.3°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	67.6	68.3	1282.3	1591.2	1241	1232.1
VC.208: South (A183.3°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68.8	25.9	2275	600.2	1241	1232.1
VC.209: South (A183.3°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	68.8	25.9	2275	600.2	1241	1232.1
VC.210: South (A183.3°, 6.94 ft², width 4.76 ft)	1	90	0.202	0.4	17.1	18.6	70.2	53.5	300	297.9
VC.211: South (A183.3°, 42.84 ft², width 4.76 ft)	1	90	0.142	0.4	68.9	26	2426.8	640.7	1300.5	1291.1
VC.212: South (A183.3°, 27.54 ft², width 3.06 ft)	1	90	0.155	0.4	67.4	25.2	1435.4	376.5	911.7	905.1
VC.213: East (A93.3°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	67.7	68.2	1374.4	1580.7	1241	1232.1
VC.214: East (A93.3°, 40.5 ft², width 4.5 ft)	1	90	0.143	0.4	67.7	68.2	1374.4	1580.7	1241	1232.1
VC.215: West (A282°, 35.78 ft², width 6.4 ft)	1	90	0.143	0.4	92.6	97.9	1417.3	1917.8	1096.5	1088.6

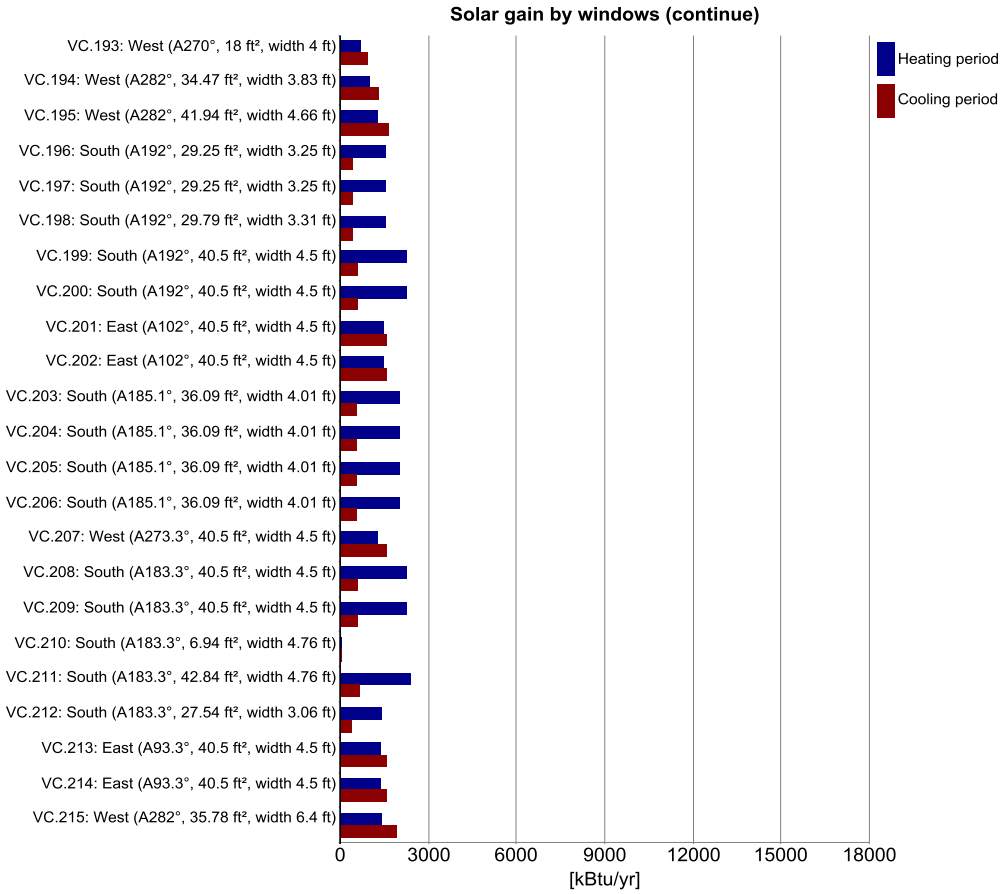

Transmission heat losses - windows
Heating period
Cooling period
VC.14: Horizontal (49.5 ft², width 5.5 ft)
VC.14: Horizontal (32 ft², width 8 ft)
VC.20: SM.2.1: South (A183.3°, 33.54 ft², width 4.792 ft)
VC.21: SM.1.1: South (A185.1°, 21 ft², width 3 ft)
VC.22: S.1.1.1: South (A183.3°, 20.25 ft², width 4.5 ft)
VC.23: B.1.2: West (A273.3°, 18 ft², width 4 ft)
VC.24: D.1.2: East (A102°, 15 ft², width 2.5 ft)
VC.25: SM.1.2: South (A185.1°, 6 ft², width 3 ft)
VC.26: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)
VC.27: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)
VC.28: SM.1.3: South (A185.1°, 31.31 ft², width 3.479 ft)
VC.29: SM.1.3: South (A185.1°, 31.28 ft², width 3.476 ft)
VC.30: B.1.3: West (A273.3°, 15 ft², width 2.5 ft)
VC.31: B.1.1: West (A273.3°, 20 ft², width 5 ft)
VC.32: S.1.8: South (A192°, 24 ft², width 6 ft)
VC.33: D.1.2: East (A102°, 16 ft², width 4 ft)
¾4: S.1.7 _ 4 sf added to accomodarte large # 29 above: South (A192°, 10 ft², width 2 ft)
VC.35: S.2.6: South (A192°, 24 ft², width 6 ft)
VC.36: S.2.3: South (A192°, 9 ft², width 3 ft)
VC.37: S.2.5: South (A192°, 11.25 ft², width 2.5 ft)
VC.38: S.1.4: South (A192°, 11.25 ft², width 2.5 ft)
VC.39: S.1.5: South (A192°, 15 ft², width 6 ft)
VC.40: S.1.6: South (A192°, 20 ft², width 5 ft)
VC.41: S.1.2: South (A192°, 28 ft², width 7 ft)
VC.42: S.1.3: South (A192°, 6 ft², width 2 ft)
VC.43: S.2.4: South (A192°, 20 ft², width 5 ft)
VC.44: S.2.3: South (A192°, 13.61 ft², width 4.666 ft)
VC.45: S.2.2: South (A192°, 15 ft², width 2.5 ft)
VC.46: S.2.3: South (A192°, 9 ft², width 3 ft)
VC.47: S.1.1: South (A192°, 15 ft², width 2.5 ft)
VC.48: S.1.1.2: South (A183.3°, 11.25 ft², width 2.5 ft)
VC.49: S.1.1.4: South (A183.3°, 18 ft², width 4 ft)
VC.50: S.1.1.6: South (A183.3°, 15 ft², width 3 ft)
VC.51: S.1.1.7: South (A183.3°, 14 ft², width 4.667 ft)
VC.52: S.2.1: South (A192°, 20 ft², width 4 ft)
VC.53: W.2.9: West (A282°, 50 ft², width 10 ft)
VC.54: W.2.8: West (A282°, 9 ft², width 3 ft)
VC.55: W.1.9: West (A282°, 15 ft², width 6 ft)
VC.56: W.1.1: West (A282°, 20 ft², width 5 ft)
VC.57: W.1.8: West (A282°, 11.25 ft², width 2.5 ft)
VC.58: W.1.7: West (A282°, 32 ft², width 8 ft)
VC.59: W.1.1: West (A282°, 9 ft², width 3 ft)
VC.60: W.2.6: West (A282°, 9 ft², width 3 ft)
VC.61: W.1.6: West (A282°, 15 ft², width 6 ft)
VC.62: W.1.5: West (A282°, 15 ft², width 3 ft)
VC.63: W.2.3: West (A282°, 27.5 ft², width 5 ft)
VC.64: W.2.4: West (A282°, 6 ft², width 2 ft)
VC.65: W.2.2: West (A282°, 28 ft², width 7 ft)
VC.66: W.2.1: West (A282°, 15 ft², width 2.5 ft)
VC.67: G.2.1: North (A12°, 21 ft², width 7 ft)
0
3000
6000
9000
12000
15000
18000
[kBtu/yr]


Transmission heat losses - windows (continue)
Heating period
Cooling period
VC.68: H.1.2: West (A270°, 7.5 ft², width 2.5 ft)
VC.69: West (A270°, 5.67 ft², width 1.417 ft)
VC.70: H.2.1: North (A360°, 30.25 ft², width 5.5 ft)
VC.75: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)
VC.80: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)
VC.81: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)
VC.82: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)
VC.83: SM.2.1: South (A183.3°, 35.04 ft², width 5.005 ft)
VC.84: W.1.3: West (A282°, 15 ft², width 6 ft)
VC.85: W1.4: West (A282°, 7.5 ft², width 2.5 ft)
VC.86: G.2.1: North (A12°, 15 ft², width 2.5 ft)
VC.87: G.1.1: North (A12°, 21 ft², width 3 ft)
VC.88: North (A12°, 29.17 ft², width 4.167 ft)
VC.89: North (A12°, 26.83 ft², width 3.833 ft)
VC.90: West (A270°, 25 ft², width 6.25 ft)
VC.91: West (A270°, 5.33 ft², width 1.333 ft)
VC.92: West (A270°, 11.33 ft², width 1.417 ft)
VC.93: West (A270°, 10.67 ft², width 1.333 ft)
VC.94: West (A270°, 50 ft², width 6.25 ft)
VC.95: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)
VC.96: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)
VC.97: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)
VC.98: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)
VC.99: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)
VC.100: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)
VC.101: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)
VC.102: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)
VC.103: South (A192°, 8.6 ft², width 4.3 ft)
VC.104: D.2.1: East (A102°, 8 ft², width 4 ft)
105: D.2.2 _ 4 sf added to accomodarte large # 30 above: East (A102°, 32 ft², width 8 ft)
VC.113: S.1.G.1: South (A183.3°, 35.9 ft², width 4.76 ft)
VC.115: S.1.1.5: South (A183.3°, 21 ft², width 7 ft)
VC.116: S.1.1.8: South (A183.3°, 9 ft², width 3 ft)
VC.117: S.1.1.9: South (A183.3°, 20.25 ft², width 4.5 ft)
VC.118: East (A93.3°, 18 ft², width 4 ft)
VC.122: I.1.4: East (A93.3°, 11.25 ft², width 2.5 ft)
VC.123: I.1.4: East (A93.3°, 20 ft², width 5 ft)
VC.124: S.1.1.10: South (A183.3°, 18 ft², width 4 ft)
VC.125: S.1.1.12: South (A183.3°, 19.83 ft², width 4.667 ft)
VC.126: G.2.2: North (A12°, 9 ft², width 3 ft)
VC.127: W.2.5: West (A282°, 18 ft², width 4 ft)
VC.128: W.2.5: West (A282°, 20.25 ft², width 4.5 ft)
VC.129: SM.G.2: South (A185.1°, 4.38 ft², width 3.5 ft)
VC.131: SM.G.2: South (A185.1°, 4.37 ft², width 3.5 ft)
VC.133: S.1.1.11: South (A183.3°, 10.62 ft², width 2.5 ft)
VC.166: South (A183.3°, 7.51 ft², width 5.005 ft)
VC.167: South (A183.3°, 7.19 ft², width 4.792 ft)
VC.190: East (A93.3°, 9 ft², width 3 ft)
VC.191: East (A93.3°, 15 ft², width 2.5 ft)
VC.192: East (A102°, 30.25 ft², width 5.5 ft)
0
3000
6000
9000
12000
15000
18000
[kBtu/yr]


Transmission heat losses - windows (continue)
VC.193: West (A270°, 18 ft², width 4 ft)
VC.194: West (A282°, 34.47 ft², width 3.83 ft)
VC.195: West (A282°, 41.94 ft², width 4.66 ft)
VC.196: South (A192°, 29.25 ft², width 3.25 ft)
VC.197: South (A192°, 29.25 ft², width 3.25 ft)
VC.198: South (A192°, 29.79 ft², width 3.31 ft)
VC.199: South (A192°, 40.5 ft², width 4.5 ft)
VC.200: South (A192°, 40.5 ft², width 4.5 ft)
VC.201: East (A102°, 40.5 ft², width 4.5 ft)
VC.202: East (A102°, 40.5 ft², width 4.5 ft)
VC.203: South (A185.1°, 36.09 ft², width 4.01 ft)
VC.204: South (A185.1°, 36.09 ft², width 4.01 ft)
VC.205: South (A185.1°, 36.09 ft², width 4.01 ft)
VC.206: South (A185.1°, 36.09 ft², width 4.01 ft)
VC.207: West (A273.3°, 40.5 ft², width 4.5 ft)
VC.208: South (A183.3°, 40.5 ft², width 4.5 ft)
VC.209: South (A183.3°, 40.5 ft², width 4.5 ft)
VC.210: South (A183.3°, 6.94 ft², width 4.76 ft)
VC.211: South (A183.3°, 42.84 ft², width 4.76 ft)
VC.212: South (A183.3°, 27.54 ft², width 3.06 ft)
VC.213: East (A93.3°, 40.5 ft², width 4.5 ft)
VC.214: East (A93.3°, 40.5 ft², width 4.5 ft)
VC.215: West (A282°, 35.78 ft², width 6.4 ft)
0
3000
6000
9000
12000
15000
18000
[kBtu/yr]
Heating period
Cooling period


Solar gain by windows
Heating period
Cooling period
VC.14: Horizontal (49.5 ft², width 5.5 ft)
VC.14: Horizontal (32 ft², width 8 ft)
VC.20: SM.2.1: South (A183.3°, 33.54 ft², width 4.792 ft)
VC.21: SM.1.1: South (A185.1°, 21 ft², width 3 ft)
VC.22: S.1.1.1: South (A183.3°, 20.25 ft², width 4.5 ft)
VC.23: B.1.2: West (A273.3°, 18 ft², width 4 ft)
VC.24: D.1.2: East (A102°, 15 ft², width 2.5 ft)
VC.25: SM.1.2: South (A185.1°, 6 ft², width 3 ft)
VC.26: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)
VC.27: SM.1.3: South (A185.1°, 31.3 ft², width 3.478 ft)
VC.28: SM.1.3: South (A185.1°, 31.31 ft², width 3.479 ft)
VC.29: SM.1.3: South (A185.1°, 31.28 ft², width 3.476 ft)
VC.30: B.1.3: West (A273.3°, 15 ft², width 2.5 ft)
VC.31: B.1.1: West (A273.3°, 20 ft², width 5 ft)
VC.32: S.1.8: South (A192°, 24 ft², width 6 ft)
VC.33: D.1.2: East (A102°, 16 ft², width 4 ft)
34: S.1.7 _ 4 sf added to accomodarte large # 29 above: South (A192°, 10 ft², width 2 ft)
VC.35: S.2.6: South (A192°, 24 ft², width 6 ft)
VC.36: S.2.3: South (A192°, 9 ft², width 3 ft)
VC.37: S.2.5: South (A192°, 11.25 ft², width 2.5 ft)
VC.38: S.1.4: South (A192°, 11.25 ft², width 2.5 ft)
VC.39: S.1.5: South (A192°, 15 ft², width 6 ft)
VC.40: S.1.6: South (A192°, 20 ft², width 5 ft)
VC.41: S.1.2: South (A192°, 28 ft², width 7 ft)
VC.42: S.1.3: South (A192°, 6 ft², width 2 ft)
VC.43: S.2.4: South (A192°, 20 ft², width 5 ft)
VC.44: S.2.3: South (A192°, 13.61 ft², width 4.666 ft)
VC.45: S.2.2: South (A192°, 15 ft², width 2.5 ft)
VC.46: S.2.3: South (A192°, 9 ft², width 3 ft)
VC.47: S.1.1: South (A192°, 15 ft², width 2.5 ft)
VC.48: S.1.1.2: South (A183.3°, 11.25 ft², width 2.5 ft)
VC.49: S.1.1.4: South (A183.3°, 18 ft², width 4 ft)
VC.50: S.1.1.6: South (A183.3°, 15 ft², width 3 ft)
VC.51: S.1.1.7: South (A183.3°, 14 ft², width 4.667 ft)
VC.52: S.2.1: South (A192°, 20 ft², width 4 ft)
VC.53: W.2.9: West (A282°, 50 ft², width 10 ft)
VC.54: W.2.8: West (A282°, 9 ft², width 3 ft)
VC.55: W.1.9: West (A282°, 15 ft², width 6 ft)
VC.56: W.1.1: West (A282°, 20 ft², width 5 ft)
VC.57: W.1.8: West (A282°, 11.25 ft², width 2.5 ft)
VC.58: W.1.7: West (A282°, 32 ft², width 8 ft)
VC.59: W.1.1: West (A282°, 9 ft², width 3 ft)
VC.60: W.2.6: West (A282°, 9 ft², width 3 ft)
VC.61: W.1.6: West (A282°, 15 ft², width 6 ft)
VC.62: W.1.5: West (A282°, 15 ft², width 3 ft)
VC.63: W.2.3: West (A282°, 27.5 ft², width 5 ft)
VC.64: W.2.4: West (A282°, 6 ft², width 2 ft)
VC.65: W.2.2: West (A282°, 28 ft², width 7 ft)
VC.66: W.2.1: West (A282°, 15 ft², width 2.5 ft)
VC.67: G.2.1: North (A12°, 21 ft², width 7 ft)
0
3000
6000
9000
12000
15000
18000
[kBtu/yr]


Solar gain by windows (continue)
Heating period
Cooling period
VC.68: H.1.2: West (A270°, 7.5 ft², width 2.5 ft)
VC.69: West (A270°, 5.67 ft², width 1.417 ft)
VC.70: H.2.1: North (A360°, 30.25 ft², width 5.5 ft)
VC.75: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)
VC.80: SM.G.1: South (A185.1°, 26.25 ft², width 3.5 ft)
VC.81: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)
VC.82: SM.2.1: South (A183.3°, 40.73 ft², width 4.792 ft)
VC.83: SM.2.1: South (A183.3°, 35.04 ft², width 5.005 ft)
VC.84: W.1.3: West (A282°, 15 ft², width 6 ft)
VC.85: W1.4: West (A282°, 7.5 ft², width 2.5 ft)
VC.86: G.2.1: North (A12°, 15 ft², width 2.5 ft)
VC.87: G.1.1: North (A12°, 21 ft², width 3 ft)
VC.88: North (A12°, 29.17 ft², width 4.167 ft)
VC.89: North (A12°, 26.83 ft², width 3.833 ft)
VC.90: West (A270°, 25 ft², width 6.25 ft)
VC.91: West (A270°, 5.33 ft², width 1.333 ft)
VC.92: West (A270°, 11.33 ft², width 1.417 ft)
VC.93: West (A270°, 10.67 ft², width 1.333 ft)
VC.94: West (A270°, 50 ft², width 6.25 ft)
VC.95: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)
VC.96: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)
VC.97: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)
VC.98: H.1.1: North (A0°, 43.33 ft², width 5.417 ft)
VC.99: H.1.2: North (A0°, 21.67 ft², width 5.417 ft)
VC.100: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)
VC.101: H.1.2: North (A0°, 22.33 ft², width 5.583 ft)
VC.102: H.1.1: North (A0°, 44.67 ft², width 5.583 ft)
VC.103: South (A192°, 8.6 ft², width 4.3 ft)
VC.104: D.2.1: East (A102°, 8 ft², width 4 ft)
05: D.2.2 _ 4 sf added to accomodarte large # 30 above: East (A102°, 32 ft², width 8 ft)
VC.113: S.1.G.1: South (A183.3°, 35.9 ft², width 4.76 ft)
VC.115: S.1.1.5: South (A183.3°, 21 ft², width 7 ft)
VC.116: S.1.1.8: South (A183.3°, 9 ft², width 3 ft)
VC.117: S.1.1.9: South (A183.3°, 20.25 ft², width 4.5 ft)
VC.118: East (A93.3°, 18 ft², width 4 ft)
VC.122: I.1.4: East (A93.3°, 11.25 ft², width 2.5 ft)
VC.123: I.1.4: East (A93.3°, 20 ft², width 5 ft)
VC.124: S.1.1.10: South (A183.3°, 18 ft², width 4 ft)
VC.125: S.1.1.12: South (A183.3°, 19.83 ft², width 4.667 ft)
VC.126: G.2.2: North (A12°, 9 ft², width 3 ft)
VC.127: W.2.5: West (A282°, 18 ft², width 4 ft)
VC.128: W.2.5: West (A282°, 20.25 ft², width 4.5 ft)
VC.129: SM.G.2: South (A185.1°, 4.38 ft², width 3.5 ft)
VC.131: SM.G.2: South (A185.1°, 4.37 ft², width 3.5 ft)
VC.133: S.1.1.11: South (A183.3°, 10.62 ft², width 2.5 ft)
VC.166: South (A183.3°, 7.51 ft², width 5.005 ft)
VC.167: South (A183.3°, 7.19 ft², width 4.792 ft)
VC.190: East (A93.3°, 9 ft², width 3 ft)
VC.191: East (A93.3°, 15 ft², width 2.5 ft)
VC.192: East (A102°, 30.25 ft², width 5.5 ft)
0
3000
6000
9000
12000
15000
18000
[kBtu/yr]



Summary building envelope

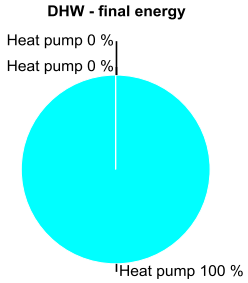
	Total area / length	Average U-value / Psi value	Transmission losses
Exterior wall ambient:	**9898.1** ft²	**0.02** Btu/hr ft² °F	**48240.6** kBtu/yr
Exterior wall ground:	**1542.1** ft²	**0.01** Btu/hr ft² °F	**2191.9** kBtu/yr
Basement:	**9201.7** ft²	**0.05** Btu/hr ft² °F	**46129.7** kBtu/yr
Roof:	**10247.9** ft²	**0.02** Btu/hr ft² °F	**46853** kBtu/yr
Windows:	**2850.2** ft²	**0.19** Btu/hr ft² °F	**113868.3** kBtu/yr
Doors:	**0** ft²	**0** Btu/hr ft² °F	**0** kBtu/yr
Thermal bridge ambient:	**0** ft	**0** Btu/hr ft °F	**0** kBtu/yr
Thermal bridge perimeter:	**0** ft	**0** Btu/hr ft °F	**0** kBtu/yr
Thermal bridge floor slab:	**0** ft	**0** Btu/hr ft °F	**0** kBtu/yr

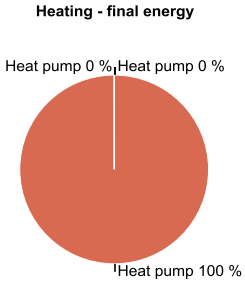
Shading

	Heating	Cooling
Reduction factor North:	**81** %	**83.6** %
Reduction factor East:	**78.8** %	**82.3** %
Reduction factor South:	**82.8** %	**64.8** %
Reduction factor West:	**83.2** %	**88.4** %
Reduction factor Horizontal:	**86.8** %	**93.1** %

HVAC SYSTEMS

System	DHW			Heating			Total		
	Covered DHW demand [%]	Estimated solar fraction [%]	Final energy demand [kBtu/yr]	Covered heating demand [%]	Estimated solar fraction [%]	Final energy demand [kBtu/yr]	Performance ratio	CO2 equivalent emissions [lb/yr]	Primary energy demand [kBtu/yr]
Heat pump	100	0	43954.3	0	0	0	0.3	19313.5	138895.4
Heat pump	0	0	0	100	0	28758.5	0	12636.4	90876.8
Heat pump	0	0	0	0	0	0	0	0	0
Σ	100	0	43954.3	100	0	28758.5		31949.9	229772.2





COOLING UNITS

	sensible	latent
Air cooling:	**0** kBtu/ft²yr	**0** kBtu/ft²yr
Recirculation cooling:	**0** kBtu/ft²yr	**0** kBtu/ft²yr
Additional dehumidification:		**0** kBtu/ft²yr
Panel cooling:	**0** kBtu/ft²yr	
Sum:	**0** kBtu/ft²yr	**0** kBtu/ft²yr

VENTILATION

Infiltration pressure test ACH50:	**0.39**	1/hr
Room ventilation volume:	**262024**	ft³
Total extract air demand:	**5565**	cfm
Supply air per person:	**18**	cfm
Occupancy:	**262**	

Average air flow rate:	**1355.41**	cfm
Average air change rate:	**0.31**	1/hr
Effective ACH ambient:	**0.06**	1/hr
Effective ACH ground:	**0**	1/hr
Energetically effective air exchange:	**0.06**	1/hr
Infiltration air change rate:	**0.03**	1/hr
Infiltration air change rate (heating load):	**0.07**	1/hr

Type of ventilation system:	**Balanced PH ventilation**
Wind screening coefficient (e):	**0.07**
Wind exposure factor:	**15**
Wind shield factor:	**0.05**

Ventilation heat losses: **49088.2** kBtu/yr

Devices

Name	HRV / ERV efficiency [-]	Electric efficiency [Btu/ft³]	Heat recovery efficiency SHX [-]	Effective recovery efficiency [-]
Temp EFF RG9000	0.9	0	0	0.9
Altogether	0.9	0	0	0.9

Ducts

Name	Length (total) [ft]	Clear cross-section [ft²]	U-value [Btu/hr ft² °F]	Assigned ventilation units
Supply Ground	240	1.1667	3.32	Temp EFF RG9000
Exhaust Ground	143	0.6667	2.67	Temp EFF RG9000
Supply Main	347	1.1667	3.32	Temp EFF RG9000
Exhaust Main	194	0.6667	2.67	Temp EFF RG9000
Supply Upper	275	1.25	3.53	Temp EFF RG9000
Exhaust Upper	202	1.1667	3.32	Temp EFF RG9000
Σ	1401			

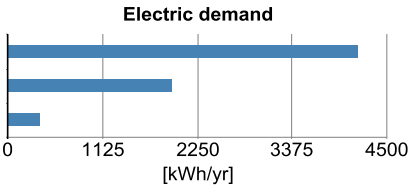
*length * quantity ** thermal conductivity / thickness

SUMMER VENTILATION

ACH night ventilation:	**0.3**	1/hr
ACH natural summer:	**0.3**	1/hr
Mechanical ventilation summer:	**0.2**	1/hr
Mechanical ventilation summer with HR:	**no**	
Preferred minimum indoor temperature for night ventlation:	**68**	°F
Overheating temperature:	**77**	°F

ELECTRICITY DEMAND - AUXILIARY ELECTRICITY

Type	Quantity	Indoor	Norm demand	Electric demand [kWh/yr]	Primary energy [kBtu/yr]
Ventilation winter	1	no	0.6 W/cfm	4165.9	44914.2
Ventilation summer	1	no	0.6 W/cfm	1942.4	20941.1
DHW circulating pump	1	yes	49.3 W	385	4151
Σ				6493.3	70006.3

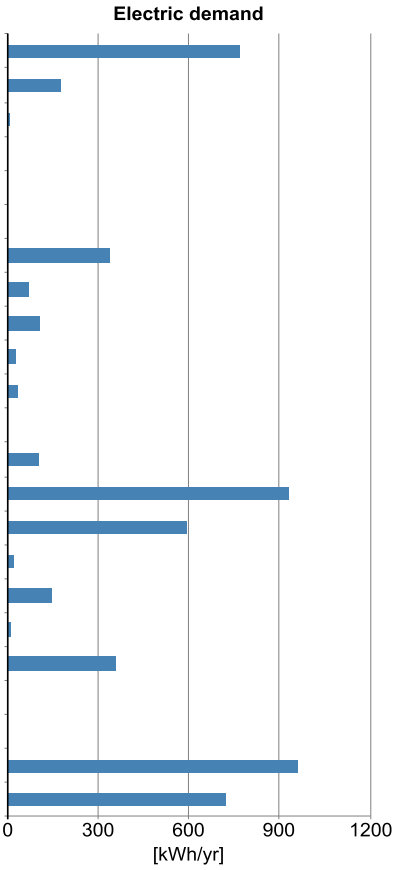


ELECTRICITY DEMAND NON-RESIDENTIAL BUILDING

Equipment

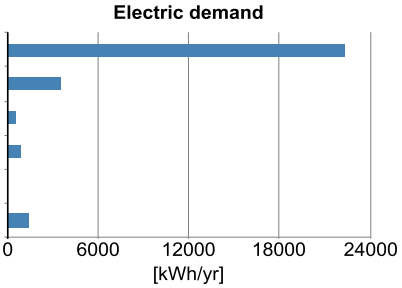
Type	Quantity	Indoor	Utilization pattern	Power rating norm demand	Electric demand [kWh/yr]	Primary energy [kBtu/yr]
User defined	16	yes	Pattern 1: Classrooms	60 (+0) W	771.8 (+0)	8321.4
User defined	5	yes		60 (+0) W	180.9 (+0)	1950.3
User defined	56	yes		0.3 (+0) W	6.8 (+0)	72.8
User defined	3	yes	Pattern 1: Classrooms	0.3 (+0) W	0.4 (+0)	3.9
User defined	7	yes		0.3 (+0) W	0.8 (+0)	9.1
User defined	5	yes		0.3 (+0) W	0.6 (+0)	6.5
User defined	14	yes		240 (+0) W	337.7 (+0)	3640.6
User defined	3	yes		240 (+0) W	72.4 (+0)	780.1
User defined	12	yes		15 (+0) W	108.5 (+0)	1170.2
User defined	3	yes		15 (+0) W	27.1 (+0)	292.6
User defined	6	yes		30 (+0) W	36.2 (+0)	390.1
User defined	3	yes		0.5 (+0) W	0.2 (+0)	1.6
User defined	8	yes	Pattern 1: Classrooms	9 (+0) W	101.3 (+0)	1092.2
User defined	2	yes		330 (+0) W	928.6 (+0)	10011.7
User defined	9	yes		330 (+0) W	597 (+0)	6436.1
User defined	4	yes		30 (+0) W	24.1 (+0)	260
User defined	7	yes		52 (+0) W	146.3 (+0)	1577.6
User defined	1	yes		1200 (+0) W	15.6 (+0)	168.2
User defined	1	yes		300 (+0) W	361.8 (+0)	3900.7
User defined	1	yes		0.3 (+0) W	0.2 (+0)	2.6
User defined	1	yes		0.3 (+0) W	0.2 (+0)	2.6
User defined	4	yes		500 (+0) W	960 (+0)	10350.1
User defined	3	yes		500 (+0) W	720 (+0)	7762.5
Σ	174				5398.6 (+0)	58203.7

Values in brackets ( ) display energy saving mode



Lighting

Name	Utilization pattern	Installed lighting power [W/m²]	Daylight utilization	Lighting full load hours [hrs/yr]	Electric demand [kWh/yr]	Primary energy [kBtu/yr]
Lighting 1: Classrooms	Pattern 1: Classrooms	6.5	None	2814	22294.5	240363.9
Lighting 2: Circulation	Pattern 2: Circulation	2.3	None	2814	3531.9	38078.4
Lighting 3: Office	Pattern 3: Office	5.1	None	2814	574.9	6198.1
Lighting 4: Restroom	Pattern 4: Restroom	5.2	None	2814	880.9	9496.9
Lighting 5: Storage	Pattern 5: Storage	1.7	None	2814	97.7	1053.2
Lighting 6: Assembly	Pattern 6: Assembly	4.2	None	2814	1411.4	15216.8
Σ					28791.3	310407.3

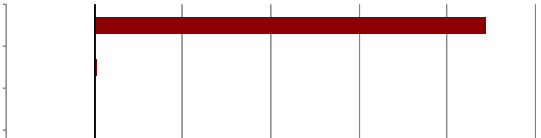


INTERNAL HEAT GAINS

Electricity total: **13317.4** Btu/hr

Auxiliary electricity: **92.3** Btu/hr

Persons: **0** Btu/hr



DHW AND DISTRIBUTION

DHW consumption per person per day:	**0.6**	gal/Person/day
Average cold water temperature supply:	**46.6**	°F
Useful heat DHW:	**44585.4**	kBtu/yr
Specific useful heat DHW:	**2076.4**	Btu/ft²yr
Total heat losses of the DHW system:	**109262.2**	kBtu/yr
Specific losses of the DHW system:	**5088.4**	Btu/ft²yr
Performance ratio DHW distribution system and storage:	**3.5**	
Utilization ratio DHW distribution system and storage:	**0.3**	
Total heat demand of DHW system:	**153847.6**	kBtu/yr
Total specific heat demand of DHW system:	**7164.7**	Btu/ft²yr
Total heat losses of the hydronic heating distribution:	**0**	kBtu/yr
Specific losses of the hydronic heating distribution:	**0**	Btu/ft²yr
Performance ratio of heat distribution:	**100**	%

Region	Length [ft]	Annual heat loss [kBtu/yr]
Hydronic heating distribution pipes		
Σ	0	0
DHW circulation pipes		
Warm region	2000	33054.7
Σ	2000	33054.7
Individual pipes		
Warm region	100	76207.5
Σ	100	76207.5
Water storage		
Σ		0