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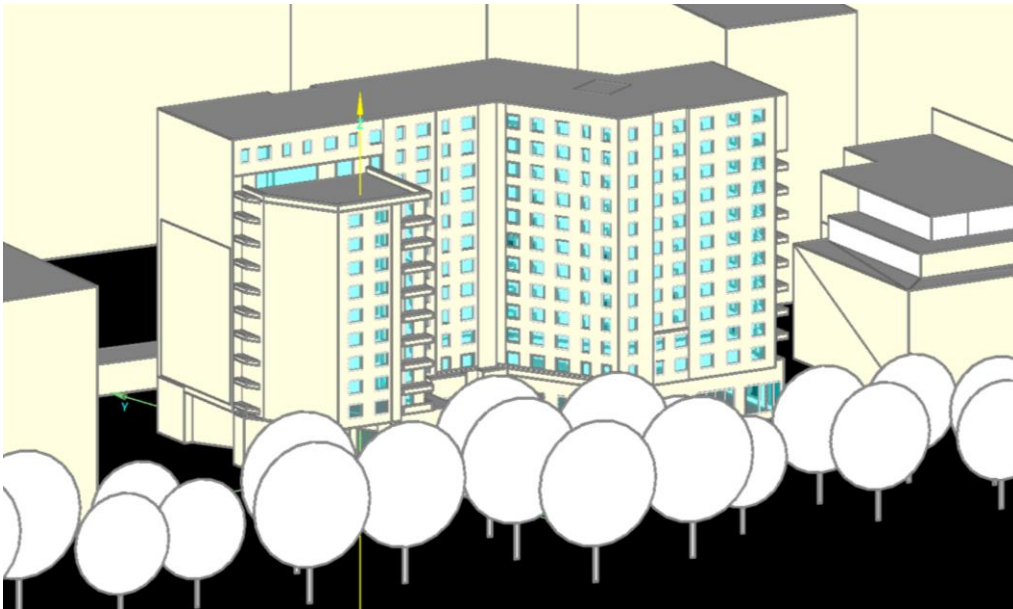
29776.000
745 Concord Ave

DATE October 25, 2024

REGARDING **745 Concord Passive House Study**

Andrew:

As requested by Boylston Properties, RDH Building Science Inc. (RDH) has completed Passive House modelling and analysis of the project known as 745 Concord Ave in Cambridge, MA to assess Passive House Certification using WUFI Passive version 3.5.0.1. To meet the PHIUS+2021 standard, the design will need to comply with limits in annual heating and cooling demands, peak heating and cooling loads, source energy, and airtightness. RDH recommends maintaining a 10% buffer below the PHIUS limits to allow for changes as the design process continues. This report summarizes the results of our analysis and recommendations moving forward.



Project Description and Background

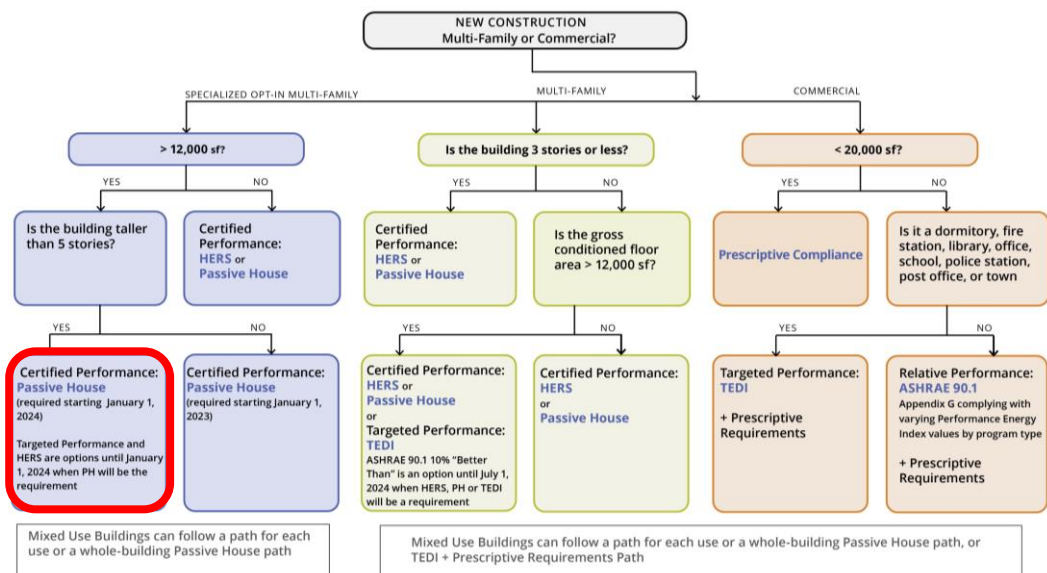
745 Concord is a 12-story residential building of approximately 230,000 square feet gross floor area. The building will contain tenant amenity spaces on the ground level and first floor mezzanine, with the remaining 11 stories containing a mix of studio, 1-bed, 2-bed, and 3-bed apartment units. The design calls for decentralized hot water, ventilation, and air-source heat pumps with VRF fan coil units in the suites and amenity spaces. Each suite has their own direct electric water heater, energy recovery ventilator (ERV), and VRF fan coil unit connected 1:1 to individual rooftop air-source heat pumps.

RDH reviewed the following documents as a basis of assumptions and to develop the energy model:

- Architectural drawings and Revit by Hacin dated June 28, 2024
- CCD Meeting Presentation with conceptual drawings and artistic Sketchup by Hacin dated June 26, 2024
- MEP Narrative from Boylston Properties received July 3, 2024

Specialized Opt-In Code in Cambridge

Cambridge has opted into the Specialized Opt-In Code, which was effective as of July 1, 2023. As a multi-family residential building over 12,000 square feet, 745 Concord is required to achieve Passive House certification for Energy Code Compliance.



Passive House Model Results

Table 1 outlines the energy model results for the basis of design. **Orange** results do not currently have the recommended 10% buffer. **Green** results currently have a 10% buffer.

TABLE 1 WUFI®PASSIVE MODEL RESULTS*		
PHIUS Targets**	Basis of Design	
HEATING DEMAND KBTU/FT²-YR	≤ 5.2	5.13
HEATING LOAD BTU/H-FT²	≤ 4.4	3.62
COOLING DEMAND KBTU/FT²-YR	≤ 8.2	2.93
COOLING LOAD BTU/H-FT²	≤ 3.4	3.13
SOURCE ENERGY kWh/occ-YR Based on 228 Dwelling Units and 294 Bedrooms	≤4,900	4,644
AIRTIGHTNESS CFM/FT² @ 75 pa	≤ 0.08	0.08 (assumed)
*Area-normalized metrics are calculated using iCFA in accordance with PHIUS requirements **Criteria based on PHIUS+ 2021 for Boston, MA ***Current Design based upon documentation listed above and assumptions noted in Table 2		

Summary of Key Design Characteristics

Table 2 summarizes the key design characteristics assumed for the WUFI Passive model.

TABLE 2 KEY DESIGN CHARACTERISTICS		
Component	Model Assumption	Performance
Building Enclosure		
Above Grade Walls	Rainscreen wall with 5" Exterior Insulation on CFMF	R-20
Roof	White TPO, 10" Polyisocyanurate insulation	R-50
Window to Wall Ratio	As currently designed	22%
Windows (vision glazing)	Punched windows: Intus Supera series, or equal.	Whole-window U-value: 0.2 SHGC: 0.30 on North, West and East Façades 0.25 on South Façade
Shading	White interior blinds	0.6 reduction factor for temporary shading devices
Mechanical		
Ventilation – Suites & Residential Common Areas	Suites: Constant ventilation balanced per suite, decentralized ERVs, 75 CFM in 1 bath suites, 100 CFM in 2 bath suites Boost mode option: Ability to boost on demand, per suite. ~30% increase in flow rate from standard operation while in boost mode Residential Common Areas & Corridors: Constant ventilation via central (rooftop) ERVs	Suites (1 bath): 12,675 cfm 78.7% Heat Recovery Efficiency 61% Humidity Recovery Fan power: .0.49 W/cfm Suites (2 baths): 5,900 cfm 74% Heat Recovery Efficiency 54% Humidity Recovery Common Areas & Corridors: 4,000 cfm 77% Heat Recovery Efficiency 68.5% Humidity Recovery Fan power 0.47 W/cfm
Heating	Primary: Decentralized VRF, ceiling mounted Fan Coils	Net Heat Pump COP: 2.47
Cooling	Primary: Decentralized VRF, ceiling mounted Fan Coils	Net Heat Pump COP: 3.60
DHW	Primary: Decentralized Direct Electric Hot Water Heater	COP: 1.0
Lighting and Plug Loads		
Lighting	LED Lighting, per WUFI PH standard values	72,733 kWh/yr
Appliance & Plug Loads	WUFI PH standard values	486,794 kWh/yr

Conclusions and Discussion of Results

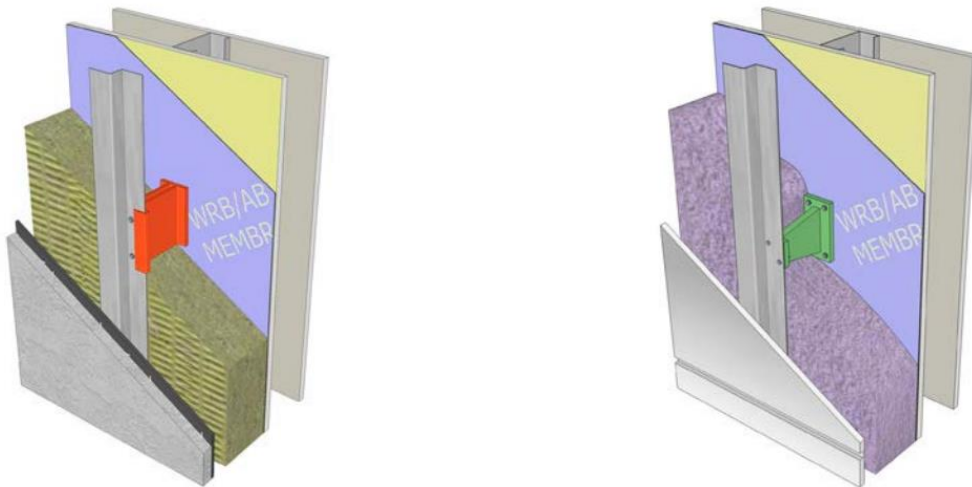
- The “Current Design” is meeting the Passive House targets with the model inputs specified in Table 2.

Solar Heat Gain and Shading considerations

- The SHGC for glazing is 0.30 at North, East, and West facing elevations. For the South facing elevations of the building we have used 0.25. This will help prevent localized overheating in the south facing units, which does not register in the whole building energy model results.
- We have assumed white interior blinds. Per the Passive House modeling, this factor plays an important role in keeping the Cooling Load results below the limit. The south facing windows contribute significantly to solar heat gains during the cooling season and thus increase to the cooling loads more than the windows of the north, west, and east elevations.

Potential Design Optimization

- Per the current Basis of Design, the Passive House model is compliant, but is not currently maintaining our recommended 10% buffer, particularly on the heating demand. This is due mainly to the revised ERV design, including product selection and duct length. We will continue to refine the design in future phases of work to ensure compliance with Phius requirements is maintained.



Example rainscreen wall assemblies on thermally broken clip and rail system.

In-Unit Hot Water Tanks

Our modelling assumes an electric resistance tank type per the current Basis of Design. As the design progresses we will continue to monitor the Source Energy, which this product selection impacts.

Ventilation Rates and ERV Efficiency

The **ventilation rates** modeled are initial assumptions based on typical Passive House rates, yielding an overall air change rate of approximately 0.5 air changes per hour for the building as a whole. As per section 3.5.2.1 of PHIUS Guidebook, residential building minimum ventilation rates are determined by the largest of two factors:

- Supply air requirement (based on occupancy): One occupant assumed per bedroom and a minimum of 15 cfm per person (18 cfm per person recommended).
- Exhaust air requirement (based on kitchens, baths, etc.): Minimum exhaust airflow requirements per Section 3.5.2.3.

Further discussion with the mechanical engineer is required to understand the ventilation control strategy for both residential and non-residential spaces. RDH advises to use standard and boost mode for residential suites. This approach can be used to design for maximum (ASHRAE) rates at boost with PHIUS rates at standard operation.

Similarly, ventilation rates for common areas (including corridors) should be optimized and include controls to deliver the required outdoor air without over-ventilating.

In addition to ventilation rates, consideration should be given to selecting ERVs with high sensible heat recovery efficiency ($\geq 80\%$) and low fan power (≤ 0.75 W/cfm). The Swegon Gold unit or equal is recommended for both residential and commercial spaces.

Closure

Please don't hesitate to reach out with any questions. We look forward to our continued collaboration on this project.

Yours truly,



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Appendix A

Energy Model Inputs and Assumptions

745 Concord - Article 22 Phase Assumptions Summary METHODOLOGY The following summary outlines the Proposed Design as presented in the bridging documents/drawings and narratives provided to RDH. This information will be used to assess the energy savings of the current design and to target additional efficiency measures if required performance is not achieved. Therefore we ask the architectural, mechanical and electrical designers to review the complete document and provide comments where the model assumptions deviate from the proposed operation. Note that energy models used for Passive House compliance includes multiple prescribed assumptions in regard to occupancy, weather, and internal loads. They are not intended to predict actual energy consumption.				Blue text denotes updates in October 2024
GENERAL				
Project Name	745 Concord			
Location	Cambridge	MA	Elevation: 40 ft	
WUFI Passive File:	2024 10 18 Concord Article 22 PH Model Update.mwp			
References	Architectural drawings and Revit by Hacin dated June 28 2024 CCD Meeting Presentation with conceptual drawings and artistic Sketchup by Hacin dated June 26 2024 MEP Narrative from Boylston Properties received July 3 2024 Misc. Correspondences with design team Aug-Oct 2024			
Building Energy Standard	Phius Core 2021			
Passive House Certification Metrics	Case 1: Article 22 Baseline	Units	Conversion	Criteria
Heating Demand	5.13	kBtu/ft ² ·yr	(16.2 kWh/m ² ·yr)	≤5.2 kBtu/ft2yr
Cooling & Dehumidification demand	2.93	kBtu/ft ² ·yr	(9.2 kWh/m ² ·yr)	≤8.2 kBtu/ft2yr
Heating Load	3.62	kBtu/ft ² ·yr	(11.4 kWh/m ² ·yr)	≤4.4 kBtu/ft2yr
Cooling Load	3.13	kBtu/ft ² ·yr	(9.9 kWh/m ² ·yr)	≤3.4 kBtu/ft2yr
Source Energy	4,644	kWh/person·year	(15836 kBtu/person·yr)	≤ 4900 kWh/person·yr
Utilization pattern	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Internal heat gains (heating)	0.9	BTU/hr·ft ²	(2.8 W/m ²)	WUFI model autocalculation
Internal heat gains (cooling)	0.9	BTU/hr·ft ²	(2.8 W/m ²)	WUFI model autocalculation
Number of dwellings	228	dwellings		240626_745 Concord - CDD Meeting 2-Rev, page 36 Zoning summary
Number of dwellings with 1 bathroom	169	dwellings		Internal takeoff 29776 745 Concord ICFA ad Suite Breakdown.xlsx based on 240626_745 Concord - CDD Meeting 2-Rev, page 36 Zoning summary, bathroom assumption is based on studios, 1 bed, 1+ bed having 1 bathroom, and 2/3 bed having 2 bathrooms
Number of dwellings with 2 bathrooms	59	dwellings		
Occupancy	476	people		ASHRAE standard, Studio =1, 1 Bed = 2, 2 bed = 3, 3 Bed = 4, Unit counts from 240626_745 Concord - CDD Meeting 2-Rev, page 34 Area plans
Area Breakdown - Building Summary	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
ICFA	207,596	ft ²	(19286 m ²)	Calculated @ 90% of GFA.
Total gross floor area (GFA)	230,662	ft ²	(21429 m ²)	From 240626_745 Concord - CDD Meeting 2-Rev.pdf pg.36 Zoning summary
Specific Capacity	23	BTU/ft ² ·F	(130.6 Wh/K per m2)	WUFI Passive standard for "Mixed"
Net Volume (ft3)	2,289,419	ft3	212,771	WUFI Passive calculated based on gross volume
Passive House boundary projected footprint	n/a	ft ²		
Heat Loss Area	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
HLA - Wall above ground	90,480	ft ²	(8406 m ²)	WUFI Passive -> Sum of relevant visualized and non visualized components as calculated by the software ¹
HLA - Wall below ground	581.91	ft ²	(54 m ²)	
HLA - Windows + Doors	26,238	ft ²	(2438 m ²)	
HLA - Roof + Terraces	22,313	ft ²	(2073 m ²)	
HLA - Exposed Soffits	2,280	ft ²	(212 m ²)	
HLA - Floor Slab / Parkade Ceiling	19,603	ft ²	(1821 m ²)	Includes BG elevator pit slab
HLA - TOTAL	161,496	ft ²	(15003 m ²)	
Heat Loss Area - Whole Building	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
HLA - TOTAL Combined	161,496	ft ²	(15003 m ²)	
Form Factor - TOTAL Combined - Heat Loss Area / ICFA	0.78	-		
SITE				
Elevation	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Climate file	Massachusetts, Boston-Logan Intl AP (725090) - PHILUS+ Climate Data			[PHPP] PHPP tool: default for New Hampshire
at Weather Station	19.7	ft	(6 m)	
Site Altitude	40	ft	(12.2 m)	
Site Altitude - Non-Residential PHPP (applied to whole building)	40	ft	(12.2 m)	240626_745 Concord - CDD Meeting 2-Rev, page 36 Zoning summary
Architectural				
Building Enclosure	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Above Grade Walls - Cold formed metal framing (TBD) - various cladding	20.0	ft ² ·F·h/Btu	(0.284 W/m ² ·K)	RDH Initial assumption based on project experience. Assumed CFMF as preliminary
Low-slope roof (L12 main, L10 and L1 terraces, penthouse)	50.0	ft ² ·F·h/Btu	(0.114 W/m ² ·K)	RDH Initial assumption based on project experience. Assumed CFMF as preliminary
Under-slab insulation (Slab on Grade at L1)	10.0	ft ² ·F·h/Btu	(0.568 W/m ² ·K)	RDH Initial assumption based on project experience. Assumed CFMF as preliminary
Soffit/overhang floors	50.0	ft ² ·F·h/Btu	(0.114 W/m ² ·K)	Assumed similar performance to roofs
Elevator shaft floor slab (no insulation)	1.0	ft ² ·F·h/Btu	(5.678 W/m ² ·K)	RDH Initial assumption - no insulation under elevator shaft slab
Elevator shaft below grade walls	17.2	ft ² ·F·h/Btu	(0.33 W/m ² ·K)	RDH Initial assumption - 4" rigid exterior insulation on concrete - Calculated through WUFI Passive Assembly build up
¹ All U-values/R-values include the impact of repeating thermal bridging, such as insulation fixings, cladding attachment clips, etc.				

Fenestration - Whole Building	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Window Area - TOTAL Combined	26041.81	ft²	(2420.243 m²)	Total window+door area from WUFI Passive minus area of opaque doors
Average Overall Installed Window U-value - Whole Building	0.200	Btu/hr-ft²-F	(1.136 W/m²K)	Starting assumption
Punched Windows	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
All windows - IGU + frames	0.2	Btu/hr-ft²-F	(1.14 W/m²K)	Assuming all glazing (including doors) on building is operable as starting point - Please confirm location and sizes of operable vs fixed, glazed doors, curtainwalls
Operable				
Window frame performance U _f - Top/Bottom/Side	0.200	Btu/hr-ft²-F	(1.14 W/m²K)	
Window frame performance U _f - Mullion	0.200	Btu/hr-ft²-F	(1.14 W/m²K)	
Frame width - Top/Bottom/Side	2.000	in	(50.8 mm)	
Frame width - Mullion/Transom	2.000	in	(50.8 mm)	
Glazing edge thermal bridge	0.000	Btu/hr-ft-F	(0 W/mK)	
Glazing COG U-value U _g (EN 673)	0.200	Btu/hr-ft²-F	(1.136 W/m²K)	
Glazing COG SHCC/g (EN 410)	0.300	-	-	RDH Initial Assumption
Opaque Exterior Door	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
BOD Product	No product specified	-		
Door performance	2.0	ft²-h-F/Btu	(2.84 W/m²K)	RDH Initial assumption - poor performing metal door
Shading (project direction, not TRUE direction)	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Horizon shading - North	All shading calculated in WUFI PH, based on SketchUp import of surrounding shading objects (buildings, etc.)	-		Sketchup
Horizon shading - East		-		
Horizon shading - South		-		
Horizon shading - West		-		
Overhang shading		-		
Balcony and Railing shading (height)		in	(0 m)	
Reveal shading - Curtainwall	3.00	in	(76.2 mm)	
Reveal shading - Punch windows and glazed doors	7.50	in	(190.5 mm)	

Thermal Bridges	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Punch Window & Glazed Door installation thermal bridges	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Top	0.023	Btu/ft-h-F	(0.04 W/mK)	PH default assumption (typical)
Left/Right	0.023	Btu/ft-h-F	(0.04 W/mK)	PH default assumption (typical)
Sill	0.023	Btu/ft-h-F	(0.04 W/mK)	PH default assumption (typical)
L1 Storefront installation thermal bridges	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Top/Bottom	0.023	Btu/ft-h-F	(0.04 W/mK)	PH default assumption (typical)
Left/Right	0.023	Btu/ft-h-F	(0.04 W/mK)	PH default assumption (typical)
Enclosure thermal bridges - Psi/Chi values	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Exterior Wall Corner [15]	0.000	Btu/ft-h-F	(0 W/mK)	Continuous insulation assumed
Elevator pit to slab on grade [17]	0.000	Btu/ft-h-F	(0 W/mK)	Continuous insulation assumed
Elevator pit BG slab [16]	0.000	Btu/ft-h-F	(0 W/mK)	Elevator pit BG slab is uninsulated so heat is transferred entirely through the slab
Slab on grade perimeter at L01 [16]	0.290	Btu/ft-h-F	(0.502 W/mK)	2021-12-06-SBD-DER-TB-Guide-RDH-FINAL
Level 12 Parapet [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	BC Thermal Database 5.5.10 for R-20 Walls
Level 10 Parapet [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	BC Thermal Database 5.5.10 for R-20 Walls
Level 1 Parapet [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	BC Thermal Database 5.5.10 for R-20 Walls
Low slope roof up to wall (all types, inverted) [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	Assume like parapet detailing in absence of information
Wall to soffit inside [15]	0.000	Btu/ft-h-F	(0 W/mK)	Continuous insulation assumed
Wall to soffit outside [15]	0.000	Btu/ft-h-F	(0 W/mK)	Continuous insulation assumed
Rooftop Penthouse Exterior Wall Corner [15]	0.000	Btu/ft-h-F	(0 W/mK)	Continuous insulation assumed
Rooftop Penthouse Parapet [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	BC Thermal Database 5.5.10 for R-20 Walls - Assuming Roof penthouse has similar thermal performing walls
Typical Intermediate Floors [15]	0.055	Btu/ft-h-F	(0.095 W/mK)	BC Thermal Database 5.2.33 Scenario B for ~R-20 Walls
Wall to roof transition [15]	0.187	Btu/ft-h-F	(0.323 W/mK)	BC Thermal Database 5.5.10 for R-20 Walls
Opaque door Perimeter	0.040	Btu/ft-h-F	(0.069 W/mK)	RDH Initial assumption
Columns at Covered Passage [15]	1.400	Btu/hr-F	(2.654 W/K)	BC Thermal Database 7.2.2 Scenario A for no insulation returning down column
Juliet balcony connection	NA	Btu/hr-F	#VALUE!	Juliet balconies observed in June 26 CDD presentation documents and SKP but not clear in June 28 Revit and drawing package. Please confirm # point connections per Juliet balcony and # Juliet balconies planned if there is consideration for these moving forward
Balcony corners - knife plate detail	0.126	Btu/ft-h-F	(0.218 W/mK)	BC Thermal Database 7.2.17 for R-15 Walls
Enclosure thermal bridges - Quantities	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Exterior Wall Corner [15]	2000.00	ft	(609.6 m)	TB - Exterior Wall Corner from 2024 07 19 Concord WUFI PH.skp
Elevator pit to slab on grade [17]	97.13	ft	(29.6 m)	TB - Elevator Pit from 2024 07 19 Concord WUFI PH.skp
Slab on grade perimeter at L01 [16]	782.98	ft	(238.7 m)	TB - SoG Perimeter from 2024 07 19 Concord WUFI PH.skp
Level 12 Parapet [15]	710.59	ft	(216.6 m)	TB - Parapet from 2024 07 19 Concord WUFI PH.skp
Level 10 Parapet [15]	156.48	ft	(47.7 m)	TB - Parapet from 2024 07 19 Concord WUFI PH.skp
Level 1 Parapet [15]	82.42	ft	(25.1 m)	TB - Parapet from 2024 07 19 Concord WUFI PH.skp
Low slope roof up to wall (all types, inverted) [15]	234.26	ft	(71.4 m)	TB - Roof up to Wall from 2024 07 19 Concord WUFI PH.skp
Wall to soffit inside [15]	415.81	ft	(126.7 m)	TB Soffit inside from 2024 07 19 Concord WUFI PH.skp
Wall to soffit outside [15]	150.50	ft	(45.9 m)	TB Soffit outside from 2024 07 19 Concord WUFI PH.skp
Rooftop Penthouse Exterior Wall Corner [15]	75.23	ft	(22.9 m)	TB - Penthouse Perimeter from 2024 07 19 Concord WUFI PH.skp
Rooftop Penthouse Parapet [15]	75.23	ft	(22.9 m)	TB - Penthouse Perimeter from 2024 07 19 Concord WUFI PH.skp
Typical Intermediate Floors [15]	9200.30	ft	(2804.3 m)	TB - Intermediate from 2024 07 19 Concord WUFI PH.skp
Wall to roof transition [15]	949.49	ft	(289.4 m)	TB - Parapet from 2024 07 19 Concord WUFI PH.skp
Opaque door Perimeter	20.10	ft	(6.1 m)	WUFI Passive: Opaque door component ->General->Data (autocalculation)
Columns at Covered Passage [15]	2	#		Based on June 28 architectural progress drawings from Hacin. Note this is slightly different from what is presented in the CCD sketchup from June 26
Juliet balcony connection	NA			Juliet balconies observed in June 26 CDD presentation documents and SKP but not clear in June 28 Revit and drawing package. Please confirm # point connections per Juliet balcony and # Juliet balconies planned if there is consideration for these moving forward
Balcony corners - knife plate detail	853.68	ft	(260.2 m)	From June 28 Drawings: 8 balconies on south elevation of green tower, 8 on west elevation of green tower, 8 on SE corner of main building, 10 on north elevation of main building

Airtightness	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Wind protection coefficient, e	0.07	-		Moderate exposure, WUFI Passive default
Wind protection coefficient, f	15.00	-		Moderate exposure, WUFI Passive default
Air change rate at Pressure test	0.46	ACH		Minimum requirement for PHIUS certification. 0.06 @ 50 Pa
Mechanical				
Ventilation Systems	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Ventilation Strategy	2x centralized units for common spaces & corridors, Decentralized in-suite ERVs	**Note for Allen: for the time being, let's take the non-residential area as 1.5/12.5 * GFA for the area of non-res spaces** A3.04 shows a mezzanine on level 1, so this is a very rough approximation of the non-res spaces, but I could not find a current floor plan for the mezzanine. Remainder of the space can be assigned to residential		Per Oct 2 Boylston Call
Control Strategy - Common Areas	12 hr @ 0.3 ACH 12 hr @ setback to 30%			Assumption
Control Strategy - Suites	23 hr @ standard rate 1 hr @ boost			Assumption
ERV Characteristics	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
BOD product (Common/Suites):	Oxygen8 Ventum/Ortech ODD ERV 120 (@75 and 100 CFM)			Cut sheets provided by mech in October 2024. Per Boylston call Oct 2 2024, 1 bathroom suites operate at 75 CFM and 2 bathroom suites operate at 100 CFM
Total Flow rate - Whole Building	22,575.00	CFM	(38355 m3/hr)	30 CFM per person x # of people estimated + 200cfm per res floor corridor + 0.5 ACH for non-suite spaces
Total Flow rate - Residential 1 bath (x units)	12675	CFM	(21535 m3/hr)	75 CFM per Boylston call Oct 2 2024. Assuming supply=exhaust (balanced system)
Total Flow rate - Residential 2 bath (x units)	5900	CFM	(10024 m3/hr)	100 CFM per Boylston call Oct 2 2024. Assuming supply=exhaust (balanced system)
Total Flow rate - Amenity + corridors (2 units)	4000	CFM	(6796 m3/hr)	Oxygen8 V25 cut sheet v 1.0.0.7 design conditions. Assuming supply=exhaust (balanced system)
Theoretical sensible heat recovery rate	77/ 78.7 (@75 CFM) / 74 (@100CFM)	%	Theoretical eff. (exc. Installation)	Oxygen8 V25 cut sheet v 1.0.0.7 / Ortech ODD-ERV-120 spec sheet received from mechanical team in Oct 2024 . Ortech ERV values interpolated from spec sheet
Theoretical latent heat recovery rate	68.5/61/54	%	Theoretical eff. (exc. Installation)	Oxygen8 V25 cut sheet v 1.0.0.7 / Ortech ODD-ERV-120 spec sheet received from mechanical team in Oct 2024 Assumed "Net moisture transfer" is HVI test equivalent to latent heat recovery, though it is noted the calculation method is likely slightly different. The ratio is converted to a percent. Ortech ERV values interpolated from spec sheet
Electrical efficiency	0.47/0.49/0.56	W/cfm		Oxygen8 V25 cut sheet v 1.0.0.7 / Ortech ODD-ERV-120 spec sheet received from mechanical team in Oct 2024 . Ortech ERV values interpolated from spec sheet
Summer bypass	Yes	-	Temperature controlled	
Frost protection	5	deg F	(-15°C)	Assumption
ERV Ducting Specification - Whole Building	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Outdoor Air & Exhaust Air Duct distances - Outdoor (rooftop)/Indoor (in-suite) units	5 ft/ 20 ft	ft		Rooftop units are outside, in-suite are assumed inside
Outdoor Air & Exhaust Air Duct insulation thermal conductivity - Outdoor (rooftop)/Indoor (in-suite) units	0.040	Btu/ft-h-F	(0.069 W/mK)	Rooftop units are outside, in-suite are assumed inside
Outdoor Air & Exhaust Air Duct insulation thickness - Outdoor (rooftop)/Indoor (in-suite) units	4" / 2"	in		Rooftop units are outside, in-suite are assumed inside
Duct size - Outdoor (rooftop)/Indoor (in-suite) units	24" / 4"	in		2x2" (600 x 600 mm)
Insulation around valves, hangers, etc.	Good	-		Rooftop units are outside, in-suite are assumed inside
Additional Ventilation	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Laundry	Ventless (leaning toward condensing)			MEP Narrative Correspondence from Boylston "RE_745 Concord Design Update for PH" dated July 3, 2024
Kitchen	Recirculating Hood			MEP Narrative Correspondence from Boylston "RE_745 Concord Design Update for PH" dated July 3, 2024
Heating and Cooling Systems - Whole Building	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Heating and cooling source	Roof-mounted VRF, in-suite FCUs			MEP Narrative Correspondence from Boylston "RE_745 Concord Design Update for PH" dated July 3, 2024
Heating Plant COP	2.47			Weighted converted COP of the 1.5, 2 and 18 ton Daikin HPs per October 2024 mechanical documents
Cooling Plant COP	3.60			Weighted converted COP of the 1.5, 2 and 18 ton Daikin HPs per October 2024 mechanical documents
Heating Capacity	5740	kBTU/hr		Total capacities of the 1.5, 2 and 18 ton Daikin HPs, and Oxygen8 ERV VRF post-heating HPs, per October 2024 mechanical documents. Unit counts from HDS "Roof diagram 745 Concord Ave" dated Sep 26 2024 updated Oct 3 2024
Cooling Capacity	5001	kBTU/hr		Total capacities of the 1.5, 2 and 18 ton Daikin HPs, and Oxygen8 ERV VRF post-heating HPs, per October 2024 mechanical documents. Unit counts from HDS "Roof diagram 745 Concord Ave" dated Sep 26 2024 updated Oct 3 2024

Heating/Cooling Distribution	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Heating and cooling distribution	R32 refrigerant			MEP Narrative Correspondence from Boylston "RE_745 Concord Design Update for PH" dated July 3, 2024
Fan coil fan power	0.09	W/cfm	0.15	Previous project reference, "1620 Main - 2023 03 21 HP - Internal Units & Controls", see page 1 of that document
Fan coil flow rate	320	CFM	(544 m3/hr)	Based on LG ARNU073L1G4 Multi V FCU Standard mode airflow Rate,
Fan coil annual operation schedule - Heating	1752	hr/yr		Initial estimate, based on 6 months in heating mode @ 40% utilization factor
Fan coil annual operation schedule - Cooling	350.4	hr/yr		Initial estimate, based on 6 months in cooling mode @ 8% utilization factor
Domestic Hot Water Systems - Whole Building	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
DHW source	Direct electric DHW tank, 1 per suite			MEP Narrative Correspondence from Boylston "RE_745 Concord Design Update for PH" dated July 3, 2024
DHW Source - Capacity (per HP)	(same)	MBH		
DHW COP	1.0	-		Direct Electric DHW
DHW distribution & storage	No recirculation			
DHW Load & Design	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Load - Non-Residential	Standard value per WUFI PH	l/person/day		
Distribution pipe length	NA	ft	#VALUE!	WUFI Autocalculates this for feasibility
Distribution pipe diameter	NA	in	#VALUE!	WUFI Autocalculates this for feasibility
Tapping points	NA	-		WUFI Autocalculates this for feasibility
DHW Fixtures	NA	-		WUFI Autocalculates this for feasibility
DHW Distribution pump characteristic	NA	-		WUFI Autocalculates this for feasibility
DHW Storage	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Storage tank capacity <u>per suite</u>	50	gallons	(189 L)	Oct 2 Boylston call.
Number of tanks	1 per suite 2 for non-res spaces	-		
Storage tank heat loss rate <u>per suite</u>	8.5	Btu/hr-F per tank	(16.1 W/K)	WUFI PH default, took the highest recommended loss
Storage tank temperature	130	F	(54 C)	Default value in WUFI
Electrical	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Lighting				
Lighting type - Residential	110	lm/W		
Lighting Energy Consumption - Residential		kBTU/yr		
Lighting Power Density	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Lighting design	TBD			Electrical consultant has not been engaged for Article 22, lighting design unknown
Common Areas/ Corridors	WUFI standard value	W/ft²	#VALUE!	Based on WUFI's autocalculated floor area: "PH case floor area"
Stairs	WUFI standard value	W/ft²	#VALUE!	
Mechanical/Electrical	WUFI standard value	W/ft²	#VALUE!	
Multipurpose Room/Lounge/Amenities	WUFI standard value	W/ft²	#VALUE!	
Process Loads	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Load - Whole Building				
Laundry Dryer	Phius 2024 Guidebook standard value	kWh/use		Based on WUFI's autocalculated occupancy: "PH Case occupants"
Dryer type	Ventless			
Cooking Usage	WUFI standard value	%		
Fridge Freezer	Phius 2024 Guidebook standard value	kWh/day		
Cooktop type	Electric	-		
Cooktop energy	Phius 2024 Guidebook standard value	kWh/use		
Kitchen Recirculation Range Hood	Phius 2024 Guidebook standard value	kWh/yr		
Elevator - Energy consumption total	10000	kWh/yr per elev.		
Elevator - Quantity	3	-		
Misc. Aux. Electricity - other plug loads	WUFI standard value	kWh/year		PHIUS 2015+ MELs Default calculation
Electricity - Common Areas	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Offices	NA	kBTU/hr		Plug loads in amenity space excluded for feasibility
Fitness	NA	kBTU/hr		Plug loads in amenity space excluded for feasibility
Multipurpose Rooms	NA	kBTU/hr		Plug loads in amenity space excluded for feasibility
Load - Non-Residential	Case 1: Article 22 Baseline	Units	Conversion	Source Of Evidence
Misc. Aux. Electricity	Case 1: Article 22 Baseline			
NA	NA	kBTU/yr		Plug loads in amenity space excluded for feasibility

Appendix B

WUFI Passive Model Results

BUILDING INFORMATION

Category:	Residential
Status:	In planning
Building type:	New construction
Year of construction:	
Units:	228
Number of occupants:	476 (Design)
Occupant density:	436.1 ft²/Person

Boundary conditions

Climate:	BOSTON LOGAN INT ARPT MA
Internal heat gains:	1 Btu/hr ft²
Interior temperature:	68 °F
Overheat temperature:	77 °F

Building geometry

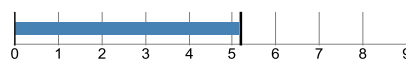
Enclosed volume:	3,012,385.6 ft³
Net-volume:	2,289,413.1 ft³
Total area envelope:	161,930.2 ft²
Area/Volume Ratio:	0.1 1/ft
Floor area:	207,596 ft²
Envelope area/iCFA:	0.78

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: **Phius CORE 2021**

Heating demand

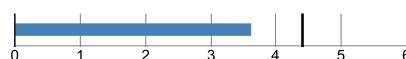
specific:	5.13 kBtu/ft²yr
target:	5.2 kBtu/ft²yr
total:	1,064,546.74 kBtu/yr

**Cooling demand**

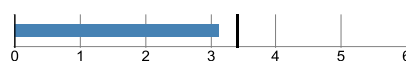
sensible:	2.63 kBtu/ft²yr
latent:	0.3 kBtu/ft²yr
specific:	2.93 kBtu/ft²yr
target:	8.2 kBtu/ft²yr
total:	608,124.16 kBtu/yr

**Heating load**

specific:	3.62 Btu/hr ft²
target:	4.4 Btu/hr ft²
total:	752,012.33 Btu/hr

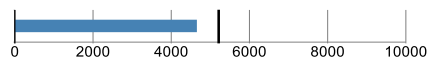
**Cooling load**

specific:	3.13 Btu/hr ft²
target:	3.4 Btu/hr ft²
total:	650,719.18 Btu/hr



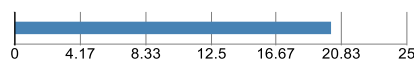
Source energy

total: **2,210,329.41** kWh/yr
specific: **4,644** kWh/Person yr
target: **5,225** kWh/Person yr
total: **7,541,212.6** kBtu/yr
specific: **36.33** kBtu/ft²yr



Site energy

total: **4,189,562.56** kBtu/yr
specific: **20.18** kBtu/ft²yr
total: **1,227,960.79** kWh/yr
specific: **5.92** kWh/ft²



Air tightness

ACH50: **0.25** 1/hr
CFM50 per envelope area: **0.06** cfm/ft²
target: **0.34** 1/hr
target CFM50: **0.08** cfm/ft²

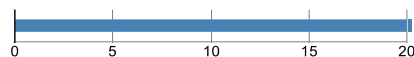


PASSIVEHOUSE RECOMMENDATIONS

Sensible recovery efficiency: **71.4** %



Frequency of overheating: **31.8** %
Cooling system is required

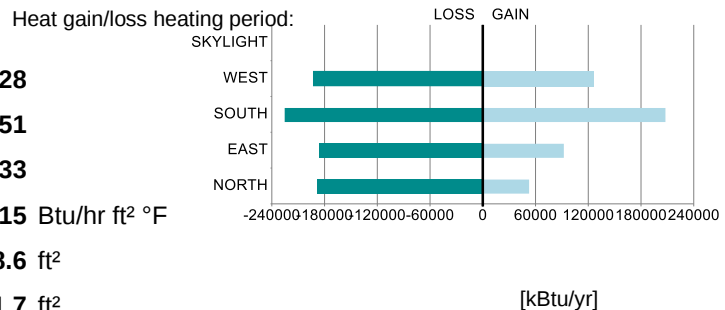


Frequency of overheating only applies if there is not a [properly sized] cooling system installed.

BUILDING ELEMENTS

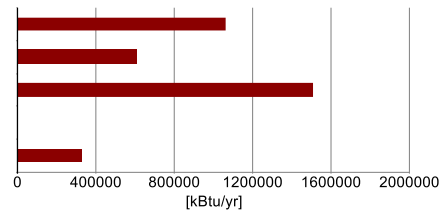
Windows

Average SHGC:	0.28
Average solar reduction factor heating:	0.51
Average solar reduction factor cooling:	0.33
Average U-value:	0.215 Btu/hr ft² °F
Total glazing area:	25,898.6 ft²
Total window area:	26,041.7 ft²



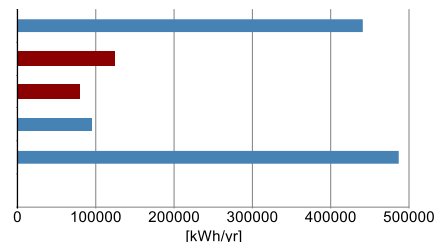
HVAC

Total heating demand:	1,064,547 kBTu/yr
Total cooling demand:	608,124 kBTu/yr
Total DHW energy demand:	1,507,166 kBTu/yr
Solar DHW contribution:	0 kBTu/yr
Auxiliary electricity:	323,619 kBTu/yr



Electricity

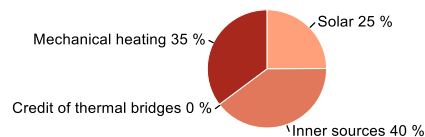
Direct heating / DHW:	441,750 kWh/yr
Heatpump heating:	124,807 kWh/yr
Cooling:	79,756 kWh/yr
HVAC auxiliary energy:	94,853 kWh/yr
Appliances:	486,794 kWh/yr
Renewable generation, coincident production and use:	0 kWh/yr
Total electricity demand:	1,227,961 kWh/yr



HEAT FLOW - HEATING PERIOD

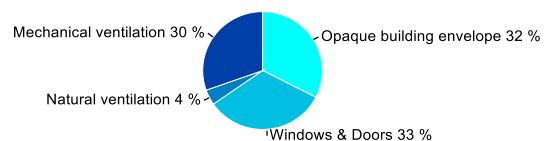
Heat gains

Solar:	685,792 kBTu/yr
Inner sources:	1,097,002 kBTu/yr
Credit of thermal bridges:	0 kBTu/yr
Mechanical heating:	1,064,547 kBTu/yr



Heat losses

Opaque building envelope:	868,756 kBTu/yr
Windows & Doors:	878,390 kBTu/yr
Natural ventilation:	113,223 kBTu/yr
Mechanical ventilation:	812,989 kBTu/yr

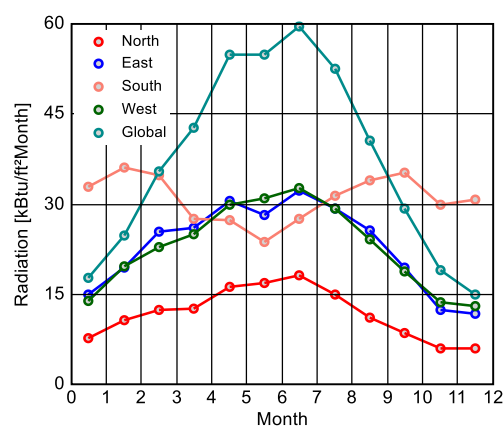
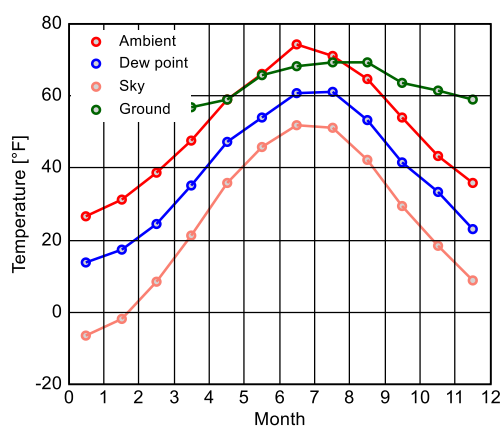


CLIMATE

Latitude: **42.4 °**
 Longitude: **-71 °**
 Elevation of weather station: **19.7 ft**
 Elevation of building site: **40 ft**
 Heat capacity air: **0.018 Btu/ft³F**
 Daily temperature swing summer: **14.8 °F**
 Average wind speed: **13.1 ft/s**

Ground

Average ground surface temperature: **52.7 °F**
 Amplitude ground surface temperature: **55.8 °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: **243 days/yr**
 Heating degree hours: **141.6 kFh/a**
 Phase shift months: **1.2 mths**
 Time constant heating demand: **244.2 hr**
 Time constant cooling demand: **0 hr**
 Time constant cooling demand with night ventilation: **0 hr**

Climate for	Heating load 1	Heating load 2	Cooling
Temperature [°F]	16.9	31.6	83.5
Solar radiation North [Btu/hr ft²]	12	7.9	27.6
Solar radiation East [Btu/hr ft²]	22.8	13.3	61.5
Solar radiation South [Btu/hr ft²]	49.5	27.3	41.8
Solar radiation West [Btu/hr ft²]	22.2	11.4	53.3
Solar radiation Global [Btu/hr ft²]	26.9	16.5	101.4

Relevant boundary conditions for heating load calculation: Heating load 1

ANNUAL HEAT DEMAND

Transmission losses : **1,921,128** kBtu/yr
 Ventilation losses: **926,212** kBtu/yr
 Total heat losses: **2,847,340** kBtu/yr

Solar heat gains: **751,226** kBtu/yr
 Internal heat gains: **1,201,671** kBtu/yr
 Total heat gains: **1,952,896** kBtu/yr
 Utilization factor: **91.3** %
 Useful heat gains: **1,782,793** kBtu/yr

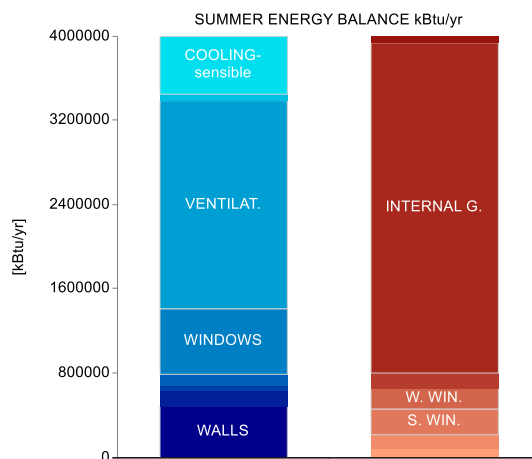
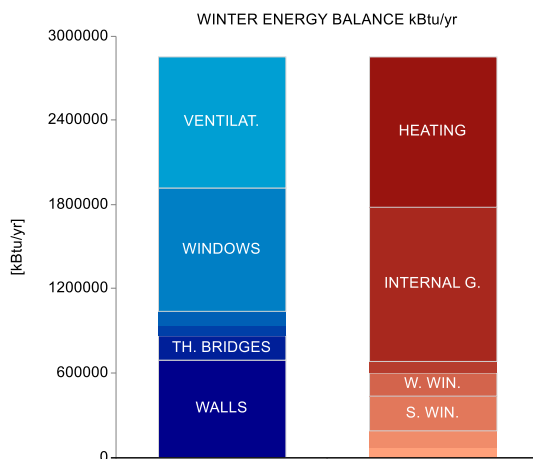
Annual heat demand: **1,064,547** kBtu/yr
 Specific annual heat demand: **5,128.5** Btu/ft²yr

ANNUAL COOLING DEMAND

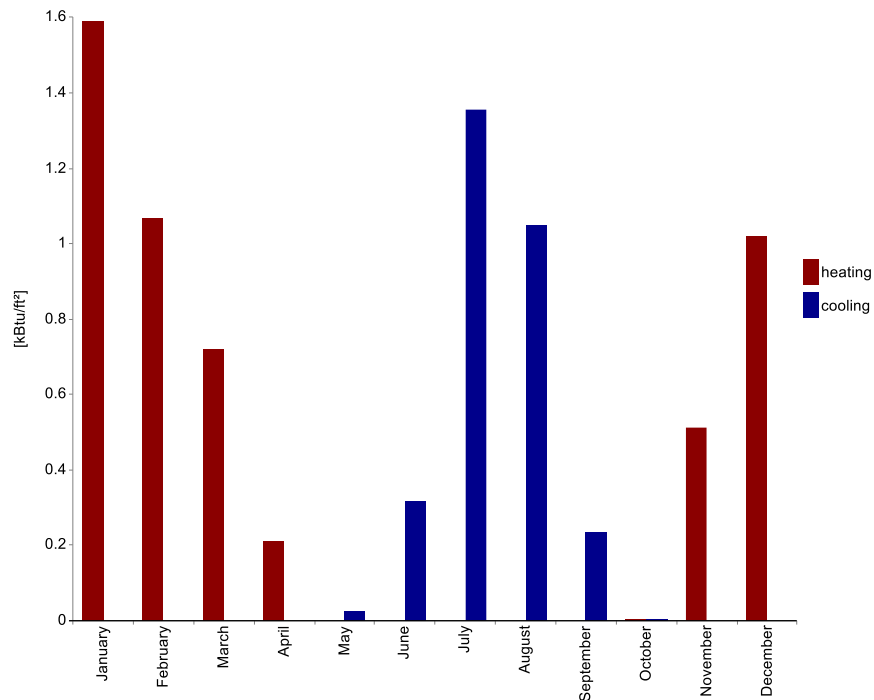
Solar heat gains: **805,874** kBtu/yr
 Internal heat gains: **3,125,100** kBtu/yr
 Total heat gains: **3,930,974** kBtu/yr

Transmission losses : **3,056,759** kBtu/yr
 Ventilation losses: **4,292,431** kBtu/yr
 Total heat losses: **7,349,190** kBtu/yr
 Utilization factor: **46.1** %
 Useful heat losses: **3,385,879** kBtu/yr

Cooling demand - sensible: **545,094** kBtu/yr
 Cooling demand - latent: **63,030** kBtu/yr
 Annual cooling demand: **608,124** kBtu/yr
 Specific annual cooling demand: **2.9** kBtu/ft²yr



SPECIFIC HEAT/COOLING DEMAND MONTHLY



Month	Heating [kBtu/ft²]	Cooling [kBtu/ft²]
January	1.6	0
February	1.1	0
March	0.7	0
April	0.2	0
May	0	0
June	0	0.3
July	0	1.4
August	0	1
September	0	0.2
October	0	0
November	0.5	0
December	1	0

HEATING LOAD

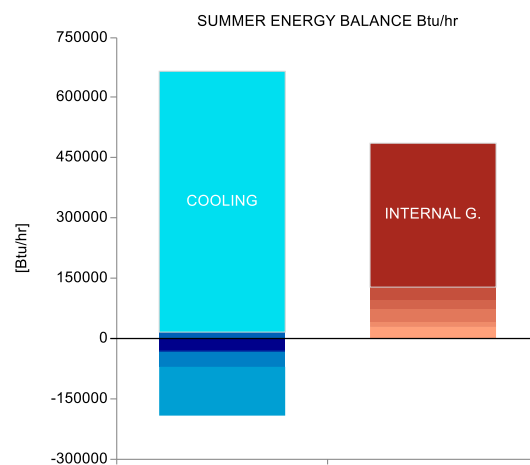
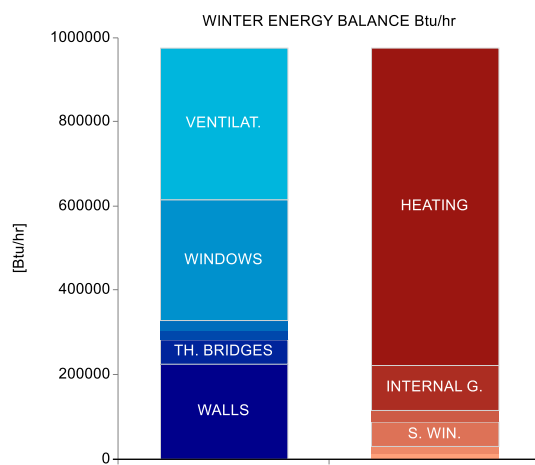
	First climate	Second climate
Transmission heat losses:	615,382.3 Btu/hr	445,684.8 Btu/hr
Ventilation heat losses:	357,918.4 Btu/hr	254,710.8 Btu/hr
Total heat loss:	973,300.8 Btu/hr	700,395.6 Btu/hr
Solar heat gain:	115,996.4 Btu/hr	64,827 Btu/hr
Internal heat gain:	105,292.1 Btu/hr	105,292.1 Btu/hr
Total heat gains heating:	221,288.5 Btu/hr	170,119.1 Btu/hr
Heating load:	752,012.3 Btu/hr	530,276.5 Btu/hr

Relevant heating load: **752,012.3** Btu/hr
 Specific heating load: **3.6** Btu/hr ft²

COOLING LOAD

Solar heat gain:	127,913.9 Btu/hr
Internal heat gain:	356,781.6 Btu/hr
Total heat gains cooling:	484,695.5 Btu/hr
Transmission heat losses:	-44,967.6 Btu/hr
Ventilation heat losses:	-121,056 Btu/hr
Total heat loss:	-166,023.7 Btu/hr
Cooling load - sensible:	650,719.2 Btu/hr
Cooling load - latent:	0 Btu/hr

Relevant cooling load: **650,719.2** Btu/hr
 Specific maximum cooling load: **3.1** Btu/hr ft²



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.3: 1 Podium Walls: East (A70.2°, 896.42 ft², width 49.187 ft)	896.4	0.047	0.4	0.9	100	6621.9	10085.9
VC.3: 1 Podium Walls: East (A100.1°, 1175.78 ft², width 62.583 ft)	1175.8	0.047	0.4	0.9	100	8685.6	13229.2
VC.3: 1 Podium Walls: North (A10.1°, 78.4 ft², width 2.958 ft)	78.4	0.047	0.4	0.9	100	579.1	882.1
VC.3: 1 Podium Walls: South (A190.1°, 0.01 ft², width 0.006 ft)	0	0.047	0.4	0.9	100	0.1	0.1
VC.3: 1 Podium Walls: West (A280.1°, 81.57 ft², width 4.828 ft)	81.6	0.047	0.4	0.9	100	602.6	917.8
VC.3: 1 Podium Walls: South (A190.1°, 130.1 ft², width 8.865 ft)	130.1	0.047	0.4	0.9	100	961.1	1463.8
VC.3: 1 Podium Walls: East (A100.1°, 870.88 ft², width 43.302 ft)	870.9	0.047	0.4	0.9	100	6433.3	9798.6
VC.3: 1 Podium Walls: West (A280.1°, 261.19 ft², width 11.115 ft)	261.2	0.047	0.4	0.9	100	1929.5	2938.8
VC.3: 1 Podium Walls: West (A250.1°, 1933.99 ft², width 94.036 ft)	1934	0.047	0.4	0.9	100	14286.5	21760.1
VC.3: 1 Podium Walls: West (A280.1°, 440.78 ft², width 22.912 ft)	440.8	0.047	0.4	0.9	100	3256	4959.3
VC.3: 1 Podium Walls: South (A190.1°, 97.18 ft², width 4.135 ft)	97.2	0.047	0.4	0.9	100	717.9	1093.4
VC.3: 1 Podium Walls: West (A280.1°, 127.95 ft², width 4.828 ft)	127.9	0.047	0.4	0.9	100	945.1	1439.6
VC.3: 1 Podium Walls: South (A160.2°, 0.03 ft², width 0.017 ft)	0	0.047	0.4	0.9	100	0.2	0.3
VC.3: 1 Podium Walls: South (A190.1°, 270.39 ft², width 17.833 ft)	270.4	0.047	0.4	0.9	100	1997.4	3042.2
VC.3: 1 Podium Walls: South (A190.1°, 298.37 ft², width 17.406 ft)	298.4	0.047	0.4	0.9	100	2204.1	3357.1
VC.3: 1 Podium Walls: East (A100.1°, 41.11 ft², width 7.448 ft)	41.1	0.047	0.4	0.9	100	303.7	462.6
VC.3: 1 Podium Walls: East (A100.1°, 26.07 ft², width 7.448 ft)	26.1	0.047	0.4	0.9	100	192.6	293.3
VC.3: 1 Podium Walls: East (A100.1°, 81.57 ft², width 4.828 ft)	81.6	0.047	0.4	0.9	100	602.6	917.8
VC.3: 1 Podium Walls: South (A190.1°, 634.24 ft², width 33.766 ft)	634.2	0.047	0.4	0.9	100	4685.2	7136.1
VC.3: 1 Podium Walls: West (A249.9°, 859.22 ft², width 55.25 ft)	859.2	0.047	0.4	0.9	100	6347.2	9667.5
VC.3: 1 Podium Walls: South (A160.2°, 0.01 ft², width 0.009 ft)	0	0.047	0.4	0.9	100	0.1	0.1
VC.3: 1 Podium Walls: South (A190.1°, 1191.08 ft², width 84.812 ft)	1191.1	0.047	0.4	0.9	100	8798.6	13401.3
VC.3: 1 Podium Walls: North (A10.1°, 1064.32 ft², width 48.505 ft)	1064.3	0.047	0.4	0.9	100	7862.2	11975.1
VC.3: 1 Podium Walls: North (A10.1°, 1391.3 ft², width 56.203 ft)	1391.3	0.047	0.4	0.9	100	10277.6	15654
VC.3: 1 Podium Walls: South (A190.1°, 350.14 ft², width 13.328 ft)	350.1	0.047	0.4	0.9	100	2586.5	3939.6
VC.3: 1 Podium Walls: South (A190.1°, 5.17 ft², width 5.168 ft)	5.2	0.047	0.4	0.9	100	38.2	58.1
VC.3: 1 Podium Walls: East (A100.1°, 4.68 ft², width 4.682 ft)	4.7	0.047	0.4	0.9	100	34.6	52.7
VC.3: 1 Podium Walls: East (A100.1°, 10.58 ft², width 10.578 ft)	10.6	0.047	0.4	0.9	100	78.1	119
VC.3: 1 Podium Walls: North (A10.1°, 87.08 ft², width 43.54 ft)	87.1	0.047	0.4	0.9	100	643.3	979.8
VC.3: 1 Podium Walls: North (A10.1°, 1298.67 ft², width 50.928 ft)	1298.7	0.047	0.4	0.9	100	9593.4	14611.9
VC.3: 1 Podium Walls: North (A10.1°, 575.34 ft², width 22.563 ft)	575.3	0.047	0.4	0.9	100	4250.1	6473.4
VC.3: 1 Podium Walls: North (A10.1°, 90.72 ft², width 8.894 ft)	90.7	0.047	0.4	0.9	100	670.1	1020.7
VC.3: 1 Podium Walls: North (A10.1°, 771.81 ft², width 40.412 ft)	771.8	0.047	0.4	0.9	100	5701.4	8683.9
VC.3: 1 Podium Walls: South (A160.2°, 0.03 ft², width 0.017 ft)	0	0.047	0.4	0.9	100	0.2	0.3
VC.3: 1 Podium Walls: South (A160.2°, 0.04 ft², width 0.026 ft)	0	0.047	0.4	0.9	100	0.3	0.5
VC.5: 2 Green wall: South (A190.1°, 1947.14 ft², width 27.283 ft)	1947.1	0.047	0.4	0.9	100	14383.7	21908.1
VC.5: 2 Green wall: North (A10.1°, 2161.12 ft², width 22.562 ft)	2161.1	0.047	0.4	0.9	100	15964.4	24315.6
VC.5: 2 Green wall: West (A280.1°, 593.29 ft², width 4.917 ft)	593.3	0.047	0.4	0.9	100	4382.7	6675.4
VC.5: 2 Green wall: East (A100.1°, 593.29 ft², width 4.917 ft)	593.3	0.047	0.4	0.9	100	4382.7	6675.4
VC.5: 2 Green wall: South (A190.1°, 1218.82 ft², width 18.36 ft)	1218.8	0.047	0.4	0.9	100	9003.5	13713.4
VC.5: 2 Green wall: West (A280.1°, 200.66 ft², width 2 ft)	200.7	0.047	0.4	0.9	100	1482.3	2257.7
VC.5: 2 Green wall: East (A100.1°, 200.66 ft², width 2 ft)	200.7	0.047	0.4	0.9	100	1482.3	2257.7
VC.5: 2 Green wall: North (A340.2°, 103.34 ft², width 2 ft)	103.3	0.047	0.4	0.9	100	763.4	1162.7
VC.5: 2 Green wall: East (A100.1°, 1180 ft², width 16.354 ft)	1180	0.047	0.4	0.9	100	8716.8	13276.6
VC.5: 2 Green wall: South (A190.1°, 490.95 ft², width 5.168 ft)	490.9	0.047	0.4	0.9	100	3626.7	5523.8
VC.5: 2 Green wall: North (A10.1°, 22.56 ft², width 22.563 ft)	22.6	0.047	0.4	0.9	100	166.7	253.9
VC.5: 2 Green wall: South (A190.1°, 1199.69 ft², width 15.063 ft)	1199.7	0.047	0.4	0.9	100	8862.2	13498.2
VC.5: 2 Green wall: East (A100.1°, 1134.07 ft², width 47.708 ft)	1134.1	0.047	0.4	0.9	100	8377.4	12759.8
VC.5: 2 Green wall: West (A250.1°, 2749.56 ft², width 37.708 ft)	2749.6	0.047	0.4	0.9	100	20311.2	30936.3
VC.5: 2 Green wall: South (A190.1°, 349.06 ft², width 14.525 ft)	349.1	0.047	0.4	0.9	100	2578.5	3927.4

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.5: 2 Green wall: South (A190.1°, 74.64 ft², width 9.33 ft)	74.6	0.047	0.4	0.9	100	551.4	839.8
VC.5: 2 Green wall: South (A190.1°, 61.94 ft², width 7.742 ft)	61.9	0.047	0.4	0.9	100	457.5	696.9
VC.5: 2 Green wall: West (A280.1°, 139.81 ft², width 1.344 ft)	139.8	0.047	0.4	0.9	100	1032.8	1573
VC.5: 2 Green wall: West (A280.1°, 1472.42 ft², width 18.68 ft)	1472.4	0.047	0.4	0.9	100	10876.9	16566.8
VC.5: 2 Green wall: East (A100.1°, 10.75 ft², width 1.344 ft)	10.8	0.047	0.4	0.9	100	79.4	121
VC.5: 2 Green wall: East (A70.2°, 431.81 ft², width 10.843 ft)	431.8	0.047	0.4	0.9	100	3189.8	4858.4
VC.5: 2 Green wall: North (A10.1°, 351.01 ft², width 9.263 ft)	351	0.047	0.4	0.9	100	2592.9	3949.3
VC.5: 2 Green wall: East (A100.1°, 103.34 ft², width 2 ft)	103.3	0.047	0.4	0.9	100	763.4	1162.7
VC.5: 2 Green wall: East (A100.1°, 478.8 ft², width 4.969 ft)	478.8	0.047	0.4	0.9	100	3536.9	5387.2
VC.5: 2 Green wall: East (A100.1°, 2232.66 ft², width 47.708 ft)	2232.7	0.047	0.4	0.9	100	16492.9	25120.5
VC.5: 2 Green wall: South (A190.1°, 94.96 ft², width 0.969 ft)	95	0.047	0.4	0.9	100	701.5	1068.4
VC.5: 2 Green wall: South (A190.1°, 500.5 ft², width 5.056 ft)	500.5	0.047	0.4	0.9	100	3697.3	5631.4
VC.6: 3 White wall: West (A280.1°, 5832.83 ft², width 64.706 ft)	5832.8	0.047	0.4	0.9	100	43087.6	65627.4
VC.6: 3 White wall: East (A100.1°, 336.05 ft², width 16.354 ft)	336.1	0.047	0.4	0.9	100	2482.4	3781
VC.6: 3 White wall: North (A10.1°, 233.38 ft², width 10.41 ft)	233.4	0.047	0.4	0.9	100	1724	2625.8
VC.6: 3 White wall: North (A10.1°, 208.68 ft², width 8.88 ft)	208.7	0.047	0.4	0.9	100	1541.6	2348
VC.6: 3 White wall: North (A10.1°, 5355.38 ft², width 56.203 ft)	5355.4	0.047	0.4	0.9	100	39560.7	60255.5
VC.6: 3 White wall: East (A100.1°, 42.22 ft², width 12.062 ft)	42.2	0.047	0.4	0.9	100	311.9	475
VC.6: 3 White wall: East (A100.1°, 123.04 ft², width 12.062 ft)	123	0.047	0.4	0.9	100	908.9	1384.3
VC.6: 3 White wall: South (A190.1°, 4093.18 ft², width 44.273 ft)	4093.2	0.047	0.4	0.9	100	30236.6	46053.9
VC.6: 3 White wall: West (A250°, 86.21 ft², width 62.022 ft)	86.2	0.047	0.4	0.9	100	636.8	970
VC.6: 3 White wall: East (A70.2°, 5203.19 ft², width 61.771 ft)	5203.2	0.047	0.4	0.9	100	38436.4	58543
VC.6: 3 White wall: North (A10.1°, 4391.2 ft², width 48.953 ft)	4391.2	0.047	0.4	0.9	100	32438.1	49407
VC.6: 3 White wall: South (A190.1°, 537.79 ft², width 5.026 ft)	537.8	0.047	0.4	0.9	100	3972.7	6050.9
VC.6: 3 White wall: South (A190.1°, 1865.73 ft², width 21.858 ft)	1865.7	0.047	0.4	0.9	100	13782.3	20992.1
VC.6: 3 White wall: North (A10.1°, 4713.57 ft², width 50.928 ft)	4713.6	0.047	0.4	0.9	100	34819.5	53034.2
VC.6: 3 White wall: East (A100.1°, 4692.23 ft², width 48.477 ft)	4692.2	0.047	0.4	0.9	100	34661.9	52794
VC.6: 3 White wall: North (A10.1°, 3288.46 ft², width 33.13 ft)	3288.5	0.047	0.4	0.9	100	24292.1	36999.7
VC.6: 3 White wall: North (A10.1°, 393.78 ft², width 10.42 ft)	393.8	0.047	0.4	0.9	100	2908.9	4430.6
VC.6: 3 White wall: South (A190.1°, 1055.69 ft², width 77.433 ft)	1055.7	0.047	0.4	0.9	100	7798.5	11878
VC.6: 3 White wall: South (A190.1°, 157.53 ft², width 6.137 ft)	157.5	0.047	0.4	0.9	100	1163.7	1772.5
VC.6: 3 White wall: South (A190.1°, 290.02 ft², width 18.36 ft)	290	0.047	0.4	0.9	100	2142.4	3263.2
VC.6: 3 White wall: South (A190.1°, 1867.97 ft², width 17.539 ft)	1868	0.047	0.4	0.9	100	13798.9	21017.3
VC.6: 3 White wall: West (A250°, 565.74 ft², width 4.743 ft)	565.7	0.047	0.4	0.9	100	4179.2	6365.3
VC.6: 3 White wall: West (A250°, 4848.03 ft², width 57.279 ft)	4848	0.047	0.4	0.9	100	35812.8	54547.1
VC.6: 3 White wall: South (A190.1°, 2491.29 ft², width 26.79 ft)	2491.3	0.047	0.4	0.9	100	18403.4	28030.5
VC.6: 3 White wall: South (A190.1°, 1148.05 ft², width 9.514 ft)	1148	0.047	0.4	0.9	100	8480.7	12917.1
VC.6: 3 White wall: South (A190.1°, 30.38 ft², width 21.858 ft)	30.4	0.047	0.4	0.9	100	224.4	341.8
VC.6: 3 White wall: West (A250°, 169.33 ft², width 56.443 ft)	169.3	0.047	0.4	0.9	100	1250.8	1905.2
VC.13: 9 Opaque door: North (A10.1°, 20.95 ft², width 2.95 ft)	20.9	0.168	0.4	0.9	100	550.4	838.3
VC.13: 9 Opaque door: North (A10.1°, 87.16 ft², width 8.894 ft)	87.2	0.168	0.4	0.9	100	2290.2	3488.3
VC.13: 9 Opaque door: North (A10.1°, 22.67 ft², width 3.175 ft)	22.7	0.168	0.4	0.9	100	595.7	907.3
VC.13: 9 Opaque door: North (A10.1°, 22.67 ft², width 3.175 ft)	22.7	0.168	0.4	0.9	100	595.7	907.3
VC.13: 9 Opaque door: North (A10.1°, 21.64 ft², width 3.1 ft)	21.6	0.168	0.4	0.9	100	568.6	866
VC.13: 9 Opaque door: North (A10.1°, 20.95 ft², width 2.95 ft)	20.9	0.168	0.4	0.9	100	550.4	838.3
VC.16: 14 Soffit: Horizontal (100.36 ft², width 8.91 ft)	100.4	0.047	0.4	0.9	100	733.5	1117.3
VC.16: 14 Soffit: Horizontal (140.06 ft², width 98.4 ft)	140.1	0.047	0.4	0.9	100	1023.7	1559.2
VC.16: 14 Soffit: Horizontal (56.25 ft², width 48.91 ft)	56.2	0.047	0.4	0.9	100	411.1	626.2
VC.16: 14 Soffit: Horizontal (451.25 ft², width 22.889 ft)	451.2	0.047	0.4	0.9	100	3298.1	5023.4
VC.16: 14 Soffit: Horizontal (2.95 ft², width 5.08 ft)	2.9	0.047	0.4	0.9	100	21.6	32.8

Transmission heat losses - areas (continue)

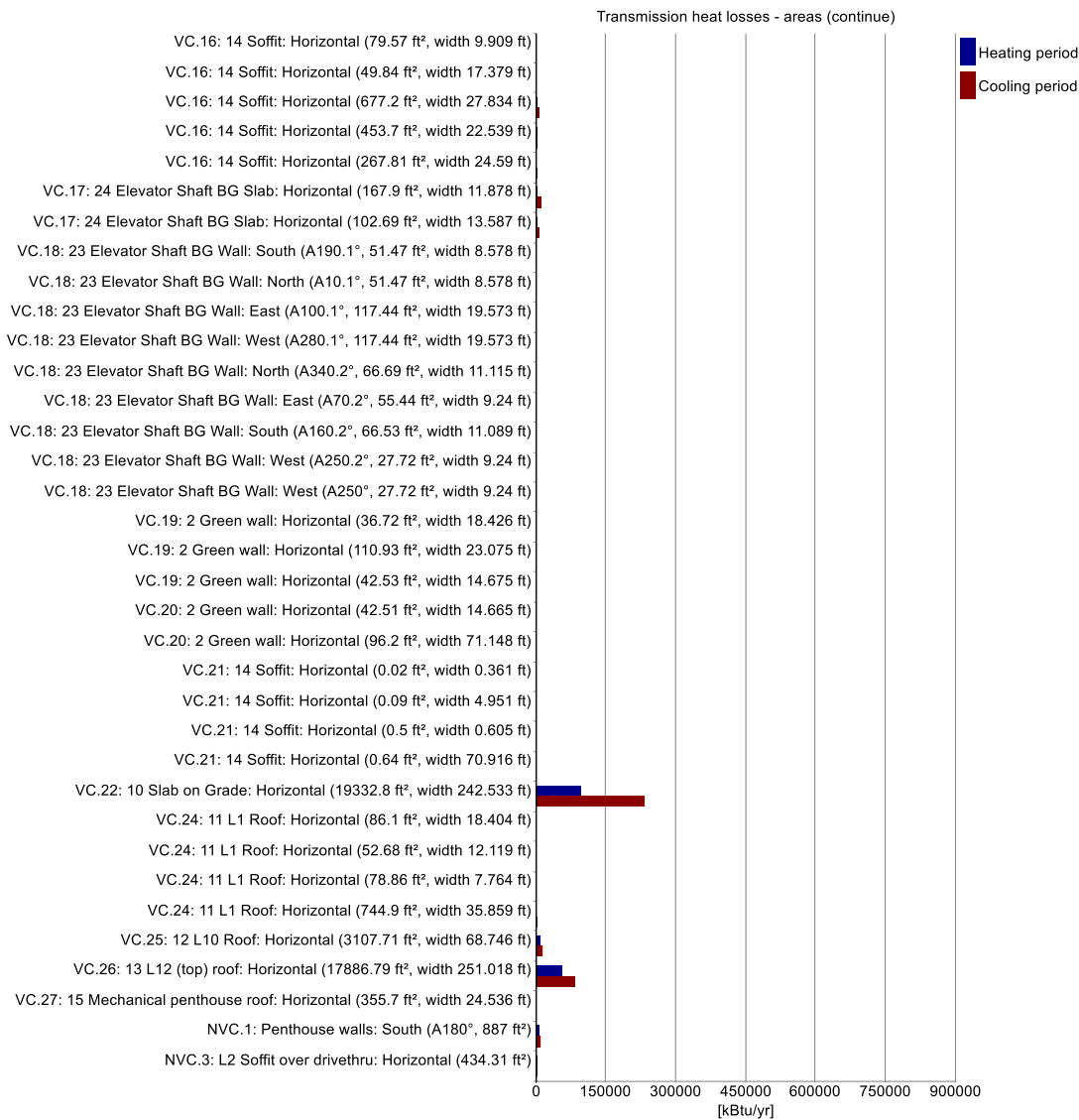
Name	Area [ft²]	Average U-value [Btu/hr ft² °F]	Absorption coefficient	Emission coefficient	Reduction factor shading [%]	Transmission losses heating [kBtu/yr]	Transmission losses cooling [kBtu/yr]
VC.16: 14 Soffit: Horizontal (79.57 ft², width 9.909 ft)	79.6	0.047	0.4	0.9	100	581.6	885.8
VC.16: 14 Soffit: Horizontal (49.84 ft², width 17.379 ft)	49.8	0.047	0.4	0.9	100	364.3	554.8
VC.16: 14 Soffit: Horizontal (677.2 ft², width 27.834 ft)	677.2	0.047	0.4	0.9	100	4949.5	7538.7
VC.16: 14 Soffit: Horizontal (453.7 ft², width 22.539 ft)	453.7	0.047	0.4	0.9	100	3316	5050.7
VC.16: 14 Soffit: Horizontal (267.81 ft², width 24.59 ft)	267.8	0.047	0.4	0.9	100	1957.4	2981.3
VC.17: 24 Elevator Shaft BG Slab: Horizontal (167.9 ft², width 11.878 ft)	167.9	0.509	0	0	0	4705.1	11386.7
VC.17: 24 Elevator Shaft BG Slab: Horizontal (102.69 ft², width 13.587 ft)	102.7	0.509	0	0	0	2877.8	6964.6
VC.18: 23 Elevator Shaft BG Wall: South (A190.1°, 51.47 ft², width 8.578 ft)	51.5	0.056	0	0	0	157.7	381.5
VC.18: 23 Elevator Shaft BG Wall: North (A10.1°, 51.47 ft², width 8.578 ft)	51.5	0.056	0	0	0	157.7	381.5
VC.18: 23 Elevator Shaft BG Wall: East (A100.1°, 117.44 ft², width 19.573 ft)	117.4	0.056	0	0	0	359.7	870.6
VC.18: 23 Elevator Shaft BG Wall: West (A280.1°, 117.44 ft², width 19.573 ft)	117.4	0.056	0	0	0	359.7	870.6
VC.18: 23 Elevator Shaft BG Wall: North (A340.2°, 66.69 ft², width 11.115 ft)	66.7	0.056	0	0	0	204.3	494.4
VC.18: 23 Elevator Shaft BG Wall: East (A70.2°, 55.44 ft², width 9.24 ft)	55.4	0.056	0	0	0	169.8	411
VC.18: 23 Elevator Shaft BG Wall: South (A160.2°, 66.53 ft², width 11.089 ft)	66.5	0.056	0	0	0	203.8	493.2
VC.18: 23 Elevator Shaft BG Wall: West (A250.2°, 27.72 ft², width 9.24 ft)	27.7	0.056	0	0	0	84.9	205.5
VC.18: 23 Elevator Shaft BG Wall: West (A250°, 27.72 ft², width 9.24 ft)	27.7	0.056	0	0	0	84.9	205.5
VC.19: 2 Green wall: Horizontal (36.72 ft², width 18.426 ft)	36.7	0.048	0.4	0.9	100	273.4	416.5
VC.19: 2 Green wall: Horizontal (110.93 ft², width 23.075 ft)	110.9	0.048	0.4	0.9	100	826.1	1258.2
VC.19: 2 Green wall: Horizontal (42.53 ft², width 14.675 ft)	42.5	0.048	0.4	0.9	100	316.7	482.3
VC.20: 2 Green wall: Horizontal (42.51 ft², width 14.665 ft)	42.5	0.047	0.4	0.9	100	310.7	473.2
VC.20: 2 Green wall: Horizontal (96.2 ft², width 71.148 ft)	96.2	0.047	0.4	0.9	100	703.1	1070.9
VC.21: 14 Soffit: Horizontal (0.02 ft², width 0.361 ft)	0	0.047	0.4	0.9	100	0.1	0.2
VC.21: 14 Soffit: Horizontal (0.09 ft², width 4.951 ft)	0.1	0.047	0.4	0.9	100	0.6	1
VC.21: 14 Soffit: Horizontal (0.5 ft², width 0.605 ft)	0.5	0.047	0.4	0.9	100	3.7	5.6
VC.21: 14 Soffit: Horizontal (0.64 ft², width 70.916 ft)	0.6	0.047	0.4	0.9	100	4.6	7.1
VC.22: 10 Slab on Grade: Horizontal (19332.8 ft², width 242.533 ft)	19332.8	0.091	0	0	0	97101.3	234991.7
VC.24: 11 L1 Roof: Horizontal (86.1 ft², width 18.404 ft)	86.1	0.02	0.4	0.9	100	265.7	404.7
VC.24: 11 L1 Roof: Horizontal (52.68 ft², width 12.119 ft)	52.7	0.02	0.4	0.9	100	162.6	247.6
VC.24: 11 L1 Roof: Horizontal (78.86 ft², width 7.764 ft)	78.9	0.02	0.4	0.9	100	243.4	370.7
VC.24: 11 L1 Roof: Horizontal (744.9 ft², width 35.859 ft)	744.9	0.02	0.4	0.9	100	2298.7	3501.2
VC.25: 12 L10 Roof: Horizontal (3107.71 ft², width 68.746 ft)	3107.7	0.02	0.4	0.9	100	9590.1	14606.8
VC.26: 13 L12 (top) roof: Horizontal (17886.79 ft², width 251.018 ft)	17886.8	0.02	0.4	0.9	100	55196.8	84071
VC.27: 15 Mechanical penthouse roof: Horizontal (355.7 ft², width 24.536 ft)	355.7	0.02	0.4	0.9	100	1097.6	1671.8
NVC.1: Penthouse walls: South (A180°, 887 ft²)	887	0.047	0.4	0.9	100	6552.3	9980
NVC.3: L2 Soffit over drivethru: Horizontal (434.31 ft²)	434.3	0.048	0.4	0.9	100	3234.2	4926.1

Degree hours [kFh/a]

	Heating	Cooling
Ambient heating	87.1	132.6
Ground heating	30.6	74.1



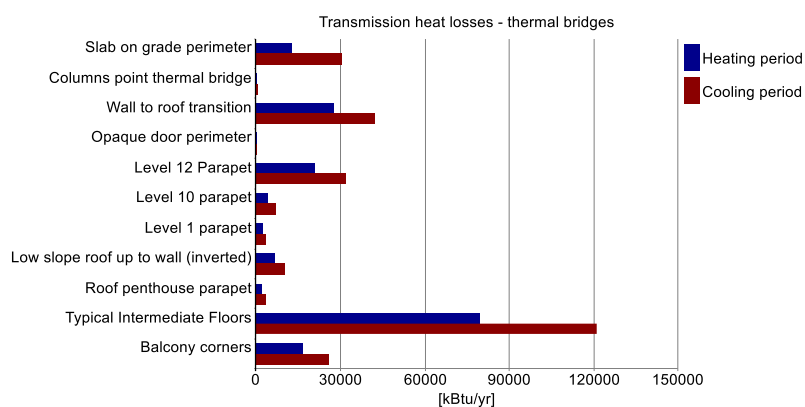




THERMAL BRIDGES

Transmission heat losses - thermal bridges

Name	Length [ft]	Psi-value [Btu/hr ft °F]	Transmission losses [kBtu/yr]	Transmission losses cooling [kBtu/yr]
Slab on grade perimeter	783	0.29	12505.5	30264
Columns point thermal bridge	2	1.4	438.9	668.5
Wall to roof transition	949.5	0.187	27831.3	42390.3
Opaque door perimeter	20.1	0.04	126	192
Level 12 Parapet	710.6	0.187	20828.7	31724.5
Level 10 parapet	156.5	0.187	4586.7	6986.1
Level 1 parapet	82.4	0.187	2415.9	3679.7
Low slope roof up to wall (inverted)	234.3	0.187	6866.6	10458.6
Roof penthouse parapet	75.2	0.187	2205.1	3358.7
Typical Intermediate Floors	9200.3	0.055	79317	120809
Balcony corners	853.7	0.126	16860.4	25680.3



WINDOWS

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.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.2	34.6	1,263.6	1,154.3	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	63.4	37	749.2	706.7	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.1	38.3	1,318.8	1,227.3	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.7	24.1	733.4	869.5	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.6	39	1,412.5	1,288.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	64.5	34.9	1,296.5	1,176.6	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	66.1	37.6	792	736	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.7	35.8	1,379.5	1,233.6	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	69.2	38.5	838.9	768.1	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.3	39.7	1,450.5	1,317.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.6	44.6	880.5	843.4	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.8	45.9	1,521	1,444.5	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.1	44.6	1,494.2	1,412.1	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.8	45.9	1,520.9	1,444.4	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.6	44.6	880.5	843.4	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.6	45	1,499	1,420.8	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.6	44.6	880.5	843.4	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.6	45	1,499	1,420.8	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.9	46	1,521.7	1,445.3	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.7	49.1	919.8	901.9	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84.1	50.6	1,587.4	1,543.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	83.9	50.5	1,585	1,540.6	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.7	49.1	919.8	901.9	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84.1	50.6	1,587.3	1,543.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84.1	50.6	1,587.4	1,543.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84.1	50.6	1,587.5	1,544	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84.1	50.6	1,587.4	1,544	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A250.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.6	49.1	919	901	874.4	1,331.8
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.3	23.8	730.1	862.4	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	48.1	24.1	769.9	899.9	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.6	35.1	919.1	1,138	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	64.1	37.4	938.4	1,180.2	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	64.7	37.8	945.9	1,191.8	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.1	45.5	1,066.1	1,376.3	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.2	45.6	1,066.3	1,377.5	1,406.4	2,142.1
VC.1: 17 Green tower WEST windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	65.9	39.2	950.2	1,211.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	35.5	19.6	192	198.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	49.3	34.4	351.6	513.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	45.1	33.1	499.3	766.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.8	32.2	504.5	531	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57	31.2	307.5	318.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	53.6	28.6	480	492.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	44.6	24.9	387.7	409.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	46.1	24.2	256.5	257.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.2	26.2	398.7	424.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	47.9	25.5	262.3	268	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	45.4	33.3	500.6	770.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.4	29.3	287.4	298.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	42.6	27.8	323.2	447.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	33.3	25	354.7	563.7	1,406.4	2,142.1

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.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	44.1	24.6	386.9	404.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	48.6	25.5	442.8	446.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	14.4	7.6	80.1	80.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.7	29.5	288.6	300	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	15.2	7.8	86.2	85	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	52.7	36.2	375.8	549.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	49.5	27.8	428.9	454.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	36.3	20.2	194.2	202.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	44.7	25	390.3	410.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	45.6	25.9	393	419	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	49.9	28	432.6	457.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	38.9	21.9	205.3	217.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	47.6	26.9	411.7	437.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.3	26.2	398.9	424.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.3	29.3	455.5	480.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	40.5	22.7	214	226	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	51.2	28.7	444.6	469.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	48	27.1	414.9	440.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	58.7	32.6	515.5	539.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	54.5	30.4	476	500.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.4	33.4	530.7	554.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	46.6	25.8	248.7	260.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.6	35.9	549	583.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.4	35.5	536.3	573.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.8	32.2	490.8	521.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	48.3	27.1	255.9	269.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.2	34.4	518.5	552.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.7	271.8	285.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.6	39.1	574.5	620.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	65.9	38.2	558.4	604.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66.2	38.4	560.9	607.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.3	32.9	297.2	320	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	69.5	40.1	592	638	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.6	41.1	611.7	657.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.3	41	609.2	654.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.1	39.3	578.9	625.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.5	33	298.3	321.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73.5	42.1	629.2	674.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	69.4	40	590.9	636.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	58.5	33.5	304.1	326.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74.7	42.8	640.3	686	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.3	41.5	618.7	664.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.3	41.5	618	663.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.7	43.4	648.1	695.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74.7	42.8	639.3	685.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	60.5	34.6	315.8	338.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.4	272.6	286.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.4	272.6	286.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	41.6	23.2	220.3	232.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	52.5	28.8	282.3	293.2	874.4	1,331.8

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.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.5	29.4	288.3	299.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	60.1	34.4	313.3	335.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	46.7	26.5	245.4	261.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.46 ft², width 4.14 ft)	1	90	0.219	0.3	71.3	40.3	373.7	397.5	872.4	1,328.7
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.3	272.4	285.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	51.2	27.5	456.4	470.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	15.9	8.2	89.9	88.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	58.2	32.7	503.5	534.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	48	25.6	262.5	268.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	14.9	7.8	83.3	83.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.9	29.7	288.5	301	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	58.7	32.9	508.4	539.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60	33.6	520.5	551.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	16.6	8.5	93.8	92.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.9	29.7	288.4	300.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.4	272.6	286.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.2	28.4	272.6	286.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	15.5	8.1	86.9	86.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.6	31.3	479.4	510.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	58.2	32.7	503.5	534.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	17.4	9	98.9	97.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.6	34.4	534.9	565.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.9	29.7	288.3	301	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.4	28.5	273.9	287.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	16.3	8.5	91.1	90.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.6	31.3	479.4	510.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.6	29.6	286.2	299.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.1	34.1	530.3	560.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	20.6	10.7	116	115.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	55.1	30.3	294.5	307.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.7	34.4	535.8	566.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	56	30.8	300.4	312.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	55	30.3	294.2	307.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.1	34.7	540	570.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	21.4	11	121.1	119.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	59.4	33.3	514.6	545.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	30.9	15.9	175.6	173	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	65.6	35.8	354.6	366.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.4	38.9	617.2	646.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	65.7	35.8	354.8	366.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70	38.7	613.2	642.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	30.8	16.3	170.3	172.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.4	38.9	617.5	646.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	65.3	35.5	353.1	364.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74.4	42.1	639.4	683.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	66.4	36.3	357	370.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	67.8	37.5	361.8	378.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.8	43.2	647.7	695.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	36.2	18.6	205.7	202.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	70.5	39.7	371.4	394.1	874.4	1,331.8

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.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	40.5	22.7	214.8	226.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.4	38.9	617.2	646.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71	40.2	373.4	396.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.3	44.4	657.4	709.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	36.9	20.7	195.7	206.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	32.9	16.9	186.5	183.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.3	40.3	374.7	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.1	40.2	373.5	397.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.3	44.4	657.5	709.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.3	44.4	657.5	709.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	40.9	22.9	216.9	228.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	36.6	18.8	207.5	204.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	37.9	19.5	215.2	211.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.2	40.2	373.9	397.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	375	398.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	42.1	23.5	223.4	235	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	375	398.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.8	29.7	328.4	323.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	375	398.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	375	398.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	64	35.9	338	357.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.3	709.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	54.2	29.9	289.9	303.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.3	31.4	308.1	320.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.1	33.9	535.6	560.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.3	30.1	491.6	508.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	54.2	29.9	289.9	303.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.6	31.7	308.9	321.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.8	34.4	538.5	567.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.4	30.9	495.7	517.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	54.2	29.9	289.9	303.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	63.2	35.6	331.6	353.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.1	34.7	539.6	570.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.3	30.8	495.2	517	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	58	31.9	311.4	324.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	65.4	36.7	344	365.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.7	35.7	551.9	585	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.3	30.8	495.2	517	1,406.4	2,142.1

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.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	69.7	39	368.1	389.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	70.8	39.9	372.7	395.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66.9	37.3	581.4	614	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.3	32.9	532.2	553.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.3	40.3	374.7	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.8	43.2	648	696.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.5	39.6	623.6	656.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.3	709.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.3	42.8	647.1	691.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.3	40.3	374.7	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.4	374.8	398.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.3	709.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75	42.5	645.5	688.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.3	40.3	374.7	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.4	42.8	647.7	692.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.3	40.3	374.7	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.4	40.3	374.8	398.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.5	42.9	648.2	692.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: North (A10.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.2	44.4	657.2	709.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.5	48	577.3	795.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	45.2	33.1	500.8	768.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	33.3	25	354.8	563.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.3	33.7	513.9	786.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.9	35	382.2	543.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	52.1	34	395.7	547.9	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.5	33.9	516.9	790.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	52.5	35.3	388.3	549.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	37	27.5	390.6	627.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	55.1	36.4	411.2	577.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.7	34	518.5	793.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	55.2	37.3	400.7	577.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	40	29.8	423.9	677.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.1	38.1	571.4	885.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	57.1	37.9	421.3	598.3	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	50.8	37.2	555.8	863	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	53.4	39	587.2	907.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	41.6	30.9	443.9	705.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	54.9	40.4	605.2	933.1	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	59.3	40.4	429.1	619.1	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	61.2	41.3	447	639.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	42.7	31.5	461.5	726.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.5	40.1	664.8	981.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.4	41.2	649	977.8	1,406.4	2,142.1

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.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	66.9	43.9	501	702.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	46.1	33.9	497.2	785	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.8	44.1	727.4	1,074.9	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	61.1	42.7	706.7	1,046.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.3	38.4	557.6	890.3	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66.7	46.7	766.7	1,140.2	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.7	46.9	534.8	752.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.5	47.6	796.6	1,173.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	53.9	39.8	571.2	915.5	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.8	48.2	790.5	1,176	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.3	49.2	829.5	1,220.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	73.5	47.9	550.2	772.2	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.9	43.1	617.2	982.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.1	47.9	571.2	790.4	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.1	49.2	827.9	1,218.4	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.6	49.7	922.7	1,302.7	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.1	48.1	751.7	1,144.8	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	75.7	48	580.2	798.6	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.1	49.8	956.9	1,332.6	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.6	49.9	989	1,361	1,406.4	2,142.1
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	76.1	48.1	584.4	802.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	55.3	37.2	402	578	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	60.5	39.6	449.9	634.7	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	68.9	45.9	504	721.5	874.4	1,331.8
VC.2: 22 Main NORTH Windows: East (A70.2°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	54.4	35.8	402.1	570.8	874.4	1,331.8
VC.2: 22 Main NORTH Windows: North (A10.1°, 25.46 ft², width 4.14 ft)	1	90	0.219	0.3	71.3	40.3	373.7	397.5	872.4	1,328.7
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	28	10	385.3	290.9	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	35	12	803.8	598.9	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	35.8	14.2	471.5	374.3	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	49.8	21.7	1,053.1	858.4	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	36	14.3	473.5	376.1	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	51.9	23.4	1,077.8	896.2	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	28.5	10.4	390.7	296.7	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	38.4	15.1	837.4	660.2	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.2	23.5	1,084.1	901.8	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.3	23.6	1,085.9	903.2	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.3	23.6	1,086.3	903.6	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.8	28.7	1,143.5	1,001.4	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.5	31	1,170.1	1,049.5	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.6	31.1	1,173.5	1,052.7	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73	42.2	1,326.4	1,273.4	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	38.7	15.3	840.3	665.5	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	37.6	15.9	481.8	394.3	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	31.4	13.1	406	328.3	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	38	16.1	485.4	398	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	32.9	14.4	415.5	345.2	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	40.2	16.6	851.8	691.4	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	40.1	16.6	851.2	690.2	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	38.8	16.8	493.7	407.3	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	34.4	15.4	428.9	360.8	874.4	1,331.8

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.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	35.2	16.2	436.9	369.8	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	42.5	20.2	529.2	447.3	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	44.5	20.5	920	767.4	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	49.8	26.9	572.9	526.6	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	40.3	20.8	480	424.6	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	49.9	25.6	978.8	865	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	50.8	27.5	582.9	537.5	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	50.6	26.2	986.5	877.7	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	45.9	24.6	535	485.2	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	58.9	31.7	1,116.4	1,023.3	1,406.4	2,142.1
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	50.8	27.2	588.6	536.9	874.4	1,331.8
VC.4: 16 Green tower EAST windows: East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	62.1	36	687.4	659	874.4	1,331.8
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 53 ft², width 4 ft)	1	90	0.215	0.3	0	0	0.3	0.4	1,785.9	2,720.1
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 52.54 ft², width 3.98 ft)	1	90	0.215	0.3	67.9	39.9	1,384	1,300.1	1,770.9	2,697.2
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 52.54 ft², width 3.98 ft)	1	90	0.215	0.3	53.8	26.4	1,198.9	1,019.1	1,770.9	2,697.2
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 52.54 ft², width 3.98 ft)	1	90	0.215	0.3	67.1	39.2	1,370.9	1,282.7	1,770.9	2,697.2
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 46.37 ft², width 3.5 ft)	1	90	0.217	0.3	11.5	3.5	249.2	179.9	1,574.6	2,398.3
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 52.54 ft², width 3.98 ft)	1	90	0.215	0.3	63.9	36.5	1,322.2	1,220.1	1,770.9	2,697.2
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 60.02 ft², width 4.53 ft)	1	90	0.214	0.3	58.4	29.6	1,902.5	1,653.3	2,009.9	3,061.3
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 52.54 ft², width 3.98 ft)	1	90	0.215	0.3	66.9	39.1	1,369	1,280.5	1,770.9	2,697.2
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 60.02 ft², width 4.53 ft)	1	90	0.214	0.3	56.9	28.4	1,865.2	1,612.3	2,009.9	3,061.3
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 82.15 ft², width 6.2 ft)	1	90	0.211	0.3	59.1	29.1	2,668.2	2,294.1	2,715.6	4,136.2
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 86.7 ft², width 6.69 ft)	1	90	0.21	0.3	84.7	50	3,766.6	3,471	2,859.8	4,355.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	82.3	48.8	2,609.3	2,407.4	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	80.9	48	2,558.3	2,363.7	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	82.5	48.6	2,620.5	2,412.5	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	81.1	48.1	2,566.6	2,370.1	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	83.3	49.1	2,644.1	2,434.7	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	82.8	48.8	2,628.9	2,421.2	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	82.7	48.7	2,625.5	2,417	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 93.96 ft², width 7.25 ft)	1	90	0.21	0.3	84.5	50.1	4,059.9	3,749.8	3,091.3	4,708.5
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 45.62 ft², width 3.52 ft)	1	90	0.217	0.3	81.3	47.7	1,901.8	1,748	1,549	2,359.3
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 23.42 ft², width 5.24 ft)	1	90	0.219	0.3	47.6	22.2	621.3	525	804.3	1,225.1
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 35.38 ft², width 2.67 ft)	1	90	0.221	0.3	42.4	22.4	800.1	705.3	1,223.9	1,864.1
VC.7: 6 Curtainwall/storefront SOUTH: West (A280.1°, 46.37 ft², width 3.5 ft)	1	90	0.217	0.3	8	3	135.2	141.6	1,574.6	2,398.3
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 54.79 ft², width 4.135 ft)	1	90	0.215	0.3	33.2	16.4	995.7	857.6	1,843.1	2,807.3
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 54.05 ft², width 4.079 ft)	1	90	0.215	0.3	35.1	17.9	1,024.1	894.5	1,819.4	2,771.1
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 54.05 ft², width 4.079 ft)	1	90	0.215	0.3	42.3	22	1,228.8	1,078.4	1,819.4	2,771.1
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 53 ft², width 4 ft)	1	90	0.215	0.3	35.9	14	831.4	650.1	1,785.9	2,720.1
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 53 ft², width 4 ft)	1	90	0.215	0.3	36.1	14	836.8	653.8	1,785.9	2,720.1
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 53.66 ft², width 4.05 ft)	1	90	0.215	0.3	38.2	14.4	907.8	700	1,807	2,752.3
VC.7: 6 Curtainwall/storefront SOUTH: East (A100.1°, 53.66 ft², width 4.05 ft)	1	90	0.215	0.3	49	21.3	1,106.7	902.1	1,807	2,752.3
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 163.61 ft², width 15.9 ft)	1	90	0.207	0.3	77.3	49	6,277.3	5,980.1	5,318	8,099.9
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 28.73 ft², width 6.5 ft)	1	90	0.217	0.3	53.1	25.2	656	548.5	979.4	1,491.8
VC.7: 6 Curtainwall/storefront SOUTH: West (A249.9°, 90.67 ft², width 6.869 ft)	1	90	0.21	0.3	50.7	23.7	1,997.2	1,656.1	2,987.2	4,549.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 61.95 ft², width 4.78 ft)	1	90	0.213	0.3	82.9	48.9	2,632.1	2,424.4	2,070	3,152.8
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 49.95 ft², width 5.55 ft)	1	90	0.213	0.3	62.9	31.5	1,718.8	1,482.3	1,670.8	2,544.9
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 254.48 ft², width 31.81 ft)	1	90	0.207	0.3	73.5	36.2	10,337	8,850.6	8,264.9	12,588.4
VC.7: 6 Curtainwall/storefront SOUTH: South (A190.1°, 72 ft², width 9 ft)	1	90	0.211	0.3	71.9	35.4	2,857.6	2,446.4	2,379.8	3,624.6
VC.8: 8 Glazed door: East (A100.1°, 33.06 ft², width 2.51 ft)	1	90	0.222	0.4	40.9	26.6	683	715.6	1,149.4	1,750.6

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.8: 8 Glazed door: East (A100.1°, 30.97 ft², width 3.16 ft)	1	90	0.219	0.4	32	25	425.9	529.9	1,064.3	1,621
VC.8: 8 Glazed door: South (A190.1°, 40.89 ft², width 3.43 ft)	1	90	0.217	0.4	57.6	36.2	1,775.4	1,685.6	1,392.4	2,120.8
VC.8: 8 Glazed door: East (A100.1°, 56.25 ft², width 3.218 ft)	1	90	0.217	0.4	1.2	1	19.4	35.7	1,912.6	2,913.2
VC.8: 8 Glazed door: East (A100.1°, 73.94 ft², width 4.23 ft)	1	90	0.214	0.4	15.2	6.1	725	584.7	2,474.5	3,769
VC.8: 8 Glazed door: South (A190.1°, 47.82 ft², width 3.69 ft)	1	90	0.216	0.4	70.3	38.9	2,687.6	2,409	1,619.3	2,466.3
VC.8: 8 Glazed door: South (A190.1°, 47.82 ft², width 3.69 ft)	1	90	0.216	0.4	70.1	38.9	2,679.9	2,403.6	1,619.3	2,466.3
VC.8: 8 Glazed door: South (A190.1°, 23 ft², width 2.62 ft)	1	90	0.223	0.4	38.7	16.8	770.1	636	803.4	1,223.6
VC.8: 8 Glazed door: South (A190.1°, 23 ft², width 2.62 ft)	1	90	0.223	0.4	46.9	21.8	914.4	770.7	803.4	1,223.6
VC.8: 8 Glazed door: South (A190.1°, 40.89 ft², width 3.43 ft)	1	90	0.217	0.4	58.6	36.4	1,820.6	1,717	1,392.4	2,120.8
VC.8: 8 Glazed door: West (A249.9°, 28.54 ft², width 3.25 ft)	1	90	0.219	0.4	44.4	22.3	806.9	694.2	981.3	1,494.6
VC.8: 8 Glazed door: West (A249.9°, 28.53 ft², width 3.25 ft)	1	90	0.219	0.4	45.9	22.7	840	717.4	981.3	1,494.6
VC.8: 8 Glazed door: West (A250.1°, 21.06 ft², width 3 ft)	1	90	0.222	0.4	14.4	6.2	214.5	163.7	732.5	1,115.6
VC.8: 8 Glazed door: West (A250.1°, 27.36 ft², width 3.35 ft)	1	90	0.219	0.4	4.9	1.5	99.7	71.3	940.7	1,432.8
VC.8: 8 Glazed door: East (A100.1°, 30.97 ft², width 3.16 ft)	1	90	0.219	0.4	37.9	27.8	540.2	625.6	1,064.3	1,621
VC.8: 8 Glazed door: East (A70.2°, 22.47 ft², width 3.165 ft)	1	90	0.221	0.4	7	3.9	65.2	84.2	778.5	1,185.7
VC.8: 8 Glazed door: East (A70.2°, 22.47 ft², width 3.165 ft)	1	90	0.221	0.4	4.2	2	43.8	50.9	778.5	1,185.7
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.9	38.8	1,602.3	1,420.4	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73.5	39.6	1,637.2	1,451.5	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	25.6	4.6	465.9	329.4	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	28.7	5.8	516.9	370.1	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	33.6	7.5	597.7	433.3	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	35.9	8.4	634.7	463.2	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	37.4	8.7	661.3	482.5	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	38.8	9	685.8	500.1	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	39.9	9.2	706.5	514.8	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	32.3	7.5	571.5	416.3	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	44.5	11.2	776.2	573.1	934.4	1,423.2
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73.5	39.5	1,641.9	1,452.8	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74.9	40.2	1,671.6	1,479.6	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.3	41.5	1,756.5	1,546.8	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.3	41.4	1,757.9	1,547.3	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	42.1	1,771.7	1,563.3	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	42.1	1,771.7	1,563.3	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	42.1	1,771.7	1,563.4	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	42.1	1,771.8	1,563.5	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	42.1	1,771.7	1,563.4	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.8	1,406.4	2,142.1
VC.9: 18 Green tower SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,773	1,564.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	48.3	21.6	886.6	726.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	50.8	24.5	900.6	767.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.3	25.6	1,294.8	1,092.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	54.4	25.9	1,264.1	1,074.8	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.3	39.5	1,604.1	1,428.6	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60.1	34.8	984.9	916.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	68.7	36.9	1,001.5	886.4	934.4	1,423.2

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.10: 21 Main SOUTH windows: South (A190.1°, 27.36 ft², width 4.45 ft)	1	90	0.218	0.3	70.6	37.5	1,031	909.4	934.2	1,422.9
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72	39.2	1,597.9	1,421.8	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73.6	39.3	1,649.1	1,454.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.1	39.7	1,687	1,483.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.4	41.6	1,759.3	1,549.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.9	41.6	1,740.8	1,538.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	76.4	41.3	1,701.2	1,510	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.8	41.2	1,682.8	1,496.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	73.1	38.7	1,069.8	942.3	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	73	38.9	1,066.4	941.5	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,109.6	974.1	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,109.6	974.1	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,109.6	974.1	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.1										

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.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.5	898.1	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.2	1,047.4	898	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.6	1,628.2	1,435.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.7	34.3	1,047.9	898.7	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	38.7	1,628.7	1,437.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	64.2	38.1	672.6	640.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	58.5	34.5	617.9	582.5	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	65.6	38.6	690.5	653.8	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	61.7	35.5	662.5	614.3	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.2	35.5	1,052	962.6	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.5	25.6	1,029.5	849.6	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	53.4	23.3	984.8	801.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	70.5	39.8	758.7	700.9	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	66.8	36.3	740.4	662.3	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.8	36.8	1,176.7	1,043.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.8	25.8	1,035.2	854.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	54.9	24.3	1,008.9	824.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	71.1	40.3	762.9	706.8	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.1	38.3	750.8	685.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.2	38	1,188.2	1,066.6	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.9	26.9	1,046.5	872.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	54.9	24.3	1,009.5	825.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.1	38.3	751.1	685.9	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.6	32.1	1,079.6	949.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.1	38.8	1,192.8	1,079.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	73.5	42.5	782.2	731.8	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	64.3	33.2	1,102.5	975.3	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	69.3	38.4	752.9	687.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.8	32.9	1,092.5	966.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	76.2	45	798.7	759.3	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.5	39.1	1,197.9	1,085.8	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	64.5	33.3	1,105.2	977.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	44.5	788.6	753.7	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.1	36.9	1,141	1,034.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	77.9	46.6	808.1	777.7	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.8	45.2	1,253.3	1,187.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73	41.2	1,198.8	1,111.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.7	44.5	789.3	754.3	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	78.5	47.1	813.5	783.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74	42.5	1,205.5	1,129.3	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.2	45.5	1,257.5	1,193.3	1,406.4	2,142.1

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.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	74.6	42.8	1,214.2	1,138	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.9	47.2	1,280	1,221.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.3	45.2	1,248.8	1,180.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	80.9	48	1,292	1,235.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	80.6	49	823.8	805.4	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	80.6	49	824	805.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	81.9	48.9	1,303.7	1,252.8	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	80.7	49	825	806.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.3	46.8	1,276.9	1,211.6	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	81.1	48.2	1,295.4	1,239.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	80.7	49	825	806.6	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	81.1	49.3	828.8	810.9	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	81.1	49.3	828.3	810.4	934.4	1,423.2
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	83.3	50.1	1,313.9	1,274.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	83.7	50.4	1,318.8	1,281.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: West (A250°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	81.1	48.1	1,295.6	1,239	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	47.7	22.2	677.8	572.9	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	52.3	23.6	1,235.8	1,033.4	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	44.5	19.8	644.4	535.4	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.5	26.8	1,286	1,096.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	48.3	22.6	684.9	580	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	44.9	20.2	647.1	539.2	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	59.3	29.5	1,358.5	1,171.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	47.2	22.4	670.5	567.2	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	55.4	25.7	1,297.1	1,095.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	52.3	25.9	731	628.6	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.4	27.3	740.6	642.3	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56	26.4	1,304.1	1,105.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	47.3	22.5	671.3	568.9	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	59.9	30.3	1,364.2	1,184.3	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	57.9	28.4	1,334.1	1,142.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	60	30.3	1,364.1	1,184.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	47.9	23.2	674.1	575.7	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	54.6	28.8	746.8	656.5	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	59.3	30.5	1,346	1,170.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	49.3	24.8	685.6	592.4	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.2	32.9	1,394.9	1,228.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	56.3	30.2	764.7	677.2	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	51.1	26.6	703.3	614.7	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	60.3	33.7	807.1	725.1	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.3	32.9	1,396.1	1,230	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	63.9	34.7	1,420.7	1,261.9	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	63.7	35	858	766	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.3	37.4	1,484.6	1,330.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	56.4	31.1	758.1	678.2	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.1	37.2	1,478.1	1,325.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	68.3	37.2	923	821.3	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	69.2	38.4	1,523.6	1,366.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	67.1	36.2	910.4	806.5	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.7	40.3	1,604.4	1,436.1	1,406.4	2,142.1

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.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	72.2	40	1,590.7	1,426	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.7	41.8	1,735	1,536.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	73.8	38.9	1,009.4	887.5	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.5	38.3	972.9	860	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	73.6	38.9	1,005.7	884.7	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.4	42	1,752.1	1,549.5	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	76.3	41.4	1,696.7	1,507.2	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	74.6	39.1	1,022.6	897.1	874.4	1,331.8
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	32.1	13.7	632.3	517	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	32.4	13.9	637.3	521.7	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	33.1	14.5	647	533.1	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	33.2	14.5	647.5	534.1	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	34	15.3	656.3	546.3	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	34.3	15.7	659.2	551.7	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	34.9	16.4	665.5	561.8	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	36.8	18	691.6	591.7	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 34.13 ft², width 5.55 ft)	1	90	0.216	0.3	43.2	22.2	798	694.9	1,154.4	1,758.3
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,771.5	1,563.8	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,110.2	974.8	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,109.7	974.2	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,772.9	1,564.7	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,109.7	974.2	934.4	1,423.2
VC.10: 21 Main SOUTH windows: South (A190.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.2	42.2	1,773.4	1,565.1	1,406.4	2,142.1
VC.10: 21 Main SOUTH windows: South (A190.1°, 27.37 ft², width 4.45 ft)	1	90	0.218	0.3	75.6	39.7	1,110.2	974.6	934.4	1,423.2
VC.11: 4 Curtainwall/storefront EAST: East (A100.1°, 27.36 ft², width 2.792 ft)	1	90	0.221	0.3	33.9	24.8	339.2	390.1	948.5	1,444.6
VC.11: 4 Curtainwall/storefront EAST: East (A70.2°, 205.94 ft², width 20.95 ft)	1	90	0.207	0.3	47.6	34.8	2,583.1	3,986.7	6,678	10,171.4
VC.11: 4 Curtainwall/storefront EAST: East (A100.1°, 148.82 ft², width 11.3 ft)	1	90	0.208	0.3	67	35.7	4,533.7	4,153.6	4,841.9	7,374.8
VC.11: 4 Curtainwall/storefront EAST: East (A100.1°, 125.77 ft², width 9.55 ft)	1	90	0.208	0.3	61.3	33.3	3,472.5	3,207.8	4,106.8	6,255.1
VC.11: 4 Curtainwall/storefront EAST: East (A100.1°, 33.06 ft², width 2.51 ft)	1	90	0.222	0.3	43.2	24.6	626	592.7	1,149.4	1,750.6
VC.11: 4 Curtainwall/storefront EAST: East (A100.1°, 28.92 ft², width 2.951 ft)	1	90	0.22	0.3	21.1	18	183.9	258.9	998.5	1,520.9
VC.11: 4 Curtainwall/storefront EAST: East (A70.2°, 8.61 ft², width 6.33 ft)	1	90	0.241	0.3	5.4	3.2	14.6	19.1	325.3	495.5
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	32.5	15.3	660.4	562.7	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	39.6	19.7	784.9	686	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	41.6	20.8	821.9	721.5	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	43.4	21.8	853.9	751.8	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	47.7	25.1	912.3	828.5	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	49.5	26.2	944.8	860.5	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	53.4	29.1	1,003.7	929.3	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	56.3	31.3	1,045.7	979.7	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	39.9	22.2	740.9	693.9	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84	51	1,470	1,468	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84	51.1	1,470.6	1,469	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	58.2	32.5	649.9	616.3	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.3	30.6	583.5	565.9	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	53.6	30.7	587.8	568.9	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	50.8	29.6	908.3	886.7	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	70	42.2	752.4	744.5	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	67.6	41.8	712.9	719.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	67.6	41.8	713.4	719.9	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	68.5	42.6	1,182.8	1,199.8	1,406.4	2,142.1

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.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.1	42.5	767.6	755.7	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.5	43	1,264.1	1,250.1	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.8	42.6	778.9	763.2	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	70.8	42.3	763.9	752.5	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72	42.7	781.4	765.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72	42.7	781.5	765.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73	43.6	1,298.5	1,275.8	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72	42.7	781.5	765.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72.9	43.5	787.3	775.3	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72.2	42.8	782.9	767.1	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	73.2	43.7	1,302.6	1,279.4	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	72.1	42.8	782.1	766.2	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	74.5	44.9	797.5	792.9	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	74.5	44.9	797.2	792.7	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	74.6	45	797.6	793.4	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	75.6	45.7	1,327	1,322.1	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	76.2	46.3	811.1	810.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	81	49	1,426.2	1,416.6	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	76.3	46.4	811.8	811.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	76.2	46.4	811.7	811.4	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	83.5	50.8	1,462.3	1,460.7	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.3	49.5	847.4	855.1	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.2	49.5	846.3	854.1	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.4	49.6	848.1	855.8	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84	51	1,470	1,468	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84	51	1,470	1,468	1,406.4	2,142.1
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	80.5	49.6	848.9	856.6	874.4	1,331.8
VC.12: 19 Main EAST windows : East (A100.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	84	51	1,470	1,468	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	69.3	37.9	1,054.8	1,284.7	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	62.6	37.5	893.5	1,150.6	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66.6	36.8	1,011.6	1,235.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66.3	36.6	1,007.4	1,230.2	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	68.3	38.8	616.4	768	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.3	38.3	1,097	1,325.3	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.3	37.1	1,020.1	1,248.3	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.3	37.2	1,020.5	1,249.2	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	66	39.2	942.2	1,214.1	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	71.6	40.5	645.4	806	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	74	42.1	659.7	831.7	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.3	37.1	1,020.1	1,248.3	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	71.3	38.3	1,098.1	1,326.4	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	67.3	37.2	1,020.7	1,249.7	1,406.4	2,142.1

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.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	70.5	41.2	1,012.2	1,298.5	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	77.3	43.8	1,154.9	1,431.2	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	82.2	47.3	729.2	923.2	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	79.1	44.1	1,193.8	1,465.2	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	76.7	43.3	1,148.7	1,420.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	78.7	46.3	1,128.3	1,448.8	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	87.3	52	1,256.3	1,606.3	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	89.3	55.5	1,220.9	1,631.6	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	93	56.6	797.7	1,037.4	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	87.3	52	1,256	1,605.6	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	89.5	51.9	1,314.9	1,649.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	89.5	51.9	1,314.9	1,649.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	87.3	52	1,256.3	1,606.3	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	93	56.6	797.7	1,037.4	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	87.3	52	1,256	1,605.6	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	90.4	56.4	1,248.6	1,650.8	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	100	60	869.6	1,117	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	100	60	869.6	1,117	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	100	60	869.6	1,117	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 25.52 ft², width 4.15 ft)	1	90	0.219	0.3	100	60	869.6	1,117	874.4	1,331.8
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.14: 20 Main WEST Windows: West (A280.1°, 41.88 ft², width 6.81 ft)	1	90	0.214	0.3	100	60	1,429.3	1,835.9	1,406.4	2,142.1
VC.15: 5 Curtainwall/storefront WEST: West (A280.1°, 143.49 ft², width 12.51 ft)	1	90	0.208	0.3	41.2	21.8	2,173.5	2,635.3	4,671.3	7,114.9
VC.15: 5 Curtainwall/storefront WEST: West (A250.1°, 138.28 ft², width 10.5 ft)	1	90	0.208	0.3	16.4	2.9	1,486.2	950.8	4,505.9	6,862.9
VC.15: 5 Curtainwall/storefront WEST: West (A250.1°, 89.16 ft², width 10.9 ft)	1	90	0.21	0.3	3	1.2	146.7	116.3	2,932.8	4,467
VC.23: 7 Curtainwall/storefront NORTH: North (A10.1°, 8.57 ft², width 6.35 ft)	1	90	0.241	0.3	6.1	3.1	11.6	11.4	324.3	493.9
VC.28: 6 Curtainwall/storefront SOUTH: East (A100.1°, 10.3 ft², width 28.024 ft)	1	90	0.327	0.3	42.1	15.9	183.9	142.1	527.5	803.4
NVC.2: Glazed door on W elevation L1 drivethru: SW (A225°, 27.36 ft², width 4 ft)	1	90	0.218	0.4	100	60	1,862.4	1,959	935.9	1,425.5



















Summary building envelope

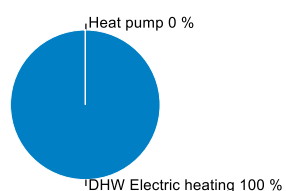
	Total area / length	Average U-value / Psi value	Transmission losses
Exterior wall ambient:	92,766 ft ²	0.047 Btu/hr ft ² °F	688,783.8 kBtu/yr
Exterior wall ground:	581.9 ft ²	0.056 Btu/hr ft ² °F	1,782.5 kBtu/yr
Basement:	19,603.4 ft ²	0.097 Btu/hr ft ² °F	104,684.3 kBtu/yr
Roof:	22,937.2 ft ²	0.02 Btu/hr ft ² °F	73,505.3 kBtu/yr
Windows:	26,041.7 ft ²	0.215 Btu/hr ft ² °F	878,390.4 kBtu/yr
Doors:	0 ft ²	0 Btu/hr ft ² °F	0 kBtu/yr
Thermal bridge ambient:	12,284.6 ft	0.084 Btu/hr ft °F	161,476.7 kBtu/yr
Thermal bridge perimeter:	783 ft	0.29 Btu/hr ft °F	12,505.5 kBtu/yr
Thermal bridge floor slab:	0 ft	0 Btu/hr ft °F	0 kBtu/yr

Shading

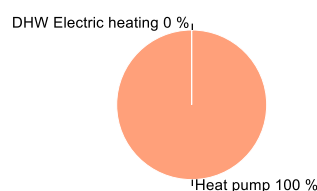
	Heating	Cooling
Reduction factor North:	60.1 %	33.8 %
Reduction factor East:	54.3 %	32.6 %
Reduction factor South:	68.6 %	36.3 %
Reduction factor West:	71.1 %	40.8 %
Reduction factor Horizontal:	100 %	100 %

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]	Source energy demand [kBtu/yr]
Heat pump, Heat pump	0	0	0	100	0	425,818.7	0	187,104.3	766,473.7
DHW Electric heating, Direct electric	100	0	1,507,166.5	0	0	0	1	662,247.3	2,712,899.6
Σ	100	0	1,507,166.5	100	0	425,818.7		849,351.6	3,479,373.3

DHW - final energy



Heating - final energy



COOLING UNITS

	sensible	latent
Air cooling:	0 kBtu/ft ² yr	0 kBtu/ft ² yr
Recirculation cooling:	2.7 kBtu/ft ² yr	2 kBtu/ft ² yr
Additional dehumidification:		0 kBtu/ft ² yr
Panel cooling:	0 kBtu/ft ² yr	
Sum:	2.7 kBtu/ft ² yr	2 kBtu/ft ² yr

VENTILATION

Energy transportable by supply air

Heating energy

transportable: **1.85 W/ft²**load: **1.06 W/ft²**

Cooling energy

transportable: **1.18 W/ft²**load: **0.92 W/ft²**Infiltration pressure test ACH50: **0.25 1/hr**Total extract air demand: **22,575 cfm**Supply air per person: **18 cfm**Occupancy: **476**Average air flow rate: **17,080.76 cfm**Average air change rate: **0.45 1/hr**Effective ACH ambient: **0.15 1/hr**Effective ACH ground: **0 1/hr**Energetically effective air exchange: **0.15 1/hr**Infiltration air change rate: **0.02 1/hr**Infiltration air change rate (heating load): **0.04 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: **836,491.27 kBtu/yr**

Devices

Name	Sensible recovery efficiency [-]	Electric efficiency [W/cfm]	Heat recovery efficiency SHX [-]	Effective recovery efficiency [-]
ERV - Residential 1 bath	0.8	0.03	0	0.7
ERV - Amenity	0.8	0.03	0	0.8
ERV - Residential 2 bath	0.7	0.03	0	0.7
Altogether	0.8	0.03	0	0.7

Ducts

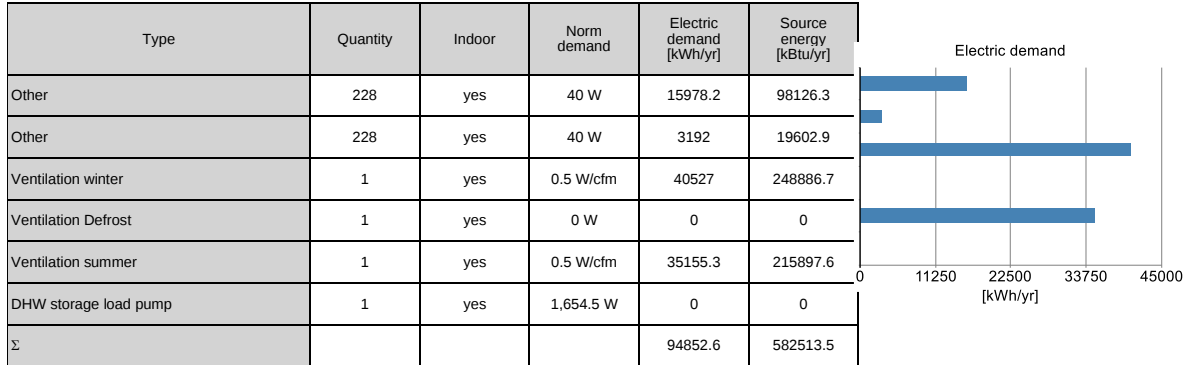
Name	Length (total) [ft]	Clear cross-section [ft ²]	U-value [Btu/hr ft ² °F]	Assigned ventilation units
ODA	5	3.1416	0.85	ERV - Amenity
ODA	20	0.0873	0.99	ERV - Residential 2 bath
ODA	20	0.0873	0.98	ERV - Residential 1 bath
EDA	5	3.1416	0.85	ERV - Amenity
EDA	20	0.0873	0.98	ERV - Residential 1 bath
EDA	20	0.0873	0.99	ERV - Residential 2 bath
Σ	90			

*length * quantity

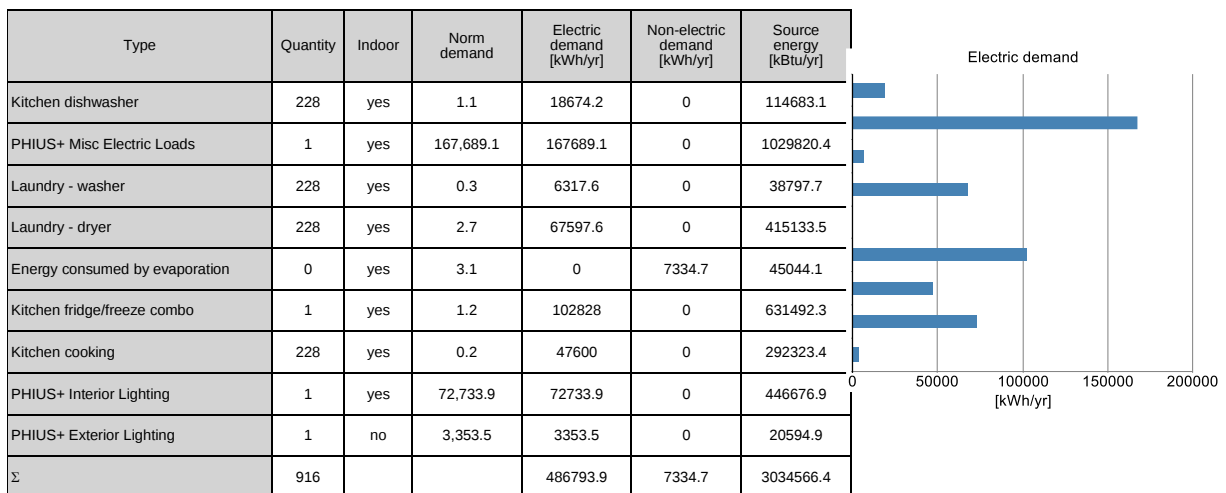
** thermal conductivity / thickness

Mechanical ventilation summer: **0.4 1/hr**
 Mechanical ventilation summer with HR: **no**
 Preferred minimum indoor temperature for night ventilation: **68 °F**
 Overheating temperature: **77 °F**

ELECTRICITY DEMAND - AUXILIARY ELECTRICITY



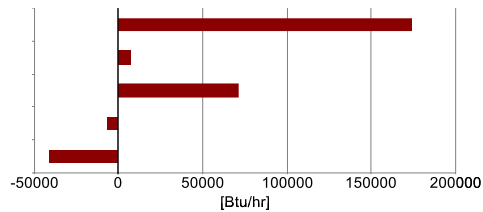
ELECTRICITY DEMAND RESIDENTIAL BUILDING



INTERNAL HEAT GAINS

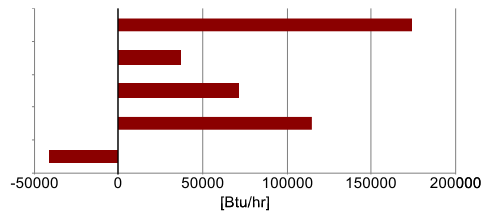
Heating season

Electricity total:	174,404.1 Btu/hr
Auxiliary electricity:	7,467.1 Btu/hr
People:	71,463.9 Btu/hr
Cold water:	-6,662.6 Btu/hr
Evaporation:	-40,604.5 Btu/hr
Σ:	206,068 Btu/hr
Specific internal heat gains:	1 Btu/hr ft ²



Cooling season

Electricity total:	174,404.1 Btu/hr
Auxiliary electricity:	36,946.4 Btu/hr
People:	71,463.9 Btu/hr
Cold and hot water:	114,571.7 Btu/hr
Evaporation:	-40,604.5 Btu/hr
Σ:	206,068 Btu/hr
Specific internal heat gains:	1 Btu/hr ft ²



DHW AND DISTRIBUTION

DHW consumption per person per day: **6.6** gal/Person/day

Average cold water temperature supply: **52.7** °F

Useful heat DHW: **982,405.4** kBtu/yr

Specific useful heat DHW: **4,732.8** Btu/ft²yr

Total heat losses of the DHW system: **524,761** kBtu/yr

Specific losses of the DHW system: **2,528** Btu/ft²yr

Performance ratio DHW distribution system and storage: **1.5**

Utilization ratio DHW distribution system and storage: **0.7**

Total heat demand of DHW system: **1,507,166.5** kBtu/yr

Total specific heat demand of DHW system: **7,260.8** 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		
In conditioned space	0	0
Σ	0	0
Individual pipes		
In conditioned space		0
Σ		0
Water storage		
Device 4 (Water storage: DHW): Direct Electric DHW storage		2281.3
Σ		2281.3















Summary building envelope

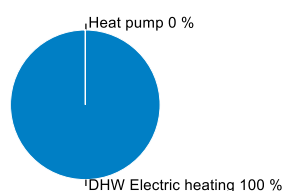
	Total area / length	Average U-value / Psi value	Transmission losses
Exterior wall ambient:	92,766 ft ²	0.047 Btu/hr ft ² °F	688,783.8 kBtu/yr
Exterior wall ground:	581.9 ft ²	0.056 Btu/hr ft ² °F	1,782.5 kBtu/yr
Basement:	19,603.4 ft ²	0.097 Btu/hr ft ² °F	104,684.3 kBtu/yr
Roof:	22,937.2 ft ²	0.02 Btu/hr ft ² °F	73,505.3 kBtu/yr
Windows:	26,041.7 ft ²	0.215 Btu/hr ft ² °F	878,390.4 kBtu/yr
Doors:	0 ft ²	0 Btu/hr ft ² °F	0 kBtu/yr
Thermal bridge ambient:	12,284.6 ft	0.084 Btu/hr ft °F	161,476.7 kBtu/yr
Thermal bridge perimeter:	783 ft	0.29 Btu/hr ft °F	12,505.5 kBtu/yr
Thermal bridge floor slab:	0 ft	0 Btu/hr ft °F	0 kBtu/yr

Shading

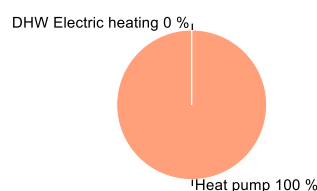
	Heating	Cooling
Reduction factor North:	60.1 %	33.8 %
Reduction factor East:	54.3 %	32.6 %
Reduction factor South:	68.6 %	36.3 %
Reduction factor West:	71.1 %	40.8 %
Reduction factor Horizontal:	100 %	100 %

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]	Source energy demand [kBtu/yr]
Heat pump, Heat pump	0	0	0	100	0	425,818.7	0	187,104.3	766,473.7
DHW Electric heating, Direct electric	100	0	1,507,166.5	0	0	0	1	662,247.3	2,712,899.6
Σ	100	0	1,507,166.5	100	0	425,818.7		849,351.6	3,479,373.3

DHW - final energy



Heating - final energy



COOLING UNITS

	sensible	latent
Air cooling:	0 kBtu/ft ² yr	0 kBtu/ft ² yr
Recirculation cooling:	2.7 kBtu/ft ² yr	2 kBtu/ft ² yr
Additional dehumidification:		0 kBtu/ft ² yr
Panel cooling:	0 kBtu/ft ² yr	
Sum:	2.7 kBtu/ft ² yr	2 kBtu/ft ² yr

VENTILATION

Energy transportable by supply air

Heating energy

transportable: **1.85 W/ft²**load: **1.06 W/ft²**

Cooling energy

transportable: **1.18 W/ft²**load: **0.92 W/ft²**Infiltration pressure test ACH50: **0.25 1/hr**Total extract air demand: **22,575 cfm**Supply air per person: **18 cfm**Occupancy: **476**Average air flow rate: **17,080.76 cfm**Average air change rate: **0.45 1/hr**Effective ACH ambient: **0.15 1/hr**Effective ACH ground: **0 1/hr**Energetically effective air exchange: **0.15 1/hr**Infiltration air change rate: **0.02 1/hr**Infiltration air change rate (heating load): **0.04 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: **836,491.27 kBtu/yr**

Devices

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Altogether	0.8	0.03	0	0.7

Ducts

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EDA	20	0.0873	0.99	ERV - Residential 2 bath
Σ	90			

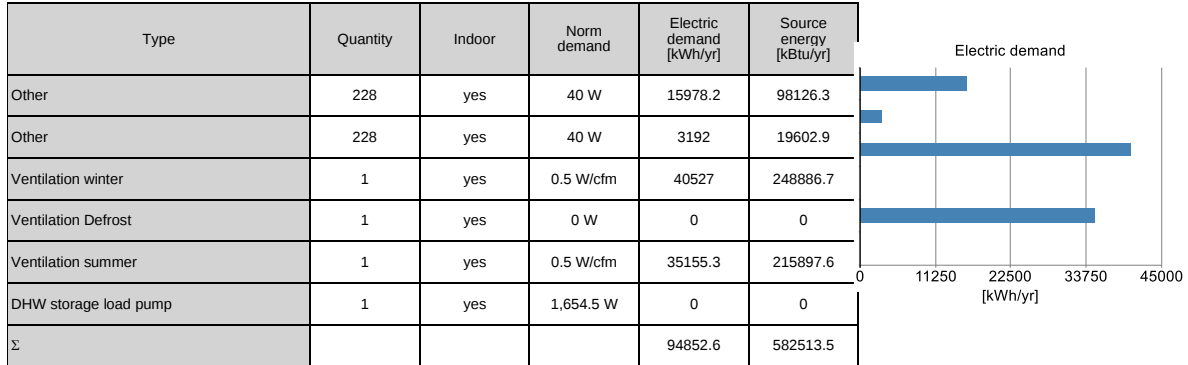
VI

*length * quantity

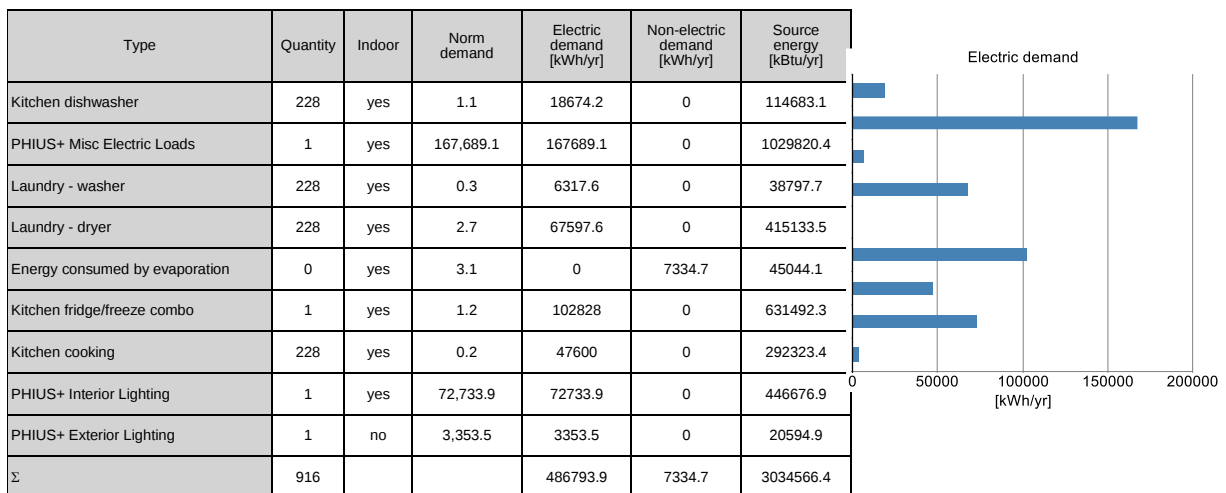
** thermal conductivity / thickness

Mechanical ventilation summer: **0.4 1/hr**
 Mechanical ventilation summer with HR: **no**
 Preferred minimum indoor temperature for night ventilation: **68 °F**
 Overheating temperature: **77 °F**

ELECTRICITY DEMAND - AUXILIARY ELECTRICITY



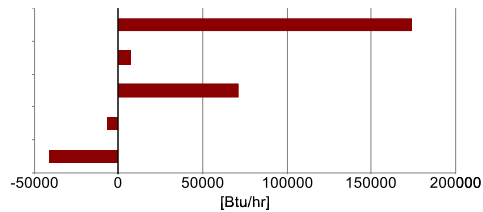
ELECTRICITY DEMAND RESIDENTIAL BUILDING



INTERNAL HEAT GAINS

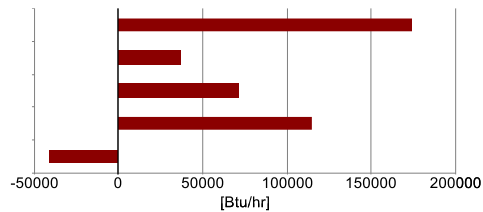
Heating season

Electricity total:	174,404.1 Btu/hr
Auxiliary electricity:	7,467.1 Btu/hr
People:	71,463.9 Btu/hr
Cold water:	-6,662.6 Btu/hr
Evaporation:	-40,604.5 Btu/hr
Σ:	206,068 Btu/hr
Specific internal heat gains:	1 Btu/hr ft ²



Cooling season

Electricity total:	174,404.1 Btu/hr
Auxiliary electricity:	36,946.4 Btu/hr
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Cold and hot water:	114,571.7 Btu/hr
Evaporation:	-40,604.5 Btu/hr
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Specific internal heat gains:	1 Btu/hr ft ²



DHW AND DISTRIBUTION

DHW consumption per person per day:	6.6 gal/Person/day
Average cold water temperature supply:	52.7 °F
Useful heat DHW:	982,405.4 kBtu/yr
Specific useful heat DHW:	4,732.8 Btu/ft²yr
Total heat losses of the DHW system:	524,761 kBtu/yr
Specific losses of the DHW system:	2,528 Btu/ft²yr
Performance ratio DHW distribution system and storage:	1.5
Utilization ratio DHW distribution system and storage:	0.7
Total heat demand of DHW system:	1,507,166.5 kBtu/yr
Total specific heat demand of DHW system:	7,260.8 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		
In conditioned space	0	0
Σ	0	0
Individual pipes		
In conditioned space		0
Σ		0
Water storage		
Device 4 (Water storage: DHW): Direct Electric DHW storage		2281.3
Σ		2281.3

CDD Determination for Special Permit submission

The Community Development Department (CDD) received the final update of the Green Building Report (GBR) for the Special Permit stage of 745 Concord Ave, per Section 22.25.1 of the Zoning Ordinance, on 12/12/2024. CDD staff have reviewed the Report and provide the following Determination and Summary of Compliance.

CDD Determination: The documentation provided by the Applicant is adequate and demonstrates compliance with the Green Building Requirements applicable to the Special Permit stage.

Summary of Compliance:

- Rating System: Passive House
- Based on the documents submitted, the project is expected to achieve the minimum criteria for certification. The applicant is pursuing Passive House certification.
- Green Building Professional Affidavit Certification: Andrew Steingiser of RDH Building Science has been identified as the Green Building Professional for the project. The affidavit states that this professional has reviewed all relevant documents for this project and confirms that those documents indicate that the project is designed to achieve the requirements of Section 22.24 under Article 22.000 of the Cambridge Zoning Ordinance.

Green Factor Certification Form

This is for projects that are subject to the Green Factor Standard in Section 22.90 of the Cambridge Zoning Ordinance, which requires site and landscape design features that reduce urban heat.

Review Section 22.90 of the Cambridge Zoning Ordinance and the Cambridge Cool Score Information and Guidelines before completing this form. When submitting a completed form, attach the supporting materials listed in the Green Factor Checklist.

Project Address/Location: 745 Concord Ave, Cambridge, MA

Planning Board (PB) and/or Board of Zoning Appeal (BZA) case number (if applicable): _____

Developer Name and Contact Information

Name: Boylston Properties

Mailing Address: 800 Boylston St Suite 1390, Boston, MA 02199

Email Address: andrew@boylprop.com

Telephone #: 617-262-4646

Applicability: Section 22.92 & Section 5.22.5

Is this project subject to Green Building Requirements (Section 22.20)?	☒ Yes ☐ No
Does this project involve the construction of a new building?	☒ Yes ☐ No
Does this project enlarge an existing building's footprint by at least 50%?	☐ Yes ☒ No
Does this project involve the creation of new surface parking area?	☐ Yes ☒ No

Answer the questions below if the answer is "Yes" to any of the above

Requirements

Cool Roof Requirement

Does this project involve the construction of a new building roof or replacement of more than 50% of an existing roof?	☒ Yes ☐ No
Has this project received a Certificate of Appropriateness from the Cambridge Historical Commission or a Neighborhood Conservation District Commission, or a determination of adverse effect by the Executive Director of the Cambridge Historical Commission? [if "Yes," attach the document to your submission]	☐ Yes ☒ No

Last Updated: April, 2023

How much of the new or replaced roof area (in sq. ft.) has a slope (rise:run) of less than 2:12? [Cool Roof Requirement is not applicable to roof area with a 2:12 or steeper slope]	20,350 SF
What is the initial Solar Reflectance Index (SRI) of the proposed roof surface material for the area described above, excluding any solar energy systems or green roof area? [Minimum is 82]	SRI = 82 (BOD Carlisle)

Cool Score – Base information on the attached Cool Score Sheet and Site/Roof Plan

What is the Cool Score of the proposed site design? [Minimum is 1.0 except per below]	1.57
What is the Cool Score of the existing site? [If the project does not involve a new building or enlargement of a building footprint, the proposed Cool Score must not be less than the Cool Score of the existing site]	N/A (footprint smaller than existing, more green area, etc.)

Modifications to Requirements

Has the project received, or will the project seek, a special permit from the Planning Board to modify the Green Factor Standard for this proposal?	☐ Received SP (date: _____) ☒ Seeking SP ☐ No modification
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February 19, 2025

Signature of Applicant

Date

Last Updated: April, 2023

Green Factor Checklist

Project Phase	Required Submissions
☒ Special Permit (if applicable)	☒ Green Factor Certification Form ☒ Cool Score Sheet ☒ Site and Roof Plans
☐ Building Permit	☐ Green Factor Certification Form (updated from prior version) ☐ Cool Score Sheet (updated from prior version) ☐ Site and Roof Plans (updated from prior version) ☐ Specifications of roof surface material including initial Solar Reflectivity Index (SRI) ☐ Catalog of landscape materials including plant species and pavement (including SRI) ☐ Specifications of green roof installation with operations and maintenance plan (if applicable)
☐ Certificate of Occupancy	<i>All materials updated based on as-built conditions:</i> ☐ Green Factor Certification Form (updated from prior version) ☐ Cool Score Sheet (based on as-built conditions) ☐ Site and Roof Plans (based on as-built conditions) ☐ Specifications of roof surface material including initial Solar Reflectivity Index (SRI) ☐ Catalog of landscape materials including plant species and pavement (including SRI) ☐ Specifications of green roof installation with operations and maintenance plan (if applicable)

Last Updated: April, 2023

Project Address	Special Permit Number	Total Lot Area (SF)
745 Concord Ave, Cambridge, MA	PB-XXX	48,463
Applicant Name	Phone Number	Open Space Requirement (%)
Boylston Properties	617-607-8203	20%
Applicant Contact / Address	Email Address	Zoning District
Andrew Copelotti, 800 Boylston St, Suite 1390, Boston, MA 02199	andrew@boylprop.com	
Project Description	Result	
The design calls for decentralized hot water, semi-centralized ventilation, and centralized air source heatpump with VRF fan coil units in spaces on the ground level and first floor mezzanine, with the remaining 11 stories containing a mix of studio, 1 bed, 2-bed, and 3-bed apartment units. The design calls for decentralized hot water, semi-centralized ventilation, and centralized air source heatpump with VRF fan coil units in	Pass	

Enter minimum required open space ratio. If the ratio is less than 20%, enter 20 here.

	Outside 20' of Street	Value Factor		Within 20' of Street	Value Factor	Contributing Area	
Trees Enter the number of trees in each category. Count each tree only once on this form.	Preserved Existing Trees						
	A1 Understory tree currently <10' canopy spread	0	0.80	+	0	1.60	-
	A2 Understory tree currently >10' canopy spread	0	1.00	+	0	2.00	-
	3 Canopy tree currently <15' canopy spread	0	0.80	+	0	1.60	-
	4 Canopy tree currently between 15' and 25' canopy spread	0	1.00	+	0	2.00	-
	5 Canopy tree currently >25' canopy spread	0	1.20	+	0	2.40	-
	New or Transplanted Trees						
	6 Understory tree	15	0.60	+	5	1.20	2,250
	7 Canopy tree	5	0.70	+	6	1.40	8,330
Planting Areas Enter area in square feet of each component in the box provided	B1 Lawn Area	1,193	0.30	+	263	0.60	516
	B2 Low Planting Area	0	0.40	+	138	0.80	110
	B3 High Planting Area	3,885	0.50	+	981	1.00	2,924
Green Roofs & Facades For definitions, see reference document.	C1 Green Façade	0	0.10	+	0	0.20	-
	C2 Living Wall	0	0.30	+	0	0.60	-
	C3 Green Roof Area	0	0.30	+	0	0.60	-
	C4 Short Intensive Green Roof Area	0	0.50	+	0	1.00	-
	C5 Intensive Green Roof Area	0	0.60	+	0	1.20	-
Paving & Structures	D1 Low Slope Roof	0	N/A				
	D2 High-SRI Paving	5,233	0.1				523
	D3 Shaded Area	2,752	0.2	+	0	0.40	550
Project Summary	Portion of lot area utilizing green strategies 29%					Total Contributing Area	15,203
	Portion of score from green strategies 93%					Total Area Goal	9,693
	Portion of score from trees 70%					COOL FACTOR SCORE	1.57
	Portion of score contributing to public realm cooling 53%						

When entering strategies that are within 20' of the street (including sidewalks), do not also enter

High-SRI Paving areas within 20' of a Street do not count towards the Cool Score

If your project scores 1 or above, you have successfully met the requirements of the Cool

DATE: October 11, 2024
TO: Jim Wilcox, Cambridge Department of Public Works
FROM: Alex Horgan
Zachary Richards, P.E.
RE: 745 Concord Avenue, Cambridge, MA 02141
Existing Floodplain and Climate Change Vulnerability Assessment

Bohler Engineering MA, LLC (Bohler) is providing this memorandum to document the existing and future floodplain elevations and proposed conditions for 745 Concord Avenue (the "Project"). The Project is located on Map 267D, Lots 299, 300, 315 & 316.

Existing Floodplain

Based on the publicly available Federal Emergency Management Agency (FEMA) National Flood Hazard Layer FIR Mette, the Project is located with a 0.2% Annual Chance Flood Hazard Zone. A FIR Mette figure with the Project site noted is attached.

Climate Change Vulnerability Assessment – Precipitation

Based on the publicly available Climate Change Vulnerability Assessment (CCVA) and the Cambridge FloodViewer 2022, the Project is outside an area that has defined flood elevations during the 10-year and 100-year precipitation events in 2030 and 2070. See Table 1 below and Figures 1 – 4. The elevations shown are in Cambridge City Base.

Table 1: Precipitation Event Flood Elevation (2030 and 2070)

	Year 2030		Year 2070	
	10-year	100-year	10-year	100-year
735 Concord Avenue (Map 267D/Lot 316)	N/A	N/A	N/A	N/A
Concord Avenue (Map 267D /Lot 315)	N/A	N/A	N/A	N/A
745 Concord Avenue (Map 267D/Lot 300)	N/A	N/A	N/A	N/A
755 Concord Avenue (Map 267D/Lot 299)	N/A	N/A	N/A	N/A

Climate Change Vulnerability Assessment – Sea Level Rise & Storm Surge (2070)

The Project is projected to experience the below sea level and storm surge elevations during the 10-year and 100-year events in 2070. See Table 2 below and Figures 1 – 4. Elevations shown are in Cambridge City Base.

Table 2: Sea Level Rise & Storm Surge Flood Elevation (2070)

	Year 2070	
	10-year	100-year
735 Concord Avenue (Map 267D/Lot 316)	N/A	23.3
Concord Avenue (Map 267D /Lot 315)	22.0	23.3
745 Concord Avenue (Map 267D/Lot 300)	N/A	N/A
755 Concord Avenue (Map 267D/Lot 299)	22.0	23.3

Address: 735 Concord Ave

Ground Elevation Min:	23.2 ft-CCB
Ground Elevation Max:	25.4 ft-CCB
2070 - 1% - SLR/SS	23.3
2070 - 1% - Precip	N/A
2070 - 10% - SLR/SS	N/A
2070 - 10% - Precip	N/A
2030 - 1% - Precip	N/A
2030 - 10% - Precip	N/A
Present Day - 1% - Precip	N/A
Present Day - 10% - Precip	N/A
FEMA 500-Year	22.4
FEMA 100-Year	N/A
1% - LTFE	23.3
10% - LTFE	N/A

Selected Map-Lot: 267D-316

Selected Address: 735 Concord Ave

Figure 1 – 735 Concord Avenue – Flood Elevations

Address:

Ground Elevation Min:	21.3 ft-CCB
Ground Elevation Max:	24.7 ft-CCB
2070 - 1% - SLR/SS	23.3
2070 - 1% - Precip	N/A
2070 - 10% - SLR/SS	22
2070 - 10% - Precip	N/A
2030 - 1% - Precip	N/A
2030 - 10% - Precip	N/A
Present Day - 1% - Precip	N/A
Present Day - 10% - Precip	N/A
FEMA 500-Year	22.4
FEMA 100-Year	N/A
1% - LTFE	23.3
10% - LTFE	22

Selected Map-Lot: 267D-315

Selected Address:

Figure 2 – Concord Avenue – Flood Elevations

Address: 745 Concord Ave

Ground Elevation Min:	24.1 ft-CCB
Ground Elevation Max:	25.8 ft-CCB
2070 - 1% - SLR/SS	N/A
2070 - 1% - Precip	N/A
2070 - 10% - SLR/SS	N/A
2070 - 10% - Precip	N/A
2030 - 1% - Precip	N/A
2030 - 10% - Precip	N/A
Present Day - 1% - Precip	N/A
Present Day - 10% - Precip	N/A
FEMA 500-Year	N/A
FEMA 100-Year	N/A
1% - LTFE	N/A
10% - LTFE	N/A

Selected Map-Lot: 267D-300

Selected Address: 745 Concord Ave

Figure 3 – 745 Concord Avenue – Flood Elevations

Address: 755 Concord Ave

Ground Elevation Min:	20.3 ft-CCB
Ground Elevation Max:	25.3 ft-CCB
2070 - 1% - SLR/SS	23.3
2070 - 1% - Precip	N/A
2070 - 10% - SLR/SS	22
2070 - 10% - Precip	N/A
2030 - 1% - Precip	N/A
2030 - 10% - Precip	N/A
Present Day - 1% - Precip	N/A
Present Day - 10% - Precip	N/A
FEMA 500-Year	22.4
FEMA 100-Year	N/A
1% - LTFE	23.3
10% - LTFE	22

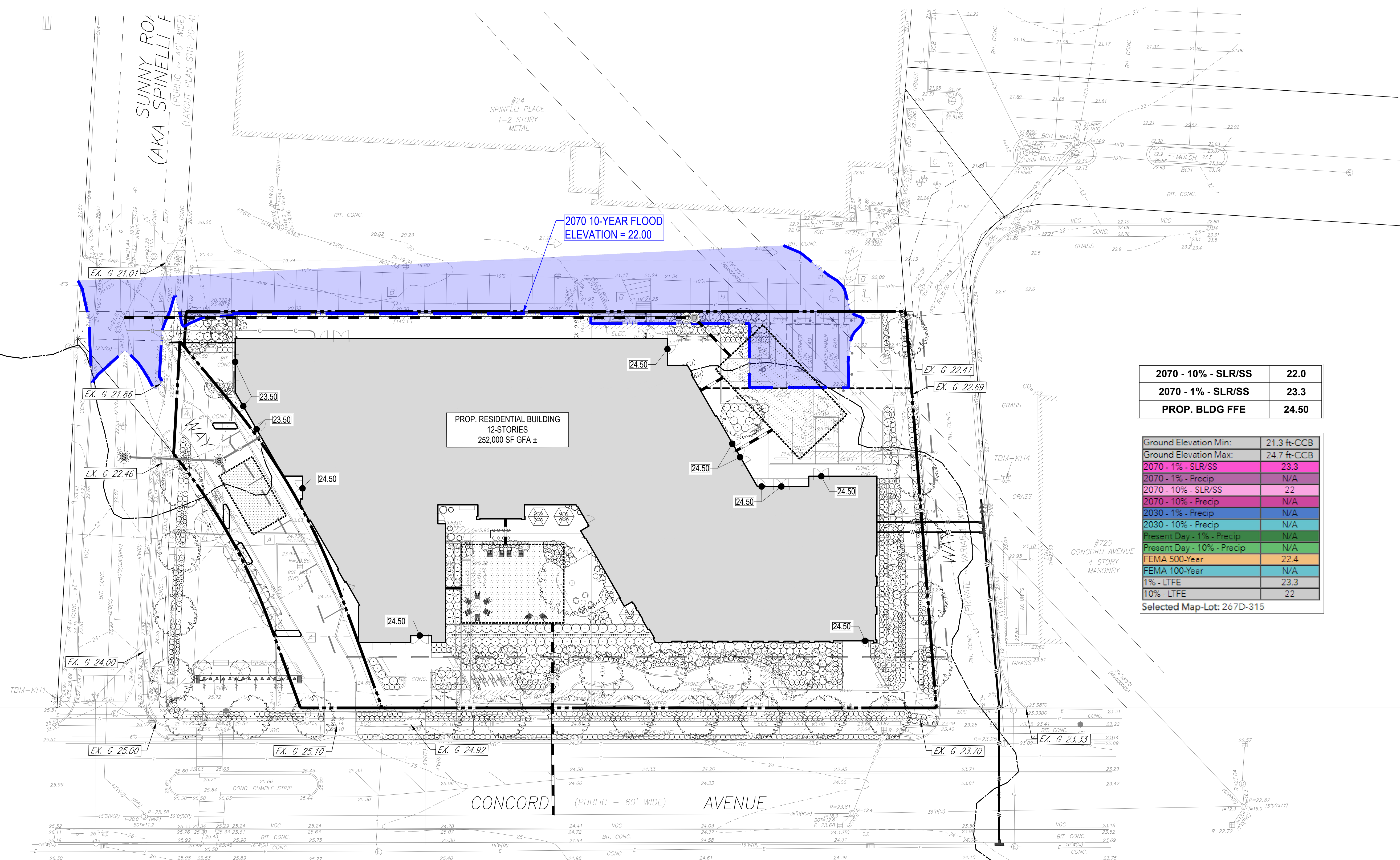
Selected Map-Lot: 267D-299

Selected Address: 755 Concord Ave

Figure 4 – 755 Concord Avenue – Flood Elevations

Project Resiliency

The City of Cambridge's "Resilient Cambridge Handbook" provides toolbox actions to achieve project resiliency. Specifically, the Handbook states that projects should "build" and "protect" to the 2070 10-year flood elevation and "recover" from the 2070 100-year flood elevation. To "build," Projects should design habitable spaces and critical systems above the 2070 10-year flood elevation. To "protect," Projects should utilize dry flood-proofing up to the 2070 10-year flood elevation. To "recover," Projects should "install materials that can be easily cleaned or repaired" up to the 2070 100-year flood elevation. The Project has been designed so that the building will be above the 2070 10-year and 100-year flood elevation. The proposed building's finish floor elevation (FFE) will be approximately elevation 24.0. The Project will, therefore, meet the guidelines of the City's "Resilient Cambridge Handbook."



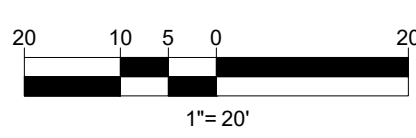
2070 - 10% - SLR/SS	22.0
2070 - 1% - SLR/SS	23.3
PROP. BLDG FFE	24.50

Ground Elevation Min:	21.3 ft-CCB
Ground Elevation Max:	24.7 ft-CCB
2070 - 1% - SLR/SS	23.3
2070 - 1% - Precip	N/A
2070 - 10% - SLR/SS	22
2070 - 10% - Precip	N/A
2030 - 1% - Precip	N/A
2030 - 10% - Precip	N/A
Present Day - 1% - Precip	N/A
Present Day - 10% - Precip	N/A
FEMA 500-Year	22.4
FEMA 100-Year	N/A
1% - LTFE	23.3
10% - LTFE	22

Selected Map-Lot: 267D-315

RESILIENCY PLAN

745 CONCORD AVENUE,
CAMBRIDGE, MASSACHUSETTS



SCALE:1"=20' DATE:10/10/2024