

**Project Information**  
 8555 85TH AVE SE, MERCER ISLAND, WA  
 ENGI & NABIL ATTIA  
 A#24009.05  
**Contact Information**  
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**Messages / Comments \*** RESULT: PASS

UA Reduction = 1.45, Proposed UA is better than baseline by 0.7%

Vertical glazing area of proposed design exceeds 15% of floor area. Baseline window area set to 15% of floor area

\* Results assume your inputs are complete and correct. Results do not constitute an approval. Analysis should be reviewed by your AHJ.

**ANALYSIS SET UP**

What code compliance pathway are you using? **Total UA Alternative, Whole Building Trade Off Analysis**

Project Building Type? **Addition**

Occupancy Type? **R3 Single family dwellings and townhouses**

Code Version? **WSEC 2021**

Classification: **Addition 150 sf to 500 sf -- 428 sq. ft.**

Baseline Description: **Code Baseline - Maximum baseline window area is 15% of floor area.**

About Your Selection: **No exempt window or door areas**

**RESULTS - Comparison of Baseline and Proposed Design \*\***

Component Performance, R occupancies	Baseline Design			Proposed Design		
	U *	Area	UA	U	Area	UA
Doors U =	0.300	18	5.3	0.160	18	2.8
Overhead Glazing U =	0.500	0	0.0		0	0.0
Vertical Glazing U =	0.300	64	19.3	0.180	140	25.2
Flat/Vaulted Ceilings U =	0.024	167	4.0	0.025	167	4.2
Wall (above grade) U =	0.056	752	42.1	0.056	676	37.9
Floors over Crawspace U =	0.029	205	5.9	0.025	205	5.1
Slab on Grade F =	0.540	263	142.0	0.540	263	142.0
Below Grade Wall U =	N/A	0			0	0.0
Below Grade Slab F =	N/A	0			0	0.0
* Values from Table R402.1.2 (Oct 2023)						
<b>Baseline UA Total</b>		<b>218.7</b>		<b>Proposed UA Total</b>		<b>217.2</b>
<b>Required Credits</b>		<b>2.0</b>		<b>Proposed Credits</b>		<b>3.5</b> from Tables 406.2 and 406.3
				<b>UA Percent Reduction</b>		<b>1%</b>
				<b>UA Reduction</b>		<b>1.4</b>

\*\* Results assume your inputs are complete and correct. Results do not constitute an approval. Analysis should be reviewed by your AHJ.

**Table R406.2 Energy Equalization Credits**

System No.	Full Description	Select System Type	Fuel Normalization Credits (406.2)	Energy Credits (406.3)	Total Credits (406.2 & 406.3)
5	For heating system based on electric resistance with (1) inverter driven ductless mini-split heat pump system installed in the largest zone in the dwelling OR (2) With 2kW or less total installed heating capacity per dwelling	Electric Resistance with Ductless Heat Pump OR electric resistance with max 2 kW Installed capacity	2.0	1.5	3.5

**Table R406.3 Energy Credits**

Option No.	Category	Select Options	Energy Credits	Brief Description of Selected Options*
1	Efficient Building Envelope	Not Selected	0.0	-
2	Air Leakage Control and Efficient Ventilation	Not Selected	0.0	0.00
3.1 -3.10	High Efficiency HVAC	Option 3.5	1.5	Ductless Mini Split Heat Pump W/ Zonal Control. Min HSPF2 of 9 (HSPF of 10) installed in largest zone of the home and primary heat is Zonal Elec Resist Heat
3.11	High Efficiency HVAC: Smart Thermostat	Not Selected	0.0	
4	High Efficiency HVAC Distribution System	Not Selected	NA	- Not applicable to ductless system selected in Option 3

5.1	Efficient Water Heating: Drain Heat Recovery		Not Selected	0.0	-
5.2	Efficient Water Heating: Compact Hot Water Distribution		Not Selected	0.0	-
5.3-5.8	Efficient Water Heating		Not Selected	0.0	-
6	Renewable Electric Energy	3,000 kWh	Not Selected	0.0	-
7	Appliance Package		Not Selected	0.0	-
<b>Energy Credits</b>				<b>1.5</b>	

\*Refer to WSEC 2021 Table R406.3 for complete option descriptions and requirements

<https://sbcc.wa.gov/state-codes-regulations-guidelines/state-building-code/energy-code>

<b>THERMAL ENVELOPE DETAILS - Proposed Design</b>	
Conditioned Floor Area of Addition, Proposed Design	428 sq. ft
Classification	Addition 150 sf to 500 sf
Notes	

Exterior Doors										
Plan ID	Component Description	Ref.	Door U	Qt.	Width		Height		Area	UA
					Feet	Inch.	Feet	Inch.		
	Insulated Steel, Wood Edge (iSteelWE)	10-6C	0.16	1	2	0	6	0	18	2.8
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
<b>Sum of Area and UA</b>									18	2.8
<b>Exterior Doors Area Weighted U</b>										0.160

Overhead Glazing										
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA
					Feet	Inch.	Feet	Inch.		
									-	-
									-	-
									-	-
									-	-
<b>Sum of Area and UA</b>									0.0	0
<b>Overhead Glazing Area Weighted U</b>										

Vertical Glazing Schedule											Rows to Show
Plan ID	Component Description	Ref.	Glazing U	Qt.	Width		Height		Area	UA	
					Feet	Inch.	Feet	Inch.			
1	OFFICE U=0.18 (2021 1.3, 1.4; 2018 1.6)	Table 406.2	0.18	2	5	0	3	6	35.0	6.30	5
2	OFFICE U=0.18 (2021 1.3, 1.4; 2018 1.6)	Table 406.2	0.18	2	4	0	3	6	28.0	5.04	
3	KITCHEN U=0.18 (2021 1.3, 1.4; 2018 1.6)	Table 406.2	0.18	2	2	0	3	6	14.0	2.52	
4	GREAT R U=0.18 (2021 1.3, 1.4; 2018 1.6)	Table 406.2	0.18	1	8	0	3	6	28.0	5.04	
5	GREAT R U=0.18 (2021 1.3, 1.4; 2018 1.6)	Table 406.2	0.18	2	2	6	7	0	35.0	6.30	
<b>Sum of Area and UA</b>									140.0	25.2	
<b>Vertical Glazing Area Weighted U</b>										0.180	
<b>Vertical Glazing and Doors Area Weighted U</b>										0.178	

Flat/Vaulted Ceilings										
Plan ID	Component Description	Ref.	Attic U						Area	UA
	R60 blown Attic STD baffled	10-7	0.025						167	4.2
<b>Sum of Area and UA</b>									167	4.2
<b>Area Weighted U-Value</b>										0.025

Walls (Above Grade)										
Plan ID	Component Description	Ref.	Wall U						Net Area	UA
	R21 cavity+R0 foam INT 2X6W T111 (Code Baseline)	10-5	0.056						676	38
<b>Sum of Net Area and UA</b>									676	38
<b>Gross Wall Area</b>									834	ft <sup>2</sup>
<b>Area Weighted U-Value</b>										0.056

Floor (over crawl or exterior)						
Plan ID	Component Description	Ref.	Floor U		Area	UA
	R38 vented Joist (2021 1.2, 1.3; 2018 1.3-1.5)	10-3	0.025		205	5
<b>Sum of Area and UA</b>					205	5
<b>Area Weighted U-Value</b>						0.025

Slab on Grade (less than 2 feet below grade)						
Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
	R10 2' horizontal w/TB (Code Baseline)	WSU	0.540		263	142
<b>Sum of Perimeter and FP</b>					263	142
<b>Area Weighted U-Value</b>						0.540

Below Grade Walls and Slabs										
Plan ID	Component Description	Slab Depth	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA	
<b>Sum of Area, Length and UA</b>						0	0		0	0
<b>Weighted U- and F-values</b>										

Links to Download Forms, Checklists and Other Resources		Link
Compliance Certificate		<a href="#">Compliance Certificate</a>
Insulation Certificate for Residential New Construction		<a href="#">Insulation Certificate</a>
Duct Testing Affidavits		<a href="#">Instructions</a>
	Existing Construction	<a href="#">Affidavit, Existing</a>
	New Construction	<a href="#">Affidavit, New</a>
Prescriptive Checklist for 2018 WSEC		<a href="#">Prescriptive Checklist</a>
Alterations (Remodel) Worksheet		<a href="#">Worksheet</a>
EER SEER2 COP HSPF2 Converter		<a href="https://www.adicotengineering.com/eer-seer2-cop-hspf2-kwton-converter">https://www.adicotengineering.com/eer-seer2-cop-hspf2-kwton-converter</a>

Show Ventilation Calculator?		Show
<b>Ventilation Requirements</b>		
Conditioned Floor Area	428 sq. ft.	
Number of Bedrooms		
Run-Time Percent in Each 4-Hour Segment	75%	
Is the system Balanced?	Unbalanced	
Is the system Distributed?	Not Distributed	
Ventilation Code Section	IRC, Chapter 15	
Whole House Mechanical Ventilation Airflow Rate		CFM

Show Distribution System Calculator?		Show
<b>HVAC Thermal Distribution System</b>		
Is this a hydronic heating system?	No	
Location of Ducts	Unducted	
Location of Air Handler	Unducted	
<b>For Existing Construction: Are Any of These Exceptions True?</b>		
Are ducts systems documented to have been previously sealed as confirmed through field verification and diagnostic testing per RS-33?	No	
Is there less than 40 linear feet in unconditioned spaces? (not excepted under WSEC 2021)	No	
Are existing duct systems constructed, insulated or sealed with asbestos?	No	
Is the project an Addition less than 750 sf of conditioned floor area?	No	
<b>Is Duct Testing Required? No</b>		

Show Heating System Sizing?		Show
<b>Heating System Sizing - Proposed Design</b>		
<b>Try Out BetterBuiltNW's HVAC Sizing Tool:</b> <a href="https://betterbuiltnw.com/resources/hvac-sizing-tool/">https://betterbuiltnw.com/resources/hvac-sizing-tool/</a>		
Nearest Weather Station	Mercer Island	
Indoor Design Temperature	70 F	

<b>Outdoor Design Temperature</b>	25 F
<b>Design Temperature Difference (ΔT)</b>	45 F
<b>Conditioned Floor Area of Addition, Proposed Design</b>	428 ft <sup>2</sup>
<b>Conditioned Volume</b> <small>Leave blank to use default of 8.5 ft. ceiling height</small>	3,638 ft <sup>3</sup>
<b>Average ceiling height = 8.5 ft. Volume = 3638 ft<sup>3</sup></b>	
<b>Average ceiling height</b>	8.5 ft
<b>HVAC System Type</b>	Heat Pump
<b>Location of HVAC Distribution System</b>	Unducted
<b>Sum of UA</b>	217
<b>Envelope Heat Load</b> <small>Sum of UA X ΔT</small>	9,775 Btu / Hour
<b>Air Leakage Heat Load</b> <small>((Volume X 0.6) X ΔT) X 018))</small>	1,768 Btu / Hour
<b>Building Design Heat Load</b> <small>Air Leakage + Envelope Heat Loss</small>	11,543 Btu / Hour
<b>Building and Duct Heat Load</b> <small>For ducts located in unconditioned space: Sum of Building Heat Loss X 1.1</small> <small>For ducts located in conditioned space or ductless: Sum of Building Heat Loss X 1</small>	11,543 Btu / Hour
<b>Maximum Heat Equipment Output</b> <small>Building and Duct Heat Loss X 1.25 for heat pumps</small>	16,160 Btu / Hour
<small>Building and Duct Heat Loss X 1.40 for all other systems</small>	4.7 kW