Project Information

Milestone NW LLS
Mercer Island - Lot 3
7623 SE 22nd St., Mercer Island, WA 98040

Contact Information

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Messages / Comments * **RESULT= PASS**

UA Reduction = 2.65, Proposed UA is better than baseline by 0%

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

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Whole House Mechanical Ventilation Airflow Rate: 120 CFM with Run Time Percent of 100%, Unbalanced, Not Distributed

Maximum allowable total measured duct leakage: 153 CFM25

* 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?	**New Construction**
Occupancy Type?	**R3 Single family dwellings and townhouses**
Code Version?	**WSEC 2021**
Classification:	Medium Dwelling Unit -- 3823 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 U *	Baseline Design Area	Baseline Design UA	Proposed Design U	Proposed Design Area	Proposed Design UA
Doors U =	0.300	49	14.8	0.300	49	14.8
Overhead Glazing U =	0.500	0	0.0		0	0.0
Vertical Glazing U =	0.300	573	172.0	0.250	760	190.1
Flat/Vaulted Ceilings U =	0.024	1,685	40.4	0.025	1,685	42.1
Wall (above grade) U =	0.056	3,175	177.8	0.054	2,988	161.4
Floors over Crawlspace U =	0.029	617	17.9	0.025	617	15.4
Slab on Grade F =	0.540	0	0.0		0	0.0
Below Grade Wall U =	0.040	1,389	55.6	0.064	1,389	88.9
Below Grade Slab F =	0.560	156	87.4	0.324	156	50.5

* Values from Table R402.1.2 (Oct 2023)

Baseline UA Total	565.9	**Proposed UA Total**	563.2
Required Credits	8.0	**Proposed Credits**	8.0 from Tables 406.2 and 406.3
		UA Percent Reduction	0%
		UA Reduction	2.6

** 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)
4	For heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) or Table C403.3.2(9) OR Air to Water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	**Variable Refrigerant Heat Pump or Air-to-Water Heat Pump**	3.0	5.0	8.0

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	**Option 2.2**	1.5	Per Section R402.4.1.2 /1.5 ACH50 / For R-2, 0.20 cfm per ft2 at 50 Pa. / HRV with min SHR eff of 0.75 per IRC Section M1505.3 or IMC Section 403.8
3.1 -3.10	High Efficiency HVAC	**Option 3.4**	1.5	Closed-loop ground source or open loop water source Heat Pump. Min COP 3.3 for GSHP or 3.6 for WSHP.w/ Max 150 Ft. Hydraulic Head.
3.11	High Efficiency HVAC: Smart Thermostat	**Not Selected**	NA	
4	High Efficiency HVAC Distribution System	**Not Selected**	0.0	-

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			Option 5.6	2.0	Electric heat pump water heater meeting NEEA Tier 3.
6	Renewable Electric Energy	3,000	kWh	Not Selected	0.0	
7	Appliance Package			Not Selected	0.0	-
				Energy Credits	**5.0**	

***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

THERMAL ENVELOPE DETAILS - Proposed Design

Conditioned Floor Area, Proposed Design	3,823 sq. ft
Classification	Medium Dwelling Unit
Notes	

Exterior Doors

Plan ID	Component Description	Ref.	Door U	Qt.	Width Feet	Width Inch	Height Feet	Height Inch	Area	UA
Mud	Code Baseline, U=0.30	-	0.30	1	2	8	8	0	21	6.4
Entry	Code Baseline, U=0.30	-	0.30	1	3	6	8	0	28	8.4
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
									0	0.0
							Sum of Area and UA		**49**	**14.8**
							Exterior Doors Area Weighted U			**0.300**

Overhead Glazing

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

Vertical Glazing Schedule

Rows to Show: 25

	Plan ID	Component Description	Ref.	Glazing U	Qt.	Width Feet	Width Inch	Height Feet	Height Inch	Area	UA
1	Media Rm	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	5	0	3	0	30.0	7.50
2	Stairway	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	4	0	3	0	12.0	3.00
3	Entry	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	1	6	5	8	8.5	2.13
4	Great Rm	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	4	0	2	0	16.0	4.00
5	Great Rm	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	6	0	5	0	60.0	15.00
6	Great Rm	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	8	0	8	0	64.0	16.00
7	Dining	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	8	0	8	0	64.0	16.00
8	Kitchen	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	5	6	4	6	24.8	6.19
9	Kitchen	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	3	0	1	6	9.0	2.25
10	Office	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	6	0	5	0	30.0	7.50
11	Mud	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	4	0	5	0	20.0	5.00
12	Hallway	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	4	0	5	0	40.0	10.00
13	Pwdr	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	1	9	4	6	7.9	1.97
14	Stairway	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	4	0	6	6	26.0	6.50
15	Stairway	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	4	0	4	6	18.0	4.50
16	P.Bath	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	3	6	5	0	17.5	4.38
17	P.Bath	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	6	0	5	0	30.0	7.50
18	P.Suite	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	2	4	0	5	6	44.0	11.00
19	P.Suite	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	8	0	5	6	44.0	11.00
20	Bath#2	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	2	0	3	6	7.0	1.75
21	Bdrm#2	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	6	0	5	6	33.0	8.25
22	Bath#3	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	2	0	3	6	7.0	1.75
23	Bdrm#3	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	2	6	5	6	13.8	3.44
24	Bdrm#3	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	1	8	0	5	6	44.0	11.00
25	Hall	U=0.25 (2021 1.2; 2018 1.4)	Table 406.2	0.25	5	4	0	4	6	90.0	22.50
								Sum of Area and UA		**760.4**	**190.1**
								Vertical Glazing Area Weighted U			**0.250**
								Vertical Glazing and Doors Area Weighted U			**0.253**

Flat/Vaulted Ceilings

Plan ID	Component Description	Ref.	Attic U	Area	UA
	R60 blown Attic STD baffled	10-7	0.025	1,685	42.1

				Sum of Area and UA	1,685	42.1
				Area Weighted U-Value		0.025

Walls (Above Grade)

Plan ID	Component Description	Ref.	Wall U		Net Area	UA
	R21 cavity+R0 foam INT 2X6W Lap (Code Baseline)	10-5	0.054		2,988	161
				Sum of Net Area and UA	2,988	161
				Gross Wall Area	3,798	ft^2
				Area Weighted U-Value		0.054

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		617	15
				Sum of Area and UA	617	15
				Area Weighted U-Value		0.025

Slab on Grade (less than 2 feet below grade)

Plan ID	Component Description	Ref.	Slab F		Slab Perim	FP
				Sum of Perimeter and FP	0	0
				Area Weighted U-Value		

Below Grade Walls and Slabs

Plan ID	Component Description	Slab Depth	Ref.	Wall U	Wall Area	Wall UA	Slab F	Slab Perim	Slab UA
	R10 Foam Ext w/TB, R10 Full Underslab	3.5' depth	Baylon & Ker	0.064	1,389	88.9	0.324	156	51
			Sum of Area, Length and UA		1,389	89		156	51
			Weighted U- and F-values			0.064			0.324

Links to Download Forms, Checklists and Other Resources — Link

Compliance Certificate	Compliance Certificate	Instructions
Insulation Certificate for Residential New Construction	Insulation Certificate	
Duct Testing Affadavits		
Existing Construction	Affidavit, Existing	
New Construction	Affidavit, New	
Prescriptive Checklist for 2018 WSEC	Prescriptive Checklist	
Alterations (Remodel) Worksheet	Worksheet	
EER SEER2 COP HSPF2 Converter	https://www.adicotengineering.com/eer-seer2-cop-hspf2-kwton-converter	

Show Ventilation Calculator? Show

Ventilation Requirements

Conditioned Floor Area	3,823	sq. ft.
Number of Bedrooms	4	
Run-Time Percent in Each 4-Hour Segment	100%	
Is the system Balanced?	Unbalanced	
Is the system Distributed?	Not Distributed	
Ventilation Code Section	IRC, Chapter 15	
Whole House Mechanical Ventilation Airflow Rate	120	CFM

Show Distribution System Calculator? Show

HVAC Thermal Distribution System — Download RS-33 (2018) http://www.energy.wsu.edu/Documents/Duct%20Testing%20Standards%20_2018%20V

Is this a hydronic heating system?	No
Location of Ducts	Unconditioned Space
Location of Air Handler	Unconditioned Space
Is Duct Testing Required?	Yes

Maximum Duct Leakage:

Is this a post-contruction test?	Yes	
Maximum total measured duct leakage per square foot	0.04	CFM25 per sq. ft.
Maximum allowable total measured duct leakage	153	CFM25

Show Heating System Sizing? Show

Heating System Sizing - Proposed Design — Try Out BetterBuiltNW's HVAC Sizing Tool: https://betterbuiltnw.com/resources/hvac-sizing-tool

Nearest Weather Station	Mercer Island	
Indoor Design Temperature	70	F
Outdoor Design Temperature	25	F
Design Temperature Difference (ΔT)	45	F

Conditioned Floor Area, Proposed Design	3,823	ft2	
Conditioned Volume Leave blank to use default of 8.5 ft. ceiling height	**35,554**	ft3	**Average ceiling height =9.3 ft. Volume = 35554 ft3**
Average ceiling height	9.3	ft	
HVAC System Type	**Heat Pump**		
Location of HVAC Distribution System	Unconditioned Space		
Sum of UA	563		
Envelope Heat Load Sum of UA X ΔT	25,346	Btu / Hour	
Air Leakage Heat Load ((Volume X 0.6) X ΔT) X .018))	17,279	Btu / Hour	
Building Design Heat Load Air Leakage + Envelope Heat Loss	42,625	Btu / Hour	
Building and Duct Heat Load For ducts located in unconditioned space: Sum of Building Heat Loss X 1.1 For ducts located in conditioned space or ductless: Sum of Building Heat Loss X 1	46,887	Btu / Hour	
Maximum Heat Equipment Output Building and Duct Heat Loss X 1.25 for heat pumps Building and Duct Heat Loss X 1.40 for all other systems	**58,609** **17.2**	Btu / Hour kW	